NAFMIP
2021 - 2030

National Agriculture and Fisheries Modernization and Industrialization Plan 2021-2030

Transforming the Philippine Food System Together

DEPARTMENT OF AGRICULTURE
1898

OneDA

The **NAFMIP logo** (technically, lettermark), designed by Manuel Jose D. Camagay, is colored in shades of green ("NAFMIP") and brown ("2021-2030"). Shades of green represent the varying seasons of plant life from seedling to maturity (e.g., rice). Although rice harvest is colored golden brown, it may be viewed as end-of-life; hence the latter hue is intentionally omitted. The idea, rather, is to portray constant growth. Brown simply represents the soil, earth, or planet.

The arch shape of the NAFMIP acronym represents the 10-year grand plan viewed as the horizon upon us all that can be seen by everyone involved in transforming the agri-fishery and related sectors. On the other hand, the straight linear period 2021-2030 simply portrays the implementation horizon.

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Acronyms

4IR	Fourth Industrial Revolution
4WD	Four-wheel drive
AANR	Agriculture, aquatic, and natural resources
A&F/ AF	Agriculture and Fisheries
ABC	Agri-Industrial Business Corridor
ABCs	Agri-fishery industrial business corridors
ACPC	Agricultural Credit Policy Council
ADB	Asian Development Bank
ADC	Agriculture Development Council
AEW	Agricultural Extension Worker
AF	Agri-Fishery/ies or Agriculture and Fisheries
AFC	Agriculture and Fishery Council
AFF	Agriculture, forestry, and fisheries
AFIBC	Agri-fisheries industrial business corridor
AFID	Agriculture and Fisheries Information Division
AFMA	Agriculture and Fisheries Modernization Act
AFMIP	Agriculture and Fisheries Modernization and Industrialization Plan
AFMIS	Agriculture and Fishery Management Information System
AFMP	Agriculture and Fisheries Modernization Plan
AFYC	Agricultural and Fishery Youthpreneur Council
AH	Agri-hub
AIGC	Agri-industrial growth corridor
AIOSS	Agribusiness Investment Opportunities Seminar Series
AIS	Agricultural innovation system
AISD	Agribusiness Industry Support Division
AKIS	Agricultural knowledge and information system
ALPAS	*Ahon Lahat, Pagkaing Sapat Kontra COVID-19*
AMAS	Agribusiness and Marketing Assistance Service, DA
AMD	Agribusiness Market Development
AMIA	Adaptation and Mitigation Initiatives in Agriculture
APC	Agricultural Productivity Commission
APCO	Agricultural Program Coordinating Office
APD	Agribusiness Promotion Division
APTCs	Agri-Pinoy Trading Centers
ARBs	Agrarian reform beneficiaries
ASEAN	Association of Southeast Asian Nations
ASF	African swine fever
ATI	Agricultural Training Institute
ATV	All-terrain vehicle
BAR	Bureau of Agricultural Research
BARMM	Bangsamoro Autonomous Region in Muslim Mindanao
BCDA-DA	Bases Conversion and Development Authority-Department of Agriculture
BCP	Border control protocols
BFAR	Bureau of Fisheries and Aquatic Resources
BLISTT	Baguio City-La Trinidad-Itogoan-Sablan-Tuba-Tula

BOC	Bureau of Customs
BOI	Board of Investment
BSMED	Bureau of Small and Medium Enterprise Development, DTI
CALABARZON	Cavite, Laguna, Batangas, Rizal, and Quezon
Capdev	Capacity development
CAR	Cordillera Administrative Region
CARP	Comprehensive Agrarian Reform Program
CC	Climate change
CCW	Centers, Corridors, and Wedges
CD	Capacity development
CDP	Comprehensive development plan
CIS	Climate information services
CLDI	Composite Land Degradation Index
CLUP	Comprehensive Land Use Plan
CNFIDP	Comprehensive National Fisheries Industry Development Plan
CO	Central Office
CommDev	Communication for development
COVID-19	Coronavirus disease 2019
CPAR	Community-based participatory action research
CRADLE	Collaborative Research and Development to Leverage the (Philippine) Economy
CRAO	Climate Resilient Agriculture Office
CREST	Compliance and Regulatory Enforcement for Security and Trade
CRVA	Climate risk vulnerability assessment
CSO	Civil society organizations
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DBM	Department of Budget Management
DBP	Development Bank of the Philippines
DEG	Digital era governance
DENR	Department of Environment and Natural Resources
DevCom	Development communication
DHSUD	Department of Human Settlements and Urban Development
DepED	Department of Education
DFW	Deputized fish warden
DICT	Department of Information and Communications Technology
DILG	Department of Interior and Local Government
DOF	Department of Finance
DOH	Department of Health
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DOTr	Department of Transportation
DPWH	Department of Public Works and Highways
DRR	Disaster risk reduction
DRRM	Disaster risk reduction and management
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
DTP	Devolution Transition Plan

EAS	Extension and advisory services
ECOZONE	Economic zone
EO	Executive Order
e-OM	Enhanced Operations Manual
EPZ	Export processing zone
ESS	Enforcement and Security Services
ESRI	Environmental Systems Research Institute
eVSA	Expanded vulnerability and suitability assessment
F2F	Face-to-face
FAME	Fishery-Agro-Forestry, Mineral and Eco-tourism
FAO	Food and Agriculture Organization
FAQs	Frequently-asked questions
FARMC	Fisheries and Aquatic Resources Management Council
FB	Facebook
FCAs	Farmer cooperatives and associations
FDA	Food and Drug Administration
FDC	Food Development Center
FMA	Fishery management area
FMR	Farm-to-market roads
FMRDP	Farm to Market Road Development Program
FMS	Financial and Management Service
FNRI	Food and Nutrition Research Institute
FOS	Field Operations Service (DA CO)
FPA	Fertilizer and Pesticide Authority
FPSU	Farmer production support unit
FRP	Fiber-glass-reinforce
FS	Feasibility study
FTI	Food Terminal, Inc.
GAA	General Appropriations Act
GAP	Good agricultural practices
GDP	Gross domestic product
GESI	Gender Equality and Social Inclusion
GFI	Government financial institutions
GFSI	Global Food Safety initiative
GHG	Greenhouse gas
GHI	Global Hunger Index
GIS	Geographic information systems
GMP	Good manufacturing practices
GSCS	Geographically specialized commodity system
GVA	Gross value added
Ha	Hectare
HACCP	Hazard analysis critical control point
HEI	Higher education institution
HFIAS	Household Food Insecurity Access Scale
HRD	Human resource development
HVC	High value crops
HVCDP	High Value Crops Development Program
IATF	Inter-agency Task Force
ICC	Indigenous cultural community

ICT	Information and communication technology
ICTS	Information and Communication Technology Service, DA
IE	Industrial estate
IEC	Information, education, and communication
IFI	International financial institution
IG	Intelligence Group
IMTA	Integrated multitrophic aquaculture
IP	Indigenous people / indigent people
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual property right
IRRI	International Rice Research Institute
IS	Strategic Intelligence
ISO	International Organization for Standardization
ISP	Innovation systems perspective
ISPF	Integrated spatial planning framework
IUU	Illegal, unreported, and unregulated (fishing activities)
KAANIB	*Kasaganaan sa Niyugan ay Kaunlaran ng Bayan*
KADIWA	*Katuwang sa Diwa at Gawa para sa Masanang Ani at Mataas na Kita*
KM	Knowledge management
KRA	Key result area
KS	Knowledge sharing
KSAP	Knowledge, skills, attitudes and practices
LBP	Land Bank of the Philippines
LEDIP	Local Economic Development and Investment Promotion
LFA	Logical framework approach
LGC	Local Government Code (of 1991, or Republic Act No. 7160)
LGU	Local government unit
LLDA	Laguna Lake Development Authority
LPTRP	Local Public Transport Route Plan
LRNDP	Local Road Network Development Plan
LTI	Land tenure improvement
M&E	Monitoring and evaluation
M/C	Municipal/city
MAFAR	Ministry of Agriculture, Fisheries, and Agrarian Reform, BARMM
MAYA	Mentoring and Attracting Youth in Agriculture
MDD	Market Development Division
MDDCs	Mill District Development Council
MDS	Market Development Services
MED	Monitoring and Evaluation Division, DA PMS
MIMAROPA	Occidental Mindoro, Oriental Mindoro, Marinduque, Romblon, and Palawan
MIS	Management information system
MLGUs	Municipal local government units
MOOE	Maintenance and other operating expenses
MOV	Means of verification
MPA	Marine protected area
MRF	Materials recovery facility
MSME	Micro, small, and medium enterprise
NAF	National agriculture and fishery

NAFC	National Agricultural and Fishery Council
NAFMP	National Agriculture and Fisheries Mechanization Program
NAFMIP	National Agriculture and Fisheries Modernization and Industrialization Plan
NAMRIA	National Mapping and Resource Information Authority
NAPC	National Anti-Poverty Commission
NAST	National Academy of Science and Technology
NBC	National Budget Circular
NCC	National Computer Center
NCCAP	National Climate Change Action Plan
NCI-SRD	National Convergence Initiative for Sustainable Rural Development
NCIP	National Commission on Indigenous Peoples
NCP	National Corn Program
NCR	National Capital Region
NDA	National Dairy Authority
NEDA	National Economic and Development Authority
NFA	National Food Authority
NFRDI	National Fisheries Research and Development Institute
NFSCC	National Framework Strategy on Climate Change
NGA	National government agency
NGOs	Non-government organizations
NIA	National Irrigation Administration
NICA	National Intelligence Coordinating Agency
NIN	National Information Network
NIS	National innovation system
NLP	National Livestock Program
NMIS	National Meat Inspection Service
NNC	National Nutrition Council
NOAP	National Organic Agriculture Program
NOL	No-objection letter
NorMinVeggies	Northern Mindanao Vegetable Producers' Association
NPAAD	Network of Protected Areas for Agriculture and Agri-industrial Development
NPCO	National Project Coordination Office
NPT	NAFMIP Preparation Team
NRP	National Rice Program
NSCB	National Statistical Coordination Board
NTF-ELCAC	National Task Force to End Local Communist Armed Conflict
NTA	National Tobacco Administration
NUPAP	National Urban and Peri-Urban Agriculture Program
O&M	Operation and maintenance
OASR	Office of the Assistant Secretary for Regulation
OASSC	Office of the Assistant Secretary for Strategic Communications
ODA	Official development assistance
OFW	Overseas Filipino worker
OICDI	Orient Integrated Development Consultants, Inc.
Op eds	Opposite the editorial page
OSec	Office of the Secretary, DA
OUAIF	Office of the Undersecretary for Agri-Industrialization and Fisheries
OURI	Office of the Undersecretary for Regulations and Infrastructure

OUs	Operating units
OVI	Objectively verifiable indicators
PAFC	Provincial Agricultural and Fishery Council
PAFES	Provincial Agriculture and Fisheries Extension Services
PCA	Philippine Coconut Authority
PCAF	Philippine Council for Agriculture and Fisheries
PCARRD	Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development
PCC	Philippine Carabao Center
PCCI	Philippine Chamber of Commerce and Industry
PCIC	Philippine Crop Insurance Company
PCIP	Provincial Commodities Investment Plan
PDP	Philippine Development Plan
PDPFP	Provincial Development and Physical Framework Plan
PDTF	People's Development Trust Fund
PDS	Project Development Service
PEZA	Philippine Economic Zone Authority
PFDA	Philippine Fisheries Development Authority
PHD	Planetary health diet
PhilFIDA	Philippine Fiber Industry Development Authority
PhilMech	Philippine Center for Postharvest Development and Mechanization
PhilRice	Philippine Rice Research Institute
PHP	Philippine peso
PIDS	Philippine Institute for Developmental Studies
PLANT 3	Plant, Plant, Plant Program
PLGUs	Provincial local government units
PLOFT	Provincial Loan Facilitation Teams
PMED	Planning, Monitoring and Evaluation Division (DA RFO)
PMS	Planning and Monitoring Service, DA
PNP-CIDG	Philippine National Police Criminal Investigation Detection Group
PO	Provincial Office
PPAs	Programs, projects and activities
PPAN 2023-2028	Philippine Plan of Action for Nutrition 2023-2028
PPD	Planning and Programming Division, DA
PPP	Public-private partnership
PRDP	Philippine Rural Development Project
PRS	Policy Research Service
PSA	Philippine Statistics Authority
PSM	Public sector management
Q1	Quarter 1
Q2	Quarter 2
Q3	Quarter 3
Q4	Quarter 4
QR	Quantitative restrictions
R&D	Research and development
RAFC	Regional Agriculture and Fishery Council
RAFMIP	Regional Agriculture and Fisheries Modernization and Industrialization Plan
RBME	Results-based monitoring and evaluation

RBOs	Rural-based organizations
RCA	Revealed comparative advantage
RCEP	Regional Comprehensive Economic Partnership
RDC	Regional Development Council
RETD	Research, extension, and training for development
RFO	Regional Field Office, DA
RFO - CAR	Cordillera Administrative Region
RFO - I	Ilocos Region
RFO - II	Cagayan Valley
RFO - III	Central Luzon
RFO - IVA	CALABARZON
RFO - IVB	MIMAROPA
RFO - IX	Bicol Region
RFO - V	Western Visayas
RFO - VI	Central Visayas
RFO - VII	Eastern Visayas
RFO - VIII	Zamboanga Peninsula
RFO - X	Northern Mindanao
RFO - XI	Davao Region
RFO - XII	SOCCSKSARGEN
RFO - XIII	CARAGA
RFU	Regional Field Unit
RMA	Rapid market appraisal
RORO	Roll-on roll-off
RPC	Revised Penal Code
RSBSA	Registry System for Basic Sectors in Agriculture
RTL	Rice Tariffication Law
RUMC	Rural urban market center
SAFDZ	Strategic Agriculture and Fisheries Development Zones
SAKM	Situational Awareness and Knowledge Management Cluster
SBCC	Social and behavior change communication
SDA	Strategic development area
SDI	Spatial development initiative
SEARCA	Southeast Asian Regional Center for Graduate Study and Research in Agriculture
SEZ	Special economic zone
SFF	Smallholder farmers and fisherfolk
SH	Stakeholder
SIDC	Sorosoro Ibaba Development Cooperative
SLM	Sustainable land plus water resources management
SME	Small and medium-scale enterprise
SO	Sub-output
SOCCSKSARGEN	South Cotabato, Cotabato, Sultan Kudarat, Sarangani, General Santos
SP	Sector purpose
SPICE Project	Smart Plant Production in Controlled Environments Project
SPS	Sanitary and phytosanitary
SRA	Sugar Regulatory Administration
SRF	Sector results framework
SUCs	State universities and colleges

SURE	Survival and Recovery
SWS	Single window system
TESDA	Technical Education and Skills Development Authority
TFD	Traditional Filipino diet
TV	Television
TWG	Technical Working Group
UHC	Universal health care
ULAP	Union of Local Authorities of the Philippines
UN	United Nations
UP	University of the Philippines
UPLB	University of the Philippines Los Baños
USAID	United States Agency for International Development
USD	United States dollar
VAT	Value-added tax
VC	Value chain
VCA	Value chain analysis
VUCA	Volatile, uncertain, complex, and ambiguous (world in contemporary times)
WB	World Bank
WISE	Web-based Information System for Entrepreneurs-Producers
WTO	World Trade Organization

Foreword

The National Agriculture and Fisheries Modernization and Industrialization Plan (NAFMIP) 2021- 2030 is a program for the future.

A result of years of painstaking efforts and preparation involving every member of the "OneDA Family," the Plan proposes strategies and policy reforms to encourage rural investments and ensure the sustained growth of the Philippine agriculture and fishery sector.

For perspective, not since the Agriculture and Fisheries Modernization Act of 1997 has there been a more detailed and strategic blueprint for agricultural progress, and the NAFMIP is the tangible expression of our belief that sustainable economic progress in the Philippine countryside is possible. This could be attained through cooperation and joint action among stakeholders to empower every farming and fishing community across the archipelago by providing them modern technologies, farm machinery and equipment, and much-needed infrastructure like farm-to-market roads, storage systems, and post-harvest facilities. Subsequently, farmers and fisherfolk could diversify their production and would have more livelihood and entrepreneurial opportunities. Also, the Plan targets to optimize the impact of rural investments and match the food supply and demand of the country.

With the strong political will and hopefully substantial budget given by the new administration, this Plan could propel the sustained development, modernization, and industrialization of the Philippine agriculture and fisheries sector, thus, greatly reducing hunger and poverty among our people.

Sama-sama nating tuparin itong Plano upang masiguro ang tunay at matibay na pagbabago at modernisasyon ng sektor ng sakahan at pangisdaan tungo sa pambansang kaunlaran at katiwasayan para sa susunod na mga henerasyon ng Filipino.

Mabuhay!

William D. Dar, PhD
Department of Agriculture Secretary

Message from the President of the Republic of the Philippines

My warmest greetings to the **Department of Agriculture** as you operationalize and implement the **National Agriculture and Fisheries Modernization Plan (NAFMIP) 2021-2030.**

I welcome this initiative that aims to transform the agriculture and fisheries sector into a modern and responsive component of our economy and society. As you carry out the NAFMIP, your laudable undertaking in partnership with the Asian Development Bank and Food and Agriculture Organization of the United Nations will surely empower our farmers and fisherfolk to enhance our food system and achieve a transformative sector-wide growth over the next decade.

I hope that these detailed and operations-oriented agri-fishery development plans foster cooperation among all private and public stakeholders toward increasing income and productivity in our agriculture and fisheries sectors. May this vital strategy and intervention accelerate the growth and development of the Philippine Agriculture and Fisheries Sector, creating a more food-secure and resilient country, especially now that we are recovering from all the impairment that the COVID-19 pandemic has caused.

Let us continue to work together in harnessing the abundance of our lands and waters as we uplift our nation toward more remarkable progress for the benefit of the Filipino people.

I wish you the best in your endeavors.

Rodrigo Roa Duterte

Message from the Undersecretary for Policy and Planning
and Department Legislative Liaison Office
Department of Agriculture, Philippines

Levelling up the agri-fishery sector through modernization and industrialization is among the topmost agenda of the government. The sector, which accounts for 9.6% of the country's gross domestic product (GDP) as of 2021 and 24.8% of the labor force as of 2020, is key not only to ensuring food security but also to providing the most effective weapon against poverty aside from hunger.

However, the agri-fishery sector faces formidable challenges of low productivity and competitiveness despite efforts to enable it to reach its full potential. More recently, the threats of a global food crisis emerged—as we reel from the impact of natural calamities, a protracted health crisis, and a disrupted global supply chain due to the Russia-Ukraine conflict. All these have placed heavy pressure on our food production and distribution systems, directly affecting our food and nutrition security.

The magnitude of responses must therefore match the scale of these challenges. They should be comprehensive, science-based, inclusive, and innovative to allow us to build efficient and resilient food production and distribution systems to meet the food needs of our growing population, now and in the future. Such is a daunting task for our new leaders in government in general, and the Department of Agriculture in particular.

A legacy of the Duterte Administration, this **National Agriculture and Fisheries Modernization and Industrialization Plan (NAFMIP) 2021-2030** provides our next leaders, as well as stakeholders and partners, with appropriate and relevant strategies to effectively deal with these challenges. It is, by design, a policy- and strategy-oriented 10-year plan that guides sector-wide growth; inspires stakeholders to take cohesive action based on shared vision; and galvanizes sector-wide public and private investments.

Let me therefore express my appreciation to everyone who took part in this purposeful initiative, spearheaded by the Office of the Assistant Secretary-designate for Planning and Project Development Agnes Catherine T. Miranda. We honor the hard work and sacrifices of DA planners, LGU partners, and various stakeholders to make this updating possible.

Guided by the goals and aspirations of NAFMIP, we must continue to work and support each other—the government, private sector, farmer/fisher cooperatives and associations, and development partners—to realize our vision of *"A food-and-nutrition-secure, resilient Philippines with empowered and prosperous farmers and fisherfolk"* in keeping with the OneDA Reform Agenda.

Mabuhay ang Pilipinas! Mabuhay ang Sektor ng Agrikultura at Pangisdaan!

Fermin D. Adriano, PhD

Message from the Assistant Secretary-Designate for Planning and Project Development

and Director for Planning and Monitoring Service

Department of Agriculture, Philippines

Updating the **National Agriculture and Fisheries Modernization and Industrialization Plan (NAFMIP)** has been a herculean task—and a noteworthy feat—for us at the Department of Agriculture, particularly the Planning and Monitoring Service and our partners in the NAFMIP Preparation Team and concerned DA Operating Units. It involved several months of comprehensive, inclusive, and numerous consultations with concerned stakeholders at provincial, regional, and national levels, guided by the principles of the **whole-of-nation approach** and the OneDA Reform Agenda.

NAFMIP is, in fact, the first successful attempt to draw up a detailed strategic plan for the agri-fishery sector since the legislation of the Agriculture and Fisheries Modernization Act in 1997, as it supports commodity system industry development and agricultural infrastructure modernization toward food sovereignty.

The completion therefore comes at an opportune time as we eagerly await the transition to the new administration of our national and local leaders amid the threats of a global food crisis, among other challenges, both old and new, facing the Philippine agri-fishery sector.

NAFMIP, as a strategic, directional, and trans-administration 10-year plan for the food and agriculture sector from 2021-2030, provides our leaders, policy makers, program implementers, and development partners with better strategies to cushion the impact of the global food crisis on our food and nutrition security, and enhance income and livelihood opportunities in our rural communities.

It is therefore our hope that the incoming Administration will seriously consider NAFMIP as its guidebook to hasten transforming Philippine agriculture into more efficient, more inclusive, more resilient, and more sustainable agri-food systems.

We wish to express our warmest gratitude and appreciation to everyone—our planners, development partners, stakeholders and all others—who have been part of NAFMIP's updating process.

Let us all continue to work together, steering and rowing as one toward food and nutrition security for healthy Filipinos, more empowered and prosperous farmers and fisherfolk, and a more sustainable planet.

Mabuhay!

Agnes Catherine T. Miranda

A Nation to Transform

The Agri-Fishery Plan in Summary

"If we keep doing what we're doing,
we're going to keep getting what we're getting."
(Stephen R. Covey, The 7 Habits of Highly Effective People)

Why "Transform"?

Transformation, understood to mean a sustained process of effecting any major change, is the clarion call in the Philippines' agriculture and fisheries sector which, in turn, is understood to encompass entire value chains including but not limited to production. The sector has yet to transform in any significant manner or extent. Agri-industrialization, a cherished state-of-affairs enshrined in the Agriculture Fisheries Modernization Act (AFMA), remains distant. Agri-fisheries has lagged behind industry and services over the years. Two decades after AFMA was enacted in 1997, the structure of Philippine agriculture has not changed and its share to GDP has consistently declined, from 14.0% in 2000 to 8.3% in 2019. Agri-fisheries production has not diversified. About half of agri-fisheries is in the production of crops. Rice, corn, and coconut remain as the major crops and use up to 74% of arable land. About 40% of crops concentrate in producing *palay*, and its share is increasing over time. In terms of support to agriculture, almost 50% of the support goes to *palay* production; 30% to pork and poultry; and 13% to sugar production. On the other hand, more support for coconut, banana, and other vegetable and fruit crops is needed (see Chapter 2).

Growth trajectory is spatially and temporally uneven, with many smallholder farmers and fisherfolk—especially in particular regions—still mired in poor socioeconomic conditions because they receive a small share of sector-wide incomes. Meanwhile, government budgets have been single commodity-oriented and production-centric, and fund distribution across AFMA components has not changed much during the past 20 years, even as private investments in agri-industrialization remain sparse. The archipelago has seven times more water than land, with rich fishing grounds. And yet, we are not giving enough attention to fishery development. In terms of food demand, wide consumer preference for unhealthy, low-nutrient food products is linked to hypertension, diabetes and other chronic diseases; malnutrition; stunting; and other health concerns that require substantial public health resources to alleviate.

Purpose of the Plan

NAFMIP 2021-2030, as a whole-of-nation plan, serves as a **Directional Plan** to steer sector-wide growth over the next decade. It will guide the trajectory of more detailed and operations-oriented agri-fishery development plans such as the commodity system roadmaps, Provincial Commodity Investment Plans (PCIPs), and Comprehensive Land Use Plans (CLUP). Thus, NAFMIP is more policy- and strategy-oriented, but not as detailed as previous AFMP iterations.

Further, NAFMIP shall aim to inspire the full range of private and public stakeholders to take coordinated, cohesive, and determined actions toward achieving a common vision and

objectives, and to galvanize sector-wide public and private investments and resources to support the shared vision, objectives, and concerted action.

NAFMIP will seek to more than double smallholder farmers' and fishers' incomes to be able to meet their family household needs during the period of Plan implementation, through the promotion of transformative interventions to significantly diversify sources of income and employment—and ultimately sustainably lift farmers and fisherfolk out of poverty. This objective will be achieved with minimal impact on the environment and without sacrificing the nutrition and health of consumers. One key strategy is to diversify farming, non-farming, and value adding activities and link farmers and fisherfolk to large private investments such as modern food terminals and market hubs serving as potent engines of inclusive growth.

Planning Framework and Innovations

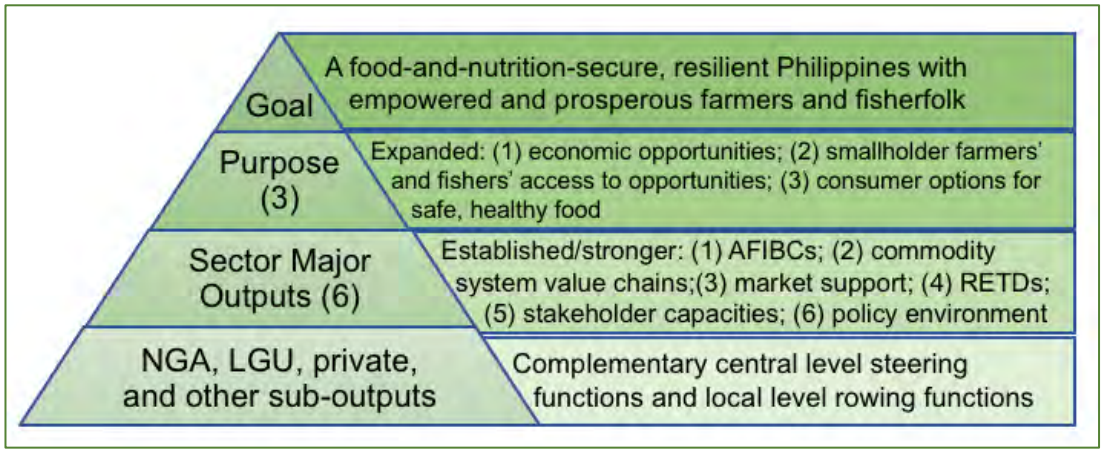
NAFMIP 2021-2030 builds upon the *DA vision* for the agri-fisheries sector embodied in the Philippines Food Security Development Framework that strives for *a food-secure and resilient Philippines with empowered and prosperous farmers and fisherfolk*. Further inspired by the **Integrative Food and Nutrition Security Paradigm** framed using global best practices (see Chapter 3), NAFMIP supports the envisioned transformation toward **a food-and-nutrition-secure, resilient Philippines with empowered and prosperous farmers and fisherfolk** by 2030. Its Paradigm, which calls for a change in the ways we think and act, builds upon the United Nations Food Systems, and the Philippines Food Security Development Framework. It calls for transformative shifts in the ways we think and act; such as in terms of: (1) how to diversify incomes and employment of smallholder farmers and fisherfolk; (2) articulating the often underrated and implicitly-defined role of urban and agropolitan (peri-urban) areas in agri-fishery growth; (3) ways to optimize synergistic impacts using a spatial framework to geographically focus investments; and (4) matching the supply and demand for nutritious food based on safe and balanced **traditional Filipino diet** (TFD)[1] guided by nutrition and environmental science. The integrated paradigm requires collaboration among national government agencies, local government units, and private and non-government stakeholders—thus calling for multisector participation all throughout the agri-fishery sector transformation process.

Hierarchy of Agri-Fisheries Sector Objectives

The NAFMIP **Results Pyramid** encapsulates the integrative design of the Plan, and particularly the vertical cause-and-effect (if… then) logic reflected, cutting across the levels of Plan objectives. Achieving the three Purpose-level objectives will contribute toward achieving the Goal of food and nutrition security. In turn, the Purpose level objectives will be attained through the interplay among six sector-wide Outputs. Finally, the sector Outputs will be achieved by various stakeholders (i.e., DA operating units, other national agencies, LGUs, private sector, NGOs, development partners) **working together** to implement mutually supportive programs, projects, and activities—referred to in the diagram as "Sub-outputs." All interventions, regardless of nature, scale, duration and fund source, will converge toward achieving sector objectives expressed as sector-wide outputs. This convergence serves as the practical strategic planning role of the NAFMIP.

[1] "TFD" refers to the consumption pattern prior to 1970, before the Green Revolution, which resulted in large-scale monocropping and the introduction of fast food. Both the Green Revolution and the fast-food lifestyle reduced the diversity of the Filipino diet.

The NAFMIP Results Pyramid (Summary)



The summary information shown on the Results Pyramid is detailed in the **NAFMIP Results Chain**, organized and presented following the same vertical cause-and-effect relationships in the Results Pyramid.

Reiterated here is the importance of officializing the use of transformative Indicators to manage Plan implementation performance. If we continue to measure implementation success using purely conventional indicators (e.g., higher production and productivity, farm inputs distribution), we cannot hope to attain the aspired-for agri-industrialization and modernization (i.e., prosperous smallholder farmers and fisherfolk with diversified on-farm, off-farm and even non-farm income sources; shorter food miles; large-scale private investments in profitable value chain segments; technology-enabled efficiencies such as higher farm mechanization ratio; surge in manufactured vs. raw material exports).

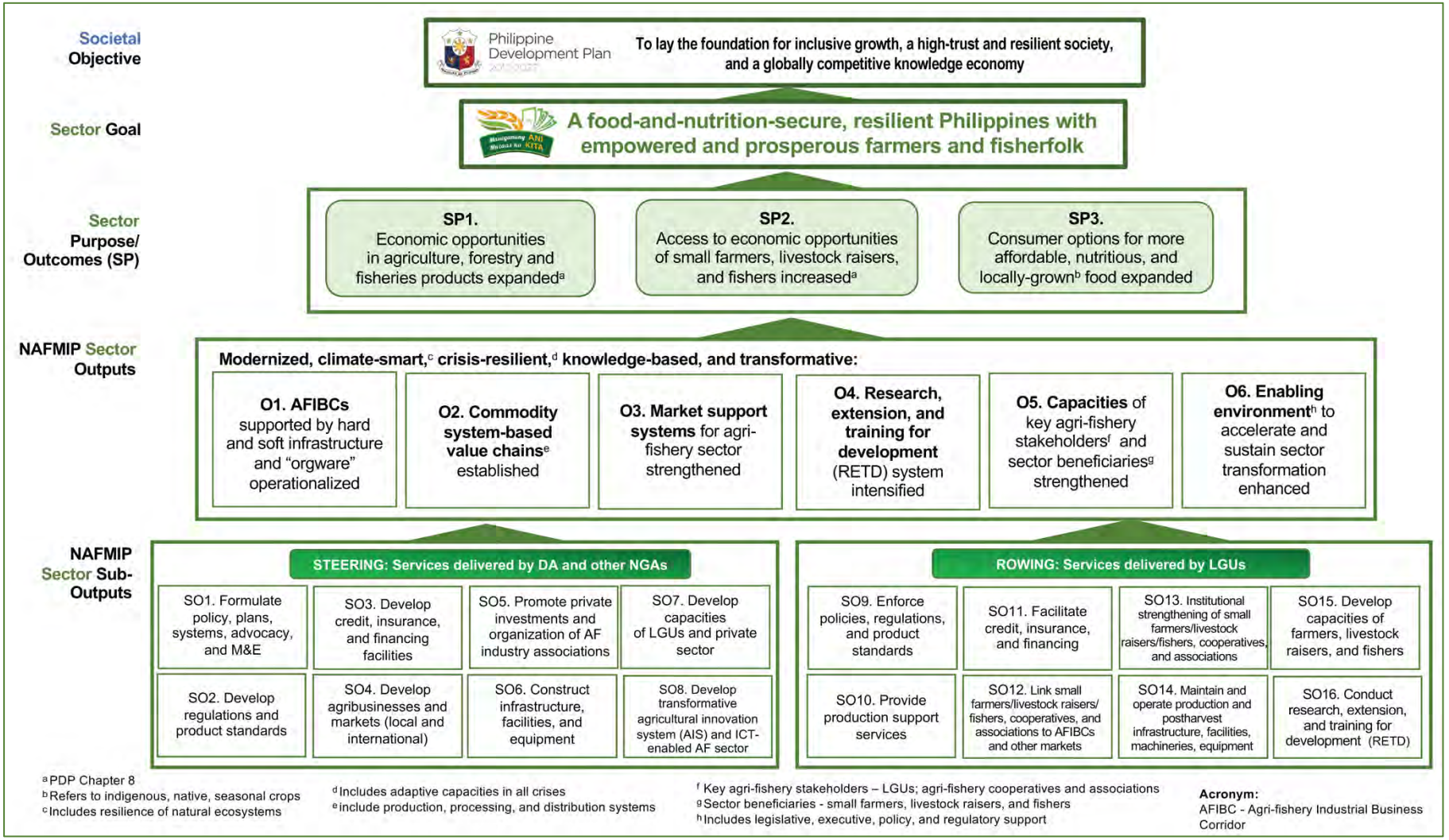
To the extent practicable, NAFMIP results-based monitoring and evaluation (RBME) will disaggregate data by stakeholder by age group, by sex, by ethnicity, by locality, by vulnerability and other such disaggregation. Indicators will reflect ICT applications in market development and all other segments of commodity value chains; environmental and social safeguards concerns including household resilience to climate and disaster risks; waste management leading to circular food systems and overall economy; and both the supply and demand/ consumption sides of food systems.

Food Sovereignty, a global movement adapted to the Philippines context, is embodied in the NAFMIP paradigm and traditional Filipino diet seeking to balance the production-supply and consumer demand for rice, corn, vegetables, fish, and livestock products. Food sovereignty places local producers, distributors, and consumers in control of food systems. In terms of consumer preferences, Filipinos have the right to be informed about, and decide to revert to, their culturally defined nutritious, balanced, and safe diet, linked to healthy eating habits and sustainable and nature-positive food production systems. This would require collective action toward empowering stakeholders by giving them choices and opportunities for improving their health, increasing their incomes, and ensuring a healthier planet.

Key Innovations

NAFMIP introduces a number of key innovations in planning and plan implementation. One innovation is the ICT-supported **transformative planning** that replaces incremental planning that only tries to improve on what is already being done. In comparison, transformative planning seeks both operational/ functional and **structural** changes and reforms.

The Full NAFMIP Results Chain



"What is not measured will not be done": this adage highlights that transformative planning results ought to be measured by **transformative performance indicators**, reflecting paradigm shifts that require generating data in formats and levels of detail that are not yet part of official statistics. Thus, the shift toward transformative planning—and plan implementation—will require investment in data and new knowledge generation, while maximizing use of existing official statistics. The **web application** used to prepare NAFMIP is envisioned to be updated for future use in plan updating and investment programming.

Another innovation is the **commodity systems approach** that substantially enlarges the scope of potential diversification; it replaces single commodity and production-centric programming and project planning, budgeting, and implementation. **Integrated spatial planning** seeks to optimize the combined, synergistic impacts of investments through the use of location planning criteria. NAFMIP is a **trans-administration plan** because agri-industrialization requires continuity, i.e., a long-term Plan transcending political administrations because NAFMIP, as a product of a whole-of-nation planning effort, reflects multi-stakeholders' fundamental lifelong aspirations.

NAFMIP highlights **urban agriculture** considering that Metropolitan Manila, Metro Cebu, Metro Davao, and Metro Cagayan de Oro jointly account for around 20% of total food demand. NAFMIP promotes advanced technology-enabled, large-scale agri-fishery production and processing in controlled environments. Upscaled backyard gardens will be widely replicated.

Multisector consultations, supported by a **strategic stakeholder engagement under the NAFMIP communication plan**, will be conducted periodically over the life of the Plan, rather than being done only during plan preparation. The **agriculture innovation system** (AIS) will enhance research, development, and extension by incentivizing the capacity of the agri-fishery sector to innovate and create novelty throughout value chains. NAFMIP will adapt e-marketing and other **disruptive technologies** to benefit smallholder farmers and fisherfolk.

Component Plans

As in previous AFMP iterations, NAFMIP will comprise three closely interrelated **component plans** detailed in Chapters 4, 5, and 6 of this Plan narrative.

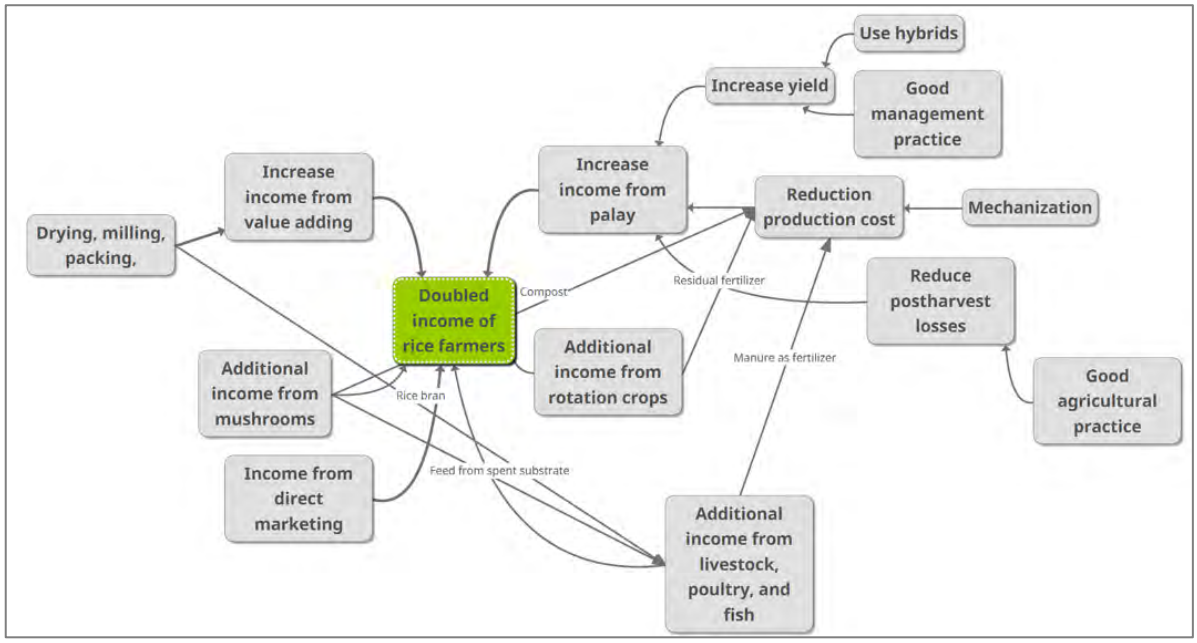
Commodity System Plan

The first component, Commodity System Plan, presents concepts, strategies and illustrative programs, projects and activities reflecting the transition away from single commodity planning, budgeting, and implementation for the purpose of liberating smallholder farmers and fisherfolk from poverty. The updating of single commodity plans to become commodity *system* plans will trigger the envisioned transition. Rooted in the farming systems approach, commodity systems planning will tap viable mixes of crops, livestock, poultry, and fishery commodities—whether food or non-food, *plus expand* agri-fishery activities to cover processing and other post-production segments of value chains—in order to diversify small farmer and fisher income and employment opportunities, and at the same time reduce the level of risk from single crop/ commodity failure due to climate events and other disasters. Program management-wise, commodity systems planning will also enable more efficient use of DA, other NGA, and LGU budgets.

NAFMIP is consolidating agricultural commodities into five commodity systems: (1) rice-based; (2) corn, livestock, and poultry-based; (3) coconut-based; (4) fisheries-based (marine and aquaculture); and (5) geographically specialized commodity systems (GSCS), e.g., premium highland vegetables commodity system in the Cordillera Administrative Region

(CAR). All other commodities—including provincial priorities identified under PRDP—can be subsumed under one or more of the five commodity systems. The planning approach provides diverse opportunities to inter-link commodities in various ways: (a) intercropping; (b) rotation cropping; (c) multi-cropping; (d) integrated multi-trophic aquaculture (IMTA); (e) polyculture; or (f) recycling of production or processing waste as input to production or processing of another commodity. It is inclusive in that all commodities (high-value crops, organic, halal, and other crops/non-crops) can be subsumed under one or more of the five commodity systems. Beyond targeting commodity-by-commodity production and productivity increases, the Commodity System Plan identifies Commodity System Models, as well as **solution pathways out of poverty** per commodity system, such as in rice. This approach is cost effective in the delivery of extension and other support services.

Solution Pathways out of Poverty via Rice-Based Commodity System



NAFMIP as Directional Plan will guide DA, national agencies, LGUs, and other stakeholders to collaboratively craft—under a whole-of-nation approach—more detailed and operational Commodity System-Based Roadmaps (e.g., coconut-based system roadmap), in lieu of the usual single commodity roadmaps. The Commodity System-Based Roadmaps will cover in detail the national, regional, and local level programs, projects, and activities to implement the commodity systems approach, based on the framework and models provided in Chapter 4.

Illustrative Investments and Interventions to be Contained in Commodity System Plans

Transformative Strategies in Commodity Systems Planning	Illustrative Investments and Interventions
1. Diversify in: a. Commodity systems-based production	• Rice-based commodity system: o Combining rice-fish-goat production o Production of rice cake or dried fish • Large-scale niche marketing of special highland rice, coffee and ornamentals

Transformative Strategies in Commodity Systems Planning	Illustrative Investments and Interventions
b. Value-adding and enterprise development	• Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fishers during the annual fishing off-season • Fisher enterprises operating market outlets in urban centers
2. Combine food security and nutrition security	• Increase production of vegetables, fruits, legumes and other nutritious commodities • Match/synchronize food supply with demand for healthy, nutritious food to avoid surplus production and corresponding low prices of healthy food products • Monitor health and nutrition metrics alongside food supply indicators
3. Promote traditional Filipino diet: nutritious, balanced and safe)	• Joint DA-DOH-NCC programs on: ○ Communication campaign on diet-related illnesses ○ Development of Filipino diet apps to track food intake
4. Strengthen measures to address sustainable environmental concerns in commodity system plans	• Promote nature-positive agri-fishery production • Shift away from environmentally undesirable practices such as monocropping • Shift away from fossil fuels, plastic bags
5. Inclusive/equitable sector growth and transformation	• Raise the smallholder farmers' and fishers' share of industry incomes/share in the Filipino consumers' peso • Set up farmer- and fisher- owned and operated enterprises
6. Consolidate for efficiency: a. Production b. Postharvest activities	• DA and other NGA training of LGUs • Organize small farmers and fishers by LGUs
7. Modernize farm and fishery technology	• Establish local enterprises for regular maintenance and repair of machinery, equipment and tools • Nationwide credit program for large farm machinery
8. Circular economy promotion	• Waste management training • Provide recycling facilities
9. Shorter food miles	• Optimize using local production and postharvest resources • Construct or expand feed mills next to livestock and poultry producers • Reduce transport cost, losses during transport by locating large processing centers accessible to consolidated production areas

Transformative Strategies in Commodity Systems Planning	Illustrative Investments and Interventions
10. Integration of non-food commodities and non-farm income and employment sources	• Programs to further expand livelihood opportunities: ○ Commodity systems to include rubber, abaca ○ Local handicraft, small-scale manufacturing, construction, home repair, transportation, etc.

Enhancing the Value Chain Approach

DA has been leading sector-wide application of the value chain approach to agri-fishery development. Over the Plan implementation period, value chains will continue to be enhanced by: (1) re-orienting these toward commodity systems; (2) more strongly addressing climate, plant and animal diseases, and other risks; (3) expanding the investments to include large-scale projects; and (4) modernizing transport and logistics. The last is one additional NAFMIP innovation, covering the entirety of the logistics landscape. Juxtaposed with value chain segments, the logistics landscape includes: (a) food processing logistics; (b) consumer-retail logistics; and (c) Import and export logistics (linked to the next section below) to be served by facilities and services discussed in Chapter 6.

International Trade in Commodities

NAFMIP will promote exports, particularly of high-value manufactured agri-fishery based products. Programs, projects and activities to be funded during the plan period will support, among others, investments in large-scale export-oriented enterprises to be located in agri-fisheries industrial business corridors (AFIBCs) and linked operationally to smallholder farmers and fisherfolk. The Plan will call for review and alignment of international trade policies and regulations vis-à-vis NAFMIP innovations; and development of ICT applications to reduce the transaction cost of exporting high-value products. International trade is covered in Chapter 2 of the NAFMIP narrative.

Priority Agri-Fishery Commodities based on Revealed Comparative Advantage (RCA)

Commodities and Harmonized System (HS) Code	Relative to …		
	Rest of the World	RCEP*	ASEAN
Edible fruits and nuts, peel of citrus fruit or melons (08)	√	√	√
Lac, gums, resins, and other vegetable saps and extracts (13)	√	√	√
Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes (15)	√	√	
Preparations of meat, of fish or crustaceans, mollusks or other aquatic invertebrates (16)	√	√	√
Tobacco and manufactured tobacco substitutes (24)	√		√

Commodities and Harmonized System (HS) Code	Relative to …		
	Rest of the World	RCEP*	ASEAN
Preparations of vegetables, fruits, nuts or other parts of plants (20)	√	√	√
Fish and crustaceans, mollusks and other aquatic invertebrates (03)	√		
Preparations of cereals, flour, starch or milk; pastrycooks' products (19)		√	

* Regional Comprehensive Economic Partnership covering the ASEAN countries and Australia, China, Japan, New Zealand, and South Korea

Regional Plans

The second NAFMIP component, Regional Plans (Chapter 5), presents the spatial role of each region in the envisioned transformation process leading to agri-industrialization and modernization within the Plan period of 10 years. The Regional Plans also provide for each region: the physical and sector planning profile; and contribution toward achieving sector-wide outputs. The plans show how Regional Plan preparation and implementation will be guided by the Integrated Spatial Planning Framework (ISPF) which is GIS-supported. The regional plans articulate the spatial roles of provinces (e.g., production areas, processing, and market centers), based on natural and human resource endowments. The regions will serve as a strategic link between national planning and LGU planning. Based on guidance provided in NAFMIP as Directional Plan, Regional Plan details will be provided in DA Regional Field Office (RFO) plans.

The above-discussed Commodity Systems Plan is disaggregated at the regional level, to show diversification-oriented commodity systems per region. Diversification can take four directions: (1) diversify primary production in which the household or enterprise combines crops, livestock, poultry, and/or fishery commodities (see “linked commodities” in the matrix below); and (2) add value to primary production (refer to “linked enterprises”), in which the household or enterprise ventures into one or more of the postharvest value chain segments to engage in a “linked enterprise” (e.g., processing), while continuing production of the original commodity; (3) diversify to increase supply of commodities to improve health and nutrition, e.g., vegetables, fruits, legumes, and nuts; or (4) diversify to non-farm ventures, where the household or enterprise, during off-season, undertakes other livelihood activities such as handicraft production or small-scale manufacturing.

Diversifying will promote rural employment through off-farm (e.g., primary processing; or online marketing), and non-farm (e.g., secondary processing; or repair shops for farm tools and equipment) ventures (see matrix below.) In the long run, the number of primary producers may decrease as a result of diversification, but enterprise development in rural areas will create new or additional employment.

Illustrative investments and Interventions to be Contained in Regional Plans

Transformative Strategies in Regional Planning	Illustrative Investments and Interventions
1. Using spatial criteria to determine optimum location of investments	• Mainstreaming PRDP initiatives at the regional and sub-regional levels:

Transformative Strategies in Regional Planning	Illustrative Investments and Interventions
	○ Edaphic, agri-climatic and socioeconomic criteria to prepare provincial commodity system investment plans ○ Ridge-to-reef (R2R) Ecological Landscape Framework integrating biodiversity to guide prioritization of investments
2. Spatial frameworks to trigger agglomeration effects	• Developing existing and potential spatial frameworks to focus investments and interventions: AFIBC, FMA, ARC, NPAAAD/SAFDZ, IP areas, others
3. Integrating sustainable land and water including coastal area management	• Combining sustainable land management (SLM), sustainable water resources management, and coastal marine spatial planning to promote integrative long-term resilience of the agri-fishery resource base
4. Agropolitan development: promotion of urban and peri-urban agriculture	• Pilot controlled-environment production, e.g., dairy products without animals • Replicating upscaled home food gardens widely • Constructing or expanding processing and distribution facilities close to population/ consumption centers
5. Rural-urban integration, recognizing that agri-fishery sector is not confined to rural areas	• Enhancing physical connectivity between production and processing areas on the one hand, and market and consumption centers on the other hand • Along with improved physical connectivity, enhancing institutional connectivity between and among value chain players
6. Crisis- and emergency-proofing of food corridors and food supply systems	• Applying lessons from the COVID 19 pandemic: • Establishing community-managed food stockpile • Agreements to ensure continually open food supply corridors • Institutional arrangements to carry out protocols to include law enforcement agencies
7. Optimizing ICT applications in regional and local planning	• Full development of National Information Network (NIN) mandated under AFMA of 1997 • Establishing Planners' ePortal with nationwide coverage
8. Nutrition-sensitive agriculture	• Campaigning to promote food-based health and nutrition • Synchronizing food supply plans with rising consumer awareness about healthy and balanced Filipino diet
9. Institutionalizing integrated spatial planning	• Capacity development on investment location criteria, GIS-supported planning including mapping, SLM, sustainable water resources management, and carrying capacity assessment

Transformative Strategies in Regional Planning	Illustrative Investments and Interventions
10. Consolidating and enhancing lower-level plans	• Value-adding enhancements in the process of integrating lower-level plans • Upscaled and technology-equipped food terminals in mega/metropolitan areas connected to integrated transport and logistics systems (modern, commercial-scale *bagsakan*) • Training program on NAFMIIP innovations

Functional Plans

The third and final NAFMIP component, Functional Plans (Chapter 6), presents the system for a "Centrally-supported Decentralized Services Delivery." The manner by which the Functional Plans are structured reflects the widely held paradox of decentralization—i.e., a strong and supportive center is necessary for decentralization to work. Delivery of agri-fishery services under NAFMIP takes on new challenges because of the "further devolution"—and eventual full devolution—expected with the Mandanas Ruling to be implemented starting budget year 2022.[2] Functional Plans show how agri-fishery services will be packaged and delivered during the plan implementation period. Based on guidance provided in NAFMIP as Directional Plan, Functional Plan details will be provided in the operational plans of the concerned DA operating units, in consultation with smallholder farmers, fisherfolk, business groups, LGUs, and other stakeholders.

The Functional Plans will guide the enhanced—and better coordinated—performance of the steering roles of DA and other NGAs, and the complementary rowing functions of the LGUs, in light of the Mandanas Ruling. The plans describe what specific support is needed per segment along the value chain of priority commodities. During the transition to full devolution, care will be taken to ensure that the quality and timeliness of services to LGUs (by DA and other NGAs), and to smallholder farmers and fisherfolk (by LGUs) will be maintained if not further enhanced. Thus, DA, other NGAs, and LGUs will collaborate to prepare service delivery transition plans. The list of central vs. local functions gives a glimpse of the intricacies involved in delineating but at the same time converging central and local services delivery.

Functions devolved to LGUs include:

1. Enforcement of policies, regulations, and products standards;
2. Provision of production support services;
3. Credit, insurance, and financing facilitation;
4. Linking small farmer/livestock raisers/fisher cooperatives and associations to agriculture and fishery industrial business corridors (AFIBCs) and other markets;
5. Capacity development of farmers, livestock raisers, and fisherfolk;
6. Maintenance and operation of production and post-harvest infrastructure, facilities, machineries, and equipment;

[2] The Mandanas Ruling of the Supreme Court (2019) clarifies that the Internal Revenue Allotment of LGUs should be increased because it is computed based on all national taxes like customs duties, which, if excluded, contravenes Section 6, Article X of the 1987 Constitution. Reference: http://constitutionalreform.gov.ph/ufaqs/what-is-mandanas-ruling/

7. Institutional strengthening of small farmer/livestock raiser/fisher cooperatives and associations; and
8. Conduct of research, extension, and training for development (RETD).

Non-devolved services under the steering role of DA and other NGAs include:

1. Formulation of policy, plans, systems, advocacy, and results-based monitoring and evaluation (RBME);
2. Development of regulations and product standards;
3. Development of credit, insurance, and financing facilities;
4. Agribusiness and market development (local and international);
5. Promotion of private investments and organization of AF industry organizations;
6. Construction and establishment of infrastructure and facilities for commodity systems;
7. Capacity development of LGUs and private sector; and
8. Development of transformative R&D and ICT-enabled AF.

Illustrative Investments and Interventions to be Contained in Functional Plans

Transformative Strategies in Functional Planning	Illustrative Investments and Interventions
1. Integration of commodity systems and functional planning	• Re-orientation of all steering and rowing functions toward commodity systems approach • Plans and budgets covering two or more commodities
2. Integration of spatial planning and functional planning	• Packaging of facilities and services based on AFIBC, FMA, ARC, IP community, SAFDZ, and other spatial/ *agropolitan* (peri-urban) frameworks, to optimize synergistic agglomeration/ concentration benefits
3. Whole-of-nation approach to functional planning	• Beyond enhancing DA-LGU coordination in services delivery, integrate fully with other service providers such as private firms, academe and NGOs (e.g., “pluralistic R&D”)
4. Further devolution of services delivery, and full devolution by end of the NAFMIP implementation period	• Joint DA-LGU preparation and implementation of Service Delivery Transition Plans to avoid gaps in services delivery (including funding and packaging of production support to small farmers and fisherfolk) • Progressive enhancement of services delivery capacities and efficiency under decentralized set-up

5. Follow through on investments promotion including Ease-of-doing business initiatives	• Passage of game-changing legislation to incentivize private investments
	  ○ By Congress
	  ○ By *Sanggunians* at all LGU levels

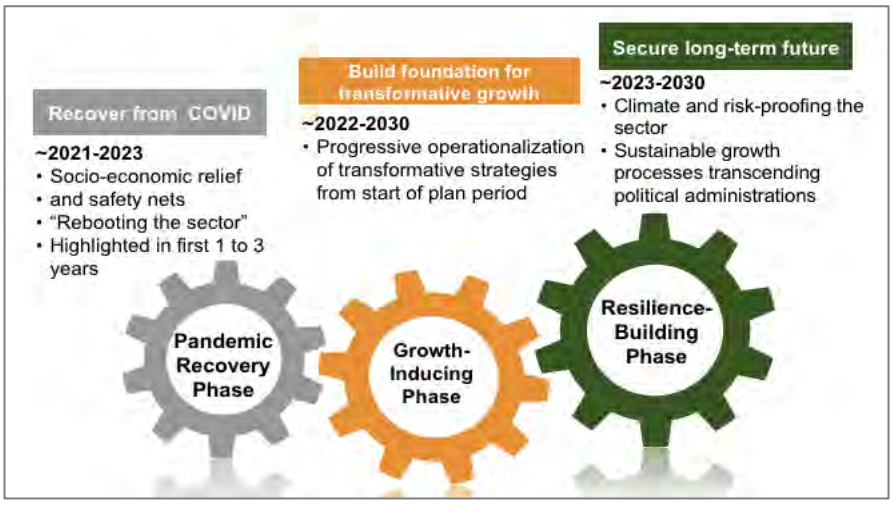
6. Democratization of e-marketing, information and other digital platforms	• Direct online selling by farmers’ groups of food system products, inputs and services • Development of small farmer- and fisher-dedicated e-marketing platforms

Transformative Strategies in Functional Planning	Illustrative Investments and Interventions
7. Restructuring of exports toward high value products	• Promotion of manufactured rather than raw material exports • Leveling up of products standards enforcement and reporting including biosecurity
8. Multi-risk proofing of service and food delivery systems	• Upgrading of infrastructure standards and unit cost estimates to cover resilience-enhancing design features • Joint institutional arrangements among NGAs and LGUs including law enforcement units • Leveling-up African swine fever (ASF) measures such as establishment of quarantine area and local supply of vaccine for ASF
9. Mainstreaming of social and environmental safeguards in decentralized service delivery systems	• Functional plans to disaggregate target beneficiaries by sex, ethnicity and age group to capture the youth sector • Plan impact evaluations to differentiate according to social and environmental criteria including biodiversity and sustainable land and water management
10. Support to structural transformation in value chains	• Farmer- or fisher-owned value-adding centers in urban and agropolitan (peri-urban) areas, specializing on: ○ Controlled environment production such as soilless agriculture, dairy production without animals ○ Processing ○ Marketing/ trading ○ Waste recycling

Phases of Implementation

The NAFMIP implementation period (2021-2030) is presented in three phases, namely, **pandemic recovery phase**, **growth-inducing phase**, and **resilience-building phase**, to guide the sequence and types of investments and interventions.

Three Interlocking NAFMIP Phases



The three interlocking phases are not mutually exclusive. Schedule of implementation of investments and interventions may overlap among the different phases. It is important that resilience and sustainability considerations be built-in all throughout Plan implementation, starting from Phase One.

This phasing of implementation framework will guide the types of investments and interventions that will be highlighted and prioritized per phase.

Illustrative Phase-wise Investments and Interventions

Phases	Illustrative Investments and Interventions
Pandemic recovery	• Nationwide replication of scaled-up KADIWA outlets • Follow-on consultations to enhance stakeholder awareness and interest to participate in sector transformation programs, projects and activities • Exploratory meetings with potential large investors (Filipino and international) in agri-fishery industrial business corridors • NAFMIP innovations- oriented capacity development • Public information campaign on integrated food and nutrition security
Growth-inducing	• Legislative and policy enhancements to incentivize large private investments • NAFMIP marketing and development of transformative financing opportunities • Launch of large-scale agriculture and fishery mechanization program • Construction of FTI-type facilities linked to integrated transport networks • Integration of NAFMIP concepts and strategies into LGU agri-fishery plans • Development of large-scale urban agri-fishery programs, projects and activities
Resilience-building	• Full assumption by LGUs of technical and financial responsibilities for devolved agri-fishery services and facilities • Issuance of blue and green bonds to finance large-scale investments • Mainstreaming of climate action plans including investments requirements into LGU agri-fishery plans • Agri-fishery industrial business corridors operating under PPP-type arrangements

Transformative Budgets and Investments

Sector transformation calls for no less than transformative types and magnitudes of budgets and investments. The NAFMIP aspires to mobilize up to as much as PHP8.0 trillion to fully fund its investment requirements over the Plan's 10-year duration. Around one-half of the total is anticipated to come from the public sector, with the balance coming from the private sector. The valuable contribution of the private sector is highlighted by the focus of the Regional Plans on the development of commodity system value chains, which relies on leveraging private

capital. An overview of the types and magnitudes of investments to be implemented based on the implementation phases follows.

The above PHP8 trillion estimate is an **aspirational amount** based on responsible planning practices to include:

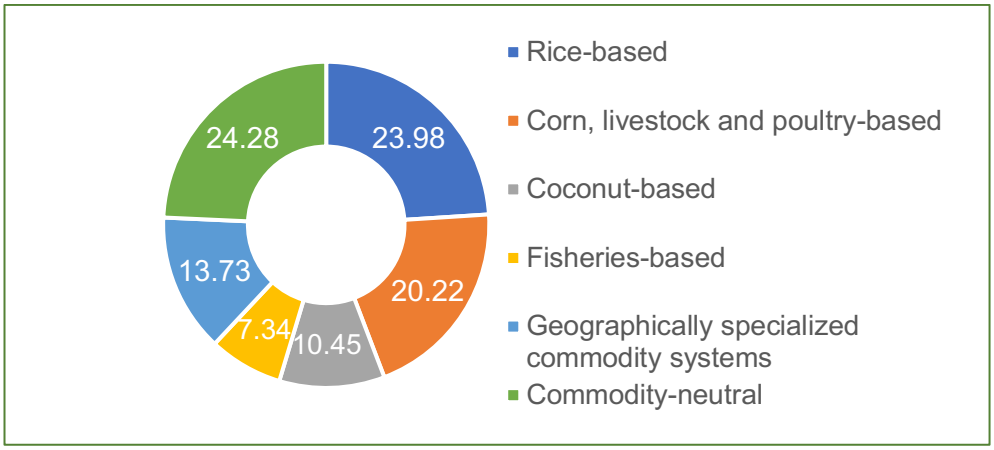
1. **Investment success scenarios** – The NAFMIP's internal logic, translated into transformative objectives and performance indicators and targets, will be achieved based on the availability of the required transformative budgets and investments. In this regard, the Plan includes three Scenarios: (a) fully-funded scenario; (b) mid-level funding scenario; and (c) low funding scenario. The magnitude of NAFMIP outcome achievement will depend on resources to be made available.
2. **Benchmarking with relevant comparators** – With the transfer of NIA to DA, the Department proposes an annual allocation of around six percent of the total national budget, This level is just restoring the budget level that was previously allocated to the Department. At this level of spending, the Philippines would be at the level of Vietnam, which allots more than six percent of its total budget to the agriculture sector. DA will continue to advocate for sizeable budget increases over the next ten years, to finance strategic investments consistent with its steering role, and more specifically to catalyze, leverage, and incentivize private investments.
3. **Convergence with whole-of-government** – Throughout the NAFMIP years, significant funding for DA is proposed, restoring its previous share of six percent level share in the total national budget. This level of funding will enable the Department to leverage resources from the private sector, LGUs, and other government partners. With the Mandanas-Garcia Ruling taking effect, DA expects a progressive increase in LGU spending as they assume greater responsibility over their rowing functions. Moreover, DA will collaborate with other national agencies like DAR, DENR, DPWH, and other agencies with mandates involving agri-fishery development for their NAFMIP counterpart investments. The convergence approach to resource mobilization will also include ADB, FAO, WB, and other development partners.
4. **Legislative action** – Sector Output No. 6 in the NAFMIP Logical Framework is: "Policy environment (i.e., legislative, executive, policy, and regulatory support) to accelerate and sustain sector transformation enhanced." Targets include national and local legislation to enable sector transformation. NAFMIP implementation success will depend, to a significant extent, on the enactment of legislation to adequately finance investments and interventions through the regular budget process; and to incentivize the private sector to direct large investments in the agri-fishery sector. A priority will be for DA to work out a legislative agenda early during plan implementation, perhaps including a possible updating of the AFMA of 1997.
5. **Beyond-the-immediate-horizon sourcing** – The Philippine Government will tap domestic and global capital markets to raise substantial resources to finance agri-fishery industrialization and modernization, e.g., bond flotation. Other possible sources could include proceeds from the sale of acquired government assets; Coco Levy Funds for coconut-based commodity system programs; and RCEF for rice-based commodity system programs; and Sugar tax for crop diversification.

Estimated Breakdown of Investment Requirements

By commodity system. NAFMIP promotes a commodity system-based approach that encourages more integrated planning and balanced programming of investments and other interventions to linked commodities. Five systems have been identified under NAFMIP, where rice-based (23.98%) and corn, livestock, and poultry-based (20.22%) top the list, after investments that benefit all or various commodities (commodity neutral) getting the slightly

larger share (24.28%). With enhanced spatial planning, higher priority may be accorded to geographically specialized and competitive commodities.

Investment Requirements by Commodity System

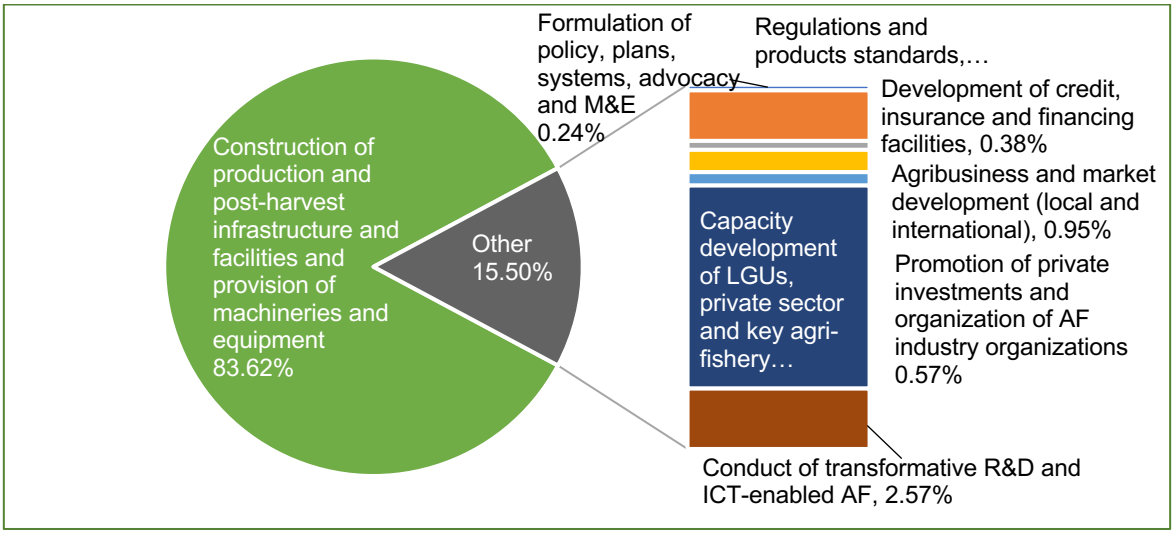


By region. Based on current estimates, Luzon accounts for 36.98% of the total requirements, followed by Mindanao (excluding Bangsamoro Autonomous Region of Muslim Mindanao) and Visayas, with estimated requirements of 13.00% and 10.34%, respectively. Meanwhile, national programs account for the remaining 40% of the estimated investment requirements. DA will promote a more balanced distribution through enhanced spatial planning that will surface the true competitive potentials of the regions.

Regional Distribution of Investment Requirements

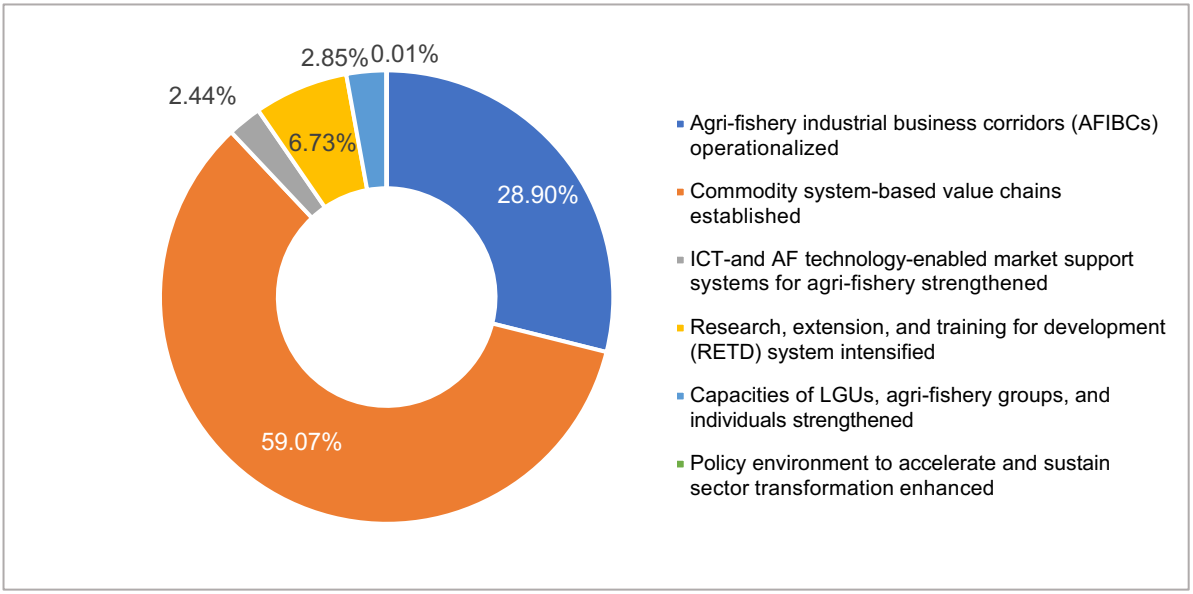
By function. Construction of production and post-harvest infrastructure and facilities, as well as the scaled-up mechanization, will be the focus of NAFMIP investments. R&D and capacity development of farmers, fisherfolk, and LGUs will likewise receive due attention as pillars of a modernizing agriculture. Further, DA will strengthen policy-making, planning, communication, M&E, and resource mobilization in the context of its steering role under the NAFMIP.

Investment Requirements by Function



By sector output. To effect the transformative elements of NAFMIP, establishment of commodity system-based value chains will require the lion's share of investments (59%), followed by operationalizing agri-fisheries industrial business corridors (AFIBCs) (29%). Also needing investments are the intensification of research, extension, and training for development (RETD) (7%), capacity development of stakeholders including LGUs and farmer/fisher associations (3%), strengthening ICT- and AF technology-enabled market support systems for agri-fisheries (2.4%), and enhancing the enabling policy environment of the NAFMIP.

Investment Requirements by Sector Output



Implementation Platforms

Responsible planning to agri-industrialize only begins rather than ends with NAFMIP finalization; it necessitates carefully thought-out arrangements to be in place to prime Plan implementation. Indeed, many good plans are crafted, but only few are well implemented, if implemented at all. This underscores the primacy of an all-important **NAFMIP implementation superstructure** (drawing from the engineering concept of a strong concrete and steel foundation supporting a large building, highway or another infrastructure). It will consist of (1) governance and capacity development, (2) performance management, and (3) strategic communication.

Governance and Capacity Development

Referencing Chapter 8 of the NAFMIP narrative, the whole-of-nation plan fully recognizes the major governance, institutional, organizational, and capacity development implications and challenges posed by the Plan's whole-of-nation approach and innovative strategies to achieve sector transformation toward agri-industrialization and modernization. Synergy and coordination within and among the member-agencies of the whole DA family will form the core and will provide models for governance and institutional adjustments, even as the DA operating units endeavor to collaborate in carrying out commodity systems planning, budgeting and implementation; regional and spatial planning; as well as functional planning for decentralized services delivery.

Taking off from a shared understanding, commitment, and resolve to work together toward the shared vision of the future (i.e., by year 2030), synergy and coordination among the full range of stakeholders will be strengthened in the context of horizontal and vertical integration. On horizontal integration, NAFMIP interventions will enable DA member-agencies to converge more closely with rural agencies and other national government agencies. On vertical integration, lines of communication and convergence will similarly be instituted to ascertain responsibility and accountability at various levels of governance, i.e., national, regional, and local. The Integrative Food and Nutrition Security Paradigm means closer collaboration between DA and other rural agencies on the one hand, and health and nutrition agencies, both public and private, on the other hand.

The challenge of food and nutrition security requires effective implementation of the NAFMIP's transformative strategies and interventions. Capacity development is an all-important component of NAFMIP implementation and will involve a critical review of individual and organizational roles, functions, and performance assessment criteria. The setting up of new or expanded operating units is expected, in view for example of requirements for spatial planning, nutrition-sensitive agriculture, RBME, and strategic communication. The new operating units will require personnel, equipment, and training—a reminder about the need to allocate resources therefor.

Performance Management

NAFMIP implementation and proof-of-concept requirements will be addressed by ICT-supported **results-based monitoring and evaluation** (RBME) that will enable evidence-based decision-making. RBME of NAFMIP programs, projects, and activities will stand on three overarching pillars: *accountability and transparency*; *results-based culture*; and *equitable and inclusive participation* to build a robust RBME system within DA extending to NAFMIP stakeholders. Grounded on a framework aligned with public sector management, the Plan outlines the institutional arrangements needed in building the NAFMIP RBME system that will lay out the NAFMIP RBME Roadmap. This shall include, among others, establishing

the National Census on Agriculture and Fisheries, digitalizing the system, and building a knowledge management and communication system and links on NAFMIP processes and outcomes.

The bottom line is to track, help orchestrate, and help facilitate NAFMIP's whole-of-nation journey in achieving its Goal—*"A food-and-nutrition-secure, resilient Philippines with empowered and prosperous farmers and fisherfolk"*— measured by results indicators on food security, hunger, energy intake, and poverty incidence.

Achievement of the Plan Purpose (see NAFMIP Results Chain) will be measured by similarly carefully selected results indicators:

Purpose Statement No. 1
"Economic opportunities in agriculture, forestry, and fisheries products expanded"—of gross value added (GVA) in agriculture, forestry, and fisheries (raw vs. manufactured products); growth in large-scale agro-industries with assets of PHP100 million or more; growth in agriculture and fishery manufactured exports; fewer rejected agriculture and fishery exports; Revealed Comparative Advantage; export market penetration index by commodity; conduciveness of enabling environment for profitable, competitive and sustainable agri-fishery; growth in agri-fishery input service industries; growth rate of restaurants and food services; and share of R&D budget to GVA.

Purpose Statement No. 2
Access to economic opportunities of small and subsistence farmers and fisherfolk increased"—growth in total income of farm/livestock/fishery households; growth in employment generated from large-scale agri-industries; growth in household incomes of smallholder farmers, livestock raisers, and fisherfolk from total diversified sources; growth in rural farm income; volume and value of production losses of crops/ livestock/ fishery from economic and environmental shocks; farming population displaced due to conflict and protracted crises; and Increases in women beneficiaries of agri-fishery programs and projects

Purpose Statement No. 3
"Consumer options formore affordable, nutritious, and locally-grown food expanded"—per capita production and supply of balanced and nutritious Filipino diet

The institutional arrangements, initially discussed during NAFMIP preparation, will be established to support tracking of implementation performance. Operationally within DA, RBME will be embedded in inter-OU collaboration and communication. Integral to performance monitoring, NAFMIP outcomes and impact will be evaluated periodically vis-à-vis baseline data (see Chapter 9).

Strategic Communication

"StratCom" will be the platform to foster sustained dialogue, mobilization and stakeholder empowerment through a combination of participatory communication interventions and stakeholder engagement throughout the plan implementation. Each stakeholder group, including the private sector on whom NAFMIP will mainly rely for investments, will continue to be interested and active participant and partner of successive government administration over the 10-year transformation process.

The Communication Plan (ComPlan) discussed in Chapter 10 is one key innovation integrated into this sector plan iteration beginning with its early incorporation in the overall planning cycle. Strategic communication for NAFMIP will be solution-oriented, because it is grounded in the expert analysis of underlying issues with inputs from stakeholders in the sector and thus,

contributes to the achievement of the NAFMIP goal and objectives indicated in the NAFMIP Results Chain. The plan should be adequately funded considering the resources required for analysis (baseline studies and surveys), capability building activities in developing specific communication strategies for the communication-related development issues identified, as well as quad-media outreach and stakeholder engagement events to be conducted.

The overarching objective of the ComPlan is to share knowledge, increase awareness, and build support, ownership, and engagement toward collective action of all stakeholders, requiring more effective organizational arrangements, better inter-agency collaboration including with other partners such as the development community, key civil society groups, and the private sector. It will provide cross-cutting support to the different areas of concern in the sector and align with DA's thrust to mobilize and empower partners, including the private sector. Strategic communication will support the work of the DA and other relevant agencies and partners involved in large-scale investment promotion based on the needs of the agriculture related industries.

Strategic communication will work with both internal and external stakeholders. It will promote consumer health and awareness on the traditional Filipino diet—healthy, nutritious choices—that will positively impact farmers and fishers' incomes. Likewise, it will help promote resilient environmental practices and a more conducive enabling environment for sector transformation. This requires investments for a sustained communication campaign and sustained engagement with target stakeholders, rooted in solid stakeholder analysis of perceptions/attitudes and practices. Communication strategies under NAFMIP will also complement long-term national health and education programs and other measures to influence consumer mindsets and behavior throughout the Plan implementation period and beyond. Further, awareness about Plan implementation progress from RBME reports, integrated commodity system and spatial planning, and innovations in RETD will be advocated.

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CHAPTER 1

Inclusive Food and Nutrition Security via Agri-Fishery Industrialization

A Trans-administration Directional Plan Anchored on AFMA

About the Plan Narrative

The **National Agriculture and Fisheries Modernization and Industrialization Plan (NAFMIP) 2021-2030** comprises 10 chapters organized according to three interrelated planning concerns: (1) addressing constraints and opportunities based on an updated situational analysis; (2) establishing objectives and targets framed by legal and policy frameworks; and (3) unbundling said frameworks by way of time-bound strategies, programs and projects. As shown in Figure 1.1, each of the major parts of the Plan corresponds to fundamental planning questions.

Figure 1.1: Flow of the NAFMIP Narrative

As asserted by this chapter's title, the NAFMIP 2021-2030 aims for **inclusive** food and nutrition security to highlight the nation's resolve that benefits must equitably accrue to all stakeholders. Similarly, the corresponding investment costs will be shared between Government and the private sector at the local, regional, and national levels—as foundation for a "working together" in its whole-of-nation approach. Moreover, this Plan is a **trans-administration** plan calling for long-term consistency—and therefore predictability and stability—in sector planning policies and strategies across political administrations. This would enable both operational enhancements and structural changes to emerge. Sector transformation as a process requires moving away from political term-based planning, and toward a 10-year planning horizon. Finally, the NAFMIP is a **directional plan** providing "guiding stars" to unify the trajectory of more detailed and operation-oriented agri-fishery plans such as commodity system and LGU plans. As a directional plan, NAFMIP focuses more on providing strategic re-directions, rather than spelling out operational details.

Strategic Planning Framework

The **NAFMIP Logical Framework** (logframe) anchored on the strategic planning frameworks presented in Chapter 3 and summarized below serves as the plan design framework showing expected implementation results in terms of a hierarchy of Plan objectives. Thus, it is also referred to as the "NAFMIP Results Framework." The NAFMIP Logframe depicts sector-wide transformations envisioned for the entire agri-fisheries sector within a span of ten years. It explains how the different OneDA strategies are operationalized at the national level down to the field implementing units. In comparison, other frameworks presented in Chapter 3 dwell not on Plan design but rather, on innovative planning concepts and strategies. These other frameworks serve as anchors for the entire Plan as discussed in this narrative.

The NAFMIP Logframe is a product of a series of multisector and multilevel consultations. It summarizes the hierarchy of objectives and results expected over the 10-year plan implementation period. In essence, the Logframe serves as the outline from which this Narrative Plan was developed following the participatory approach required under the Agriculture and Fisheries Modernization Act (AFMA) of 1997. The NAFMIP Strategic Planning Framework is shown in Table 1.1. The complete and detailed logframe is presented and discussed in Annex 1.

Table 1.1: The NAFMIP Strategic Planning Framework

HIERARCHY OF OBJECTIVES *What do we want to achieve?*	**RESULTS INDICATORS** *How do we measure achievement?*
SECTOR GOAL Definition High-level and long-term objective to which NAFMIP will contribute to within the Plan lifetime Goal statement **A food-and-nutrition-secure, resilient Philippines with empowered and prosperous farmers and fisherfolk**	Philippine Food Security Index Score
	Philippine Hunger Index Score
	Percentage of families who experienced hunger among the poor
	Proportion of households meeting 100% recommended energy intake
	Food self-sufficiency ratio improved, by key commodity
	Poverty incidence among farming and fishing families
SECTOR PURPOSE Definition Medium-term changes in the agri-fishery sector to be attained by the end of the Plan period, to be produced from the synergy of various sector outputs Purpose statement 1 (P1) **Economic opportunities in agriculture, forestry and fisheries products expanded** (PDP Chap. 8)	Growth rate of Gross Value Added (GVA) in Agriculture, Forestry and Fisheries (AFF) increased (%, at constant prices) - raw vs. manufactured/processed AF products
	Growth in large-scale agri-industries (assets of =>PhP100 million) increased (%)
	Growth in agriculture and fishery manufactured/processed exports increased
	Rejected agriculture and fishery exports decreased
	Revealed comparative advantage (RCA) of Philippine agri-fishery exports enhanced
	Export market penetration index by major export commodity

HIERARCHY OF OBJECTIVES *What do we want to achieve?*	RESULTS INDICATORS *How do we measure achievement?*
	Conduciveness of enabling environment for profitable, competitive and sustainable agri-fishery improved
	Growth in agri-fishery input service industries (%, constant prices):
	Growth rate of restaurants and food service activities
	Share of AFF R&D budget to total AFF GVA increased (%, cumulative)
Purpose statement 2 (P2) **Access to economic opportunities of small and subsistence farmers and fisherfolk increased** (PDP Chap. 8)	Growth in total income of farm/livestock/ fishery sustained (%)
	Growth in employment generated from large-scale agri-fishery industries inclusive and sustained (%)
	Growth in household income of small farmers, livestock raisers, and fisherfolk from total diversified sources sustained (%, in real terms)
	Growth in rural farm income sustained, by region (cumulative, at constant prices)
	Volume of production losses of crops/livestock/fish of small farmers, livestock raisers, and fisherfolk from economic and environmental shocks reduced, by type of disasters
	Value of production losses of crops/livestock/fish of small farmers, livestock raisers, and fisherfolk from economic and environmental shocks reduced, by type of disasters
	Number of farming population displaced due to conflict and protracted crises (e.g., farming livelihood breakdown) reduced
	Percentage increase of women beneficiaries of agriculture and fisheries programs and projects
Purpose statement 3 (P3) **Consumer options for more affordable, nutritious and locally-grown food expanded**	Per capita production and supply of balanced and nutritious Filipino diet increased
OUTPUTS Definition Short-term tangible goods and services to be produced from the synergy of sub-outputs delivered by the different DA operating units, local government units (LGUs), other national government agencies (NGAs), state universities and colleges (SUCs), private sector and other AF stakeholders; must be modernized, climate-smart, crisis-resilient, knowledge-based, and/or transformative	

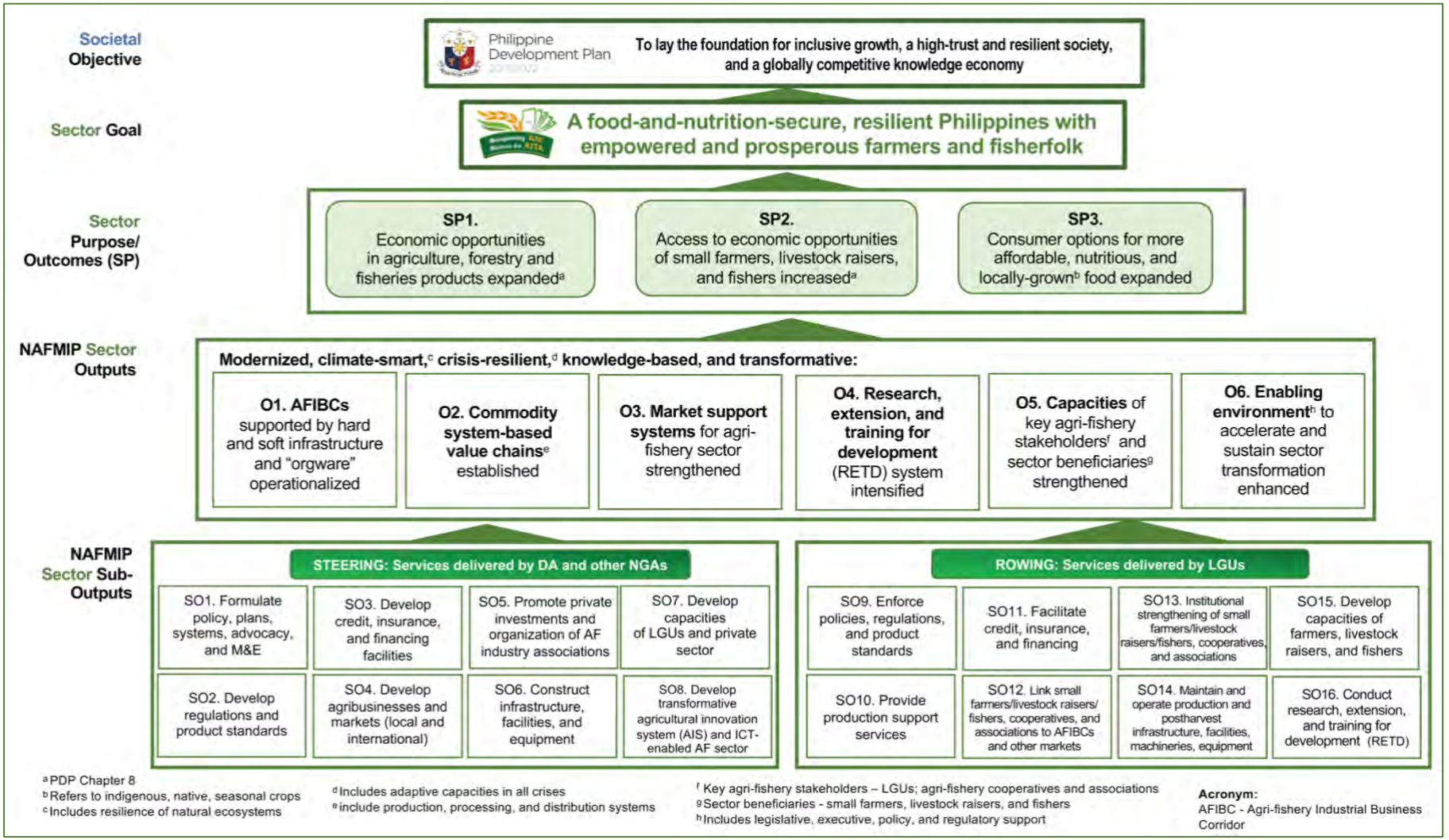
HIERARCHY OF OBJECTIVES *What do we want to achieve?*	RESULTS INDICATORS *How do we measure achievement?*
Output 1 Agriculture and fishery industrial business corridors (AFIBCs) with supporting hard and soft infrastructure and orgware operationalized (Indicators for all Outputs are provided in Annex 1)	
Output 2 Commodity system-based value chains established (i.e., production, processing, and distribution systems)	
Output 3 Market support systems in agri-fishery that are technology and/or ICT-enabled strengthened	
Output 4 Research, extension, and training for development (RETD) system intensified	
Output 5 Capacities of LGUs, agri-fishery (AF) groups (cooperatives and associations) and Individuals (i.e., smallholder farmers, livestock raisers, and fisherfolk) strengthened	
Output 6 Policy environment (i.e., legislative, executive, policy, and regulatory support) to accelerate and sustain sector transformation enhanced	

The Plan will continue to pursue the Goal embodied in the Department's long-term vision of "A food-secure and resilient Philippines with empowered and prosperous farmers and fisherfolk"—but this time integrating nutrition security in accordance with global best practice. Within a decade, NAFMIP envisions to contribute to realizing the societal goal of "**A food-and-nutrition-secure, resilient Philippines with empowered and prosperous farmers and fisherfolk**" (Figure 1.2). This Goal aligns with the *Ambisyon Natin* 2040 societal objective "To lay down the foundation for inclusive growth, a high trust and resilient society, and a globally competitive knowledge economy."

Realizing that the Sector Goal is contingent on the attainment of three sector Outcomes. NAFMIP will pursue three objectives at the Purpose level: two of these focus on economic growth, while the third centers on social development, particularly in promoting the consumption of nutritious food. The first two outcomes, P1. Economic opportunities in agriculture, forestry, and fisheries products expanded and P2. Access to economic opportunities of smallholder and subsistence farmers and fisherfolk increased, are both taken from the Philippine Development Plan (PDP), and were both included in previous AFMPs. The third outcome, P3. Consumer options for more affordable, nutritious, and locally-grown food expanded, is tagged as "innovative" not only because it is added for the first time in the agri-fisheries sector, plan but also because it shifts priority from straightforward increases in production toward matching food supply with healthy consumption patterns.

Going down to the output level of the NAFMIP Logframe, making the three sector outcomes happen will depend on the interactions between and among, as well as the synergistic effects of, six Sector Outputs, each of which aligns with one or several OneDA strategy or strategies as spelled out in the above NAFMIP Strategic Planning Framework (Table 1.1).

Figure 1.2: The NAFMIP Results Chain



Finally, in the hierarchy of NAFMIP objectives, the above-enumerated six sector outputs are planned to be achieved by generating 16 sub-outputs divided into eight **steering** sub-outputs (those that are delivered by DA and other NGAs) and eight **rowing** sub-outputs (those that are delivered by the LGUs).[1] The NAFMIP Logframe is further discussed and detailed in Annex 1.

Advancing Knowledge in Tracking NAFMIP Processes and Outcomes

In NAFMIP, data and information on performance indicators will not just be managed, but also build new knowledge and facilitate its sharing and use toward organizational and a NAFMIP whole-of-nation community learning that is dynamic, emanating from plan implementation experience. Chapter 9 expounds on a system for results-based monitoring and evaluation (RBME) for sustained data and knowledge management to inform decision-making and actions throughout the Plan implementation period. Data to be generated will provide evidence on performance and will flag any changes that may be needed for any given project, program, or policy—and for the Plan as a whole.

The timeline for compiling RBME data (baseline, mid-term, and end-term) is discussed in Chapter 9. The logframe as tool for planning, management, and evaluation serves as RBME framework. The development planning hypotheses (if … then cause-and-effect relationships) embedded in the NAFMIP Logframe will be validated by data ("proof of concept") to be collected through baseline (at start of implementation), mid-term (2025) and end-term (2030) surveys. Building on existing baseline data, the anticipated survey results will enable target-setting and progress tracking including the **transformative indicators** specified in Annex 1.

[1] The clustering of the sub-outputs into steering and rowing was made in anticipation of the full implementation of the Mandanas-Garcia ruling of the Supreme Court, which effectively increased budget allocation of LGUs and expects to transfer some AF-related functions and services from DA to LGUs.

CHAPTER 2

Fundamentals for Transformative Growth

Agriculture and Fisheries Performance

Agri-fisheries has lagged behind industry and services over the years. The structure of Philippine agri-fisheries has not changed and its share to GDP has consistently declined, from 14.0% in 2000 to 8.3% in 2019. Agri-fisheries production has not diversified. About half of agri-fisheries is in the production of crops. Rice, corn, and coconut remain as the major crops and use up to 74% of arable land. About 40% of crops concentrate in producing *palay*, and its share is increasing over time. In terms of support to agriculture, almost 50% of the support goes to *palay* production; 30% to pork and poultry; and 13% to sugar production. On the other hand, more support for coconut, banana, and other vegetable and fruit crops is needed.

Box 1. OneDA

is a **holistic approach** to enhance productivity, uplift rural people from poverty, improve livelihood, and increase farmer and fisherfolk incomes. Comprising OneDA are strategies promoting spatial convergence and focusing of sector-wide efforts; enhancing decentralized sector governance and support services delivery; and resilient growth—all underpinned by Information and Communication Technology (ICT) applications. From the planning standpoint, the strategies can be categorized into: (1) **spatial convergence strategies**; (2) **functional enhancement strategies**; (3) **thematic strategies**; and (4) **support strategies**. These strategies will guide the range and depth of interventions (i.e., programs, projects and activities) to progressively transform agri-fisheries into a modern, industrialized sector over the 10-year NAFMIP implementation period.

The lack of diversity in crop production in agriculture may be attributed to the incentive system that largely favors staple (rice) and traditional (sugar) production. However, these commodities getting most of the support (palay and sugar) are not in the list where the Philippines has comparative advantage.[1]

Aside from low profitability of these major crops, small farm size contributes to the low income of farmers.

Further, despite the country's rich marine resources, more focus on fisheries development, both marine and aquaculture, is needed.

Fisherfolk and coconut farmers remain the poorest in the Philippine food system. In terms of poverty incidence and food expenditure, the bottom 20% of the population with poverty incidence of more than 70% has the highest ratio of food expenditure to total expenditure (more than 60%), as well as of rice expenditure to total expenditure (18%). On the other hand, the top 20% with practically zero poverty spends three to six% of their total expenditure on rice, and about 30% on food in general.

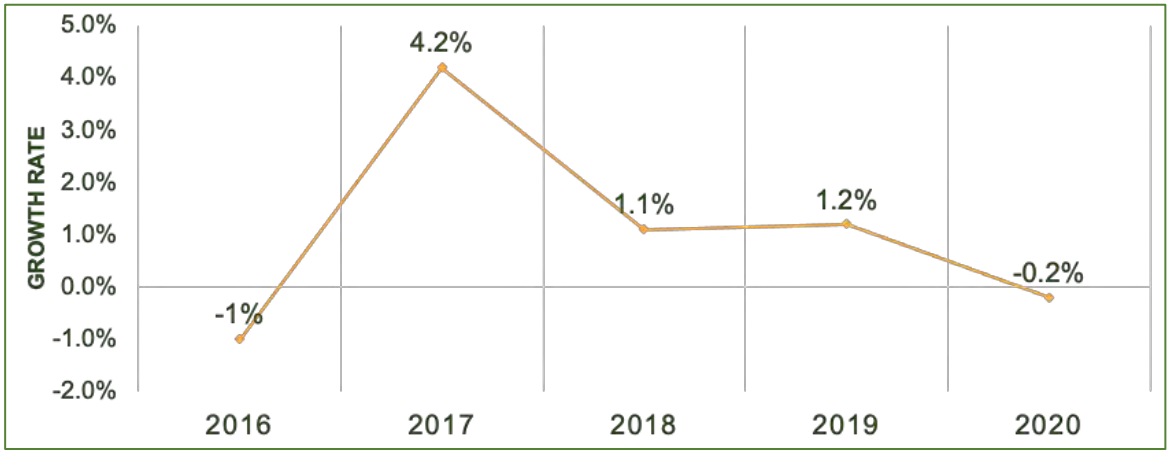
Figure 2.1 illustrates the poor economic performance of the AF sector compared to industry and services over the years. In 2020, the gross value added (GVA) of agriculture and fisheries amounted to around PHP1.78 trillion translated to 10.2% of GDP share, with crops contributing

[1] See Chapter 1 Table 1.31 (NAFMIP Preparation Team, 2021)

51.4% of the GVA, livestock contributing 12.2%, fishing and aquaculture 12.5%, and poultry and eggs 9.9%. However, the sector's growth rate contracted to -0.2%, which could be attributed to the COVID-19 pandemic and the onslaught of the African swine fever (ASF).

In 2021, the household final consumption expenditure for food and non-alcoholic beverages in the Philippines was valued at over 5.6 trillion Philippine pesos.[2] Spending on food and non-alcoholic beverages has significantly increased in that year despite the COVID-19 pandemic.

Figure 2.1: Growth Rate of Agriculture, Forestry, and Fishing Sector, Philippines 2016-2020



Note: Philippines, 2016 to 2020, based on 2018 prices
Source: Philippine Statistics Authority

Compared to neighboring ASEAN countries, except for the production of livestock, the Philippines lags in the production of crops and food (Figure 2.2). Specifically, the value added of the AFF sector averaged 9.8% over the last five years. Among the ASEAN 5 (i.e., Indonesia, Malaysia, Philippines, Thailand, and Vietnam), the performance of the Philippines is at the midpoint. However, in terms of spending, using the budget of DA as the benchmark, the Philippines lags behind its neighbors. In 2020, the share of the DA budget to the national budget was only at 1.5%, compared to over three percent for Thailand and Indonesia, and over six percent for Vietnam.

In addition, looking at the 2021 Global Hunger Index, the Philippines, which is an agricultural country, ranked 68th out of the 116 countries with a score of 16.8 or at moderate hunger level (Figure 2.3).

Agri-fisheries is not diversified in terms of production. About half of agri-fisheries is in the production of crops. About 40% of crops are in the production of *palay*, and its share is increasing over time. While the share of banana production has increased, the shares of the rest of agricultural crops are declining.

Agri-fisheries provides raw materials to the food manufacturing sector for processing into final consumable commodities. Based on historical data, the link between the two sectors has declined as indicated by the divergence of their growth. In 2000-2009, agri-fisheries expanded by an average of 3.7% per year, while food manufacturing grew by an average of 4.3% per year.

[2] Statista (https://www.statista.com/statistics/708945/philippines-household-final-consumption-expenditure-by-type/)

Figure 2.2: Value added in Agriculture, Forestry, and Fisheries in Selected ASEAN Countries, 2016-2020

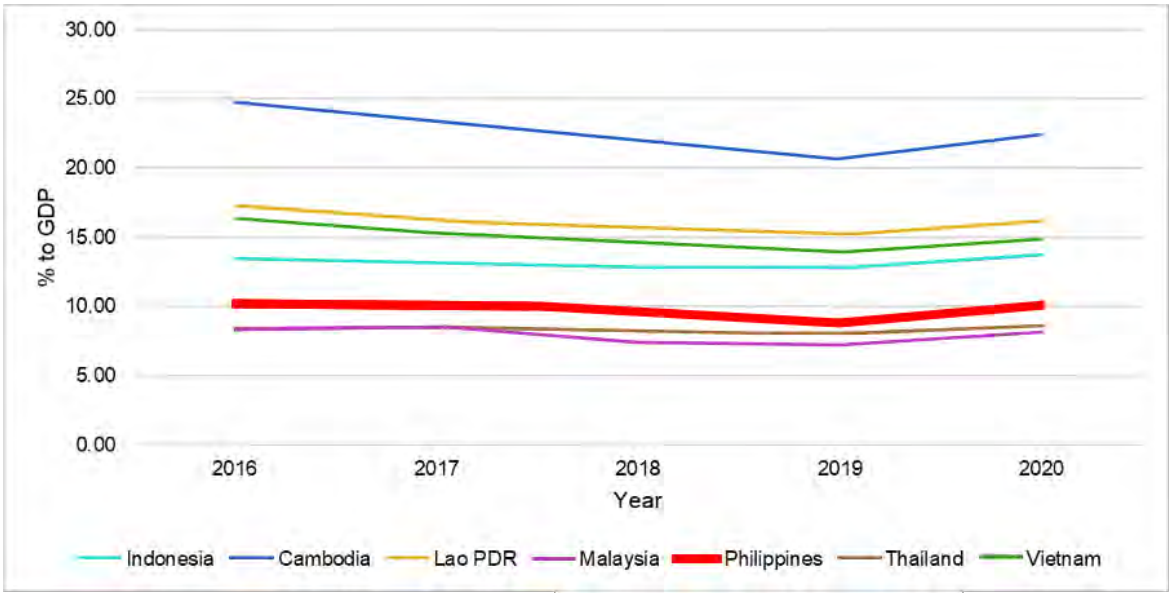
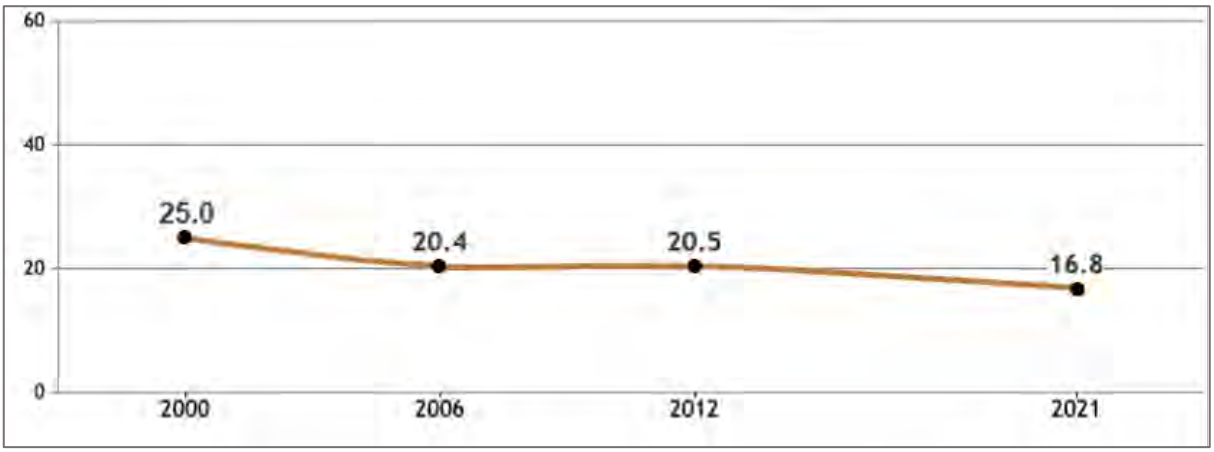


Figure 2.3: Global Hunger Score Trend for the Philippines



However, in 2010-2019, agri-fisheries grew by an average of 1.9% per year, while food manufacturing did by an average of 4.3% per year. This implies that in the last decade, because of declining share of agri-fisheries due to lack of product diversification within the sector (dominated largely by *palay* production), the food manufacturing sector has sustained its growth by shifting its source of raw materials for processing from domestic agri-fisheries to imports. Compared to neighboring countries, except for the production of livestock, the Philippines lags behind in the production of crops and food.

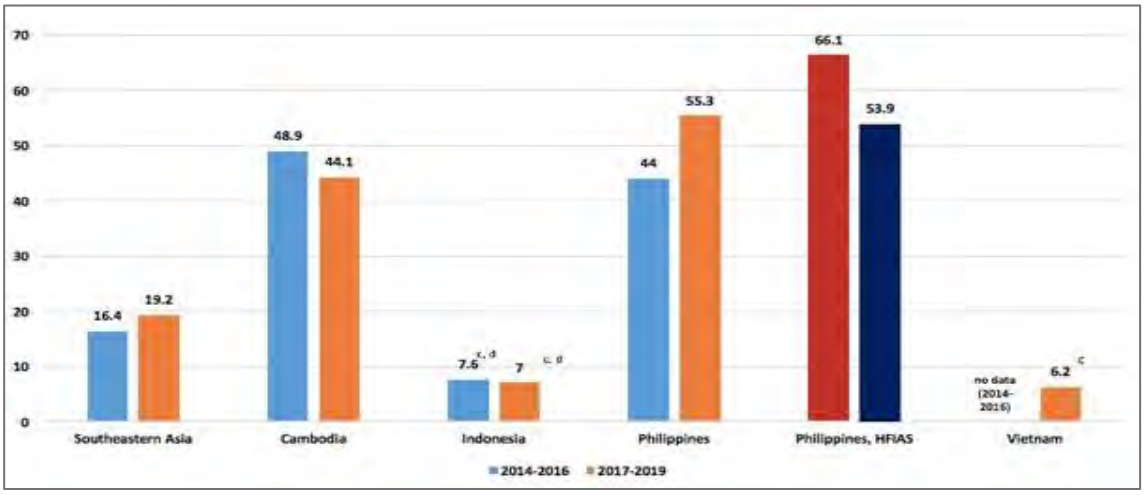
The agricultural sector receives a substantial amount of support representing about three percent of GDP. In 2019, the total support for agri-fisheries amounted to PHP465 billion. Almost 90% of the support is in the form of market price support, which implies that the consumers are paying for the support.

Almost 50% of the support goes to *palay* production; 30% to pork and poultry; and 13% to sugar production. On the other hand, support for coconut, banana, and other vegetable and fruit crops is zero. The lack of diversity in crop production in agriculture may be attributed to the incentive system that largely favors staple (rice) and traditional (sugar) production.

Even with the implementation of the new rice law in 2019 (Rice Tariffication Law), the domestic price of rice is 90% higher than the price of rice of similar variety in Vietnam. This price gap is largely due to the market price support to *palay*/rice production. The bottom 20% of the population with poverty incidence of more than 70% has the highest ratio of food expenditure to total expenditure (more than 60%) as well as of rice expenditure to total expenditure (18%).

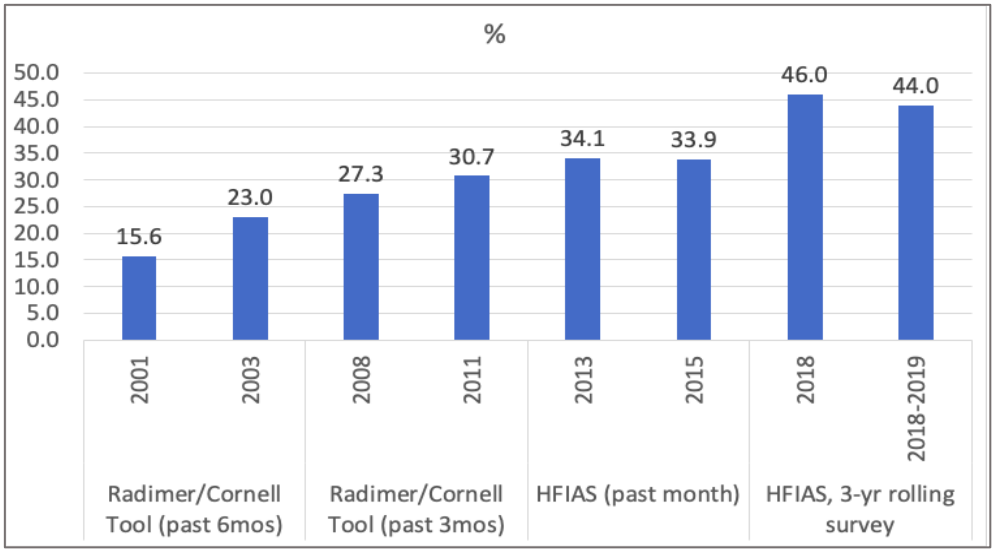
On the other hand, the top 20% with practically zero poverty spends three to six percent of their total expenditure on rice, and about 30% on food in general. These numbers indicate that, ironically, the poorest Filipinos are the ones shouldering the support to agri-fisheries. Figure 2.4 shows how the Philippines experiences the highest food insecurity compared to its neighbors, while Figure 2.5 pegs the latest (2018-2019) food insecurity level at 44%.

Figure 2.4: Prevalence of Moderate or Severe Food Insecurity in the Population based on FIES, 2014 to 2019 (percent)



Source: Overview of Food Security and Nutrition 2019-2020 (Forthcoming)
Note: HFIAS is Household Food Insecurity Access Scale

Figure 2.5: Percentage of Food Secure Households: Philippines



Source of data: DOST-FNRI National Nutrition Survey
Note: HFIAS stands for Household Food Insecurity Access Scale

Outmigration of labor from agri-fisheries to services and industry sectors is significant. This is largely due to the surplus labor in agri-fisheries, low employment productivity, and high poverty incidence. However, quality of labor in agri-fisheries is relatively low in terms of educational attainment. Thus, out-migrating agricultural labor may likely end up moving to services and industry sectors where the educational attainment of labor is equally low (such as other household services, retail trade, land transportation and construction). However, these non-agricultural sectors also have low employment productivity. This labor movement may have implications on urban poverty.

Philippine Agri-Fisheries Trade

Agri-food trade balance. The Philippine agri-food trade balance has consistently been in deficit, i.e., the total imports of agri-food exceeded the total exports of agri-food (Chapter 1 Figure 1.14 in NAFMIP Preparation Team, 2021). The trade gap continues to widen over time. In the period 1996-2007, the agri-food deficit trade balance was relatively small, averaging US$ -0.7 billion per year. However, trade balance started to deteriorate starting in 2008. In 2018, the total agri-food trade imports was US$ 14.5 billion, while the total agri-food exports was US$ 7.5 billion. The deficit in the agri-food trade balance in 2018 increased to US$ -7.1 billion.

Data on agriculture-food imports shows the Philippines' largest trade gap deficit in cereal (HS 10) (Chapter 1 Figure 1.13 in NAFMIP Preparation Team, 2021). Meat and edible meat offal showed a similar trend in trade gap deficit (HS 02); along with residues and waste from the food industries, prepared animal fodder (HS23); miscellaneous edible preparations (HS 21); dairy produce, bird's eggs; natural honey, edible products of animal origin, not elsewhere specified or included (HS 04); cotton (HS 52); sugars and sugar confectionery (HS 17); beverages, spirits and vinegar (HS 22); and products of the milling industry, malt, starches; inulin, wheat gluten (HS 11). The trade balance of fish and crustaceans, mollusks and other aquatic invertebrates (HS 03) posted positive average trade balance 1996 and 2015, but the trend reversed in the period 2016-2018 with a trade gap deficit of US$ -333 million per year.

On the other hand, our major food imports include cereal imports including seed of wheat and meslin, with more than 50% share, rice semi-milled or wholly milled, whether or not polished or glazed, parboiled (HS 100630). Its share increased from 21.3% 1996-2000 to 57.2% in 2006-2010 (Chapter 1 Figure 1.16 in NAFMIP Preparation Team, 2021). The surge in rice imports in 2008-2010 was due to the surge in rice imports during the 2008 food crisis. After the import surge, the share of rice imports declined. The share of yellow corn imports is small at less than 10%. Next are dairy imports (Chapter 1 Figure 1.17 in NAFMIP Preparation Team, 2021) and residue and wastes from food industries (Chapter 1 Figure 1.18 in NAFMIP Preparation Team, 2021).

More details on the Philippines' agri-food trade are found in the rapid AF sector assessment report of the NAFMIP Preparation Team (2021).

Trading partners. The United States and Japan are the largest markets for Philippine agri-food exports (Chapter 1 Figure 1.24 in NAFMIP Preparation Team, 2021). However, their combined shares dropped from the average 56.8% in 1996-2000 (United States 29.4% and Japan 27.4%) to the average 36.8% (United States 21.1% and Japan 15.7%). The total share of these markets dropped 20 percentage points over the period. Another key market for Philippine agri-food exports is the European Union, with an average market share of 18.7% in 2016-2018. The markets in ASEAN, China, South Korea and "all others" are growing markets for Philippine agri-food exports.

The major sources of Philippine food imports are ASEAN and the United States, with a combined share of almost 50% (Chapter 1 Figure 1.25 in NAFMIP Preparation Team, 2021). China is rapidly becoming a major source of the country's agri-food imports. Imports from the European Union is about 10%.

Revealed comparative advantage. Relative to the rest of the world, the Philippines has revealed comparative advantage (RCA) in seven commodities:

1. Edible fruits and nuts, peel of citrus fruit or melons (08);
2. Lac, gums, resins, and other vegetable saps and extracts (13);
3. Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes (15);
4. Preparations of meat, of fish or crustaceans, mollusks or other aquatic invertebrates (16),
5. Tobacco and manufactured tobacco substitutes (24);
6. Preparations of vegetables, fruits, nuts or other parts of plants (20); and
7. Fish and crustaceans, mollusks and other aquatic invertebrates (03).

The RCA estimates for nos. 1 and 2 above (08 and 13) are consistently high from 1996 to 2018. The RCA estimates for commodity no.3 (15) dropped from 5.94 in 1996 to 3.24 in 2018, while those for commodity no. 4 (16) remained generally stable at above 2.0 over the period. The RCA estimates for tobacco etc. (commodity 24) are on an upward trend from initially less than 1.0, which indicate revealed comparative disadvantage, to more than 2.0 in recent years. The RCA estimates for fish and crustaceans etc. (commodity 03) are consistently above 1.0 over the years, but low relative to the other commodities.

Relative to the Regional Comprehensive Economic Partnership (RCEP) market, the Philippines has revealed comparative advantage in seven agri-food commodities where it has RCA relative to the world.[3] These are the same in six of seven commodities relative to the world, the only difference being in the last item, replacing fish and crustaceans etc. (03) above:

1. Edible fruit and nuts; peel of citrus fruit or melons (08)
2. Lac; gums, resins and other vegetable saps and extracts (13);
3. Tobacco and manufactured tobacco substitutes (24);
4. Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes (15);
5. Preparations of vegetables, fruits, nuts or other parts of plants (20);
6. Preparations of meat, of fish or crustaceans, mollusks or other aquatic invertebrates (16); and
7. Preparations of cereals, flour, starch or milk; pastrycooks' products (19).

Finally, relative to ASEAN, the Philippines has RCA in only five commodities it has similar advantage relative to the world and to RCEP:

1. Lac; gums, resins and other vegetable saps and extracts (13);
2. Edible fruit and nuts; peel of citrus fruit or melons (08);
3. Preparations of vegetables, fruits, nuts or other parts of plants (20),
4. Tobacco and manufactured tobacco substitutes (24); and
5. Preparations of meat, fish or crustaceans, mollusks or other aquatic invertebrates (16).

[3] RCEP includes ASEAN countries and Australia, China, Japan, New Zealand, and South Korea.

Cororaton (2021) provides more details on Philippine agri-fisheries trade in the NAFMIP Preparation Team's (2021) rapid sector assessment report.

Challenges and Opportunities

Taking off from the current structure and performance of the sector presented, the NAFMIP 2021-2030 recognizes the following challenges, which also serve as opportunities for sector transformation:

1. **The sector's growth has been spatially and temporally uneven**, with many smallholder farmers and fisherfolk still mired in poor socioeconomic conditions. The underperforming growth trajectory may be due to the lackluster investments that correspond to the preliminary magnitude of transformative resources devoted to the A&F sector.
2. **Reliance on a single commodity and production-centric plans and programs**, apart from unsustainable farm subsidies, also account for sector underperformance.
3. In terms of food culture**, unhealthy food practices tend to be the dominant lifestyle**, which leads to chronic diseases that require substantial public and private resources. Based on the 2018 family Income and Expenditure Survey, the bottom 20% of the population spends 58% of their income on food, of which 22% is spent on rice and cereals, while only 7.9% is spent on fish and seafood, 4.9% on vegetables; the diet of Filipinos is mostly rice-fish-vegetables but as income increases, the diet observed is rice-meat-fish/seafood.
4. Moreover, any transformation agenda must address **the rapid degradation of the environment**, specifically biodiversity, land, and water resources on which long-term food and nutrition security rest. The impact of the food system on pollution and climate change also need to be addressed.

Further Challenges to Accelerating Agricultural Transformation

For a country like the Philippines, the urgent need is to be competitive in the global market. Despite the seemingly greater attention afforded to the agri-fisheries sector in the past years, sustaining growth has continued to be elusive. This is due to the continued failure to address the challenges that have lingered over time and weakness to overcome the emerging ones. In addition to the challenges outlined above are as follows (PDP 2017-2022):

1. **Limited access to credit and insurance**. Farmers and fisherfolk have been inhibited from utilizing the appropriate type of inputs, farm equipment, and facilities that will expand production and spur entrepreneurial activities due to lack of capital. In 2015 for example, about 39% of small farmer and fisher borrowers did not access formal credit due to: (a) lack of technical capacity to develop viable project proposals; (b) lack of or poor credit track record; (c) lack of acceptable collateral; and (d) limited information about available loan products. On the supply side, banks and other financial institutions also face challenges in providing formal credit owing to (i) perceived risks in lending to farmers and fisherfolk due to the sector's vulnerability to climate-related risks; (ii) limited outreach in far-flung areas; and (iii) lack of information on the demand from prospective borrowers.

   The agricultural insurance programs are greatly needed by farmers and fisherfolk due to the country's vulnerability to climate and disaster-related risks. Farmers and fisherfolk need to be protected from production shocks brought about by calamities. However, due to legal constraints that limit capitalization and human resources, the Philippine Crop Insurance Company's (PCIC) agricultural insurance products have been mainly intended to safeguard lenders from loan default.

2. **Low farm mechanization and inadequate postharvest facilities**. Farm machinery and postharvest equipment and facilities are important to increase quantity and quality of produce, reduce losses, and lower labor costs. The level of mechanization has improved over the years but lags behind Asian countries such as Japan, South Korea, Thailand, and People's Republic of China. It is only at par with Vietnam, Pakistan, and India.

   Yet to be tapped, for example, is local manufacture of farm machinery under an upscaled Farm Mechanization Program (Updated PDP 2017-2022). Relatively high losses in crops are experienced due to inadequate postharvest facilities. For the fisheries sector, post-harvest losses range from 20 to 40% of the total outputs based on the Bureau of Fisheries and Aquatic Resources data.

3. **Inadequate irrigation**. The Updated PDP 2017-2022 reiterates the urgency of developing and maintaining irrigation facilities to support food and nutrition security. As of 2015, only 1.7 million hectares or 57% of the 3.0 million hectare potential irrigable area has been irrigated. Irrigation development has been slow due to the long and tedious process of designing and constructing large-scale irrigation systems. On the other hand, the construction of small-scale irrigation systems has been limited and many of the existing irrigation systems need rehabilitation or restoration to improve their efficiency.

   As of 2015 From 2009 to 2020, the level of irrigation development has increased from 49.3% to 64.1%, translating to only 1.7 about 2.01 million hectares or 57% of the 3.01-million-hectare potential irrigable area that has been irrigated. This level of Irrigation development has been slow due to the long and tedious process of designing and constructing large-scale irrigation systems, which can be attributed to (a) inadequate and unreliable hydrologic data for proper irrigation system planning and design; (b) institutional issues, including delays in the release of funds for irrigation projects; (c) occurrence of typhoons, flooding, and siltation; and (d) social issues, especially on acquiring and securing the right of way.

   On the other hand, the construction of small-scale irrigation systems has been limited and many of the existing irrigation systems need rehabilitation or restoration to improve their efficiency. Further, overestimation of irrigation benefits during the planning stage resulted in low accomplishments in terms of the actual areas irrigated upon project completion.

4. **Scant support for research and development** (R&D)**.** Despite the significance of R&D in developing technologies and identifying good farm and fishery management practices, the share of R&D programs remains low in the total budget of the Department of Agriculture (DA) and Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST PCAARRD). Emerging R&D opportunities are yet to be tapped, e.g., developing processing and packaging technologies to prolong shelf-life and improve nutrition (see Updated PDP 2017-2022). The limited number of permanent positions for scientists and researchers in agriculture, resulting in contractualization of research jobs and consequently adversely affecting the capacity for R&D, has to be addressed.

5. **Weak extension service**. Weak extension service slows down the just-in-time delivery and adoption of farm practices and technologies that are applicable to a specific area and responsive to the needs of farmers and fisherfolk. Inefficiencies in the delivery of extension services can be attributed to inadequate operational funds and lack of human resources of local government units (LGUs).

6. **Aging farmers and fisherfolk.** The average age of farm operators of *palay*, corn, *bangus* and *tilapia* ranges from 48 to 55 years old. On the other hand, the younger population are finding more attractive employment opportunities outside the sector.

7. **Limited connectivity between production areas and markets, and poor compliance with product standards resulting in low competitiveness of AFF products**. As a result, AFF products are less competitive in the market due to: (a) increase of travel time from the production area to markets; (b) reduction of quality during transport; and (c) increase of transport and handling costs. Owing to poor compliance with quality standards along the supply chain, the Philippines experienced agri-food rejections at the border of the importing countries. This was due to the presence of mycotoxins, additives, bacteria and other contaminants; labeling; and adulteration of or missing documentary requirements
8. **Weak institutions also fail to stimulate sector growth.** Overlapping functions across several government agencies led to the inefficient delivery of support services and hampered agrarian reform implementation. Without close coordination of efforts, limited public investments will not be strategically directed to areas with greater needs and potentials for development, thus resulting in duplication of activities. Premature and illegal conversion of prime agricultural lands, irrigated and irrigable lands also continue, despite safeguards against land conversion (e.g., Agricultural and Fisheries Modernization Act, CARP, and Local Government Code). If existing laws are not strictly implemented, premature and illegal conversion may persist, and this will compromise food security and agrarian reform objectives.
9. **Lifting of the quantitative restrictions (QR) on rice** poses risks to AFF stakeholders who remain uncompetitive. However, it can help lower the price of rice, and this will benefit the general public including farmers who are net consumers of rice. The share of rice in the total food expenditure of the lowest quintile (poorest 20%) of Filipino households is quite substantial at 30.6% based on the 2012 Family Income and Expenditure Survey.
10. **Growing population threatens existing agricultural land use**. The growth in population also implies an increase in demand for AFF products and housing while putting pressure on the use of natural resources. Likewise, there is a huge conversion of existing agricultural lands to settlement lands to meet the increased demand for housing. There is a need to strike a balance to meet competing development objectives such as addressing housing needs, agri-industrialization, and food security objectives, among others. This calls for legislation of a National Land Use Plan to address the huge conversion of productive agricultural lands. Compounding these issues is the sector's vulnerability to climate and disaster risks.

The Covid19 pandemic however may have provided the strong impetus for a complete turnaround regarding the willingness of the government as well as the private sector to increase its investment for agricultural development of the country. Because among all sectors, only agriculture has performed rather well in contrast to the other sectors that are in the doldrums. Recently, it has been observed that the government has been increasing its funding for agriculture to ensure the food security of both urban and rural consumers. Likewise, the interest of the private sector in investing in agriculture has been heightened. Bilateral donors, and multilateral organizations as well as national governments alike have placed agriculture at the top of its political, economic, and development agenda. The long-term positive impacts however of this increased interest in agriculture will be attained if a sufficient pipeline of new and sustainable investments is developed.

Faced with these challenges and opportunities, the Department of Agriculture has initiated actions and plans for modernizing agriculture, among which is the development of agri-fishery industrial business corridors (AFIBC). It is also important to highlight the need to address cross-cutting concerns relative to governance, performance management, and strategic communication.

The Department of Agriculture has asserted eight paradigms on Food Security/New Thinking and a "OneDA" holistic approach to agri-fisheries transformation. This Plan translates these eight paradigms into a package of strategically and spatially focused investments to kindle accelerated and sustainable growth processes. NAFMIP highlights measures of implementation progress as well as change processes.

NAFMIP 2021-2030 equally recognizes the primacy of the health and welfare of all food consumers and environmental sustainability with the aim of building an inclusive and dynamic agri- fishery-food economy. The focus on nutrition-sensitive agriculture is based on international experience where citizens continue to be malnourished long after food security is achieved. By combining food and nutrition security, the agri-fishery sector can contribute more substantially to nation-building.

Implications and Insights for Modernization, Agri-Fishery industrialization, and Inclusive Prosperity

Furthering the value chain approach and climate resiliency planning introduced since AFMP 2011-2017, the NAFMIP provides guidance on operationalizing agri-fishery industrial business corridors (AFIBCs) with the benefit of digital technology advances in strategic and spatial planning. It calls for further building up as well as consolidating the agri-fishery sector and whole-of government bureaucracy's capacities and initiatives in spatial planning, data analysis, and data management. Moreover, it bodes for active engagement with non-agri-fishery (AF) entities whose operations bear upon the wellbeing of farmers and fisherfolk, and the nation's food and nutrition security as a whole. The Plan factors the requirements in infrastructure, logistics, and agricultural credit toward a modernizing and industrializing AF sector. It draws lessons on the current COVID19 pandemic toward building a more resilient AF sector.

The Plan further draws up shifts in the agri-fisheries innovation system (AIS) toward transforming the sector into a dynamically modernizing and industrializing one, along two other OneDA pillars of consolidation and professionalization. AIS advocates creation of an enabling environment to create novelty throughout agri-fishery value chains. It seeks more active multisector involvement in the creation, diffusion, adaptation and use of all types of innovations, leading eventually to innovation-driven socio-economic change.

Finally, cross-cutting plans in governance, results-based monitoring and evaluation (RBME), and on communicating strategically with various AF stakeholders will promote readiness and engagement of stakeholders and partners in, implementing, and monitoring and evaluating agri-fishery and food systems transformation toward *Masaganang Ani at Mataas na Kita* in the context of *Ambisyon Natin* 2040. Planning does not end with plan formulation; governance, RBME and strategic communication are vital in the plan implementation phase of the planning cycle.

Foundation for Sector Transformation: 20 Years of AFMP Experience

The series of Agriculture and Fisheries Modernization Plans (AFMPs) over the last 20 years had sought to achieve sector growth following fundamentally similar **pathways to sector modernization**:

1. ***AFMP 2001-2004 – production-enhancement pathway.*** A combination of production, marketing, trade, and fiscal interventions was envisioned to raise productivity and increase production of major commodities, while generating non-farm employment. The higher-level Goals were to raise sector GVA; create one million jobs; and protect vulnerable groups. At this time, resources were focused on infrastructure and Research,

Development, and Extension (RDE); Human Resource Development (HRD) and training for employment; as well as identification of Strategic Agriculture and Fishery Development Zones (SAFDZs).

2. ***AFMP 2011-2017 – value chain and climate resilient pathway.*** This second iteration of the AFMP basically continued the original pathway to sector modernization but incorporated value chain analysis (VCA) to highlight post-production enhancements. At this time, the higher-level Goals were to improve food security; increase incomes; and improve climate resilience. This updated AFMP included a plan for transitory functions that would enable DA to focus more on public goods, and consequently allow the private sector to engage in the business of providing private goods and services.
3. ***AFMP 2018-2023 – enhanced value chain and resiliency pathway.*** By this third iteration of the AFMP, significant advances in value chain analysis (e.g., climate-smartness and gender-sensitivity) and resilience planning (e.g., geospatial databases and mapping) had been achieved. The Plan also continued to seek enhancements in agri-fishery productivity and production, but highlighted ecological limits ("carrying capacity"). The AFMP further reflected initial efforts to integrate spatial planning frameworks into the updated AFMP.

Incremental vs. Transformative Planning

Incremental planning is defined as a progressive enhancement of fundamentally the same pathways to sector modernization, as in the above AFMP iterations. But having fallen short of achieving growth targets in terms of both magnitude and "quality,"[4] the National Agriculture and Fisheries Modernization and Industrialization Plan (NAFMIP) 2021-2030 adapts **transformative planning**. NAFMIP as a transformative plan aims to leapfrog from, rather than simply build on, previous AFMPs. Transformative leapfrogging is grounded on the recurring realization that agri-fishery modernization—as called for under the Agriculture and Fisheries Modernization Act (AFMA) of 1997—cannot be achieved using business-as-usual planning and implementation approaches. Rather, sector modernization will require no less than transformative planning that employs innovative strategies, in place of incremental planning that only gradually builds on previous sector planning efforts. The **agri-industrialization pathway** to sector modernization is introduced via NAFMIP 2021-2030.

The ensuing chapters will detail how transformative planning will entail pursuing operational, functional, and structural reforms in the agri-fisheries sector:

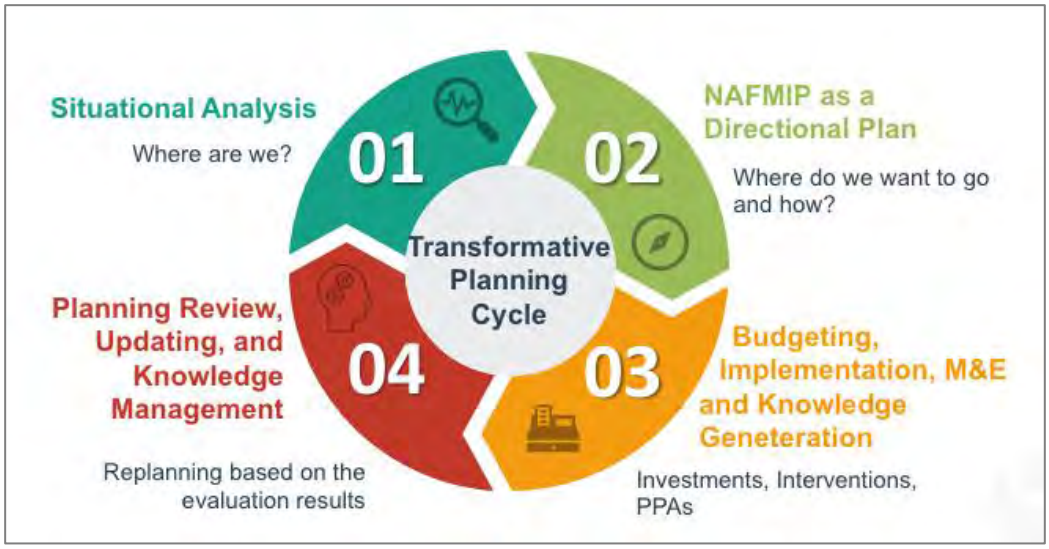
1. ***Operational changes.*** Shift to commodity system-based planning, budgeting and implementation; substantially larger-scale private investments in agri-processing (>PHP100 million per project); credit and other incentives for agri-industrialization ventures; large-scale mechanization; ICT applications; restructuring planning and implementation arrangements at the central, regional, and local levels; and official integration of transformation-driven metrics into regular agency performance evaluation.
2. ***Functional transformation.*** This is the most fundamental change that NAFMIP advocates—from a focus on farm productivity and efficiency to emphasizing higher farmer/fisher income, consumer health, and environmental protection.

[4] "Quality" of targets refers to descriptors like inclusivity, gender-sensitive impact, and client satisfaction. Related to incremental vs. transformative planning is the ADB **Incremental Transformation and Reform Model** focusing on finance, knowledge management, and partnerships. In comparison, "Radical transformation" will involve a Knowledge ++ model with significant additional investment in human resources along with changes in the organizational structure—enhancements similar to those envisioned under NAFMIP. See ADB, "Knowledge Solutions for Development: An Evaluation of ADB's Readiness for Strategy 2030" (July 2020) https://www.adb.org/documents/knowledge-solutions-development-independent-evaluation-adb-s-readiness-strategy-2030.

3. ***Structural reforms.*** Inclusive agri-fishery industrialization, i.e., shift toward more equitable relations and benefits between and among value chain players; significant increases in total farm and fishery household income from diversified sources (crops, livestock, poultry, and fisheries; on-, off-, and non-farm), quality food items rather than commodity food items; greater share of smallholder farmers and subsistence fisherfolk in aggregate industry-wide incomes; stronger market power and negotiating capacity of clustered farmers and fisherfolk; and rising scale-efficiency from consolidated landholdings/ productive assets of smallholders.

Transformative planning will span the entire planning cycle (Figure 2.6), beyond plan preparation. This will address disjointed planning, budgeting, and implementation of agri-fishery programs and projects. Medium-term and annual investment programs and budgets will be based on the NAFMIP 2021-2030 as a directional plan.

Figure 2.6: Planning, Investment Programming, and Budgeting Linkages



COVID's Medium- and Longer-Term Sector Planning Implications

The COVID-19 pandemic—and similar other crises—adds a strategic dimension and direction to NAFMIP, building on current DA programs such as *Ahon Lahat, Pagkain Sapat kontra* COVID-19 (ALPAS).[5] In part, NAFMIP will serve as Pandemic Recovery Plan.

The 10-year NAFMIP implementation period will be broadly sub-divided into three closely inter-linked major phases:

- First phase: Recovery from the COVID-19 pandemic (Pandemic Recovery Phase);
- Second Phase: Post-recovery growth (Growth-inducing Phase); and
- Third Phase: Sector resilience enhancement (Resilience-building Phase).

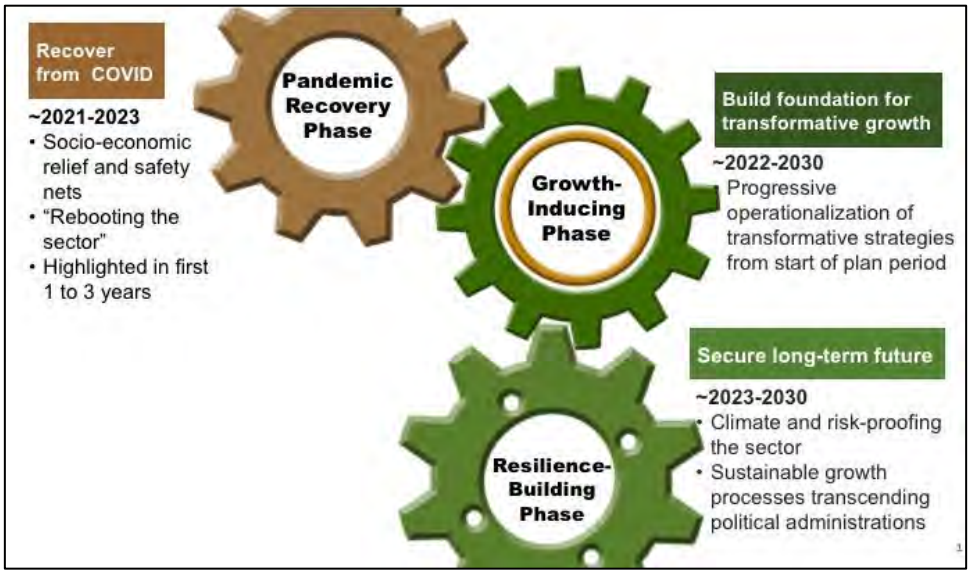
The phasing is for purposes of prioritizing and sequencing investments types, beginning with categories of intervention that quickly respond to the most urgent and immediate sector concerns and priorities (e.g., farmers' and fisherfolk's livelihood and income restoration), and

[5] ALPAS involves mobilizing assistance and support to farmers, fisherfolk, farm workers, and producers in the food chain; and expanding production areas, increasing levels of productivity, improving efficiencies, and enhancing projects and activities to raise available food supply.

then progressing to address medium- and longer-term concerns and priorities (i.e., inclusive and sustainable sector modernization)—both operational and structural—as above discussed. The phases are not envisioned to be mutually exclusive; in fact, sustainability and resiliency considerations will be integrated even during the Second Phase. The progression only indicates what socio-economic concerns and priorities are to be highlighted or emphasized per phase. For example, the first phase will not be limited to purely Recovery-oriented interventions such as the DA Upscaling of *Kadiwa ni Ani at Kita*.[6] Rather, it will include interventions to seize immediate opportunities to enhance target value chain segments in priority commodities. Phase-wise implementation planning is shown in Figure 2.7.

The three "gears" in Figure 2.7 are envisioned to be turning simultaneously, in a synchronized manner, over the 10-year Plan implementation period. The phasing of NAFMIP implementation is generally aligned with the "Survive, Reboot, Grow > Socio-Economic Recovery and Resiliency" sequence depicted in the DA Food Security Framework. Indicatively, Phase 1 Pandemic Recovery Phase will be implemented from Years 1 to 3; Phase 2 Growth-Inducing Phase, from Years 2 to 10; and Phase 3 Resilience-Building Phase, from Years 3 to 10. The "New Normal" expected to prevail during the First Phase will define/present opportunities to modernize and industrialize the sector in the succeeding two phases, using transformative strategies to confront persistent problems such as worsening of poverty and widening of inequality, among others, brought about by the pandemic.

Figure 2.7: Three Interlocking Phases of NAFMIP 2021-2030 Implementation



[6] A social amelioration project providing: (a) seed capital to barangay entrepreneurs directly selling basic commodities to consumers; and (b) logistical support such as hauling and delivery trucks, and cold storage.

Luisito Cleofas | SEARCA

CHAPTER 3

Transformative Planning Frameworks

"If you carry bricks from your old house to your new one, you will end up building the same house that fell apart before." (adapted)

Agenda for Sector Transformation

Box 2. Strategic Objectives of NAFMIP 2021-2030
as a Whole-of-Nation Plan

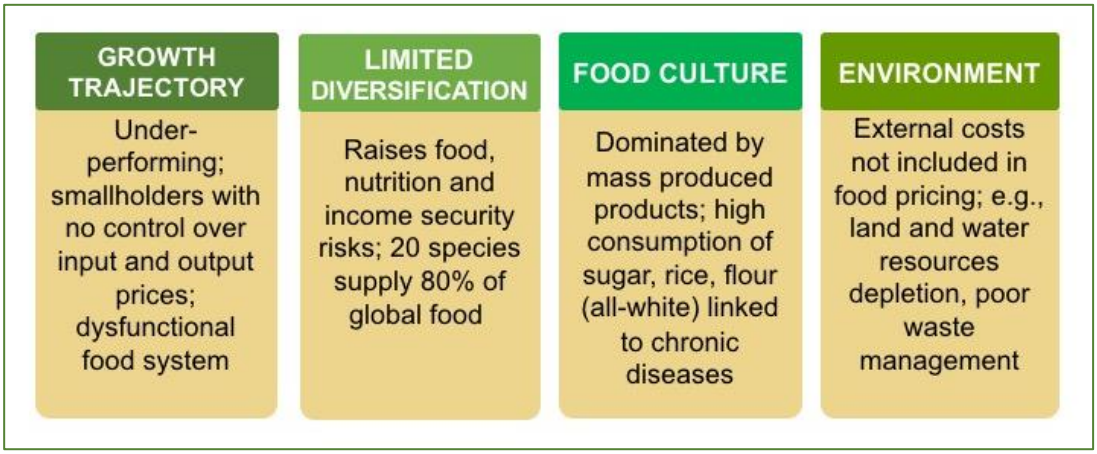
1 ***Guide*** sector-wide growth / serve as directional plan

2 ***Inspire*** stakeholders to take cohesive action based on a shared vision

3 ***Galvanize*** sector-wide public and private investments

The NAFMIP agenda responds to four fundamental, inter-related concerns depicted in Figure 3.1. As discussed in Chapter 1, sector growth has been spatially and temporally uneven, with many smallholder farmers and fisherfolk still mired in poor socioeconomic conditions. The updated sector analysis underpinning NAFMIP preparation shows that reliance on single commodity and production-centric plans and programs, apart from unsustainable farm subsidies, account to a large extent for sector underperformance.

Figure 3.1: Fundamental Areas of Concern for NAFMIP



Moreover, the analysis raises another concern that has yet to be integrated into agri-fishery sector planning: **nutrition security**. Food production patterns and availability drive food consumption patterns. High consumption of unhealthy food is reinforced by widely available and affordable albeit unhealthy food products. The nation can be food-secure, but growth cannot be sustained if diabetes, hypertension, cancer, and such diet-linked illnesses remain widespread. Finally, any transformation agenda must address the rapid degradation of the very land and water, as well as biological resources on which long-term food and nutrition security rests.

NAFMIP Results Framework

The Logical Framework (see Chapter 1) around which NAFMIP was developed not only synthesizes but also enhances the current DA new thinking with innovative concepts and strategies contained in current and emerging agri-fishery sector development models discussed below. As will be seen from the immediately following sections and succeeding chapters, NAFMIP integrates key notions beyond that of food security, purposively embedding concepts on nutrition-sensitive agriculture, shorter food miles, circular food systems, logistics landscape, climate resiliency and climate smart agriculture, agri-fisheries (AF) value chains, entrepreneurship and AF industrial business corridors, among others, mindful of inclusiveness by gender, age, and embracing ethnic and regional diversity.

DA Food Security Framework

The framework in Figure 3.2 presents at a glance how its vision of “A food-secure and resilient Philippines with empowered and prosperous farmers and fisherfolk” will be attained via key strategies and enablers. It identifies major initiatives elaborated upon in the NAFMIP. The framework specifies five key result areas (KRA), namely: (1) modernized agri-fishery value chain systems (fisheries including both aquaculture and marine); (2) enhanced competitiveness of agri-fishery products; (3) empowered farmers and fisherfolk in terms of (a) broadened access and participation in value chain development, and (b) jobs generation and entrepreneurial activities; (4) strengthened partnerships with institutions including farmer cooperatives and associations (FCAs), the private sector, LGUs, NGAs, SUCs, and other stakeholders; and (5) increased resilience of the environment and natural ecosystems. It is designed to accelerate the sector's recovery from the COVID-19 pandemic. In the NAFMIP, the DA Food Security Framework is further enhanced to integrate Nutrition Security so that anticipated enhancements in production patterns, competitiveness, and other metrics will highlight agri-fishery commodities to promote improved public health.

NAFMIP Integrative Food and Nutrition Security Paradigm

NAFMIP is framed by the Integrative Food and Nutrition Security Paradigm (Figure 3.3), which unbundles the DA Food Security Framework. The paradigm is derived from the UN Food Systems Model, further enhanced with elements of global best practices in ICT-supported sectors and spatial planning. The paradigm highlights transformative concepts and strategies including shifting away from ineffective practices such as: (a) single commodity programs; (b) production-centric investments; and (c) high-cost, low-efficiency production systems. Productivity enhancements will be targeted not only in commodity production but also in various post-production, higher-return segments of priority commodity value chains.

Furthermore, with the looming effects caused by global crises such as the Ukraine-Russia conflict, we must now expand our mission-vision toward a **food sovereign nation**. This entails boosting local production of significant commodities to secure food for Filipino people even in the face of unanticipated challenges that may confront the sector in the future.

Food sovereignty, a global movement adapted to the Philippine context, is embodied in the NAFMIP paradigm and traditional Filipino diet seeking to balance the production supply and consumer demand for rice, corn, vegetables, fish, and livestock products. Food sovereignty places local producers, distributors, and consumers in control of food systems. In terms of consumer preferences, Filipinos have the right to be informed about, and decide to revert to, their culturally defined nutritious, balanced, and safe diet, linked to healthy eating habits and

Figure 3.2: DA Food Security Framework

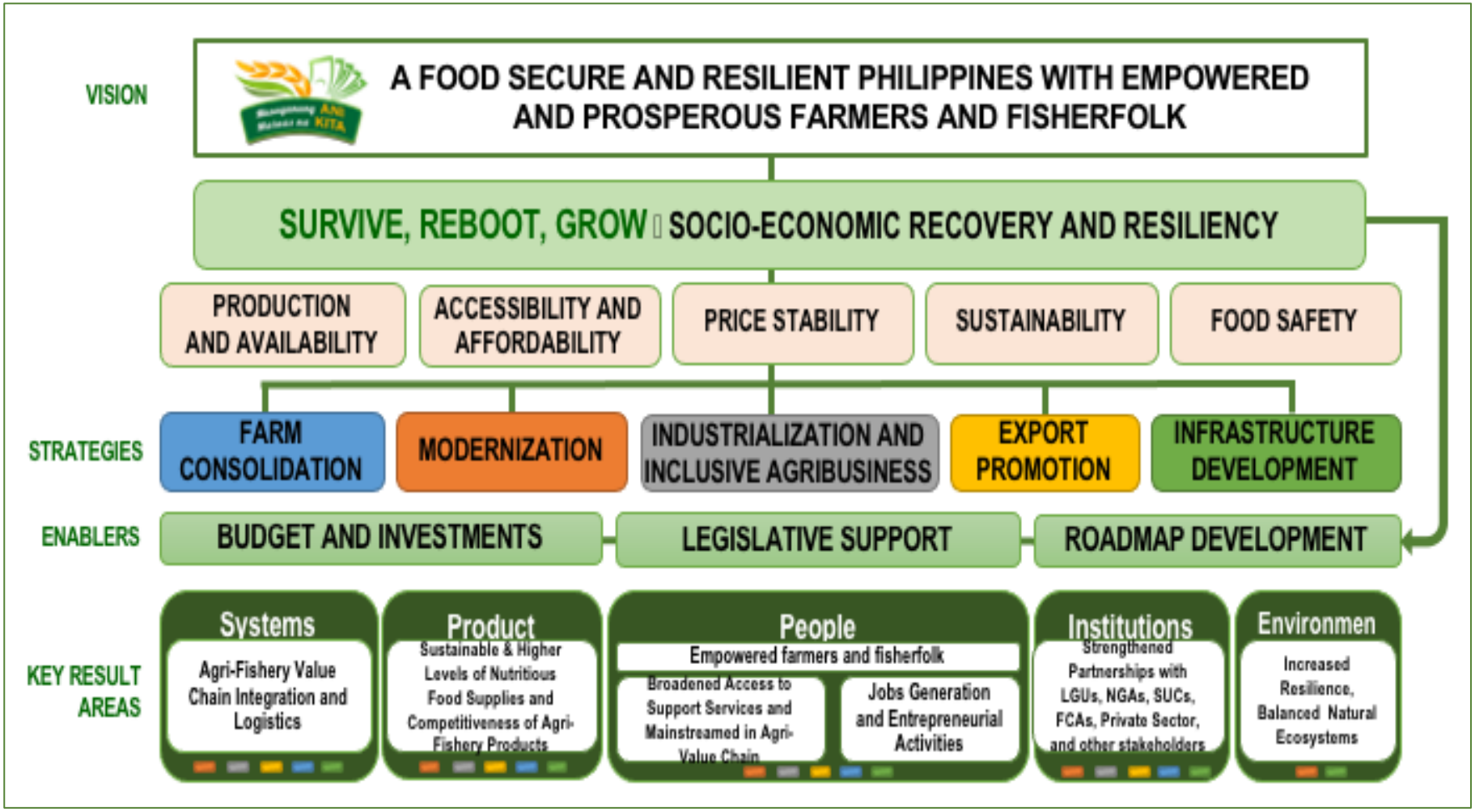
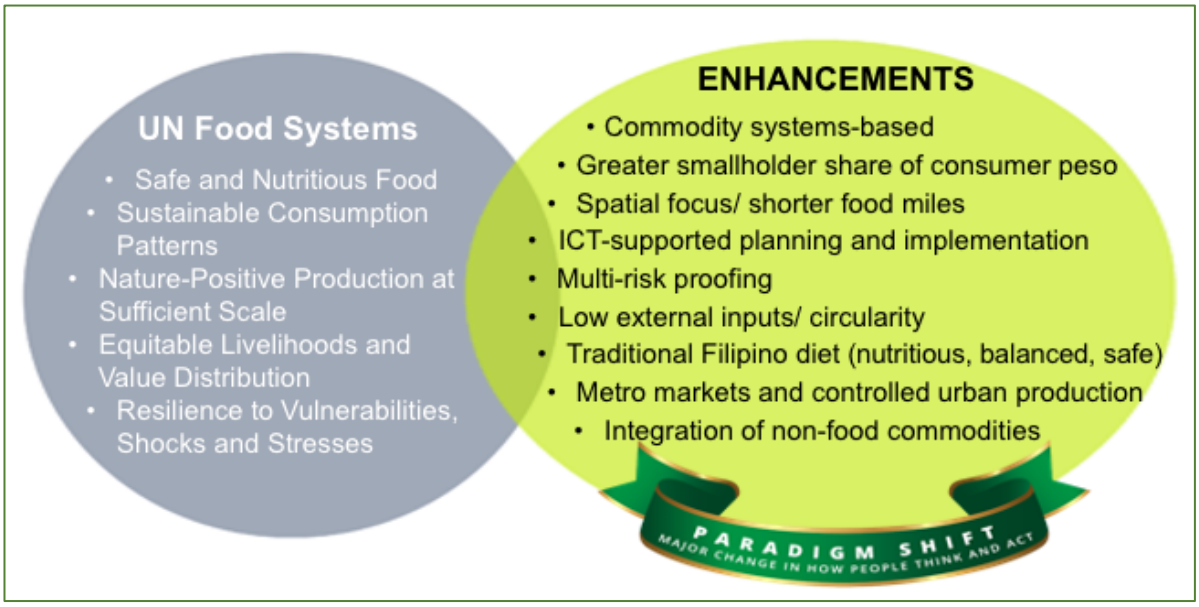


Figure 3.3: NAFMIP 2021-2030 Integrative Food and Nutrition Security Paradigm

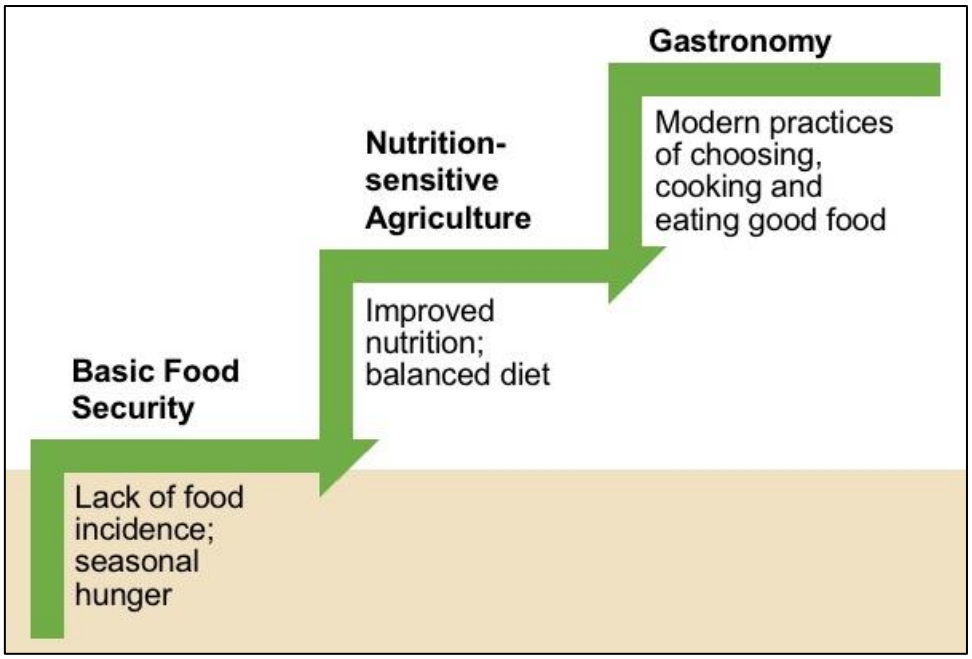


sustainable and nature-positive food production systems. NAFMIP will mobilize collective action toward empowering stakeholders by giving them choices and opportunities so that all can have improved health, increased incomes, and a healthier planet.

Nuanced Food Security Model

Now combining the DA Food Security Framework and the NAFMIP Integrative Food and Nutrition Security Paradigm, the progression toward **healthy food security** can be visualized in Figure 3.4.

Figure 3.4: Stages of Nutritional Food Security



Early during the NAFMIP implementation period, basic food security interventions are expected to more fully address chronic, persistent food insecurity; transitory food insecurity; and/or seasonal food insecurity in terms of particular segments of the population (including farmers and fisherfolk) and specific regions and provinces. Basic food security concerns will be addressed by targeted interventions, until such time that a critical mass of the population would have achieved basic food security.

The next set of interventions will then more strongly support **nutrition-sensitive agriculture**, which refers to the combination of agri-fishery investments to reduce poverty, improve food security, and prevent mal- and under-nutrition.[1] The final stage of the quest for food security may be idealized as "gastronomy," at which point both food and nutrition security objectives will have been substantially achieved. Sustainability from the environment perspective will continue to be highlighted in all three stages, along with revival and promotion of healthy eating habits.

Spatial Planning Framework

The Framework, consisting of maps and guidelines, seeks to optimize the location and geographical distribution of agri-fishery investments based on: (1) suitability and socioeconomic criteria; (2) sensitivity, hazard, and adaptive capacity criteria; and (3) sustainable land plus water resource management (SLM) criteria. Aside from and complementing the commodity system planning approach, integrating spatial planning aims to:

1. Promote planning, program, and institutional convergence within the planning area;
2. Minimize duplication while maximizing potential synergistic impacts among investments;
3. Articulate the functional role of planning areas, e.g., production areas vis-à-vis market (population) centers; and
4. Enhance ecological balance between and among landscapes, e.g., protecting the biological integrity of waterways within a watershed.[2]

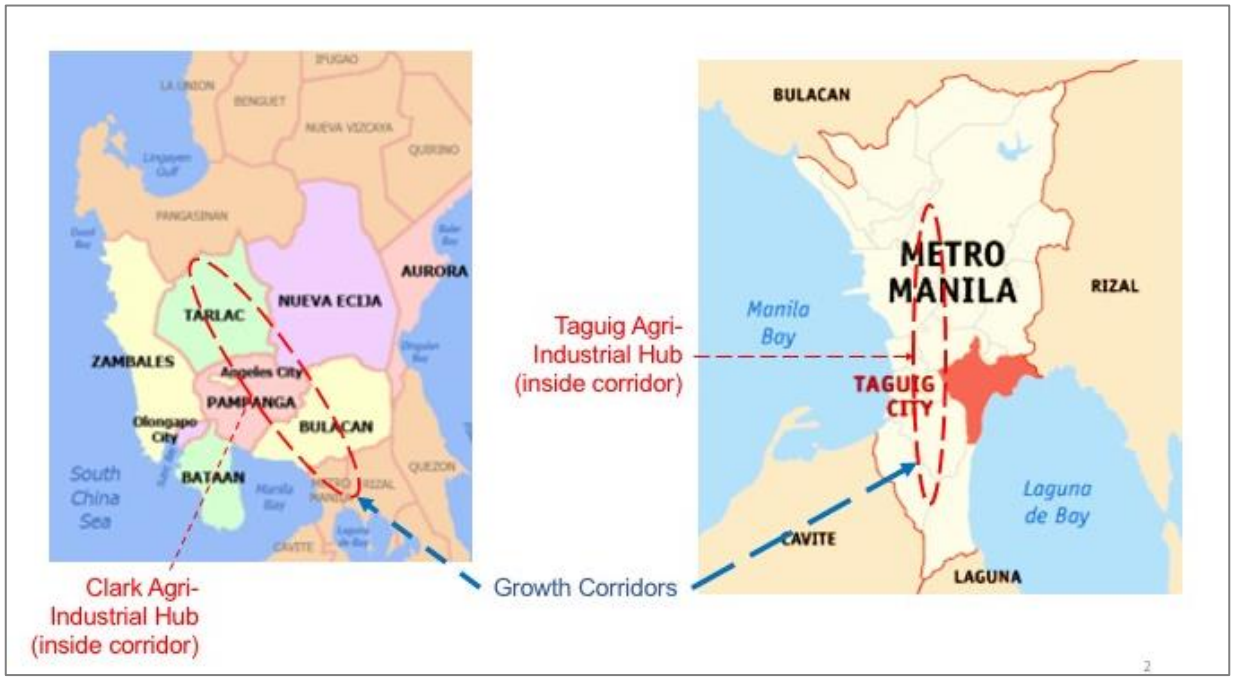
The NAFMIP spatial framework directly supports the Consolidation pillar under OneDA, and more specifically, envisions a multi-nodal spatial form in continuing efforts to identify and develop Agri-Fishery Industrial Business Centers (AFIBC) nationwide. See illustrative examples in Table 3.1 and Figure 3.5.

Table 3.1: NAFMIP Spatial Form: Multi-Nodal within Economic Corridors

HUBS AND SPOKES: Spatial Structure	**HUBS/GROWTH POLES: Anchor Investments/ Nodes to Generate Forward and Backward Linkages within the Growth Corridor**	**GROWTH CORRIDOR** (Growth Centers): **Spatial Framework and Direct Impact Area**
Pampanga	New Clark City Agri-industrial Hub (50 hectares)	Metro Manila-Pampanga-Tarlac Corridor
Pampanga	New Clark City National Seed Technology Park	Metro Manila-Pampanga-Tarlac Corridor
Taguig City	Taguig Agri-industrial Hub (Freshwater, Aquaculture and Urban Farming)	Laguna-Metro Manila Corridor

[1] See USAID Technical Guidance Brief, "Nutrition Sensitive Agriculture: Multi-Sectoral Nutrition Strategy 2014-2025"
[2] See PRDP, Enhanced Operations Manual (e-OM), June 2021.

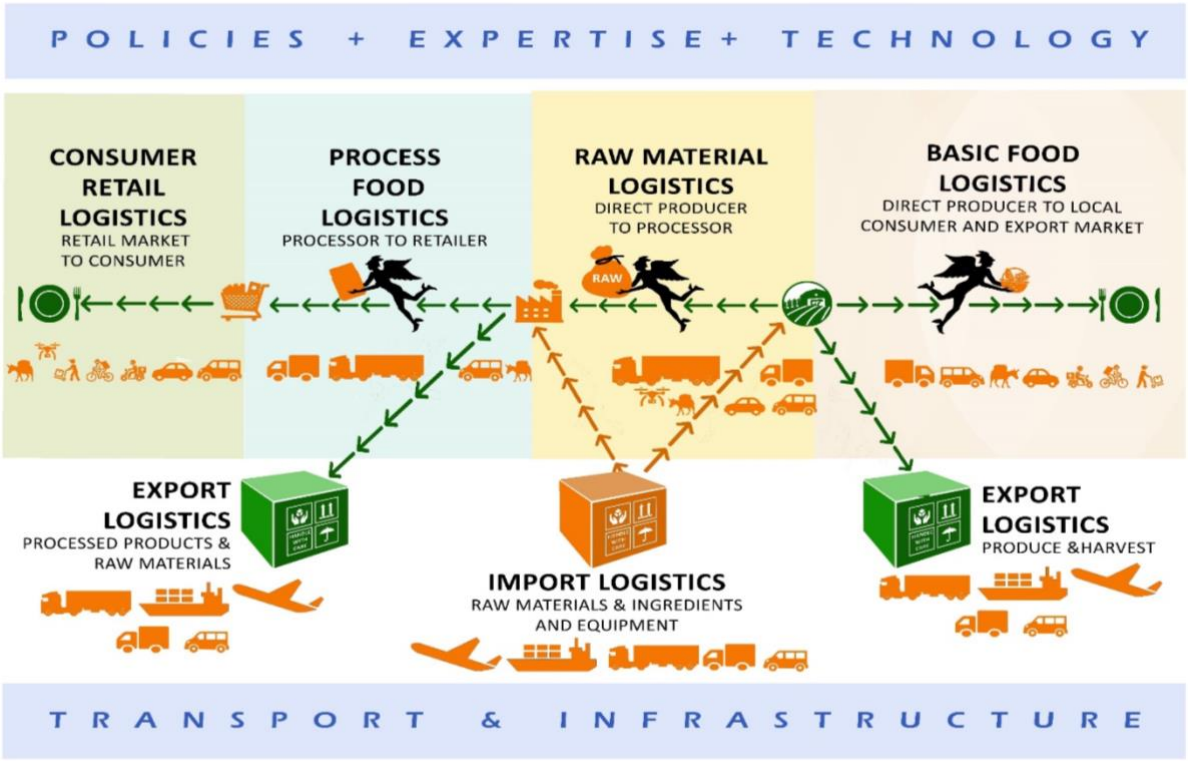
Figure 3.5: Multi-Nodal Spatial Form



The Role of Logistics in Food System Transformation

The NAFMIP spatial planning framework covers the Transport and Logistics Landscape generated during NAFMIP preparation (Figure 3.6).

Figure 3.6: The Logistics Landscape



The common understanding of logistics is the simple linear movement of a commodity from producer to consumer. Obviously, food production and logistics do not operate on a single commodity alone that will be grown or raised, then harvested and delivered to a customer. Figure 3.6 presents in a nutshell the different dimensions of logistics to complete the journey of an agricultural product. The full picture, however, includes layers of simultaneous processes of different magnitude and phases to complete the whole cycle.

Basic food logistics mostly applies to local consumption where commodities need not travel long distances to reach consumers, thus shortening food miles and requiring less market promotions. Transport requirements largely vary depending on the size of the local and distant markets.

Raw material logistics applies to pre- and postharvest processes wherein ingredients are sourced locally, regionally, or internationally to produce processed and/or semi-processed food products. Transport requirements usually involve long-haul heavy trucks from 10-wheelers to 24-wheelers. In the last three decades, truck configurations have resorted to wing-van types to easily unload the cargo on both sides unlike the old practice of dislodging at the rear end gate.

Food processing logistics pertains to the manufacturing industry that buys both produce or harvest and the ingredients as well as materials to transform the raw produce into food products with extended shelf life. In many cases, food manufacturers or processors develop new food products by combining raw materials and ingredients or sometimes improving the shelf life longevity to stay in the (market) competition. This whole exercise is designed for market resilience, longer shipping period, safe extended storage, and overall savings. Transport requirements largely vary depending on the size of the local and distant markets.

Consumer-retail logistics is the phase of logistics wherein manufacturers or "second source" (not the raw commodity producer, e.g., the middle man) brings the products to the market and mostly employ heavy promotions. This is a bond between the second source and the distributors/retailers to enable sale of the commodities. Transport requirements will vary with the distribution scheme and target consumption areas. In high-density urban areas, transport modes naturally downsize to penetrate smaller roads and settlements within the urban layout. In selected areas especially with difficult accessibility, the emerging transport mode in the past five years is the drone.

Import logistics. Commodities need pre-cultivation or pre-processing inputs before transporting to the market. Either raw material, ingredient, equipment or machine, parts/spare parts and manpower to train clients on how to operate and/or troubleshoot the equipment in the production areas. Transport requirements are mostly high-volume vehicles from cargo vans, 10-wheeler to 24-wheeler trucks. For inter-island goods movement, the logical mode is always by sea where cargo-handling and transport rates are significantly lower.

Export logistics is the movement of commodities, whether consumable food products or manufactured raw materials, to complete the cycle of production. Export logistics need not strictly refer to supply for commodities outside the local market. This may also refer to "general redistribution" to reach all possible markets.

The tangible *(transport and infrastructure)* and non-tangible *(policies, expertise, and technology)* elements of the logistics landscape are vital to its whole operability in the value chain and are all deep-rooted in investments. The transport infrastructure and logistics components primarily cater the postharvest phase in food production and commodity distribution to the target market while the pre-harvest phase mostly involves importation of raw

materials, ingredients, parts, and components of equipment and machineries required in the food system across all stages.

Supporting Pre- and Postharvest Activities, Local Industry, and Marketing

Logistics should include both pre- and postharvest agri-fishery activities in order to fully understand requirements of handing commodities and capture their optimum marketability. These activities will require facilities, machineries, and equipment to complete the whole production and consumption cycle. Using farm machinery and postharvest equipment and facilities increases the quantity and quality of produce, reduces losses, and lowers labor costs. The PDP reported that while farm mechanization in the country improved considerably from 0.52 horsepower per hectare (hp/ha) in the 1990s to 1.23 hp/ha for all crops and 2.31 hp/ha for rice and corn in 2011 *(Assessment of Sector Performance and AFMP 2011-2019 Implementation).* Likewise, without proper provisions for pre- and postharvest activities, the consequence could simply translate into waste of food products or raw material that ultimately distort the invested resources because of unrecovered revenue.

For products that are to be marketed live, poor harvesting techniques and improper postharvest handling will increase the risk of mortality of marine products, if not quality, prior to and during marketing. Harvesting is one of the most important activities of fish farming. For marine products, smell, taste, and texture of fish greatly influence consumer behavior, as these are affected by pre-harvest environmental and handling conditions. When aquaculturists control the pre-harvest conditions and handling of fish, a flavorful product of superior appearance can be provided to consumers. This would require adequate pre-handling and pre-harvesting facilities affecting quality of fisheries or marine products to ensure marketability.

In essence, pre- and postharvest facilities, machineries and equipment are vital in the whole distribution chain especially with commodities for consumption. Table 3.2 inventories the pre- and postharvest provisions to give an idea of the requirements in farm or fishing areas.

Table 3.2: Simple Inventory of Pre- and Postharvest Requirements in Agri-Fisheries

		FACILITIES		MACHINERIES		EQUIPMENT	
		Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
Agriculture	**Mechanized**	Seed Bank	Warehouse	Tractor	Payloader	Watering Truck	Delivery trucks
		Seedling Nursery	Barn with Controlled environment	Soil Cultivator	Reaper / Harvester		Thresher
		Fertilizer Barn	Cold-storage	Tiller	Mill (Generic)		
		Irrigation System	Drying facilities		Rice Mill		
		Watering / Sprinkle system					
		Research Laboratory					
		Barn (multi-purpose)		Customized / articulated machineries		Pick-up truck	

		FACILITIES		MACHINERIES		EQUIPMENT	
		Pre	Post	Pre	Post	Pre	Post
						Van / utility vehicle	
						Drone	
						Motorcycle / scooter	
		Others	Others	Others	Others	Others	
	Manual	Seed Bank	Ice plant (mostly shared with LGU)	Carabao / cow or sometimes horse	Animals for hauling harvest	Plow	Animals for delivery of products
		Seedling Nursery				Regular tools / eqpt: Scythe, axe, reaper, hoe, rake, shovel, pick mattock, manual sprinkler, pail,	
		Fertilizer storage				Animals for transport	
						Bicycle	
		Others	Others	Others	Others	Others	Others
Fisheries	Mechanized	Breeding Pond	Purging tanks	Fishing boat		Fishing gears	
		Nursery for fingerlings	Cold Storage	Fishing vessel		Life boats	
		Research Laboratory				Diving equipment	
		Customized fishing vessel complete with processing and canning, packaging equipment and cold storage					
		Others	Others	Others	Others	Others	Others
	Manual	Breeding pond	Purging tanks	Banca / raft		Paddle	
		Nursery for fingerlings	Ice Plant			Night lamp (to attract fish)	
						Fishing net	
		Others	Others	Others	Others	Others	Others

Source: NAFMIP Preparation team (NPT), 2022

Consolidating the list is just a basic step to building the whole landscape on pre- and postharvest requirements. Including mechanized and manual categories completes the picture of current practice for both and gives AF stakeholders a better grip of what policy making and investment could cover. In all of these considerations, strong local industry support is required to ensure the sustainability of the whole scale of operations.

Local Industry and Market Support

NAFMIP highly recommends that the pre- and postharvest facilities, machineries, and equipment be localized or locally manufactured to ensure that the aftersales condition is sustained to maximize usability. Table 3.3 compares imported/foreign machinery with locally-manufactured ones, presenting the advantages of the latter.

Table 3.3: Comparative Assessment of Industry Support in View of Local and Imported Sourcing for the Pre- and Postharvest Provisions

AREAS OF COMPARISON	IMPORTED / FOREIGN	LOCALLY MANUFACTURED
Cost, taxes and economic contribution	Usually higher cost	Fair market price, normally lower
	Importation taxes apply	Local tax applies
	Enriches foreign companies	Attracts local and foreign investment
	Increases importation expense	Generates local employment
	Increased costs due to "middleman" transactions	Generates business
Quality	Normally world-class	Competitive and improving
	Normally follows set of international standards	Technology transfer allows local industry to catch up and become globally competitive
Readiness and availability	Availability is not always secured	Locally availability ensured
	Requires long lead time before delivery	Short lead time
	Aftermarket stocks of parts takes tedious and costly arrangement	Secured availability for aftermarket stocks under sovereign agreement
	Technical specification may not be divulged for replication copyrights	Parts and accessories can be commissioned for fabrication locally
		Fast delivery and logistics support is strong due to presence of delivery services[3]
Opportunities and negative impact	Importers are enriched	Strengthens technical capability locally
	Middlemen, salesmen, or traders are enriched	Widens technical education for future generations of learners
	Cargo handlers	Generates skilled manpower
	Creates employment for a few	Creates employment for many
	Captured market	Dependency on imports
	Tendency to increase cost due to situation	Hampered operations due to unavailable parts or accessories
	Using imported raw materials may become a bottleneck if supply is not secured	Free market competition can further lower prices
		Small players can be given competitive chance
		Raw materials and their alternatives may be tapped
		Opens new horizons in materials research and possible commercialization

Source: NAFMIP Preparation Team (NPT), 2022

[3] Domestic logistics is significantly effective and cost efficient with the emergence of delivery services (Grab, Shopee, J&T Express, etc.).

The local social capital is strong and the level of technical skills is high, which makes the Philippines one of the premier exporters of skilled labor and professionals globally. NAFMIP vouches for institutionalizing support to the local mechanization industry for developing pre- and postharvest provisions outlined in Table 3.4. Further, strong, small-and-large scale capacity-building programs with appropriate agencies like TESDA, DTI, DOST, DENR, DILG and DOTr, among others, are needed.

Digital Infrastructure

Digitalization has great potential in the agri-fishery sector, as outlined in Table 3.10.

Table 3.4: Common Digital Applications in Agri-Fisheries

APPLICATIONS	BRIEF DESCRIPTION / REMARKS
Weather monitoring	A good reference for the climate and weather conditions that can affect agri-fishery activities
Geospatial monitoring	Spatial planning for mapping commodities on where they are abundant or scarce, where plant or animal species can possibly be grown or raised. This is covered by NAFMIP
Materials research	For packaging, storage, preservation, others
Biotechnology	Agri-fishery research for ingredients or raw materials that may be used for medical or commercial purposes
Robotics / mechanization	Robotics does not refer to replacement of farmers or fisherfolk but may be applied on the laborious tasks that can be assigned to workers to make their tasks lighter and less stressful or reduce risks. This may cover specialized farm implements for plating or harvesting, and for fishing vessel facilities for cleaning, processing, canning, and packaging.
Animal monitoring	Basic application for herd or fish mapping using drones and satellites
Precision application of water and chemicals	For water-controlled farming, chemical analysis and monitoring
Digital and wireless technologies for data measurement	Applies to a wide range of information gathering in farms, mountains, valleys and even desert areas
Plant symbiosis research	The natural environment allows plants to co-exist naturally but may result to lower yield or even eliminate each other when mixed with other plants when humans decide
Delivery tracking	Using geographic information system in transport and logistics
Basic traffic monitoring	Travel information for finding the shortest and fastest safe routes for transport of goods

Source: NPT

The Integrated Spatial Planning Framework

Spatial planning, in general, involves an attempt to plan various processes related to social, economic, and environmental change that would bring about certain ends, together with the drawing up of plans, including maps or diagrams, that would indicate where socio-spatial

activities should take place. It is also recognized that spatial planning can influence the future spatial distribution of activities and balance demands for development with the need to protect the environment and to achieve social and economic objectives at the same time (Yoshida et al., 2020). The Integrated Spatial Planning Framework or ISPF of NAFMIP is mainly developed to address similar issues especially with the growing demand for food and agricultural products in the country that are highly driven by rapid population growth as well as competing use of resources. It is believed that without proper planning, results of any effort may lead to unsustainable use of resources, threats to biodiversity, further aggravation of land degradation, decreased ecosystem services, and increased climate change vulnerability, among many others. *The ISPF also supports the shift of focus of the Department from a single commodity to a commodity system-based approach.*

The ISPF is mainly premised on an integrated land use planning approach, which takes into account not just the systematic assessment of land and water potential but also incorporates suitability, climate change vulnerability, and sustainable land management. Integrated planning also portrays productivity and sustainability of a given land use system, which is mainly determined by the interplay and interaction among different resources, climate, and human activities. This interaction can lead to either a favorable condition (sustainability and resilience) or toward an unfavorable condition (degradation and vulnerability).

Moreover, the ISPF is a geographic approach to spatial planning. In general, it comprises five elements, namely, (1) data capture and measurement, (2) data management, (3) spatial analyses, (4) map visualization and data statistics, and (5) actions and interventions. Data capture and measurement for planning include data in several forms coming from different sources. Therefore, the system must be able to capture this feature, or at least can transform these varying types of data into a common format where the system may operate. Data management, on the other hand, organizes the different captured datasets and collates them in a manner that can be easily understood and accessed/retrieved by various users. This means that development of the system requires a platform that can handle geographic datasets and allow or provide for other functionalities toward data integrity and performance in conducting various processes and analyses. The third element is on spatial analysis toward developing workflows or procedures leading to generation of outputs supporting various decision-making processes. The fourth element is map visualization and data statistics. This particular stage of the geographic approach aims to provide visualization of outputs in many forms, from thematic maps to 3D maps or through various charts, graphs and even with the use of an operational dashboard. Finally, the fifth and last element involves identifying actions and interventions based on the outputs generated from the analyses; and are shown in different types of information. These actions contribute to better decisions; generate greater efficiency in managing money, other resources, and time; and finally, enable more effective communication.

The ISPF mainly supports the commodity system-based approach that highlights different major commodity systems anchored on their agro-ecological distributions. These five commodity systems are the **rice-based**, **corn-poultry- livestock-based**, **coconut-based**, **aquaculture and coastal fishery-based**, and the **geographically specialized commodity systems** (elaborated in Chapter 4). Illustrated in Figure 3.7, the main goal of the ISPF is to provide a way of improving the decision-making process especially in identifying potential areas for the different commodity systems and aid in eventually identifying potential interventions in the area. The framework captures well the elements of suitability, climate change vulnerability, and sustainable land management; and can aid in improving how to identify potential actions or interventions. This also includes pinpointing the Climate Risk Corridors, which are the usual or regular paths of typhoons, to determine the appropriate cropping patterns in those areas along such typhoon paths.

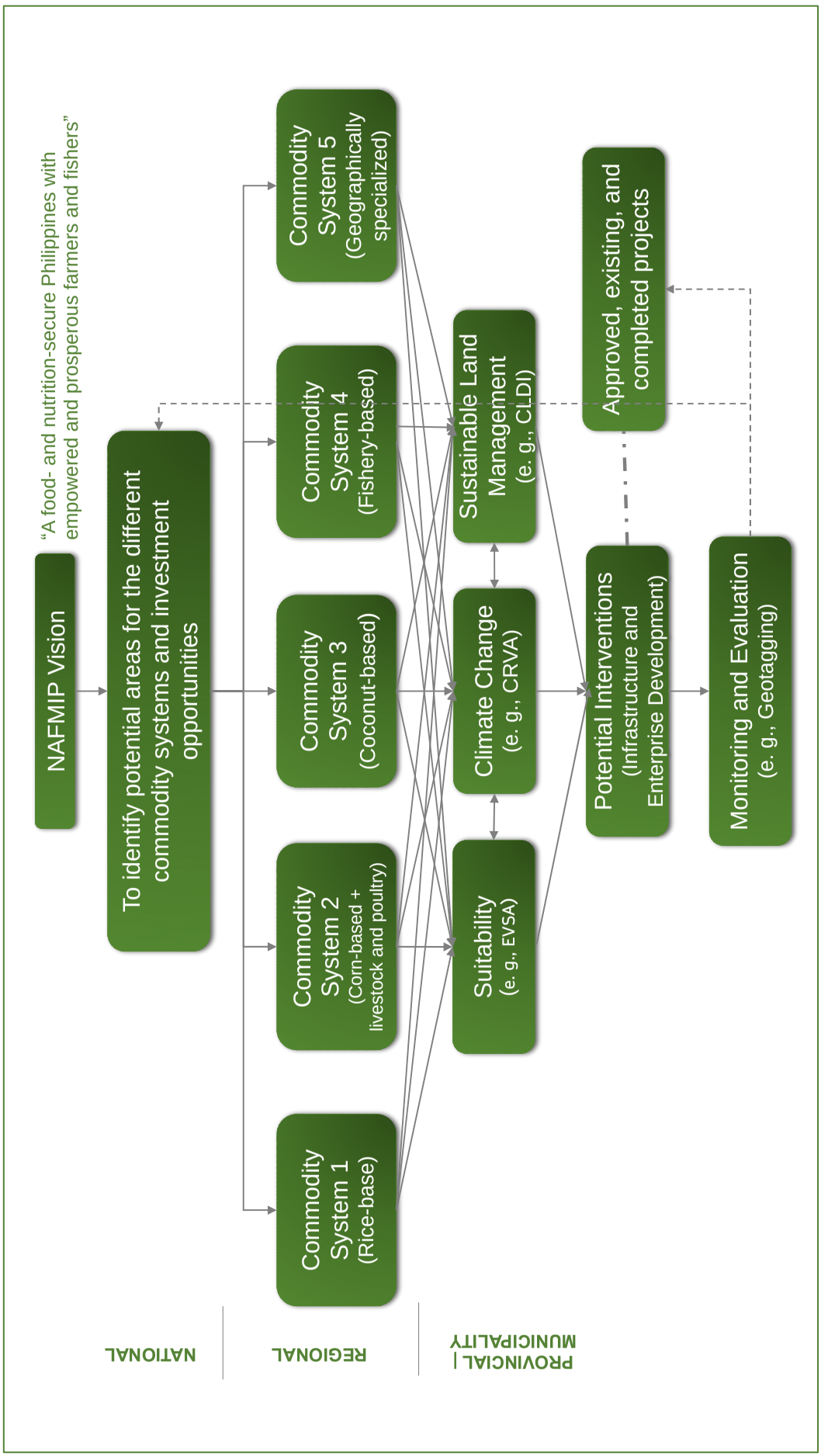


Figure 3.7: The Integrated Spatial Planning Framework

The ISPF has also been divided into five general stages as illustrated in the ISPF workflow (Figure 3.8), namely, (1) identification of potential areas for the different commodity systems; (2) prioritization of anchor commodities and possible linked commodities; (3) application of spatial-based tools and methods; (4) integration for improved decision making; and (5) identification of proposed actions and interventions.

The first stage of identifying potential areas for the different commodity systems uses an overlay process of various criteria such as land cover, protected areas, forest cover extent, and slope, among many others. The output from this stage is a map showing the distribution of potential areas for the different commodity systems. After this step, the different regions or provinces will start identifying the priority anchor commodities in the area. Once the anchor commodities are identified, possible linked commodities are likewise determined for each anchor commodity.

The next step is to conduct various spatial based tools and methods to ensure that other important elements in the plan will be considered such as suitability, climate change vulnerability, and sustainable land management. For suitability, the Expanded Vulnerability and Suitability Assessment (eVSA) is to be applied; for climate change vulnerability, the Climate Risk Vulnerability Assessment (CRVA) is to be used; and for sustainable land management, the Composite Land Degradation Index (CLDI) is recommended. All these tools and methods were developed by the Department and are being used by specific divisions, units, or programs of the organization. In ISPF, these tools will be utilized to achieve holistic and integrative planning during NAFMIP implementation.

It is imperative though that these data be made available to various offices, both at the provinces and regions, to enable the DA planners to more comprehensively incorporate all these elements in developing their plan and guide them in the eventual determination of various projects in the area. Once these processes have been conducted, the next step is the integration of these outputs. The completeness of information from the different spatial-based methods and tools is vital in this part of integration as this will pave the way in generating sound decisions and aid in identifying potential interventions.

For information that remain missing, the concerned office or unit should ensure that the information is collected in time for the next planning cycle to ensure all the information or inputs needed are available by then. The eVSA would indicate the priority and linked commodities in the area, either at the provincial level or regional level. Meanwhile, the CRVA will provide climate risk vulnerability information, specifically on hazard, sensitivity, and adaptive capacity that when combined would provide the overall vulnerability picture. Further, CLDI describes the extent of land degradation in the area based on type, degree, and spatial extent. The last step in the workflow, identifying actions and interventions, would require the output from the previous stage and additional information of completed, ongoing and approved projects in the area. This would help bridge the gap to prioritize projects that would address issues related to suitability, climate change vulnerability, or sustainable land management.

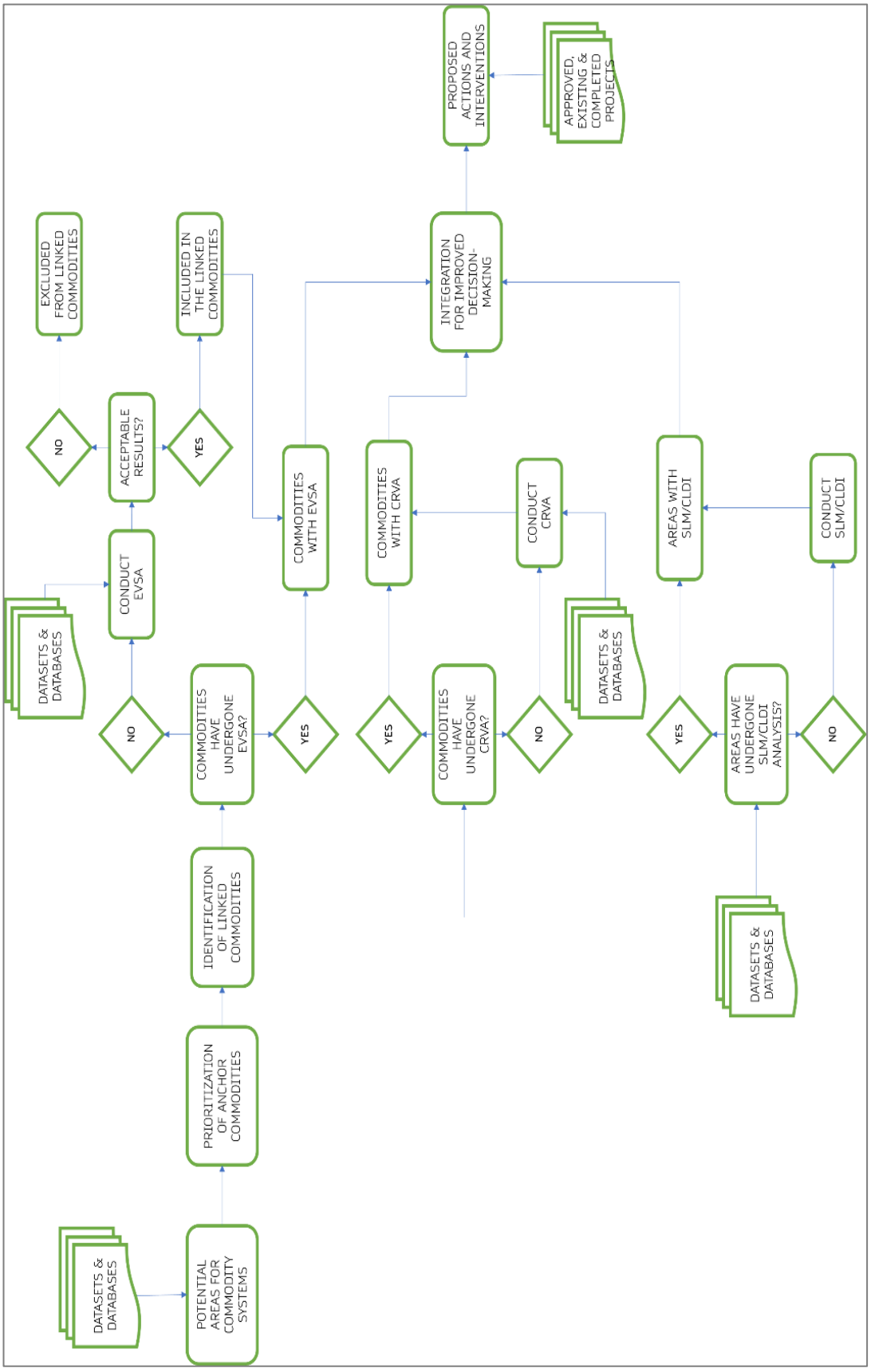


Figure 3.8: Detailed Workflow of the Integrated Spatial Planning Framework

NAFMIP implementation will include different activities to build up and integrate the ISPF within regular planning processes for the AF sector.

1. First and foremost, is the need to **harmonize the different spatial-based tools or methods** currently being used in the framework. This will improve the flow of data needed to generate the necessary maps, prevent any unnecessary use of correlated layers, and use only a single system. Further inclusion of relative weights to various factors may also be considered to capture the uniqueness or peculiarities of specific provinces or regions. Further, additional layers will be included toward improving or harmonizing tools with those of the Network of Protected Areas for Agriculture and Agri-industrial Development (NPAAD) and the Strategic Agriculture and Fisheries Development Zones (SAFDZ). This would ensure that prime agricultural areas are protected especially from being converted into other land uses or zones.
2. Once the harmonization of tools has been achieved, **capacity building of various staff in the use of spatial-based tools and analyses** would ensure that all concerned units will be able to undertake the necessary task in using the system. This would enable consolidating data from ground up to the national level in a systematic and comprehensive manner. This requires all focal units in planning at various levels having personnel or staff who are knowledgeable to use geospatial-based technologies. This would guarantee that the developed tools will be utilized properly and that outputs can be applied during planning or in any other activity or program where these tools will be deemed necessary.
3. Finally, DA needs to create/designate within ICTS a unit that would **lead the upkeep and management of all geographic datasets and other relevant datasets and information** of the Department that are essential in planning. These geographic datasets should be made a component of the NAFMIP Management Information System that will be created as part of the NAFMIP RBME system.

Establishing Agri-Fishery Industrial Business Corridors

The framework of the **agri-fishery industrial business corridor (AFIBC)** highlights linking economic agents along a defined geography. AFIBCs will connect economic nodes or hubs, linking demand and supply, that are usually centered on urban areas where large amounts of economic resources and actors are concentrated. However, the economic benefits from these corridors cannot be gained in isolation, but rather from its participation in integrated economic networks, such as global and regional value chains and production networks (Bruner, 2013).

The AFIBC as a growth corridor is a “smart” tool for integrated territorial planning that combines interventions in infrastructure (and related services) with specific actions to boost key agriculture sectors (Nogales, 2014). Its objective is to catalyze the development of rural areas by fostering sustainable agricultural development through value chains with agricultural clusters along existing infrastructure corridors while establishing transformative public-private partnerships and using catalytic financing to attract capital from varied sources—domestic and international, public and private. The agricultural growth corridors lie on existing infrastructure backbones, which have to be enhanced and extended. Infrastructure is a main prerequisite for economic development, and for agriculture. The corridor model is a way of breaking an impasse and catalyzing large volumes of private investments, enabling rural regions to develop and local agriculture to become sustainable and internationally competitive (de Cleene, 2014).

The aim of developing agricultural growth corridors is to link different territories or areas together to catalyze agricultural development through infrastructure and market linkages. Growth corridors can vary in their geographical scope, their objectives, and underlying drivers.

In terms of geographical scope, it can aim to connect ports and thus promote international trade flows to surrounding hinterlands, sometimes across borders, and thus take on a regional dimension. The nature, and particularly the production potential of the areas being connected, as well as the nature and volume of trade flows between regions and countries, and the balance of inflows and outflows determines the types of investments to be made in these corridors, and the degree to which different segments of the population can take advantage of the corridor in an inclusive way.

The objectives of growth corridors have also been evolving, ranging from transport and logistics corridors linking landlocked countries or regions and ports, to so-called development corridors, that covers a wider range of additional development objectives and accompanying investments around the central infrastructure. These corridors may be viewed simply as linking hinterlands to ports and thus international trade flows to surrounding hinterlands. This can include national or cross-border hinterlands, taking on regional characteristics when including two or more countries (Byiers et al, 2016).

AFIBCs have six defining features, as follows:

1. The first is taking on **a business and market view of agricultural development**. The main focus is developing markets along the value chain for strategic commodities that would increase competitiveness of agriculture at the farm level as well stimulate the development of agri-processing and agribusiness ventures at the regional level. This would create shared value across the sector, which is necessary to establish sustainable development.
2. The second feature is the **cluster approach or hub development** that enables a wide number of both smallholder and medium to large-scale farmers/fisherfolk alike to attain economies of scale and access affordable services across the value chain in a time of rapid urbanization. Smallholder farmers/fisherfolk especially need to be provided with access to important inputs such as seeds and fertilizers as well as transport, service facilities, power, and water.

3. The third feature is **investment in infrastructure** such as ports and roads that are necessary to be able to link farmers and fisherfolk to the markets for their inputs and outputs. It would draw on existing physical infrastructure such as roads and railways, electricity grids, telecommunications systems.

4. The fourth is the **transformative and cross-sector multi-level nature of the public-private partnerships** that are aimed at forging greater linkages between modern agribusinesses and smallholder farmers/fisherfolk and their communities to harness the various partners' diverse capabilities to the best advantage. By coordinating their efforts, stakeholders can mitigate risk, leverage their contributions, and build on each other's competencies to harness market forces for sustainable growth.

5. The fifth is the **innovative and multilayered approach to innovative financing and managing risk at different stages of the value chain** that is vital to attract private-sector investment. Risk is mitigated through weather-indexed insurance schemes, warehouse receipting, catalytic funding, and patient capital. Appropriate rural financing with a long term view requires access to longer term patient capital (de Cleene, 2014).

6. Finally, a key determinant of success is the **active engagement of leadership in promoting the wider perspective** necessary in ensuring the early success of such initiatives. While we may consider the AFIBC approach as key in transforming the agri-fisheries sector, ownership by the country's leadership, engagement of country champions, and most importantly, public support for the approach are critical in the success of the agricultural growth corridors.

The AFIBC Program

The AFIBC is a growth corridor program that includes a set of coordinated actions to ensure a critical mass of investments with the ability to transform the territory. Growth corridor strategies are aimed at coordinating 'soft' and 'hard' public and private investments around infrastructure backbones in the country. Intrinsically, corridors facilitate multi-stakeholder dialogues to overcome coordination failures and bottlenecks related to market linkages or producer-relations to secure supply chains. Corridors and other spatial development initiatives (SDIs) have this coordination potential that are conducive to generating multi-stakeholder strategic alliances for development not only within or between countries and regions, but also between industries, farmers/fisherfolk, people and firms (Nogales, 2014).

Figure 3.9 shows the important elements of the AFIBC program. This includes the entire value chain from input supply to the market for distribution. The strategic pillars supporting the entire value chain include the development of infrastructures, promotion of investments, and the development of agribusiness with due consideration of the climatic and natural environments. On the other hand, the major spatial development initiatives for operationalizing the AFIBCs are the agri-based anchor and cluster projects with participation of local communities and small business enterprises; core transport infrastructure and freight logistics; agri-industrial parks/ technopoles; and special economic zones. The three forms of investments in the AFIBCs include hard investments, soft investments, and orgware investments.

The purpose of developing an AFIBC is to enhance the mechanisms for engaging various stakeholders and optimize investments from public and private sectors to accelerate inclusive and broad-based development in the agriculture sector. Growth corridors are an integrative strategy. In particular, the establishment of these business corridors spurs industrial growth, creates jobs, upgrades infrastructure, aligns infrastructure development with urban and social agglomerations, unifies domestic markets, and links production centers with global value chains, decentralizing development away from the country's capital city and creating markets in the lagging regions.

When adequately designed and implemented, agricultural growth corridors substantially and positively impact upon economic development, along with social and environmental sustainability. For farmers, the benefits would include: (1) reduced costs of agricultural inputs, improving farmers' profitability; (2) reduced prices of goods consumed by local farmers, improving farmers' standard of living; (3) increased income from selling agricultural products; and (4) easier access to finance and support services.

By nature, corridor programs are complex and resource-intensive. This means that behind the leading corridor institution, a group of development partners and private companies collaborate in designing and implementing operations. As such, the AFIBC program will employ a mix of strategies to mobilize resources to sustainably meet its financing needs over time. In addition to continued support from the main champion (public authorities), the AFIBC program shall coordinate with other development partners and international community (donors, IFIs and technical agencies) for greater financial support. Often, the interests of donors and lenders are on strategies for economic growth and development, commercializing small farmers, linking producers to value chains, removing barriers to trade and business, efficient agricultural market linkages and not just productivity, and renewing interest in the importance of infrastructure.

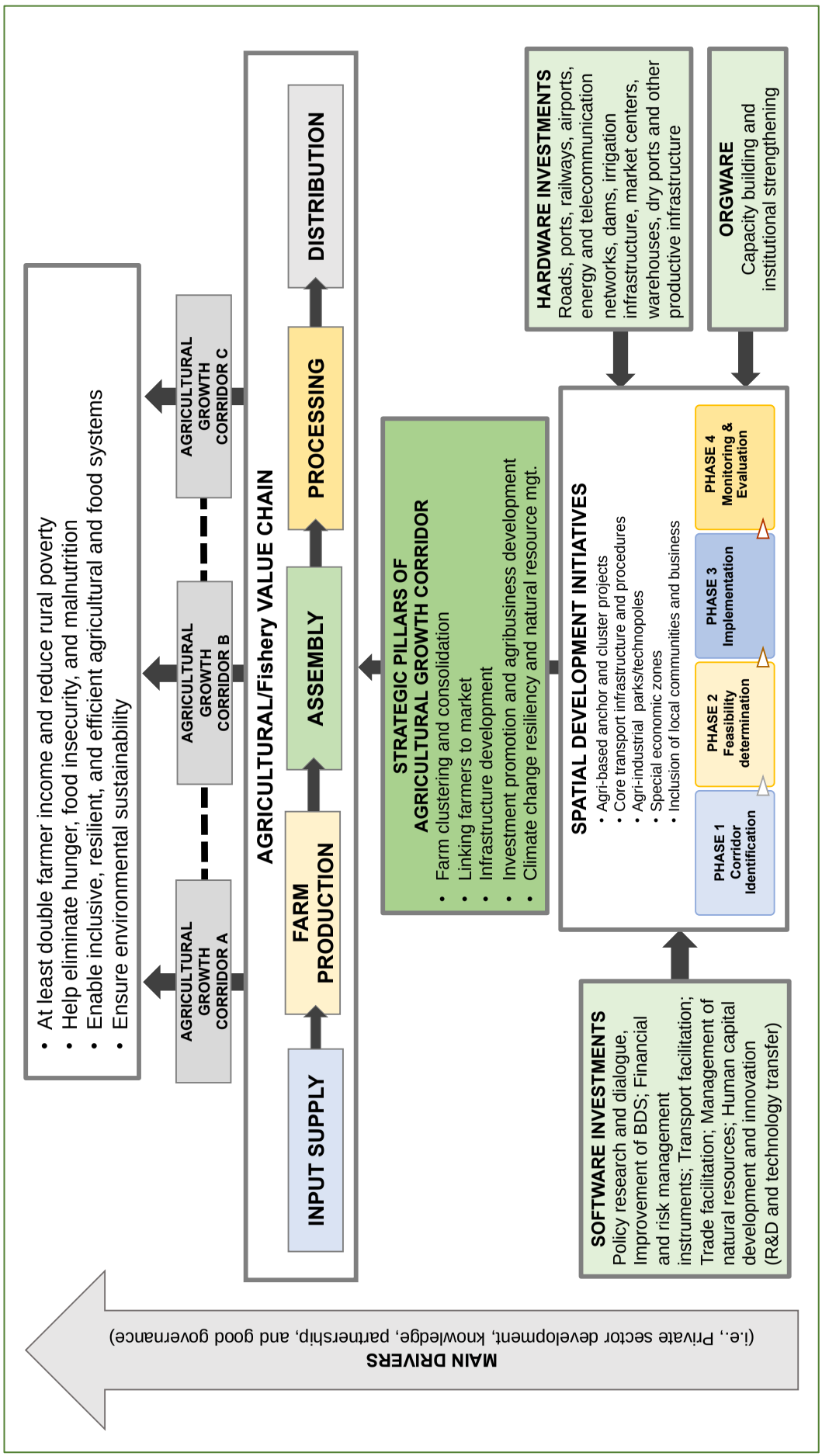


Figure 3.9: The Agri-Fishery Industrial Business Corridor Program

The program will also tap private investors and civil society for bottom-up initiatives through public-private partnerships (PPPs). These can be called PPP corridors or multi-stakeholder partnership corridors. The AFIBC program will progressively scan and access some of the newer and specialized global funds, including those supporting climate change and food security.

AFIBC Objectives and Strategies

Objectives

Three goals. The spatial development objectives tend to link to three goals: (1) *enhancing competitiveness* (by promoting trade and investment, optimizing the use of infrastructure and encouraging value-addition, among others); (2) *ensuring social cohesion*; and (3) *promoting the conservation of natural resources and cultural heritage*. This triple goal of economic development, balance, and protection (i.e., avoiding the production of negative externalities) must be reconciled when planning the desired spatial transformation of a country or region.

Intervention modalities. Among the various modalities of intervention to transform classic transport corridors into effective economic corridors that will work for the agri-fisheries sector, what is common among them is the need to design a holistic intervention that combines a smart mix of soft and hard instruments as well as orgware to reduce the cost of doing business in the area and facilitate start-up and operation of business ventures in these corridors. The **hard interventions** include infrastructural elements such as roads, ports, railways, airports, energy and telecommunications networks, dams, irrigation infrastructure, market centers, warehouses, dry ports, among others.

The **soft interventions** are those that deal with developing institutions and human resources aiming to build capacity to promote economic growth, among them: (1) policy research and dialogue (e.g., border policies and national policies dealing with land use, standards, and public-private collaboration), treaties and streamlining of procedures to improve ease of business in the corridor (e.g., legislation, regulation, and administration); (2) improvement of business development services, such as agricultural marketing, extension services, and investment promotion; (3) financial and risk management instruments; (4) transport facilitation (e.g., shipping and port services, trucking, railways, handling, warehousing, customs, insurance, banking, and freight forwarding) and trade facilitation, including customs cooperation; (5) incentives for the development of regional integration initiatives; (6) management of natural resources; (7) human capital development and innovation (R&D and technology transfer), among others. However, while software interventions require fewer financial resources than the infrastructure ones, they improve capacities and institutions that make it possible to increase returns to hard investments.

The **orgware interventions**, on the other hand, refer to capacity building and organizational strengthening of both dedicated corridor institutions and national and regional institutions involved in the implementation of the corridor program (Nogales, 2014).

Given these modalities, the different types of activities that are supportive of the different corridor objectives and spatial development initiatives (SDI) may be grouped into four categories (Nogales, 2014): These would include the (1) hard infrastructures; (2) soft infrastructures that include the accompanying regulatory reforms required for smooth clearing of goods at ports and borders, one-stop borders, non-tariff barrier monitoring, transport market structure, security and other regulations and policy measures; (3) Investment promotion through investment plans, instruments, and incentives to promote investment in industrial processing zones, growth poles, clusters promotion, or specific related investments around out-grower schemes, postharvest storage and processing, etc.; and (4) multi-stakeholder

collaboration which refers to partnerships to overcome various challenges relating to market linkages, producer-relations to secure supply chains, among others.

Corridor Selection Strategies

According to Nogales (2014), a successful corridor strategy starts with the suitable selection of geographic areas, i.e., those with adequate economic potential and capacity to develop and maintain sustainably competitive advantage over time. This can follow two directions. One direction is to select sectors or industries. Two types of industries could be targeted: (a) those with strong current performance, which will yield near-term economic benefits, but also (b) those with high future potential to ensure, to the extent possible, a healthy diversification of corridor activities in the medium and long term. Once identified, the next step is to identify within the corridor area the growth centers or nodes of high economic density where dynamic companies, their suppliers and their customers are geographically concentrated, forming clusters with sustainable competitive advantage, grounded both in current and potential economic performance. After selecting the potentially strong industries and having identified their regional groupings, it is important to assess the status of the major connective infrastructure linking clusters by roads, railroads, and air connections and, if needed, study the feasibility of completing, complementing, or upgrading such infrastructure. It may be useful also to assess the growth potential of adjacent areas and which other economic activities could be promoted along the corridor.

Another direction is to select “star connecting firms” according to certain criteria and a rule for ensuring the effectiveness of the intervention, the five-to-one (5:1) rule. This rule means that the project engages in a technical assistance intervention only when it is reasonable to expect a client’s sales to augment at least five times the cost of the assistance in question. The selection of star firms eventually reveals the competitive structure of the corridor, which usually confirms the findings of pre-feasibility studies carried out to assess the competitiveness of sectors or industries. This means that if these studies were adequately conducted, there should not be much difference between the targeting in the first (star sectors and industries) and second (star firms’) options. The difference, as already explained, would be the possibility to discover out-of-the-box business opportunities using the star firms’ model, which relies on the natural selection of products/value chains/sectors, as opposed to an *ex ante* targeting.

Whichever direction is taken, the next steps would be to steer both public and private investment into the corridor areas targeted for development. It is important to remember that resources should be focused on helping the corridor to achieve its maximum economic potential and not be distributed so widely—something that might happen for political reasons, e.g., to reach a wider base of citizens—that they fail to have the intended impacts. The next steps would be to learn from successful corridors in one region or (sub)sector before spreading investments to others.

Overall, it is important to note that each economic corridor has different factor endowments, strengths, constraints, and complementarities. As such, each corridor will try to develop economic activities for which they enjoy competitive advantages. This also applies to agriculture and its different subsectors and value chains. Even within a corridor, each route tends to specialize in certain sectors in order to make the most of underlying comparative advantages and complementarities.

Spatial Development Initiatives

The term spatial development initiatives (SDI) includes the concepts of economic corridors, clusters, industrial parks, SEZs and technopoles, among other related initiatives that represent an agglomeration of economic activity in a specific location where businesses gain advantages through co-location. SDIs are publicly driven or generated projects that contribute positively to territorial development on different scales. As their key features, SDIs are: (1) designed and implemented based on specific geographic linkages; (2) consist of a cluster of mutually reinforcing development projects established to help a specific geographic area; (3) a component of the institutional framework to facilitate their design, implementation, and monitoring and (4) link infrastructure and large-scale economic sectoral investments in a defined geographic area (Nogales, 2014).

As part of the integrated planning of infrastructure and agribusiness interventions, AFIBC corridors may come in combination with several types of SDIs in a geographic area, as follows:

1. ***Agri-based clusters.*** An agri-based cluster is a concentration of producers, agribusinesses, and institutions that engage in the same agricultural or agri-industrial subsector, and interconnect and build value networks when addressing common challenges and pursuing common opportunities. In this context, a value network is the aggregation of: (a) vertical relationships (e.g., contract farming) among suppliers of raw materials and production inputs, agricultural producers, processors and exporters, branded buyers and retailers; (b) horizontal relationships among producers, which take the form of growers' cooperatives or various types of smallholder business consortia; and (c) support relationships between producers and facilitating organizations (e.g., local governments, business service providers, research institutes, universities and non-government service organizations) that reinforce the quality, efficiency, and sustainability of the chain (Nogales, 2014). Two cluster farming approaches:
    - Area based - farmers come together based on the proximity of farms and trading posts; and
    - Commodity-based - farmers plant the same type of crops and combine their produce to achieve a higher volume.
2. ***Agri-industrial parks***. An agri-industrial park is an area of intensive, contiguous, parcels of land for agricultural production that seek to integrate all facets of the agricultural value chain from pre-production to production, post harvesting, and marketing. The agri-industrial park comprises three key distinct but interrelated basic components:
    - The farmer production support unit (FPSU), a rural smallholder farmer outreach and capacity building unit. The FPSU does primary production and provides extension services including mechanization.
    - The agri-hub (AH), a processing, packaging, logistics, equipment hire, innovation, and training unit
    - The rural urban market center (RUMC), with three main purposes: (a) linking and contracting rural, urban and international markets through contracts; (b) acting as a holding-facility, releasing produce to urban markets based on seasonal trends; and (c) providing market intelligence and information feedback to the AH and FPSU, using latest Information and communication technologies.
3. ***Special economic zones (SEZ) or ECOZONE***, selected areas with highly developed or potential to be developed into agri-industrial, industrial, tourist/recreational, commercial, banking, investment, and financial centers. An ECOZONE may contain any

or all of the following: industrial estates (IEs), export processing zones (EPZs), free trade zones, and tourist/recreational centers.

4. ***Agri-incubation***, a process focused on nurturing innovative early-stage enterprises that have high growth potential to become competitive agribusinesses by serving, adding value, or linking to farm producers. The agribusiness incubation process typically provides some or all of the following: (a) shared facilities and equipment; (b) business development, market access, and technology assessment services; (c) financial services; and (d) mentoring and networking. Agribusiness incubators open new entry points, which actors in the agricultural value chains can use to access new markets.

Public-Private Partnerships

The “Agri-PPP or a PPP for agribusiness development is defined as a formalized partnership between public institutions and private partners designed to address sustainable agricultural development objectives, where the public benefits anticipated from the partnership are clearly defined, investment contributions and risks are shared, and active roles exist for all partners at various stages throughout the PPP project lifecycle” (Rankin, et. al, 2016).

The partnerships between the public and private sectors have two main benefits. First, within the country, they broaden stakeholder engagement to farmer associations, civil society organizations, local private sector firms, multiple ministries, and local governments. Second, the partnership becomes a vehicle for coordinating and reinforcing global support for on-the-ground corridor activity. This support is not just financial, but also includes expertise and knowledge about efficient new approaches to agricultural and local development.

Four types of potential public-private partnerships under the AFIBC program are possible. Table 3.5 shows the potential actors, the description of these types partnerships as well as the the kinds and activities under each type of collaboration.

Designing and Implementing Agri-corridor Initiatives

Establishing agri-corridor initiatives involves five phases (Figure 3.10), as follows:

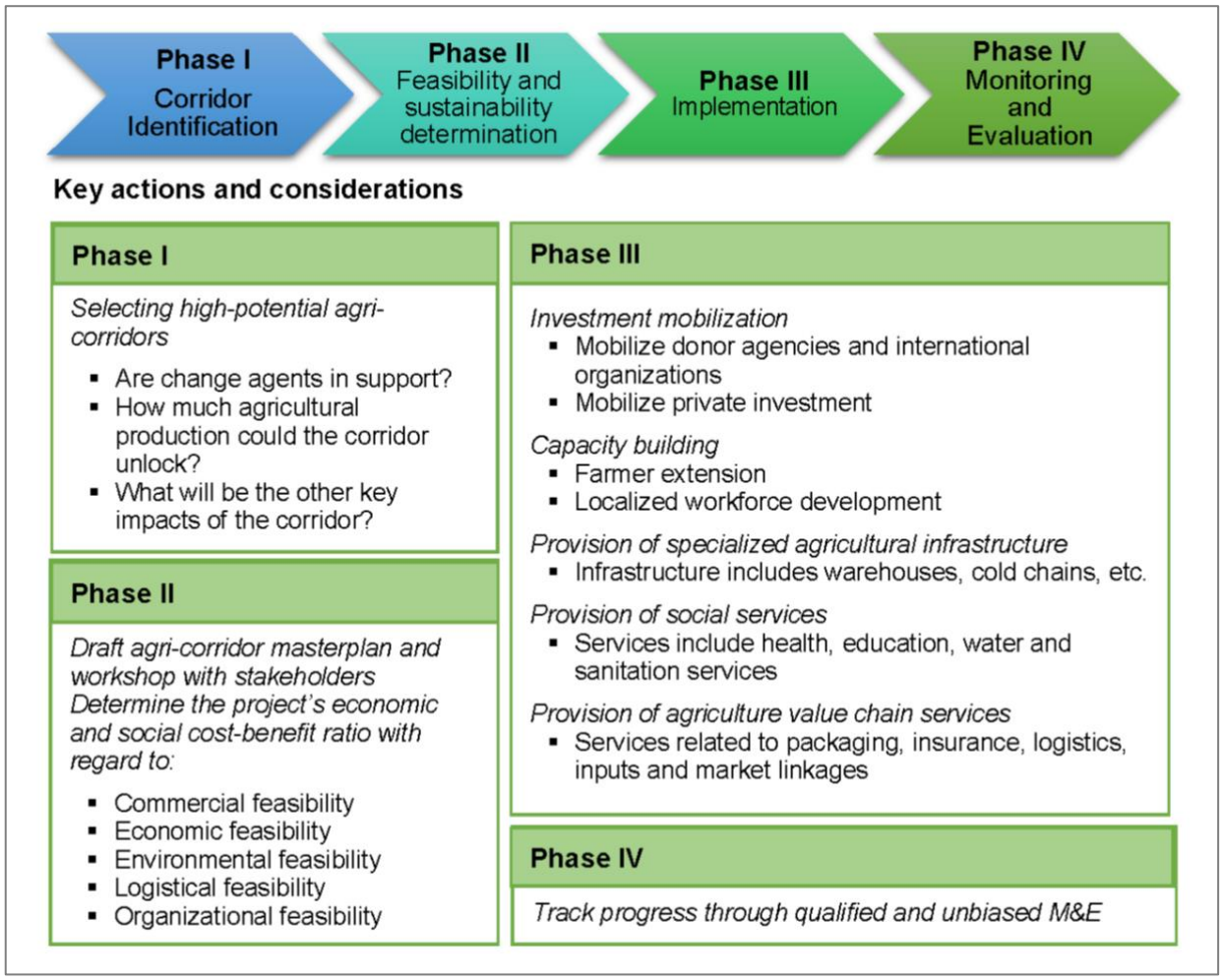
1. ***Select high-potential agri-corridors.*** Determine whether a proposed corridor has the necessary prerequisites to justify investments. A pre-feasibility study would help assess the orders of magnitude of the agricultural production likely forthcoming from the agri-corridors. Also, assess the impacts of lower costs of inputs, lower costs of farm-to-market transportation, potential for mobilizing agri-enterprise investment, and likely costs of putting in not only the transportation infrastructure but the necessary basic services (both social and commercial) without which such investment would not be likely to emerge. Also assess where the catalytic change agents are on board, including the national government and financial backers of the corridor (Nogales, 2017).
2. ***Determine feasibility and sustainability.*** This would normally be funded by the national government, international financial institutions (IFIs) or major donor agency. This study looks at the agri-enterprise clusters already existing in the country and the extent to which the corridor production will be buoyed by backward and forward linkages. Relevant ongoing or completed studies under the Industry Strategic Science and Technology Programs (ISPs) administered by the Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (PCAARRD) will inform this phase. Also worth factoring are initiatives and outcomes of PCAARRD projects like "Development of Smart Food Value Chain Models for Selected Agricultural Products" and Project SARAI (Smarter Approaches to Reinvigorate Agriculture as an Industry). Benefits should be scrutinized for over-optimism. The study will look at the costs taking

Table 3.5: Types of Potential Public-Private Collaborators under the AFIBC Program (Nogales, 2014 and Rankin et al., 2016)

TYPE	ACTORS	DESCRIPTION	EXAMPLES OF ACTIVITIES
Enhancing the agricultural value chain	Agribusiness firms and farmer organizations	A collaboration (usually informal) facilitated by corridor centers between an agribusiness firm and farmers, e.g., a partnership built around a contract farming arrangement	• Collaboration along the different points in the chain that commonly include postharvest interventions to improve the bulking and handling of commodities, processing and packaging, etc. • Co-funding or grants to farmers or their organizations for implementing quality standards on-farm and associated certification costs • Access to support services, including technical skills and training that may be provided by either partners or outsourced • Contract farming agreements (forward production contracts) between the lead private partner (buyer of raw material) and farmers (or their collective organizations)
Joint agricultural research, innovation, and technology transfer	Government/lead corridor convener + private company from the transport, energy, or construction sectors, etc.	Public-private collaboration for co-financing and implementing soft corridor interventions	• Traditional R&D PPPs for the development and commercialization of agricultural inputs, including new seed and plant varieties with specific genetic traits such as pest and disease resistance and climate adaptation • PPPs that develop and commercialize new small-scale, value-adding technologies for adoption by SMAEs • Technology transfer PPPs that are designed to demonstrate and stimulate demand for new technologies, such as agricultural machinery, and adoption of advanced integrated farming practices, such as sustainable farming systems • 4Ps (public-private-producer partnership) national agricultural research programs to enhance the demand-driven nature of research for agri-industry development
Building and upgrading	Government/lead corridor convener + private company from the	Public-private collaboration for co-financing, building, and managing corridor infrastructures and	• Development of trading/marketing centers for perishable crops

TYPE	ACTORS	DESCRIPTION	EXAMPLES OF ACTIVITIES
agri-market interventions	transport, energy, or construction sectors, etc.	facilities, such as highways, ports, markets and warehouses	• Rehabilitation of existing public grain warehousing facilities (and equipment) for commercial use
Delivery of agri business development services to farmers and small enterprises	Government/lead corridor convener + private companies interested in local/agricultural development	Public-private collaboration for co-financing and implementing soft agri corridor interventions	• Supporting the development of new commercial entities, group training, individual counselling and advice, information provision, business networking and policy advocacy • Establishing transregional information centers to provide agri market information and services to farmers (on weather, market prices, agricultural machinery for hire, etc.) • Providing marketing services for agri-based handicrafts by facilitating access to alternative markets and promoting direct commercialization networks and fair purchase initiatives. • Providing business services – financial support, technology transfer, training in management and marketing, business mentoring, etc.

Figure 3.10: Phases of Establishing an Agri-corridor



Source: Nogales, et.al., 2017

into account the frequent underestimation of time and costs of infrastructure projects. Decisions should consider the feasibility of mobilizing counterpart investment from the private sector. Engineering obstacles and the local science related to soil conditions, water, climate, weather variability, and current and future pests are among the technical factors most easy to assess. More difficult are the environmental impacts and assumptions regarding social issues such as land, migration, and response of local residents. It is also important to assess the business climate in the corridor together with the recommendations for its improvement.

3. ***Draft the agri-corridor master plan with stakeholders.*** This will lead to drafting the agri-corridor master plan including the blueprints and greenprints (plans for promoting sustainable agricultural growth). The plan will include inputs from stakeholders from the private sector, farming communities, policy makers, and others. It will also include the basic strategy for promoting cluster development or attracting anchor firms or star firms such as vegetable oil processing plants that provide a ready market for farmer expansion. Include a governance structure that will be effective and inclusive, a road map for stakeholders, meetings to present cost and benefit analysis. Key areas to be focused are strategies to ensure market linkages, and access to finance and infrastructure development. The vision and goals need to be clearly articulated with the latter often including agricultural competitiveness, job creation, productivity growth, food

safety, food security and sustainability of the initiative. Also pay attention to non-agricultural sectors such as potential impacts on tourism, mining and other sectors. Rural areas often offer tourism prospects, including agritourism. Take note of the scalability of the plan beyond its original scope. The governance structure should include roles and responsibilities of all parties on whom the initiative depends for its success. The role of small farmers/fisherfolk, SMEs, youth, and women need to be considered. The rights of communities need to be upheld, especially the possibility of dispossession of land when land values start to increase.

Engage stakeholders for consensus on design and implementation. Engaging them early in the design process is essential to minimize unexpected obstacles and opposition later on down the road.

4. ***Implementation.*** This involves not only building infrastructure along the most efficient routes from an engineering perspective, but also along those lines that spur economic activity, including zigzags where necessary to connect key towns or producing regions. Planning for clustered economic activity in agriculture will require planning for energy, water, communications, and other services. Sector-specific infrastructure may also need to be considered for specific commodities. Involving industries directly in infrastructure planning and rollout can help speed up the impacts of high-potential sectors while encouraging investments.

   Mobilize private and public investments including but not limited to donors in special areas of their concern and priority. Investment mobilization is a key activity of the corridor center investment agency or other specialized unit that is responsible for attracting investments.

   Build capacity and provide social services. Aside from infrastructure development, it is also important to build human capacity, including training farmers in the region to be able to take advantage of the new opportunities that may open up. Provide social services to attract new producers to the region and to make existing population groups productive.

   Facilitate agricultural value chain development including business development services. It is important to monitor the development of the value chain and the services that encourage it, such as finance, storage, warehousing, insurance, cold storage, and packing providers. Financial facilities dedicated to promoting growth along the corridor can facilitate this development. Corridor management centers can help with monitoring development by improving stakeholder communication, coordinating service delivery, and acting as a communication hub.

5. ***Monitoring implementation and evaluating impacts*** will be aligned with the NAFMIP RBME System discussed in Chapter 9. RBME databases will include GIS or spatial data. Participation of private sector organizations, civil society organizations, and other AF stakeholders in actual monitoring and evaluation activities will be detailed in the NAFMIP RBME Roadmap, which will be developed within the first year of Plan implementation.

Multistakeholder Engagement

The large number of corridor stakeholders, each with its own agenda and capacities, calls for advanced governance mechanisms to harness public, private, and collective perspectives and interests in the corridor. In light of this, the duties and responsibilities, priority agenda, and incentives of the following actors are defined below toward seamless and effective implementation of the AFIBC Program.

Responsibilities of Local Government Units (LGUs)

1. Establish provincial and municipal technical committee in coordination with DA-RFO to implement activities in line with the AFIBC Program
2. Formulate various ordinances and policies supportive of the AFIBC development
3. Translate the AFIBC Roadmap for local adaptation as strategy in ensuring food security, stable supply and value chain management, and addressing impacts of climate change and disasters toward enhancing building resilience of agricultural systems while alleviating poverty (i.e., Provide developmental support toward the establishment of Agri-industrial corridors in the locality)
4. Designate Focal Persons and Agricultural Extension Workers (AEW) specific for the AFIBC Program
5. Provide incentives to focal persons, AEWs, technicians, farmers and fisherfolks, private investors and other stakeholders involved in AFIBC Program
6. Undertake regular monitoring of the different activities under the AFIBC Program and their impacts in accord with the NAFMIP RBME Roadmap[4]
7. In collaboration with relevant government agencies, include the development of AFIBC Program as major component of the Comprehensive Development/ Investment Plan, Comprehensive Land Use Plan (CLUP), and Provincial Developmental and Physical Framework Plan (PDPFP)
8. All local and international donations and grants that would directly or indirectly affect the agriculture sector should be aligned with the AFIBC Program.
9. Appropriate at least 5% of the local development fund for the development of AFIBC as approved by the AFIBC Board/Advisory Council

Role of Government Financial Institutions (GFIs)

- In compliance with R.A. No 10000 or Agri-Agra Reform Credit, R.A. No. 8435 or AFMA Law, R.A. No. 6977 or Magna Carta for MSMEs and other existing and pertinent laws, all government financial institutions shall align their lending, insurance and credit guarantee activities with the implementation of the AFIBC Program

Incentives for Public and Private Sector

1. Government Agencies in the AFIBC Board/Advisory Council
   a. Exemptions from the provisions of R.A. No. 9184 or the “Government Procurement Reform Act”
   b. Other regulatory Relief

[4] See AFIBC related performance indicators in the Plan Logframe, p. 5-22 of Annex 1.

2. Private Investors
   a. Provision of preferential rates and special window to private investors by the LBP, DBP, ACPC, PCIC, and other government and non-government lending institutions
   b. Provision of technical and financial support services relevant to the development of Agri-industrial Corridors
   c. Income tax holiday
   d. Low to zero-rated value-added tax (VAT) on transactions involving the sale and purchase of food and non-food and input products in all identified Corridors
   e. Exemption from the payment of duties on the importation of agricultural equipment, machinery, and implements
   f. Identification by LGUs of local taxes that may be offered as incentives to production, processing, and other value-adding activities in support of the AFIBC Program

Potential Challenges and Pitfalls

Challenges

A number of challenges may be faced in developing and rolling out the AFIBCs (Nogales, 2017), as follows:

1. ***Selecting the appropriate region.*** Obvious political interests come into play when it comes to corridor selection, so a neutral analysis is imperative. Selecting the appropriate regions requires a comprehensive and realistic cost-benefit analysis. It also means conducting a separate risk analysis that looks at the unforeseen environmental and social consequences.
2. ***Coordinating different agencies***, sometimes between or among countries, is an important feature of successful corridors. But institutional coordination can be difficult, especially if different institutions are not familiar with working with one another or insert their political agenda into the corridor development process.
3. ***Mobilizing adequate public sector, third party, donor or IFI capital*** for agri-corridor development includes ancillary private investments that make the agri-corridor initiative a success or failure.
4. ***Ensuring last mile infrastructure***, including feeder roads and access to water, electricity and communications is integral to successfully constructing and promoting growth along the corridor. The complexity of last-mile infrastructure emphasizes the need for robust coordination and communication at each stage of corridor development.
5. ***Guaranteeing*** that the goals ***for environmental sustainability, social inclusion and gender equity*** are taken into account in both design and implementation is essential.
6. ***Ensuring continued market access***, notably in the case of agri-corridors involving more than one country, also poses a challenge.

Pitfalls to Avoid

Some of the most frequent problems in designing AFIBCs include the following:

1. ***Over-designing the program.*** AFIBC programs must fit the financial and human capacities of those responsible for corridor development.
2. ***Developing the corridors from nothing.*** The AFIBC should be developed in areas where there are already existing agglomerations and enough economic activity whose potential can be maximized. It will not be wise to blindly support backward regions with little potential for economic growth and where everything needs to be developed.

3. ***Not always paying equal attention to hard and soft components*** of the interventions poses a problem. Avoid the tendency of investing first in hard infrastructure, thinking that soft interventions will logically follow; because this is not the case. An example of this is developing first the lacking connective infrastructure without improving the business environment and investing in transport and trade facilitation. This will give way to a scenario where returns on investments are not maximized, and economies of scale are more difficult to attain. The design and planning of an effective hard-soft mix is challenging because it requires intense capacity building and coordination skills to orchestrate the participation of various actors, each with a vested interest in its own part of the agenda.
4. ***Incorrect selection of areas, sectors and industries*** to be developed may be shaped by political considerations or dictated by lobby and pressure groups. Rather, the criteria for selecting and designing AFIBCs should be economic performance and social and environmental sustainability based on the results of economic and technical feasibility studies and preferably through some kind of multilevel and multi-stakeholder checks-and-balances mechanism. There is great risk that local groups and elites would be able to dictate on the local governments and fail to identify economies of scale for delivering public services; or a failure to deal with corridor spillovers. It may also happen that multinational agribusiness companies exert excessive pressure on governments and development partners to the point where they can dictate the design of the corridor program. It would be helpful to get the participation of domestic firms, producer federations, and civil society in the identification and designing process.
5. ***Neglecting the mobilization of private investors.*** Increased mobilization of funds from the private sector is important for development because such greater mobilization is consistent with greater poverty reduction and improvement in living standards. New products seem to be driving new areas of growth in mobilizing private investment, and innovations appear to be successful at expanding the universe of investors. It will be important to develop new ways of scaling up mobilization and increasing focus on developing a pipeline of bankable projects, a need that is only further deepened by the COVID-19 pandemic and the global economic slowdown. It will be helpful to provide concessional financing to mitigate real and perceived risks associated with investments expected to bring positive development impact.
6. ***Not ensuring continued market access.*** Better access to domestic and international markets is important because it especially allows small producers to reliably sell more produce with better quality and at higher prices that would encourage them to invest in their own businesses and increase the quantity, quality, and diversity of the goods they produce.
7. ***Disregarding issues which are vital to the success of the agri-corridor*** but which will require politically unpopular action(s) may also create problems. For example, if the design of the agri-corridor program fails to address lack of security in land tenure that discourages potential investors, the corridor investment strategy will likely not be successful.
8. ***Neglecting the introduction of environmental, social and food security safeguards.*** Corridor developers should ascertain that the strategy to develop agribusiness within the corridor contributes to maximizing the economic, social and environmental benefits of the corridor for local communities.

Ensuring Environmental Sustainability and Climate Resilience of Food Systems

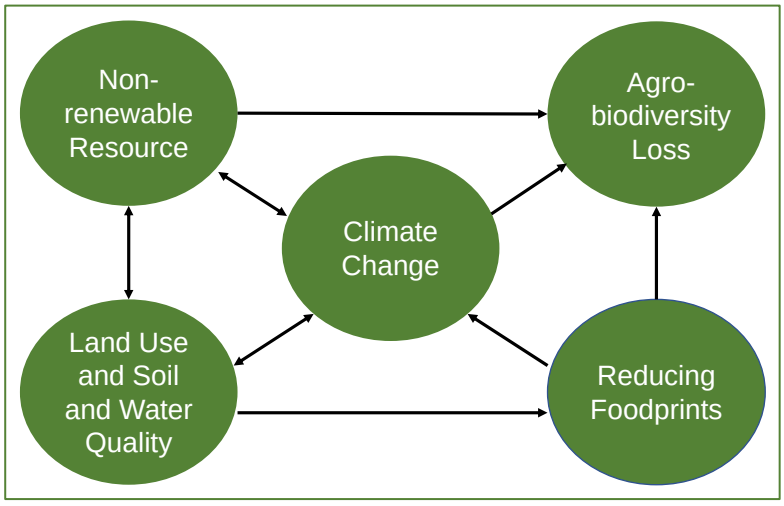
The unsustainability of the current agricultural and fisheries systems and their impact on the environment threaten the attainment of the ultimate societal goal of "a food-and-nutrition-secure, resilient Philippines with prosperous farmers and fisherfolk." The NAFMIP considers the particular areas that need to be fixed as follows: (1) natural resource depletion; (2) agrobiodiversity losses; (3) energy-water-carbon efficiency; and (4) priorities for action in reducing the foodprint of the system on the environment.

Figure 3.11 illustrates the interconnections between environmental changes due to agricultural activities and climate change.

The NAFMIP will protect and conserve natural resources through sustainable agriculture and fisheries systems innovations grounded on an integrated spatial planning framework (ISPF). Key innovations in ISPF include reducing the rate of depletion of natural and agricultural ecosystems through commodity system-based suitability assessments, and greening the agri-food value chain's infrastructure through AFIBC development.

NAFMIP innovations will extend to agri-fishery system transformation beyond reducing the depletion rate of non-renewable resources. Such transformative innovations would use renewable energy sources across food system activities, particularly scaling up of solar and wind generated power. Most farm machines are driven by fossil fuels, which contribute to greenhouse gas emissions and, in turn, accelerate climate change. These renewable resources have a huge potential for the agriculture industry. Farmers should be encouraged by subsidies to use renewable energy technology.

Figure 3.11: Interconnections between Environmental Changes and Climate Change



In terms of reducing emissions, the agriculture sector is significantly less consolidated than other sectors besides having a complicated set of objectives to consider alongside climate goals, including biodiversity, nutrition needs, food security, and the livelihood of farmers and farming communities. Cross-cutting activities including capacity building, technology transfer, research and development, information and communication, and gender and development should be integrated in all strategic priorities toward lowering emissions from the agri-food sector and capitalize on the opportunities associated with a future low carbon economy.

A foodprint measures the environmental impacts of growing, producing, transporting, and storing the food we eat—including natural resources consumed, pollution produced, and greenhouse gases emitted. In the Philippines, the largest sources of GHG emissions in the agricultural sector (excluding energy) is from rice cultivation (33.8 MtCO2e) (62%), digestive processes in animals (12%), livestock manure (13%), use of synthetic fertilizers (9%), and crop residues (45%) (Data for 2017, FAO, 2019). These greenhouse gases include nitrous oxide (N_2O), carbon dioxide (CO_2), and methane (CH_4), which all contribute to climate change and global warming and thereby have a profound impact on the sustainability of agricultural production systems.

Any successful scenario would mean major changes for agriculture, from how we farm, to how we eat and waste food, to how we manage our forests and natural carbon sinks. Sustainable practices and technologies should be adopted toward natural nutrient (organic fertilizer) use, agrobiodiversity management for food and nutrition security and improving local economies, recycling nutrients from bio-waste, managing microclimate to improve soil health, more efficient use of fertilizers, and eliminating the use of chemical pesticides. A shift to organic farming and adoption of proven GHG-efficient farming technologies and practices could achieve about 10 percent of the sector's required emissions reduction by 2030, and by 20% by 2050 (from 2010 levels, FAO).

On the demand side, dietary changes will help reduce GHG emissions. The NAFMIP pushes for a balanced Filipino diet to achieve food security and nutrition outcomes. Eating more plant-based foods will be the antidote to eating meat and a resource-intensive livestock agriculture system. Awareness on the impact of food choice on the environment can change foodprints, and eating more plant-based food will be easier if the market offers more choices.

Cascading Climate Change Impacts

With climate change, agriculture and fisheries are extremely vulnerable. Gains in food production and food security are threatened by looming losses and damages due to escalating frequency and scale of extreme weather such as typhoons, El Niño-associated drought and dry spells, severe flooding and La Niña, and surprises of as yet unknown impacts from atmospheric changes. The impacts of climate change compromise agri-fishery production systems, bring annual losses in GDP and economic wellbeing of farmers and fisherfolk, threaten natural ecosystems, pose public health risks, and endanger vulnerable groups such as women and indigenous people.

The potential impacts and implications of climate risks also cascades across agri-fishery productive systems through physical linkages—such as built infrastructure, financial goods and services, and social systems dynamics. The National Integrated Climate Change Database Information and Exchange System consolidates key data on climate change impacts including quantifiable projections for agri-fisheries, as summarized in Table 3.6. This information will direct beyond the immediate impact toward adaptation measures, and any potential policy or governance response or proactive decision across various agri-fishery productive systems and interconnected sectors.

Table 3.6: Key data on Climate Change Impacts on Agri-fishery Productive Systems of Relevance for Policy Design

AGRIFISHERY PRODUCTION SYSTEM DOMAIN	KEY DATA ON CLIMATE CHANGE IMPACTS
Declining crop yields	Grain yield decreased by at least 10% for each 1°C increase in growing-season minimum temperature in the dry season (IRRI analysis of temperature trends).
Fish catch potential	By the years 2051 to 2060, the maximum fish catch potential of Philippine seas will decrease by as much as 50% compared to 2001-2010 levels (IPCC projection).
Coral loss	Around 98 percent of coral reefs in Southeast Asia will die by 2050, practically an extinction by the end of the century, if current global warming trends continue (Low Carbon Monitor Report Forecast).
Water scarcity	The Philippines will experience a 'high' degree of water shortage by the year 2040 (World Resources Institute projection). The country ranked 57th likely most water stressed country in 2040 out of 167 countries, and the agriculture sector will bear the brunt of the water shortage.
Higher sea level rise	Observed sea level rise is remarkably highest at 60 centimeters in the Philippines, about three times that of the global average of 19 centimeters (IPCC). This puts at risk 60% of LGUs covering 64 coastal provinces, 822 coastal municipalities, 25 major coastal cities, and an estimated 13.6 million Filipinos who would need relocation.
More intense droughts	Significant increase in number of farmers directly affected by El Niño-associated drought and dry spells, causing serious income and livelihood losses (Department of Agriculture estimates)
Labor productivity declined	Climate change-induced heat in the workplace is projected to render 1% loss in working hours by 2025, 2% by 2050, and 4% by 2085 (United Nations, 2016)
Emergence of more infectious animal and plant diseases and pests	Climate change is triggering effects on the incidence and severity of animal and plant diseases and pests.
Poorest farming and fishing communities could be plunged further into poverty	With climate change and disasters, the causes and consequences of poverty will worsen. The common pattern of the poorest farmers and fisherfolk being often hit the hardest has played around the world in recent years. Inequality will deepen as agriculture is inherently vulnerable to climate change. It will become more common that farmers and fisherfolk are farthest away from recovery, every after a climatic disaster.
More public health emergencies	Higher temperatures also trigger the surge of diseases such as dengue, malaria, cholera, and typhoid.

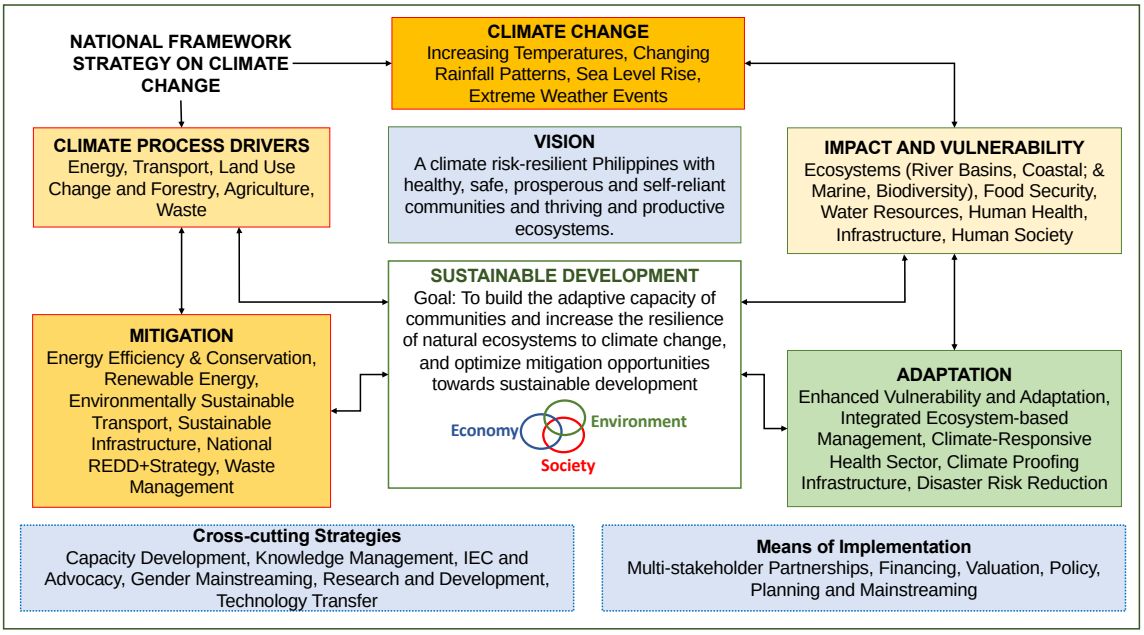
AGRIFISHERY PRODUCTION SYSTEM DOMAIN	KEY DATA ON CLIMATE CHANGE IMPACTS
More women endangered and killed	Climate-sensitive and gender-specific health impacts affect women disproportionately than men. The impacts of natural hazards such as droughts, floods, and storms affect more women than men, and tend to affect women at a younger age (World Health Organization).

Entry Points toward Environmental Sustainability and Climate-Resilience

The agri-fishery sector, among others, is vital in addressing the impacts posed by environmental changes including climate change, and in mainstreaming climate action at all levels. As the NAFMIP will resonate the DA's battle cry on increasing productivity and income of farmers and fisherfolk—*"Masaganang ani at mataas na kita"*—the goal is to ensure food security and nutrition, at the same time make farmers and fisherfolk empowered, prosperous, and resilient. This means deepening the synergy of the sector both in private and public segments, to promote recovery and transition to a climate-resilient and sustainable, low-carbon development pathway.

The NAFMIP recognizes that climate change adaptation and mitigation is a critical strategy embedded in the OneDA reform agenda. The climate change adaptation and mitigation plan for agriculture shall be founded on the National Framework Strategy on Climate Change (NFSCC), translated into a National Climate Change Action Plan (NCCAP). Figure 3.12 illustrates a more specific climate change framework, taking into account how climate change impacts and vulnerabilities shall be addressed by adaptation, mitigation and crosscutting strategies and supported by the means of implementation, which would eventually lead to achievement of the national goal.

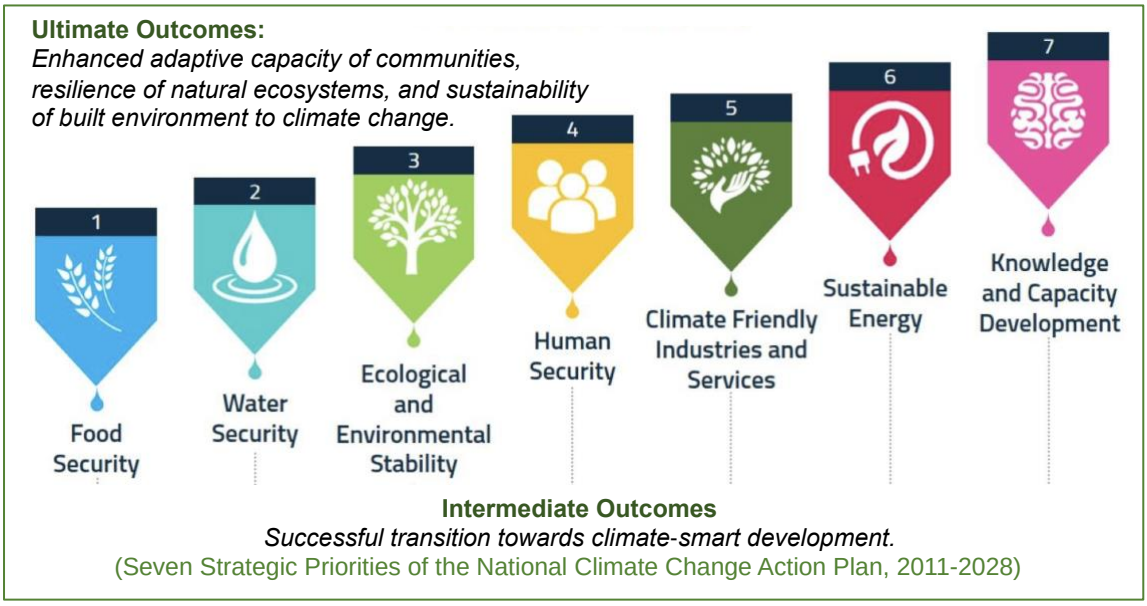
Figure 3.12: Operational Diagram of the National Framework Strategy on Climate Change



Adaption and mitigation are pillars of the NFSCC, adaptation as the priority and anchor strategy, while mitigation as a function of adaptation. In addition, the framework is guided by the following principles: anticipatory and precautionary, complementation, principle of subsidiarity and the role of LGUs as front-liners in addressing climate change, multi-stakeholder participation and partnership, and private sector participation.

With the NCCAP, the seven strategic priorities are updated to align the plan with the latest climate science and national development priorities, which are food security, water sufficiency, ecological and environmental stability, human security, climate-smart industries and services, sustainable energy, and knowledge and capacity development as the strategic direction for 2011 to 2028 (see Figure 3.13). The ultimate outcomes of enhancing the adaptive capacities of communities, resilience of natural ecosystems, and sustainability of built environment to climate change are reiterated; while the intermediate outcome is the successful transition toward climate-smart development—"climate-smart" to emphasize the need for both adaptation and mitigation as responses to climate change.

Figure 3:13: Seven Strategic Priorities of the National Climate Change Action Plan (2011 – 2028)



(Seven Strategic Priorities of the National Climate Change Action Plan, 2011-2028)

Mainstreaming Climate Resilience in Agri-fishery

In advancing climate resilient agriculture within its institutional mandate, the DA-PPD and other units will work with the Climate Resilient Agriculture Office (CRAO) in planning, implementation, research for development (R4D), and extension through (1) using decision-support tools developed by CRAO in investment planning and prioritization; (2) institutionalizing climate information service (CIS) as basic function of all RFOs; (3) direct farming community assistance; and (4) advocacy, communication, and social mobilization. In the regions, RFOs should also have personnel or units performing this function.

Decision-support tools developed by CRAO, i.e., National Color-Coded Agricultural Guide (NCCAG) Map, Climate Risk Vulnerability Assessment (CRVA), Participatory Vulnerability Assessment Training Manual, Climate Risk Profiles, AMIA Climate Resilient Agriculture (CRA) Technical and Investment Briefs, and Typhoon Risk Information, will be promoted. These tools will support integrating climate change issues in plans and programs of the DA, LGUs, and all other stakeholders in the agri-fishery sector.

To achieve a climate-resilient value chain and ensure adoption of climate-resilient technologies, the Farmers Guide Map for decision-making will be promoted. The national color-coded guide maps are tools to identify the crops that are most suitable in agricultural parcels. It also enables overlaying soil properties, elevation, rainfall pattern, temperature and more importantly, the projected climate-induced multi-hazards. If utilized by the DA and LGUs, this will significantly improve decision-making and contribute to sustainability in agri-fishery. This will also enhance the spatial analysis in the PDPFP of provinces and in the CLUPs of cities and municipalities.

Consistent with the modernization of agri-fishery, appropriate technologies should be tapped to utilize climate data in planning and implementation. The Adaptation and Mitigation Initiative in Agriculture or AMIA piloted by the CRAO in several LGUs should be further expanded to cover more areas. Its integration with the SAFDZ should also be explored and pursued.

Climate Change Adaptation and Mitigation Co-Benefits

Carefully planned and properly coordinated climate action will create powerful synergies that result in multiple positive non-climate benefits, such as economies and productive efficiencies, reduced inequality, improved public health, food security and nutrition, as well as avoid some cascading impacts. Co-benefits are the positive effects that a policy or action aimed at climate actions might have on other objectives. Monetizing co-benefits is difficult but various evidence from traditional cost-benefit analysis point of view and modelling studies show that the value of co-benefits often equals or exceeds climate mitigation costs. It is also likely that the full value of co-benefits is underestimated as the value varies geographically and by sector. Understanding all potential co-benefits is important during planning, evaluation and monitoring of climate and policy actions to ensure fairness, and to realize sustainability from climate change. However, there is a lack of policy evaluation tools enabling this, particularly in the agri-fishery sector.

The NAFMIP covers both the climate adaptation and mitigation actions, primarily to have positive impacts on productivity and economies of farmers and fisherfolk. Several examples of less carbon-intensive farming practices and carbon sequestration actions leading to substantial improvement in agricultural yields. Similarly, environmental tax revenue can provide double dividends; energy efficiency and renewable energy growth can lead to reduced inputs and increased productivity.

Alongside economies and productivity, co-benefits are biodiversity and environmental conservation. Increases in biodiversity, reduced soil erosion, ecosystem services, and air and water quality have been linked to sustainable land management and forest management. It is important, however, to develop and implement improved methodologies for quantifying carbon reductions from similar SLM and similar forest management programs. Models predict that a 84-93% global reduction in species extinction compared to business-as- usual could be achieved with aggressive climate adaptations.

Lastly, consumer health will co-benefit in terms of balanced Filipino diets associated with sustainable food production through environment-friendly and climate-smart practices. Policies encouraging reduction in use of chemical fertilizers and pesticides, and efficient energy use along food value chains contribute to the prevention of non-communicable diseases such as diabetes and heart disease, and create positive impact on the overall public health. Shifting toward plant-based diets could also reduce mortality by 6-10% at the same time reducing GHG emissions related to food by 29-70% by 2050 (Springmann et al., 2016).

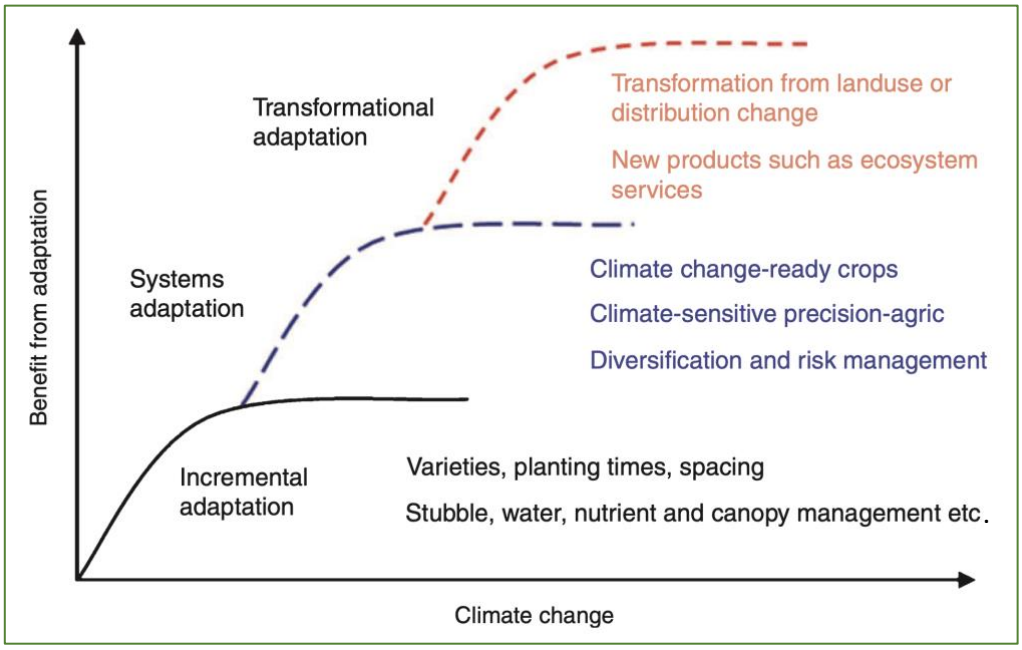
NAFMIP Crosscutting Support for Positive Transformational Adaptation

Incremental adaptation may be inadequate to deal with rapid shifts and tipping points for food production under climate change and environmental risks. The concepts of transformative and transformational adaptation address the need for *"major, non-marginal change"* in sectors, such as agriculture in response to climate change. Transformational climate change adaptation in agriculture is defined as major, purposeful action undertaken at the farm or supra-farm level in response to potential or actual climate change impacts and opportunities in the context of other drivers (Vermeulen, et al., 2018). It reinforces the realization that agricultural research can no longer remain insulated from off-farm, non-science or non-agricultural knowledge or processes. Support and guidance of transformational adaptation will require deeper understanding on the state of the Philippine agri-fishery, and could be positioned within the landscape, rural communities, and broader social, political, and cultural environment.

The elements of transformational adaptation are emphasized in Figure 3.14. It presents 'transformational adaptation' as a change that begins with incremental adaptation (changes in practices and technologies within an existing system such as planting times or row spacing) and extends through systems adaptation (changes to an existing system).

Several empirical examples of transformational agriculture have existed, at least partially because of climate change. For example, Vietnam shifted away from conventional rice to low-input ratoon rice in response to the increased frequency of crop failures due to flooding. Transformational adaptation here is abandonment of high-productivity, high-input rice in favor of low-input ratoon rice; and a farmer-led shift approach to climate adaptation driven by the falling government revenues (see more examples in Vermeulen, et al. (2018). The NAFMIP commodity system-based approach will foster transformational climate change adaptation practices alongside implementation of other integrative planning tools such as ISPF and policy support through innovation, markets, and technology.

Figure 3.14: Levels of Adaptation in Relation to Benefits from Adaptation Actions and Degree of Climate Change, with Illustrative Examples
(Adapted from Howden et al., 2010)



Supporting Positive Transformational Adaptation

Pursuing the path that neglects the environmental consequences of economic growth is unaffordable; and **more of the same will not work** given daunting and complex challenges in agri-fisheries sector and overall food systems. Support systems will be needed for positive transformational adaptation in agri-fisheries, such as (1) early warning systems that offer efficient protection from weather risks; (2) innovative crop insurance building resilience in farm communities; (3) climate-resilient value chains (green infrastructure and logistics) as farmers diversify based on commodity systems; (4) digital technologies that can expand inclusive growth to farmers in remote areas and scale up climate information services (CIS) and precision farming; (5) improved regulation that can make agriculture and aquaculture more productive and sustainable; (6) appraised implementation of adaptation-oriented policies that entrench incremental or status quo behaviors among farmers—such as production subsidies—in light of potential need for more transformational change; (7) farmers and other food system participants provided with the tools to forecast and envisage possible futures and to monitor and evaluate progress to support transformative options through investment in information and knowledge systems.

Investments to get both incremental and transformational adaptation practices to work will be valuable. This will necessitate more comprehensive and long-term approaches to adaptation planning to create a strong basis for effective action, meaningful learning, and beneficial outcomes for the sector. The NAFMIP will improve the effectiveness of transformative adaptation leading to transformational outcomes by considering multi-functionality of agriculture and a system-wide view of food production and consumption. In practical terms, the transformation plan is framed considering the desired agricultural futures in terms of ability to supply benefits to nutrition, livelihood and environment, over and above benefits to national-level food security.

An important transition to transformational adaptation will be a move toward understanding, and economically rewarding, farms as multi-functional systems that deliver not only calories and profits but also good jobs, health and nutrition, environmental benefits (importantly greenhouse gas mitigation and biodiversity conservation) and cultural value—the guiding principles of the NAFMIP. Evidence shows that the communities most advanced in climate change innovation are those with coherent policies based on integrated and cooperative planning processes. Institutional and sectoral fragmentation, and competitive rather than cooperative settings across sectors, are key barriers to incorporating co-benefits in broader climate planning The adaptation and mitigation co-benefits approach can bridge organizational and disciplinary divides. For example, learning between local authorities and other sectors led to greater emissions reduction and more productive climate actions.

CHAPTER 4

Commodity System Planning

Toward Multidimensional Diversification

Commodity Plans under NAFMIP will shift away from single commodity planning which neither reflect farm and fishery household behavior and practices, nor optimize use of available development resources. The alternative approach, referred to as transformative **commodity system-based planning**, seeks to diversify, upscale, and enhance smallholder farmers, fisherfolk, and other stakeholders' income and employment opportunities, in different ways:

1. Production diversification in which the household or enterprise combines crops, livestock, poultry and/or fishery commodities (production diversification involving five "anchor commodities" and "linked commodities" discussed in this Chapter);
2. Diversification to raise production of non-commodity or "quality food" to improve health and nutrition, e.g., vegetables, fruits, legumes and nuts;
3. Value chain or value-adding diversification in which the household or enterprise ventures into one or more of the postharvest value chain segments to engage in a "Linked enterprise" (e.g., processing), while continuing production of the original commodity; and
4. Non-farm diversification in which the household or enterprise, during the off-season, undertakes other livelihood activities such as handicraft production, small-scale manufacturing, construction, house repair, or local transportation.

How multidimensional diversification might look like, using rice as anchor commodity, is illustrated in Figure 4.1.

Figure 4.1: A Rice-based Commodity System

Photo sources:
Rice – SEARCA | Alfonso Venzuela
Mungbean – abc.net.au and SEARCA
Ducks – SEARCA
Machinery – SEARCA | Paul John S. Gozon
Support services – SEARCA | Danilo O. Victoriano, Jr.
Credit/insurance – landbank.com
Pest control - permaculturenews.org
Rice flour – cdn.shopify.com
Puto – Darlyn R. Angeles
Hopia mongo – angsarap.net
Balut – bitemybun.com
Rice straw – feedipedia.org
Manure – agriculturalinformation4u.org

Unlike previous AFMPs, NAFMIP commodity plans will not provide:

1. A daunting long list of priority commodities that only tends to dissipate available resources but rather, five major **anchor commodities** to which all other food as well as non-food commodities may be linked. The unit of analysis will not be individual commodities but the farm household **commodity system**. In this case, **the goal is to maximize farm household income** through the commodity system.
2. Commodity-specific strategies, outcomes, programs, projects, and activities and instead, an alternative systems approach to commodity planning and program implementation.

NAFMIP as Directional Plan will guide DA, other national agencies, LGUs and other stakeholders to collaboratively craft—under a whole-of-nation approach—more detailed and operational **Commodity System-Based Roadmaps** (e.g., coconut system-based roadmap), in lieu of the usual single commodity roadmaps. The Commodity System-Based Roadmaps will cover in detail the national, regional and local level programs, projects, and activities to implement the commodity systems approach, based on the framework and models provided in this chapter.

Strategies and Interventions

Commodity Systems Planning, and particularly the preparation and refinement of more detailed Commodity System-based Roadmaps for each of the aforementioned five anchor commodities, will be inspired and guided by transformative strategies shown in Table 4.1.

Table 4.1: Transformative Strategies in Commodity Systems Planning with Illustrative Investments and Interventions

TRANSFORMATIVE STRATEGIES IN COMMODITY SYSTEMS PLANNING	ILLUSTRATIVE INVESTMENTS AND INTERVENTIONS
1. Diversify in: a. Commodity systems-based production b. Value-adding and enterprise development	• Rice-based commodity system: o Combining rice-fish-goat production o Production of rice cake or dried fish • Large-scale niche marketing of special highland rice, coffee and ornamentals • Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season • Fisher enterprises operating market outlets in urban centers
2. Combine food security and nutrition security	• Increase production of vegetables, fruits, legumes and other nutritious commodities • Match/synchronize food supply with demand for healthy, nutritious food to avoid surplus production and corresponding low prices of healthy food products • Monitor health and nutrition metrics alongside food supply indicators
3. Promote a pattern of consumption that is data and values driven to achieve better nutrition and care of the	• Joint DA-DOH-NCC programs on: o Communication campaign on diet-related illnesses o Development of Filipino diet apps to guide consumers in making food choices

TRANSFORMATIVE STRATEGIES IN COMMODITY SYSTEMS PLANNING	ILLUSTRATIVE INVESTMENTS AND INTERVENTIONS
environment, while building on traditional Filipino diet.	○ Link consumption data with data from the rest of the food system to allow frictionless synchronization with production, processing, and marketing
4. Strengthen measures to address sustainable environmental concerns in commodity system plans	• Promote nature-positive agri-fishery production • Shift away from environmentally undesirable practices such as monocropping • Shift away from fossil fuels, plastic bags
5. Inclusive/equitable sector growth and transformation	• Raise the smallholder farmers' and fisherfolk's share of industry incomes/share in the Filipino consumers' peso • Set up farmer- and fisher- owned and operated enterprises
6. Consolidate for efficiency: a. Production b. Postharvest activities	• DA and other NGA training of LGUs • Organize small farmers and fisherfolk by LGUs
7. Modernize farm and fishery technology	• Establish local enterprises for regular maintenance and repair of machinery, equipment and tools • Nationwide credit program for large farm machinery
8. Circular economy promotion	• Waste management training • Establish upcycling and recycling facilities
9. Shorter food miles	• Optimize using local production and postharvest resources • Construct or expand feed mills next to livestock and poultry producers • Reduce transport cost, losses during transport by locating large processing centers accessible to consolidated production areas
10. Integration of non-food commodities and non-farm income and employment sources	• Programs to further expand livelihood opportunities: ○ Commodity systems to include rubber, abaca ○ Local handicraft, small-scale manufacturing, construction, home repair, transportation…

Enhancing the Value Chain Approach

Over the Plan implementation period, value chains will continue to be enhanced by: (1) re-orienting these toward a commodity system and multi-dimensional diversification approach; (2) more strongly addressing climate, plant, and animal diseases, and other risks; (3) expanding the investment horizon to include large-scale projects of PHP100 million or more; and (4) integrating transport and logistics requirements. The latter is one additional NAFMIP innovation, covering the entirety of the "logistics landscape." Juxtaposed with value chain segments, the logistics landscape to be covered includes: (a) food processing logistics; (b) consumer-retail logistics; and (c) jmport and export logistics to be served by facilities and services discussed in Chapter 3.

Opportunities and Constraints

Attaining the long-cherished vision of agri-industrialization and modernization is impeded by structural and functional-operational constraints, and conversely, encouraged by promising transformative opportunities, discussed in this section. An anticipated effective strategic response to transform the sector—both food systems and non-food systems—will then be provided in the next section.

Dysfunctional Food Systems

The food system-based analysis of the agri-fishery sector as promoted in 2020 by FAO on a global scale and on a national scale by the Philippine Department of Agriculture (DA) suggests a direction toward no less than transformation of the agri-fishery sector. Two interrelated transformations are needed: *functional* and *structural*.

Traditionally, the agri-fishery sector has been concerned more or less exclusively on production. DA interventions to support the sector consisted mainly of improving crop, livestock, poultry, and fishery productivity and profitability. In crops, livestock, and poultry, individual commodities are treated more or less independently by single commodity programs such as those on rice, corn, coconut, chicken, cattle, swine, and goat. There is little, if any, symbiosis among programs. They compete with each other for government resource allocations. As a result, the favored programs have grown while the others have stagnated.

Over the past 50 years, the structure of Philippine agriculture has not changed: the main crops using up to 74% of arable land are rice, corn, and coconut. These have enjoyed the lion's share of natural and government resources. Rice alone is estimated to use at least 25% of the best arable lands, 70% of diverted water, and 40% of DA resources. Livestock and poultry pale in comparison with the crops sector, given a proportion of the DA resources that does not do justice to their contribution to gross value added (GVA) in agri-fishery. The same is true for fishery, in spite of the fact that the country has seven times more water than land, 60% of its population live along the coast being an archipelagic country, and it is blessed with rich fisheries.

The transformative food systems approach introduces two revolutionary concepts that are crucial in transforming the agri-fisheries sector:

1. Functionally, the agri-fisheries sector must not limit itself to farmers' and fisherfolk's welfare; it should be equally concerned with consumer and environmental health.

2. Functional transformation must be accompanied by structural transformation. The allocation of land (for farmers) and water resources (for fisherfolk) needs to change to enable the functional transformation. Functional transformation refers to moving from farming focus to one that is also concerned with environment and consumer health. Circularity will reduce external inputs and lighten the pressure to the environment. Reducing food miles will reduce energy requirement for transport, trading, and also reduce postharvest losses. Specific strategies such as diversification and use of biodegradable materials for packaging are discussed in the chapter.

Imperatives for Functional Transformation

The interrelatedness of the various components of the food system creates unlimited opportunities for transformation of the agri-fisheries sector. In addition to the opportunities in the farm, transformation may apply in any of the other steps in the food system: value adding,

marketing, consumption, and waste management. The envisioned **circular food system** will mean that interventions in any of the steps can affect all the other steps.

The hierarchy of societal concerns implies that consumer nutrition and health deserve priority. After all, it is the main goal of agri-fisheries. Various surveys show a continuing rise of chronic diseases related to food consumption and lifestyle. Among these are diabetes, cardiovascular diseases, and cancer. Four of the top six causes of morbidity and mortality in the Philippines today are in the category of chronic diseases. These affect all economic classes and all age categories. Aside from causing morbidity and mortality, nutritional problems particularly at an early age are related to inability to learn and other mental ability problems. There is little surprise that the academic performance of Filipino students is near the bottom in global ranking.

Other aspects of the food system aside from the kind and quantity of food consumed directly and indirectly impact on farmer income, consumer health, and the environment. Among these are the sources of food, form of energy used in the food system, packaging materials, and farm inputs. Local sourcing of food and farming inputs reduces **food miles** and enhances the local economy. Renewable energy and biodegradable packaging materials reduce environmental impact and enhance the local economy as well.

It is for these reasons that **transformation of consumption is key to all the transformations envisioned in the Philippine food system**. This requires interventions not only in the farm, which is already an ongoing concern—but also in the other steps of the value chain, food consumption, and waste management aspects, all of which have not been adequately addressed by past agri-fishery plans and programs. Planners need to refocus their attention from the farm to other parts of the value chain. Many of the solutions to the farmers' problems are actually outside the farm.

Imperatives for Structural Transformation

Structural transformation of agri-fisheries is needed to sustain if not trigger functional transformation of the food system. Since transformation of consumption will require drastic changes in the structure of the typical Filipino meal in favor of more diverse food that is locally sourced, the supply side must adjust. **The kind of crops and other food items produced by farmers must be attuned to consumer needs.** This is quite a challenge because the current direction of consumption is toward less diversity and increasing proportion of unhealthy food components. Present-day consumers do not necessarily want what they need to remain healthy. Therefore, the agri-fisheries program will invest in developing a strong communication strategy that includes changing consumer habits, which the Plan elaborates in Chapter 10.

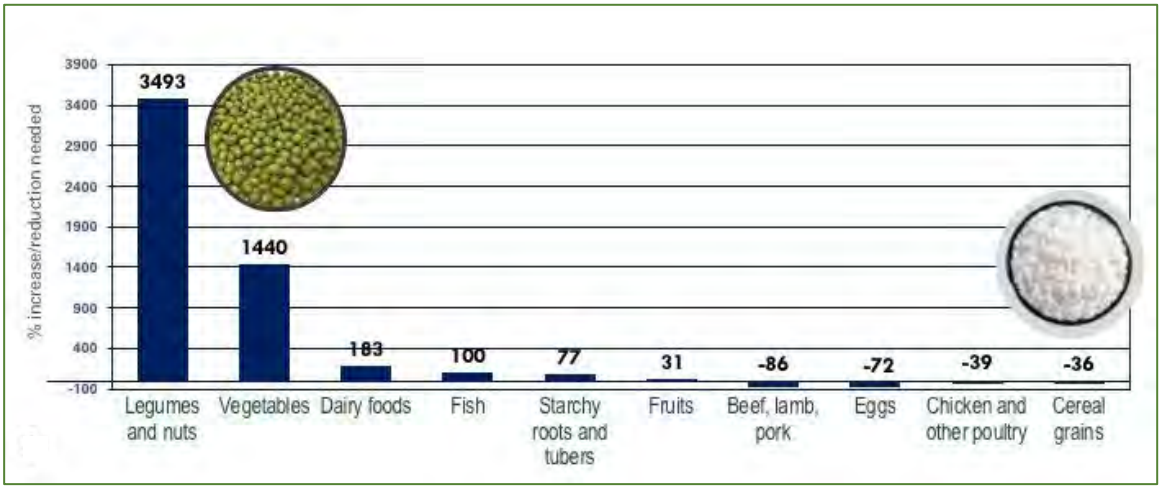
One science-based guide for decision making on the components of a healthy diet is the **planetary health diet** (PHD).[1] The PHD gives precise figures on how much of each food group must be consumed to meet nutritional and environmental targets. These figures can be used by the AF sector in production planning. Using this guide, Filipino farmers need to adjust production of various food items in the scale shown in Figure 4.2. It can be used as a national standard, utilizing locally produced food resources.

PHD can be used as a guide to improve on the **traditional Filipino diet (TFD)**, defined as the consumption pattern prior to 1970, before the Green Revolution that resulted in large-scale

[1] An optimal diet for human health and environmental sustainability, PHD emphasizes a plant-forward diet where whole grains, fruits, vegetables, nuts, and legumes comprise a greater proportion of foods consumed. Meat and dairy constitute important parts of the diet but in significantly smaller proportions than whole grains, fruits, vegetables, nuts and legumes (https://eatforum.org/eat-lancet-commission/the-planetary-health-diet-and-you/).

monocropping and introduction of fast food. Both the Green Revolution and the fast-food lifestyle effectively reduced the diversity of the traditional Filipino diet. Since the traditional Filipino diet differs across regions, TFD factors such regional differences. On the average, reverting to the traditional Filipino diet would result in going back to average per capita rice consumption below 90 kg per capita/year, which is much less than the current consumption of about 120 kg per capita/year.

Figure 4.2: Recommended Increase/Decrease in Daily Food Intake as Basis for Determining Scope and Extent of Diversification Using the Commodity System Approach



In the same manner, consumption/utilization patterns in the rest of the food value chain need changes. Among the changes are as follows:

Production

1. Increasing the efficiency of using land, water, energy and time resources, such as by using crops that give higher productivity per unit land, water and time. This would argue against crops such as rice and meat such as beef. On the other hand, dryland crops such as root and tuber crops, vegetables and grain legumes, as well as aquaculture, will be favored.
2. Reducing dependence on fossil fuel by switching to electricity for machines, and bio-based and locally produced fertilizers and pesticides. This may mean switching to electric tractors and similar devices, switching to bio-based fuel such as alcohol and coco diesel, or switching to vermicast and compost in combination with synthetic chemical fertilizers.

Value adding

1. Increasing efficiency in using energy resources, such as by producing brown rice instead of white rice because the former has more than 10% milling efficiency than the latter. Brown rice is also more nutritious than white rice. The inferior keeping quality of brown rice suggests that a brown-rice based program should be community-based. The highly centralized rice processing centers are better suited for white rice, for long distance transport and longer-term storage (e.g., disaster relief), and export.
2. Switching to renewable energy such as solar, wind, or biomass for processing and the cold chain. The tropical location of the Philippines creates many possibilities for bio-based energy. Among these are alcohol and biodiesel from palms. A bio-based energy

program must be local in nature, using small facilities. Alcohol does not easily lend itself to transport and storage.

3. Using biodegradable biological materials such as abaca, bamboo, and palm leaves for packaging. This is a game changer not only because of its environmental impact but also for its potential to create a new packaging industry.

Marketing

1. Reducing **food miles** by sourcing food locally and changing consumption patterns with the seasons. One may eat alternative dryland crop staples during the dry season when they can be grown after the rice crop and brown rice during the wet season. Local food sourcing will also tend to reduce postharvest and transport losses. Seasonality of food supply must dictate seasonality of consumption.
2. Directing marketing to reduce middlemen and increase farmer income. Digital technology has demonstrated its potential to support this approach during the pandemic. The e-Kadiwa is a good example of direct marketing; other private sector-led schemes also exist.

Waste management

1. Using farm wastes as fertilizers by composting and other methods, or as energy source for the farm.
2. Upcycling wastes in the value chain. A good example is one of the DOST CRADLE[2] projects which processes the waste in soybean oil extraction into a high value product.
3. Recycling wastes in the value chain by converting these to energy and materials (such as fertilizers). The ultimate unutilized resource, considered as a disposal and pollution problem, is human manure and urine. Technology is available for efficiently converting these to fertilizers and other uses.

Taking all of these together, a consumption-led structural transformation of the food system to support the goals of farmer income and consumer and environmental health will require a predominantly localized food system. This is the exact opposite of the current trend, which is globalization.

The Transformative Commodity Systems Approach

Rice, corn, and coconut have dominated the agricultural landscape in the Philippines. The farms are typically small (about 1 ha for rice) and practice monoculture. The low profitability of these crops coupled with small farm size is the main reason why farmers remain poor. Livestock and poultry growers suffer the same fate. On the other hand, capture fishery is dominated by fisherfolk who cannot venture further out into richer fishing grounds because of lack of technology. Their fishing grounds are also depleted. Aquaculturists typically operate small fish cages or fish pens that specialize in two major species (*bangus* and *tilapia*). The fisherfolk compete with the coconut farmers in the distinction of being the poorest sector in the Philippine food system.

As a main strategy for improving farmer and fisher incomes, NAFMIP will pursue diversifying production and other in farm- and farm-related activities. This may go in two directions—diversification of primary production and value addition to primary production. If DA promotes rural employment through off-farm (primary postharvest processing) and non-farm (agri-

[2] Collaborative Research and Development to Leverage the Economy, described at https://s4cp.dost.gov.ph/programs/cradle/

processing) opportunities, the number of primary producers will decrease in the long run, but other activities in rural areas can create employment (i.e., some agri-processing is better to be located close to production sites). Diversification in the manner envisioned in the Plan will require a commodity systems-based approach. The DA will orchestrate a whole-of-nation effort to move away from single commodity-centered planning to commodity systems or even more broadly, food systems planning.

What is commodity system-based planning? It is:

1. Coordinated (if not integrated) planning for two or more Inter-linked crops, livestock, poultry, and/ or fishery commodities, e.g., combined rice and fish system, and possibly non-food commodities, e.g., abaca and coconut intercropping;
2. Rooted in the farming systems approach;
3. A planning approach that operationalizes the OneDA diversification strategy, leading to a food and nutrition-secure Philippines with prosperous farmers and fisherfolk; and
4. Organized into five commodity systems: rice-based, corn-based, coconut-based, fishery-based, and geographically specialized commodity systems (GSCS), e.g., highland vegetable production in the Cordillera Administrative Region (CAR);
5. Inclusive in that all other commodities (livestock and poultry, high value crops, organic, halal, etc.) can be part of one or more of the above five commodity systems; and
6. An opportunity to inter-link commodities in various ways: (a) intercropping; (b) rotation cropping; (c) multi-cropping; (d) integrated multi-trophic aquaculture (IMTA); (e) polyculture; or (f) recycling of production or processing waste as input to production or processing of another commodity.

The commodity system approach is better able to deliver the triple bottom line of NAFMIP, which includes increasing farmer incomes, improving consumer nutrition, and improving care for the environment. Table 4.2 compares single commodity and commodity system approaches from a farmer perspective.

Table 4.2. Comparison of Single Commodity and Commodity System Approaches from a *Farmer* Perspective

CRITERIA	SINGLE COMMODITY	COMMODITY SYSTEM
1. Productivity measurement	Based on one commodity	Based on total farm and farm related productivity
2. Relative farm income	Low	High
3. Risk from all sources	High	Low
4. Relative efficiency in using resources (labor, land, water, fertilizer, machines)	Low	High
5. Knowledge and skills requirement	Simple	Complex

Meanwhile, Table 4.3 compares single commodity and commodity system approaches from the government perspective.

Table 4.3: Comparison of Single Commodity and Commodity System Approaches from a *Government* Perspective

CRITERIA	SINGLE COMMODITY	COMMODITY SYSTEM
1. Planning approach	By commodity	System approach; by "anchor commodity" together with "linked commodities"
2. Planning perspective	Industry development	Farm/ fishing household and industry development
3. Institutional/ organizational arrangements in planning and implementation	Commodity program directorates	Commodity *system* program directorates
4. Scope of Value chain analysis (VCA)	All segments, players and their relations in one commodity	Segments of two or more commodities linked in one unified system
5. Allocation of budget investments	Specialized on one commodity	Shared among commodities

Five Major Commodity Systems

The five major commodity systems introduced in NAFMIP are as follows:

1. ***Rice-based Commodity Systems***

Table 4.4 presents the metrics for rice (*palay*) as anchor commodity.

Table 4.4: *Palay*: Anchor Commodity Profile

PALAY METRICS	2016	2017	2018	2019	2020
Area harvested ('000 ha.)	4,556.0	4,811.8	4,800.4	4,651.5	4,718.9
Percent of total area	34.80%	35.62%	35.62%	34.98%	35.16%
Volume of production ('000 mt)	17,627.2	19,276.3	19,066.1	18,814.8	19,294.9
Value of production (PHP million, in current prices)	304,568	350,152	385,008	305,046	318,711

Source of data: PSA

Rice-based commodity system planning highlights

Strategic Objectives

1. Raise rice-farmers' total incomes from diversified sources by at least 100% by the end of the plan period; and
2. Optimize returns to productive rice lands, especially those supported by irrigation systems.

Basic Interventions

1. Introduce high-value crops, livestock, poultry and/ or aquaculture commodities that can be integrated into *palay* farming;
2. Similarly, introduce various possible value-adding activities in palay and other commodities;

Basic Interventions…(cont'd)
2. Modernize/adapt irrigation to serve rice plus high value crops;
3. Provide the corresponding research and development support;
4. Conduct on-farm trials to establish model farms on rice-based commodity systems; and
5. Develop working rice-based system models for upscaling and wider geographic replication.

DA Cluster
NRP and other program directorates, FOS, PhilRice, BFAR, BSWM, AMAS, FMRDP, CRAO, BAR, BPI, BAI, RFOs

Partners
Farmer organizations, Congress, NIA, NFA, NCI, DAR, DENR, DOH, DTI, DILG, LGUs, business groups

Directional guide for rice-based commodity system planning. Among the many proven farm diversification systems are simple systems such as rice-fish (a practice that is 2,000 years old in China), rice-duck (commonly practiced in Bulacan and Laguna) and rice-vegetables. In Java, rice fields are converted to vegetables during the dry season (Figure 4.2). A similar practice is seen in Thailand (Figure 4.3).

Figure 4.3: Luffa *(patola)* Grown in Rice Fields using Raised Beds in Java

Figure 4.4: Raised Beds in Rice Fields for Growing Dryland Crops such as *Kangkong* in Thailand

A more diverse system uses rice straw as substrate for growing mushrooms, and spent mushroom substrate for feeding ruminants. The ruminants can produce milk, and the manure can be used in vermiculture to produce fertilizer for rice, completing vertical integration in a circular system (Figure 4.5).

Figure 4.5: A Highly Diverse System in Rice-based Farming

Photos: PhilRice

These examples of diversification provide opportunities for vertical and horizontal integration with enhanced income, security against losses, and better environmental outcomes. It creates year-round employment opportunities even for the urban poor and particularly for women who have been displaced by the mechanization of rice farming. In contrast, labor use in monoculture rice farming is seasonal.

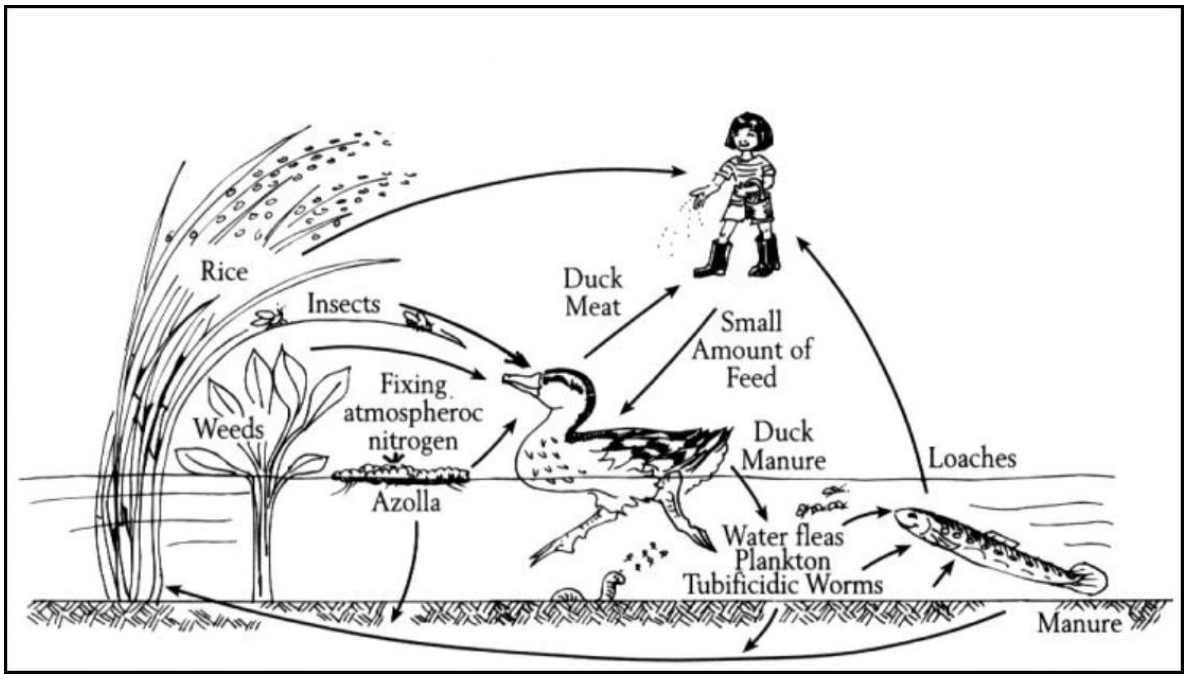
To encourage diversification, various models of diversification are on year-round display at the Future Rice Farm and *Palayamanan* (diversified rice farm) sites of the Philippine Rice Research Institute (PhilRice). These serve as a laboratory for studying diversification options and implementing Fourth Industrial Revolution (4IR) technologies, an educational farm tourism destination, and a marketplace for fresh and minimally processed products.

Figure 4.6 presents an idealized agriculture system featuring two food species (rice and duck), with azolla serving as feed for duck and fertilizer to the rice plant, insects serving as feed for ducks, duck manure serving as fertilizer to rice. A modified version will include fish, mushrooms for utilization of rice straw, carabao to provide manure for earthworms, and vermiculture to produce fertilizer for the rice plant. A similar system can be conceived for sustainable aquaculture.

Diversified rice farms can become a main source of plant-based food commodities by 2030. They will continue to produce rice but should increasingly produce other commodity foods and even high-value crops that are in demand, particularly those with good handling and storage qualities. This vision of the future is similarly reflected in the updated Philippine Rice Industry Roadmap 2021-2035.

Some monocrop rice farmers in the best areas and those with bigger-sized farms will remain as the main suppliers of rice in the country. To be globally competitive, these farms need to consolidate to achieve economies of scale.

Figure 4.6: Example of an Idealized Rice-based System



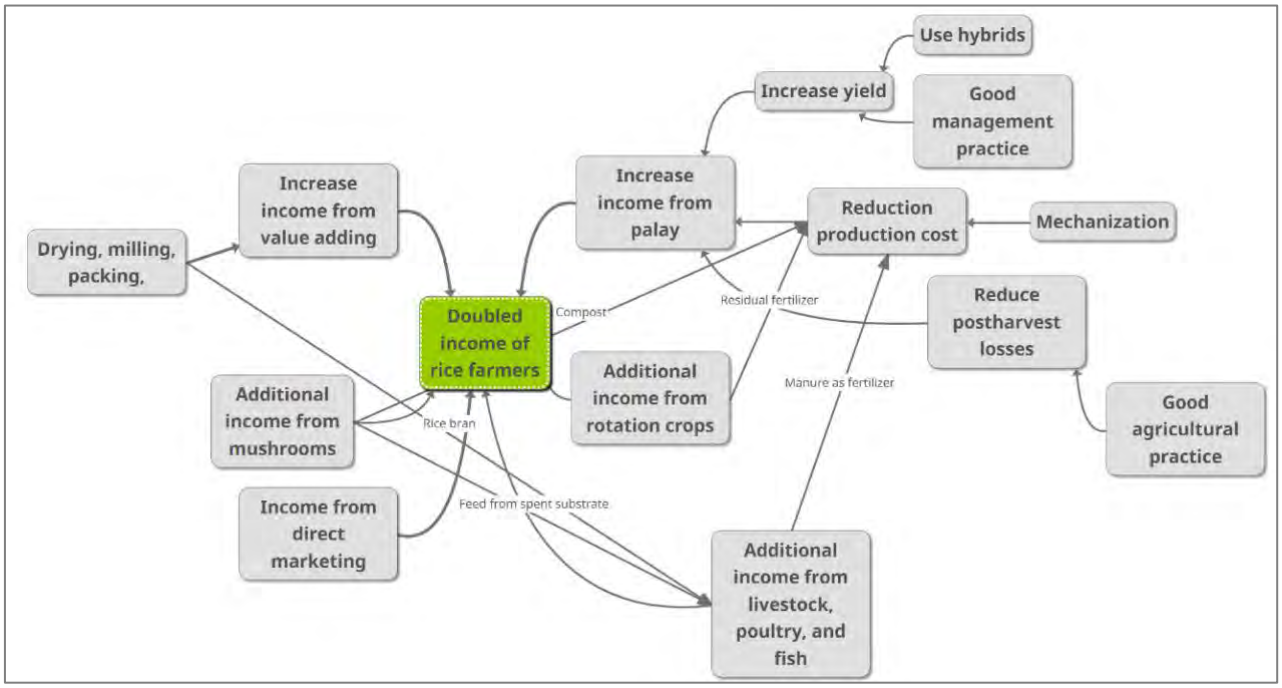
Improved technology also promises to reduce the negative environmental impact of monoculture rice; thus, rice farming need not be so environmentally damaging. These technologies will further reduce costs and make the rice farmer more competitive in the global market.

Reducing the negative health impacts of white rice has likewise received due attention from PhilRice. Among the approaches are the use of varieties with better nutritional value, product development and promotion in favor of reduced processing (e.g., brown rice, brown sugar), and fortification with nutrients. Government support in the form of more favorable policies on biotechnology and research and development (R&D) funding are much needed to bring these products to the consumer table.

With the above expected adjustments, rice production systems will tend to branch out into the following categories: (1) diversified, integrated, and intensified; (2) high-tech (monoculture); and (3) conventional (monoculture). The first two will be more compliant with environmental care, while high tech will be more dependent on 4IR technologies as well. Examples of 4IR technologies that can be used for the rice-based commodity systems are shown in Annex 2, The list also shows technologies that can be considered for the other commodity systems, as well as for modernization of the entire food system.

Figure 4.7 presents an analysis of rice-based system pathways to bring the farmer out of poverty. It illustrates the different possibilities for increasing the income of rice farmers. The choices will have to be made at the local level, building on existing practices. For example, rice-mungbean integration may be the choice in areas in Isabela that have similar conditions as San Mateo, where it is an established practice. In Laguna, rice-duck integration is a good possibility in areas around Pila, where it is an established practice. In Central Luzon and the Ilocos Region, onion and garlic production along with other popular vegetables will continue to prosper and serve as inspiration for other areas.

Figure 4.7: Solution Pathways for Rice-based Systems



2. ***Corn/ Livestock/Poultry-based Commodity Systems***

Table 4.5: Corn: Anchor Commodity Profile

CORN METRICS	2016	2017	2018	2019	2020
Area harvested ('000 ha.)	2,485	2,553	2,511	2,517	2,554
Percent of total area	18.98%	18.90%	18.64%	18.93%	19.03%
Volume of production ('000 mt)	7,282	7,915	7,772	7,979	8,119
Value of production (PHP million, in current prices)	85,297	94,257	109,162	104,458	97,665

Source of data: PSA

Table 4.6: Livestock and Poultry: Profile as Anchor Commodities

VOLUME OF PRODUCTION ('000 MT)	2016	2017	2018	2019	2020
Livestock	2,746	2,776	2,827	2,799	2,591
Poultry	1,707	1,778	1,868	1,958	1,839
Eggs	506	538	581	633	656

Source of data: PSA

Table 4.7: Value of Livestock and Poultry Production

VALUE OF PRODUCTION (PHP million in current prices)	2016	2017	2018	2019	2020
Livestock	268,391	305,503	331,420	303,699	299,863
Poultry and eggs (million pesos, in current prices)	202,650	214,742	231,655	242,657	262,415

Source of data: PSA

Corn/ livestock/poultry-based commodity planning highlights

Strategic Objectives

1. Raise corn/livestock/poultry-based farmers' total incomes from diversified sources by at least 100% by the end of the Plan period; and
2. Vigorously pursue integrated corn-livestock-poultry farming systems toward commercial scale.

Basic Interventions

1. Introduce feasible combinations of high-value crops, livestock, poultry and/or aquaculture commodities;
2. Similarly, introduce various possible value-adding activities in corn/livestock/poultry and other commodities;
3. Provide the corresponding research and development support;
4. Conduct on-farm trials to establish model farms on corn/livestock/poultry-based commodity systems; and
5. Develop working models of corn/ livestock/poultry-based systems for upscaling and wider geographic replication.

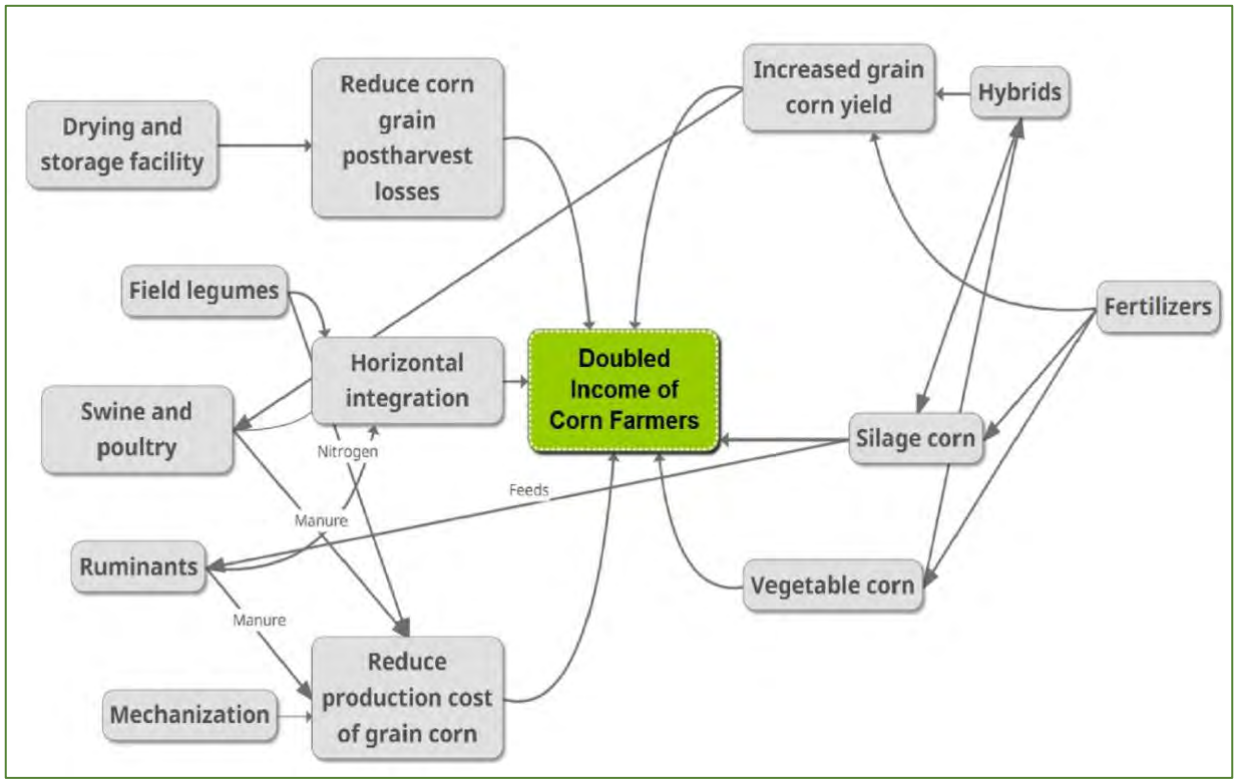
DA Cluster
NCP, NLP and other program directorates, NDA, FOS, AMAS, FMRDP, CRAO, BAR, BPI, BAI, BFAR, RFOs

Partners
Farmer organizations, Congress, NCI, DAR, DENR, DOH, DTI, DILG, LGUs, business groups

Directional guide for corn/livestock/poultry-based commodity systems planning. Figure 4.8 illustrates pathways out of poverty for corn-based system farmers. As corn is known to deplete the soil of its nutrients, UPLB had studied way back in the 70s and 80s corn-legume intercropping schemes, the legumes being known to help augment soil nitrogen through nitrogen fixating actions by their roots' interaction with rhizobia bacteria. Legumes comprise the recommended protein source in the traditional Filipino healthy diet. As source of animal feed aside from human food, combining animal raising with corn farming along with other high value crops is one pathway out of rural poverty.

Local planners need to decide which of the possibilities in Figure 4.8 will be assigned to each of the phases of development discussed in Chapter 2 (Figure 2.3): recovery, growth, and resilience. In provinces with high urban population, shifting to vegetable corn may be a path to recovery. This will not require a lot of training and the lucrative market is within easy reach. In areas that exhibit high postharvest losses of grain corn, putting up communal drying and storage facilities may be the option.

Figure 4.8: Solution Pathways for Corn-based Systems



3. ***Coconut-based Commodity Systems***

Table 4.8: Coconut: Anchor Commodity Profile

COCONUT METRICS	2016	2017	2018	2019	2020
Area harvested ('000 ha.)	3,565	3,612	3,628	3,652	3,651
Percent of total area	27.23%	26.74%	26.92%	27.46%	27.20%
Volume of production ('000 mt)	13,825	14,049	14,726	14,765	14,491
Value of production (PhP million in current prices)	108,654	120,701	91,768	72,026	85,055

Source of data: PSA

Coconut-based commodity planning highlights

Strategic Objectives

1. Raise coconut farmers' total incomes from diversified sources by at least 100% by the end of the plan period; and
2. Commercially develop various consumer and industrial products derived from coconut, such as coco water, coco coir, virgin coconut oil, coconut cream. coconut flour, coconut sugar, and many others.

Basic Interventions

1. Introduce feasible combinations of coconut with abaca and other crops, livestock, poultry and/or fishery commodities;
2. Similarly, introduce various possible value-adding activities in corn/livestock/poultry and other commodities;
3. Provide the corresponding research and development support;
4. Conduct on-farm trials to establish model farms on corn/livestock/poultry-based commodity systems; and
5. Develop working models of coconut-based farming system models for upscaling and nationwide replication.

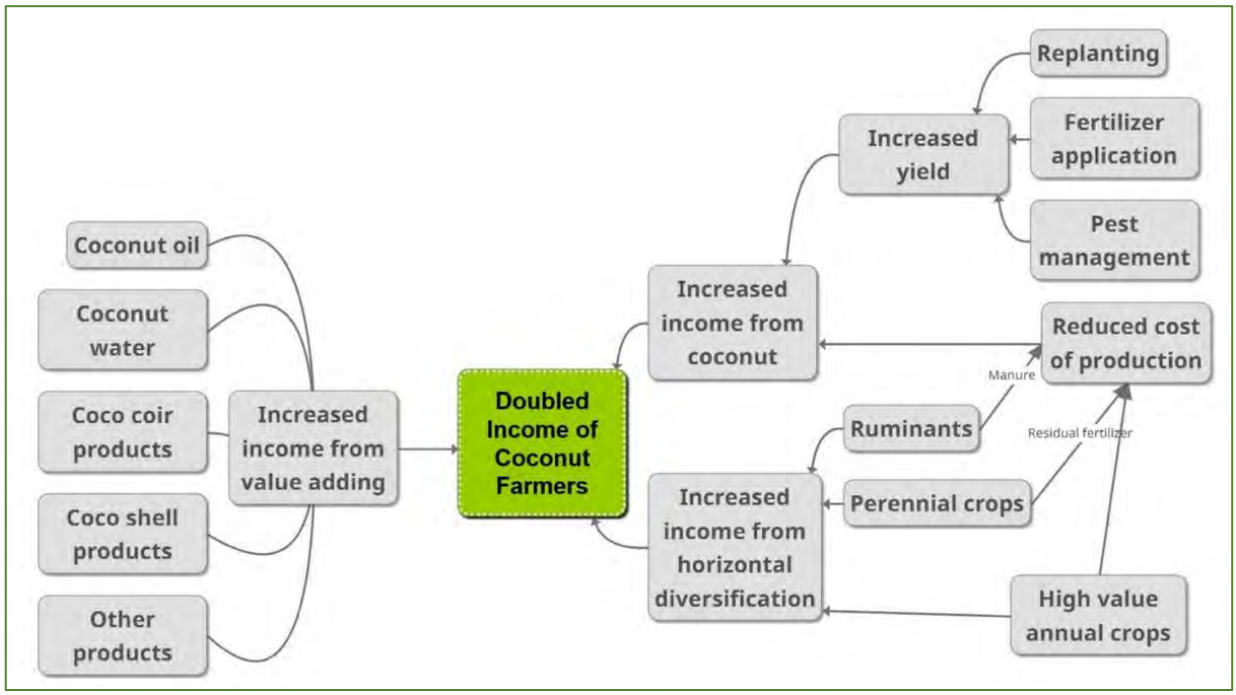
DA Cluster

PCA, PhilFIDA and other program directorates, FOS, AMAS, FMRDP, CRAO, BAR, BPI, BAI, RFOs

Directional guide for coconut-based commodity systems planning. For coconut, research as well as practice has shown the merits of various intercropping combinations under coconut with livestock growing. Figure 4.9 shows solution pathways out of poverty with coconut-based farming systems. Added income may come from engaging in value-adding processes toward manufacturing various coconut-based products (left side of Figure 4.9), and coffee, corn, abaca, and other perennials grown under coconut. PCA and PhilFIDA are already intercropping coconut and abaca. Replanting of new trees to replace the aging ones in decades-old coconut farms continues to be necessary.

Local planners may decide to prioritize value adding in areas where investors who can partner with farmers are willing to put up processing facilities. Where there are no investors and the areas are close to the market and relatively young coconut trees, short season vegetable crops may be an option for intercropping.

Figure 4.9: Solution Pathways for Coconut-based Farming Systems



4. ***Fishery-based Commodity Systems: the Future of Fish***

Table 4.9: Fishery: Anchor Commodity Profile

VOLUME OF PRODUCTION ('000 MT)	2016	2017	2018	2019	2020
Commercial	1,017	948	946	932	975
Municipal	1,138	1,126	1,106	1,125	1,102
Aquaculture	2,201	2,238	2,304	2,358	2,323

Source of data: PSA

Table 4.10: Value of Production in Fisheries

VALUE OF PRODUCTION (PHP million in current prices)	2016	2017	2018	2019	2020
Commercial	58,867	59,716	61,045	63,475	61,093
Municipal	78,926	83,479	93,974	100,342	98,012
Aquaculture	91,142	100,707	110,329	117,835	114,384

Source of data: PSA

Fishery-based commodity planning highlights

Strategic Objectives

1. Raise fisher total incomes from diversified aquaculture and marine fishery, farming, and non-farm sources by at least 100% by the end of the plan period; and
2. Provide stable year-round income and employment to fisherfolk, especially engaging them in reliable alternative livelihood activities during typhoon season and during the closed fishing season.

Basic Interventions

1. Introduce diversified income and employment opportunities, including combining coastal fishing and aquaculture to substantially raise incomes (at least 100% increase);
2. Provide the corresponding research and development support; and
3. Develop working models of fishery-based commodity systems for upscaling and nationwide replication.

DA Cluster

OUAIF, BFAR, NFRDI, PFDA, commodity program directorates, FOS, AMAS, RFOs

Partners

Fisher organizations, Congress, NCI, DAR, DENR, DOH, DTI, DILG, LGUs, business groups

Directional guide for fishery-based commodity systems planning. The Philippines is severely handicapped by limitations of land and water in terrestrial farming, but not as much with harvesting food from the sea. The archipelago has ***seven times as much water as land*** and it has access to rich fishing grounds. If this resource is nurtured, it can continue to yield fish to 2030 and beyond. The yield from capture fisheries will be supplemented by aquaculture.

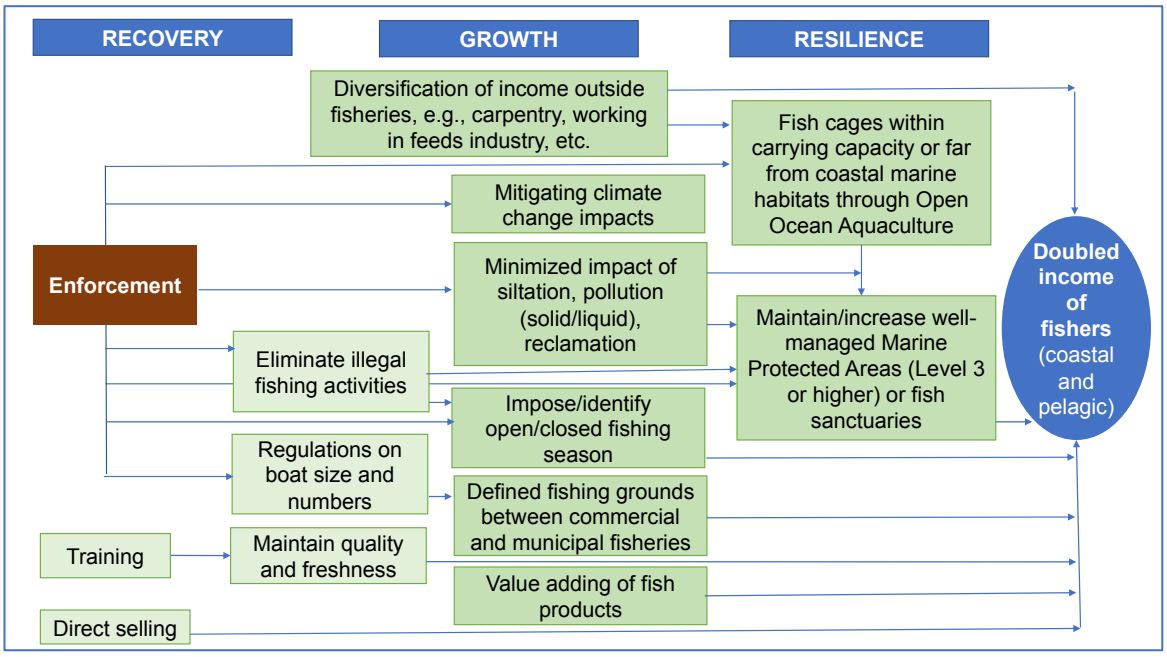
Rice and fish comprise the basic Filipino food. Fish consumption makes sense because of the archipelagic nature and rich fisheries of the country. In Metro Manila specifically, three nearby large bodies of water supply most of the fish.

Aquaculture in the scale seen near Metro Manila is a relatively young industry, but not necessarily so with respect to cities in other regions. Negros Province had a boom in shrimp aquaculture in the mid-1980s when its wealthy families converted their sugar plantations into shrimp farm to cash in on their high export demand until disease problems caused their decline after 1992 (FAO, 2005-2021). Capture fishery used to be the main source of fish for Metro Manila. Indeed, Manila Bay once supported the second largest fishery in the country. But overfishing, deterioration of water quality, habitat degradation, and rapid urbanization pushed down its fish yield to less than 10% of the level in the 1940s. The rivers flowing through Metro Manila suffered this fate sooner; they are no longer identified as an important source of commercial fish.

All together, the fish industry in the Philippines is second only to rice in number of jobs created. About 1.9 million fisherfolk engage in fishing activities throughout the country, broken down into different sectors: capture fishing, aquaculture, fish vending, gleaning, fish processing, and others. While there are four times as many fisherfolk involved in capture fishing as there are fisherfolk involved in aquaculture, the latter accounted for more than 50% of fish tonnage reported in 2018 for the entire country. Poverty incidence in the fishing industry is high at 34%, and artisan fisherfolk are considered the poorest of the poor in Philippine society.

Figure 4.10 analyzes the solution pathways for capture fisheries. In this diagram, doubling the fisherfolk's income is in the context of the fisher's family unit. To meet the target, e.g., double the income of fisherfolk (shaded as dark blue), the activities are categorized into three phases, namely: Recovery, Growth, and Resilience (colored blue), which all address the sustainability of marine resources (i.e., blue economy). The other shades of green boxes from light to medium represent the outputs and outcomes, respectively. Furthermore, Figure 4.10 emphasizes that to achieve the desired impact, enforcement is the most critical input. Presently, the country has more than enough laws leading to sustainability of the marine resources, but these have not been fully enforced particularly those pertaining to illegal, unreported, and unregulated (IUU) fishing activities (RA 10654).

Figure 4.10: Solution Pathways in Capture Fisheries



Some of the issues have been well described under the Comprehensive Natural Fisheries Industry Development Plan (CNFIDP). Assuming everything is in place, the more obvious ways of achieving this is through directly selling their daily catch while fresh; and by value adding. For both fresh and frozen products, value adding can be through labelling, such as "fish caught using non-destructive fishing gear"; "sexually mature fish"; and those "caught by marginalized fisherfolk."

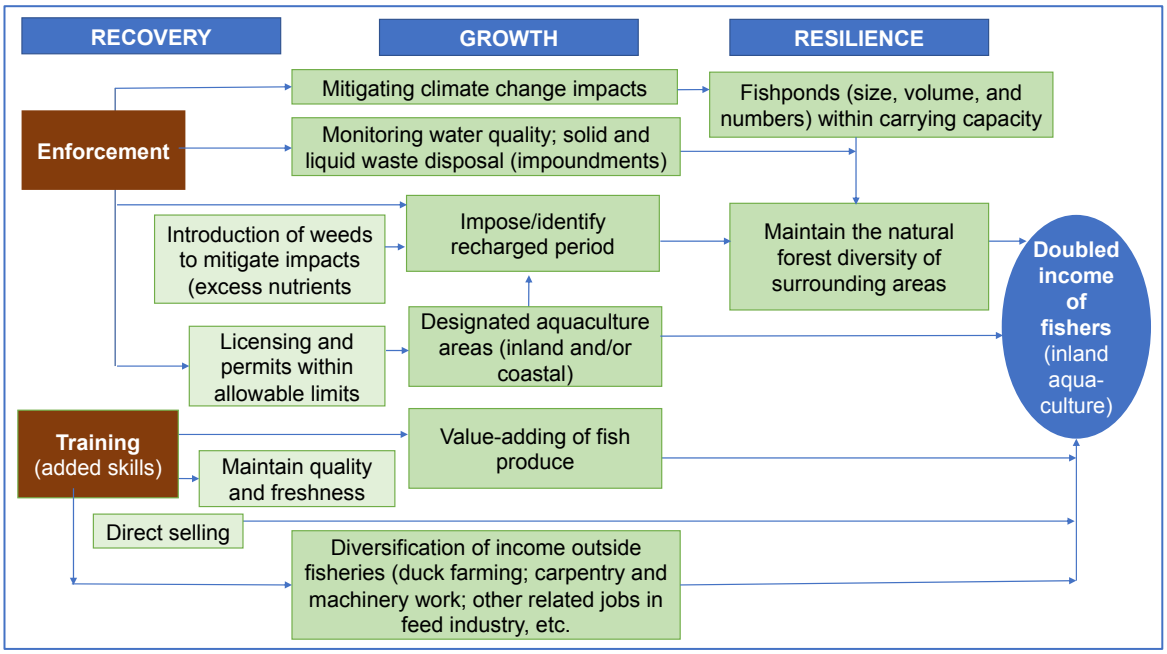
Although aquaculture through fish cages in tandem with mariculture such as seaweed and oyster farming are the best combinations as other sources of income, it has to be well managed and enforced within the areas' allowable carrying capacity. Neglecting such policies will not only result in fish kills but it can result in irreversible damage to marine habitats particularly the coral reefs.

To maintain the natural source of fish supply, which is the main target commodity of our marginalized fishermen, there must be some portions of the marine habitats that have to be protected or conserved. Hence, existing fisheries laws must be well enforced including minimizing impacts of siltation/pollutants and other wastes drained through river systems. These measures are critical in mitigating climate change impacts.

Presently, there are close to 2,000 marine protected areas (MPAs) all over the country. It started with two MPAs in the mid-1970s and gained national support among fisherfolk and coastal communities in the late 1990s. In 2007, the first national award was given for the best managed MPA in the country. Since then, the awards activity has been held biennially.

For the inland fishery sector (Figure 4.11), almost the same steps as for capture fisheries are involved. But for fisherfolk that are more situated inland, the critical need is training on skills to increase their income. This is similar to the other commodity systems mentioned above.

Figure 4.11: Solution Pathways in Inland Fisheries



Alternatively, during lean months, fisherfolk's incomes may be augmented through diversification. Thus, the local government unit needs to collaborate with the other sectors of the government, such as DOLE, DTI, TESDA, and DPWH, including the private sector.

By 2030, we can aim for more than 50% of the fish supply in the big cities to come from aquaculture. Today, all of the aquaculture around Metro Manila is essentially monoculture dominated by only two species (*bangus* and *tilapia*). Monoculture fish is a large-scale commercial operation. In Laguna de Bay, big-time capitalists crowd out small fish pen owners and the lake itself, leaving little room for small operators and for navigation within the lake. The Laguna Lake Development Authority (LLDA) had to reserve areas for these purposes and for native fish reproduction as well. The other major issue is water pollution from domestic, agricultural, and industrial wastes discharged into the lake by communities, farms, and factories around the lake.

Diversification in aquaculture. In the same way we envision diversification in the industrialized type of rice farming, we envision diversification in aquaculture. However, the technology for diversification in aquaculture is not as nearly mature as diversification in rice. After all, our skill in fish culture in captivity is fairly recent compared to that in plant agriculture. Two models—aquaponics, which is growing fish and crops together in a controlled environment, and integrated multitrophic aquaculture (IMTA)—are worth looking into. Both of these can significantly reduce the pollution of monoculture fish farming and increase fish productivity.

Both models require substantial investment. Hobbyists can show the way like in artisan farming. Hobbyists have the money, are willing to experiment and take risks, highly educated, and values-motivated. They can inspire and train traditional fisherfolk. Sustaining current efforts to clean up Manila Bay and the two lakes can accelerate diversification. Government-supported R&D, incentives to the private sector, and subsidy for small aquaculturists will also help.

A highly successful aquaculture model involving artisan fisherfolk-turned-aquaculturists is demonstrated in the Panabo Mariculture Park in Davao Gulf. It is patterned after industrial

parks where planned infrastructure and government services are provided and locators converge. In Panabo, the business unit (10 x 10-meter cages) is small enough for the small-scale aquaculturist. This small unit can generate a profit of PHP85,000 or PHP340,000 per hectare of water given that only four fish cages allow for navigation and control pollution. For the same length of time (120 days) and the same amount of space, a rice farmer would earn only PHP70,000 in the best-case scenario. If aquaculturists diversify into high-value fish, their profits will go further up.

If fish can command the same public attention as rice, subsidies and favorable policies for the fish sector may come more easily. The ones who need this support the most are the artisan fisherfolk, comprising close to a million in the entire country. Their fishing grounds need protection from poachers, illegal fisherfolk, and polluters. Their fish need sanctuaries. They need better equipment. Sometimes, they need to be protected from their own destructive fishing ways. They may also be encouraged to engage in aquaculture.

5. ***Geographically Specialized Commodity Systems***

Geographically specialized commodity systems (GSCS) are commodities that are:

1. Not currently produced on nationwide scale (unlike rice, corn-livestock-poultry, coconut, and fishery; and thus, the qualifier "geographically-specialized");
2. "Local brand" commodities known in other parts of the country (e.g., premium highland vegetables in the Cordillera);
3. Operated using a diversified smallholder system requiring specialized skills and generating high returns;
4. Significant in terms of potentials for geographic and/or technological scaling-up and commercialization; and
5. Of high value relative to the major commodities rice, corn, and coconut.

In NAFMIP, there is no minimum area for a commodity to qualify as being "geographically specialized." The DA RFOs are given the flexibility to identify geographically specialized commodities to include in their regional plans. *The concerned RFOs will prepare detailed commodity system roadmaps for their identified GSCS.*

GSCS-based commodity planning highlights

Strategic Objectives

1. Provide an opportunity to expand the geographic coverage and to enhance economic benefits from local commodities and products; and
2. Enable stakeholders in geographically-specialized commodities to modernize and scale-up their enterprises.

Basic Interventions

1. Introduce crops, livestock, poultry, or fishery commodities that may be included in a geographically specialized system;
2. Provide research and development support to enhance production and postharvest efficiency;
3. Develop GSCS models for upscaling and replication in other municipalities, provinces and regions.

DA Cluster

RFOs, commodity program directorates, FOS, AMAS

Partners

Farmer organizations, NCI, DAR, DENR, DOH, DTI, DILG, LGUs, business groups

Directional guide for GSCS-based commodity systems planning. Rice-, corn-, coconut-, and fish-based commodity systems cover a great majority of the rural poor, hence NAFMIP prioritizes them over other commodity systems that are collectively referred to as geographically specialized commodity systems (GSCS). As earlier pointed out, the latter are not grown all over the country and are anchored on an established monocrop as the first four systems. Examples of these are the artisan farm and urban farm as described below; and sugarcane farming.

The artisan farm. The artisan farm has many alternate names depending on the main objective and production method. They are usually located in peri-urban, upland and hilly areas. They tend to be multifunctional. A new trend is the farm that starts as a hobby, then evolves to become a tourism farm with the added function of training. The hobby farm's main revenue eventually comes from selling farm products rather than tourism and training services.

Organic farms, a type of commercial artisan farm restricted by their production method, are gaining practitioners. At the moment, however, organic agricultural products are expensive and cater only to a niche market.

The conventional commercially oriented artisan farm supplies the bulk of high-value food crops today and it is likely to continue to do so. It is typically small, less than five hectares, but its main feature is diversity and labor intensity, requiring a high level of skill. But the artisan farm may also involve a wide range of crops plus livestock, poultry, and fish. A few farms are conservation-oriented—they grow native species such as wild pig, native chicken, and heirloom crop varieties (e.g., black rice).

At the other extreme are capital-intensive, specialized, high-tech farms with modern features such as net and plastic houses, drip irrigation, and non-native crops such as salad vegetables to provide year-round supply to the high-end market. Some artisan farmers also venture into food processing.

With such a variety of options, the artisan farms can not only cater to a range of food preferences, but also provide food diversity needed in the traditional Filipino diet, increased farm employment, and revival of local food cultures.

The typical modern artisan farm is initiated by an educated entrepreneur, including the newly retired baby boomer, who is keen on farming as a lifestyle to support good health and mindful of environmental impact. She is the opposite of the traditional artisan farmer who had dropped out of school due to poverty, earns barely enough, is afraid to take risks, is shunned by banks, is at the mercy of traders, does not inspire her own children to inherit her work, and continually looks to the government for support.

The modern artisan farmer is a keen experimenter, constantly trying new products, processes, and markets. She will serve as a trailblazer and an inspiration to other similarly placed entrepreneurs, as well as traditional farmers. Successful models exist, where traditional farmers are assisted by the more advanced ones by providing them technical assistance as well as linking them to the market. Indeed, many modern artisan farms also serve as government-accredited training centers.

The poster case of a modern artisan farm is the Costales Nature Farm in Majayjay, Laguna, although many similar ventures have sprung up and are modeled in various parts of the country as well. They usually start as a hobby by a retired professional or overseas Filipino worker, become a commercial organic farm, then finally a tourist destination. Costales Nature Farm has the distinction of being the first government-accredited tourism farm that has

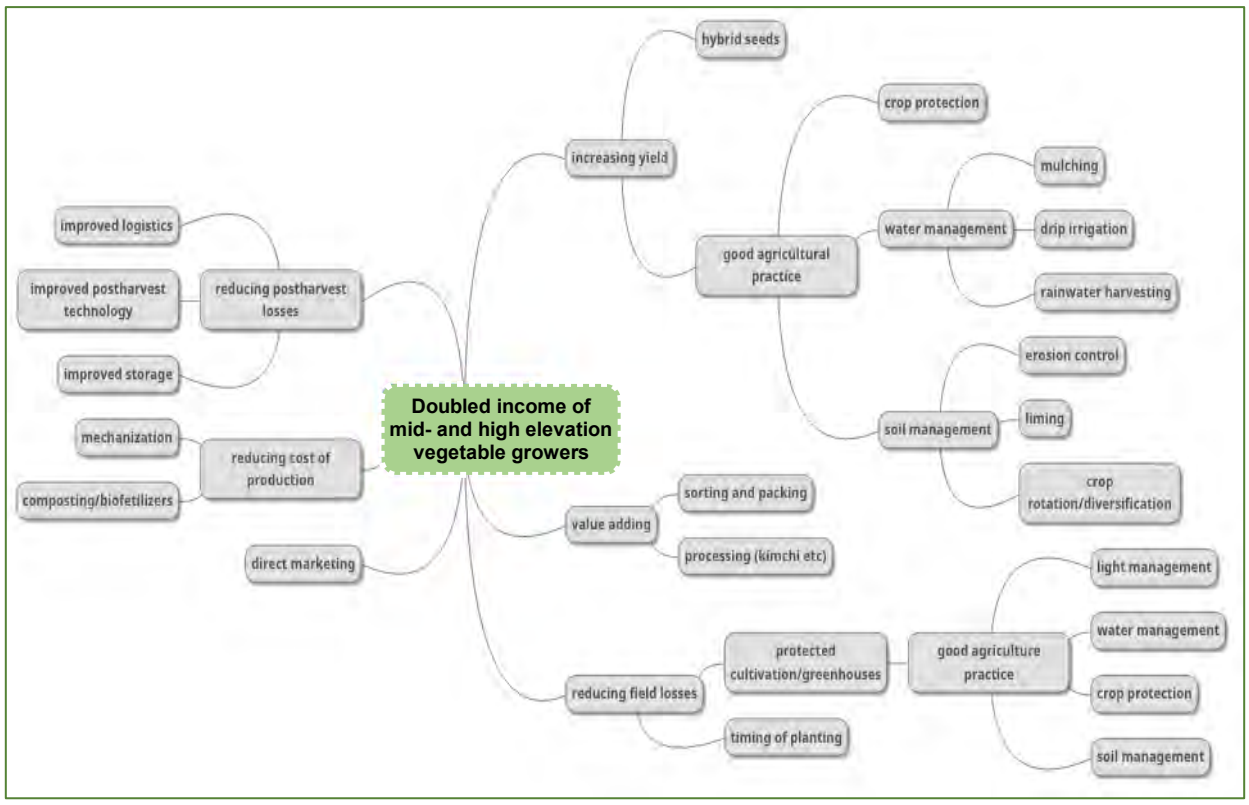
inspired many others. In 2019, the list of tourism farms and learning sites had expanded to 31 and 51 members, respectively, just in the five provinces bordering Metro Manila.

Region IV or CALABARZON has the biggest concentration of artisan farms in the country. When they flourish with increased demand for diverse food products, they will absorb labor that otherwise will migrate to and fill the slums of Metro Manila. They will attract new investors, inspire new business models, and energize the countryside with their idealism, knowledge, and money.

A fitting illustration of a new investor is the case of Mr. Crisanto Gualberto, a highly educated experienced farmer who plans to put up a network of small coconut-based farmers around a food innovation hub producing nutritious processed coconuts that the farmers would co-own. It will be a good model for combining the social orientation of artisan farming with the economic orientation of industrial farming. These new investors will be encouraged by new consumer habits, and will likely attract aquaculturists as well. Aquaculture is uncharted territory, with greater potential for food security and poverty alleviation in the Philippines than terrestrial farming.

The pathways for doubling the income of high and mid-elevation vegetable growers, an example of the artisan farm, is shown in Figure 4.12.

Figure 4.12: Pathways for Doubling the Income of Mid- and High-elevation Vegetable Growers



Urban agriculture. Urban farming will be our best chance of feeding Metro Manila and other big cities sustainably into the far future. Mega Manila, Metro Cebu, Metro Davao, and Metro Cagayan de Oro account for around 20% of total food demand based on population. It is the urban farm system that has the least physical limit. Pushed to the extreme of human ingenuity, urban farming will be much less subject to the limitations of land, water, pests, global warming, calamitous weather, pollution, and labor that constrain contemporary farms. It can utilize

practically limitless vertical space, purify seawater, isolate its facility from temperature and weather extremes, pests and diseases of plants and animals, reprocess its waste, and reduce labor by automation. Its main input and ultimate limit is energy, but energy is practically limitless coming from the sun. At the moment, all of humanity is using only a small fraction of solar energy—less than one percent by some estimates. Technology is making energy cheaper every year, thus it is only a matter of time when food from urban farming can be cost-competitive with food from the sea and terrestrial farms. Combined with development of appropriate production systems, urban farming can produce practically every food component that can be produced by sea and land farming.

Just a decade ago, urban farming could only produce lettuce, tomato, and similar short-season high-value food crops. Today, new technologies are available to produce meat in the lab, without growing animals; thus, it is not inconceivable that, in the future, every household can have a food factory that can produce most of what it needs. ***This is the ultimate in food security.*** For this to happen by 2030, considerable investment is needed for technology transfer and local R&D.

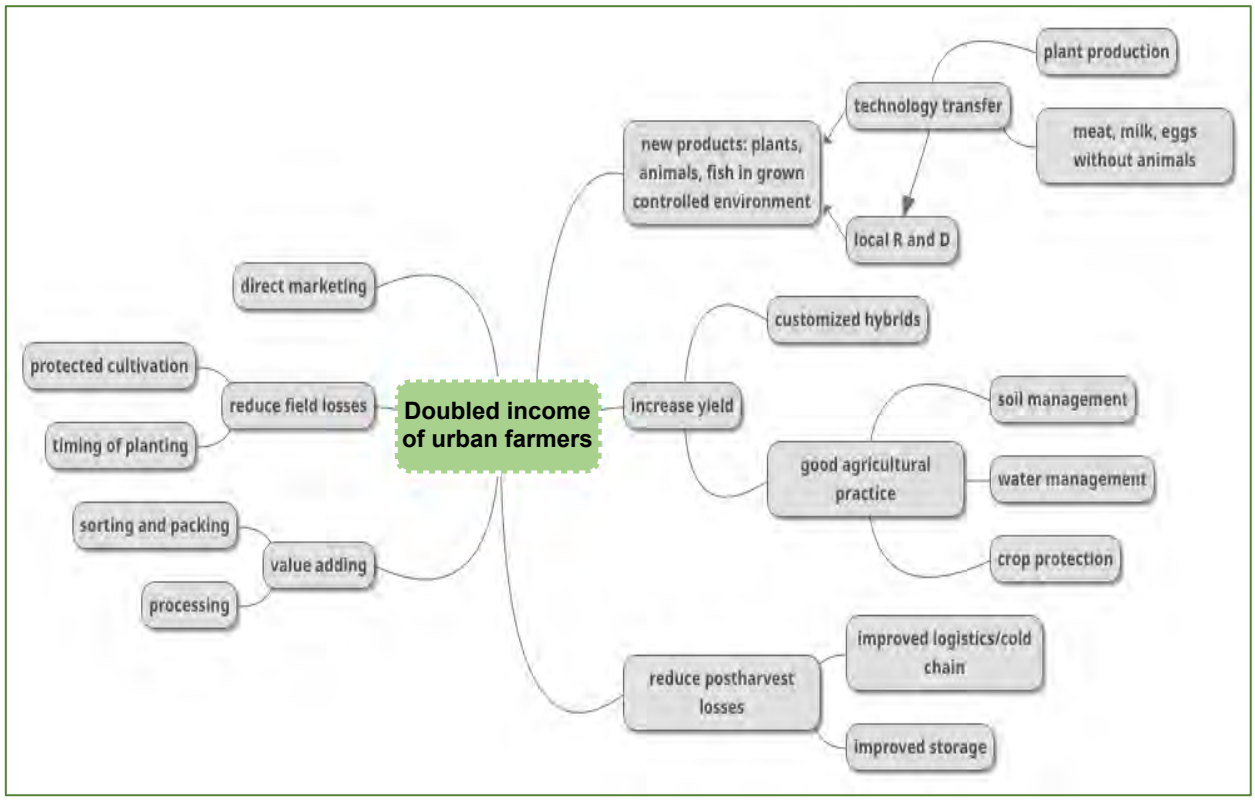
Between now and 2030, increasing sophistication in organization and technology in urban gardening is expected. Among the options are landscape gardening, community gardening using vacant lots and buildings, hydroponics, and an increasing use of vertical space. Creating the path for urban farming is a futuristic project of the University of the Philippines called Smart Plant Production in Controlled Environments (SPICE) Project. The strategy of the project is similar to that of the new artisan farms, that is, a multifunctional model for food production, but it is focused on controlled environments.

Unlike the new artisan farms that are privately owned, the SPICE Project is a government initiative with funding provided by the Department of Science and Technology. The idea is to establish a facility that can serve multiple functions: R&D, genetic resources conservation, food production, education, entertainment, and marketing. Hobbyists and experienced investors like in the case of artisan farms should be encouraged to replicate the concept. A new curriculum for training urban farmers can spin out of this university-based project.

By 2030, urban farming could develop into three types: conventional, organic, and high-tech. The bulk of the food supply will likely progressively shift toward organic and high-tech. Communities ought to be required by law to set aside facilities for these, but their operation can be private (leased to investors) or done by the community itself through appropriate mechanisms such as cooperatives. The pathways for doubling the income of urban farmers are shown in Figure 4.13.

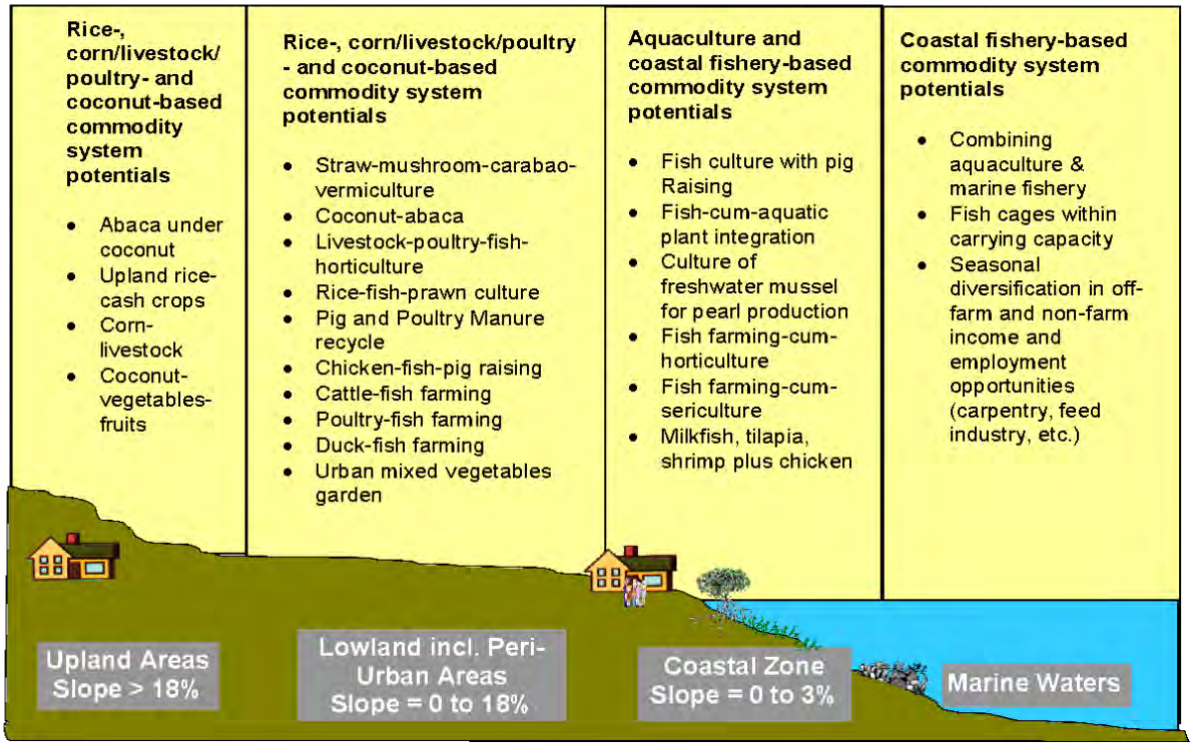
Sugarcane is another example of GSCS, mostly grown in Negros. Although sugarcane is cultivated as a monocrop, it may be intercropped with short-term crops such as legumes before the rows in the sugarcane field close their canopy. The Sugar Regulatory Administration (SRA) promotes intercropping of sugarcane with other crops to farmers through sugarcane farm management seminars. Intercropping with leguminous crops such as peanut and mungbean improves soil fertility and will increase farmer incomes.

Figure 4.13: Pathways for Doubling the Income of Urban Farmers



In summary, Figure 4.14 illustrates possibilities for commodity systems across various agri-ecosystems from ridge to reef.

Figure 4.14: Illustrative Combinations of Crops, Livestock and Poultry, and Fishery in Commodity System-based Planning



Support Services for Food System Transformation

The support services for food system transformation can be broadly categorized as follows:

1. Supply of inputs;
2. Primary production;
3. Value adding (processing, storage);
4. Trading and retailing;
5. Food services (restaurants, delivery services);
6. Consumption; and
7. Waste management.

NAFMIP has departed from the usual agri-fishery development plan in adopting the food systems approach, which explicitly entails support for all the above categories. In addition, NAFMIP addresses cross-cutting services: governance; research, extension, and training for development; results-based monitoring and evaluation; and strategic communication.

Based on the food system vision drafted by a multisectoral team of 15 organizations led by the National Academy of Science and Technology (NAST), consumption is considered as the trigger for a demand-driven transformation. This "trigger" covers not only food consumption, but "consumption" at different stages of the value chain. The assumption is that shifts in consumption will trigger corresponding changes in all the other aspects of the food system. If consumers demand more diversified, plant-based food, then farmers will adjust their production targets. If consumers demand biodegradable packaging, farmers, traders, retailers, and processors will follow.

Focusing on the first three of the categories that most directly affect farmers' income—supply of inputs, primary production, and value adding—the Plan prioritizes localized self-reliance as a way of supporting the local economy and coping with uncertainties due to natural disasters, climate change, and disruptions of trade. The extent of self-reliance is a political decision, preferably guided by sound science and economics that the provincial planning teams must establish early in the operational planning phase.

Priorities among food commodities can be gleaned from the recommended shifts in consumption away from food commodities to nutritious and healthy food items. Broadly, greater emphasis should be on fish vis-à-vis land-based food. Among the land-based food, greater emphasis should be on alternative staples, grain legumes, vegetables, dairy, root and tuber crops, and coconut.

Nevertheless, NAFMIP also covers non-food items such as rubber, abaca, tobacco, and ornamentals. Engaging in producing these commodities creates jobs and indirectly provides food for the various sectors involved in their value chains.

Agricultural Inputs and Requirements

Seeds and Propagules

Whether or not seeds and propagules will be locally produced, it is essential that local R&D should be in place to develop the needed varieties and breeds. Theory and experience have shown that superior breeds generate the best value for money among the different agri-fishery technologies. Thus, the government must give genetics and breeding the highest priority in agri-fishery. In the past, research in this area was intended for monocropping. With the new emphasis on diversified farming, research must be directed toward farming systems. For

example, dryland crop varieties intended for production in a rice-based system must be evaluated under this condition.

Most but not all seeds and propagules can/should be produced locally. Highly perishable living materials such as chicks, piglets, fish fingerlings, mushroom spawns, recalcitrant seeds, and materials for asexual plant propagation cannot easily be stored and transported over long distances and they need special transport conditions. Local production of these should be encouraged and supported.

Seeds of some species of plants cannot be produced in the Philippines, as they require temperatures and daylengths that cannot be found under field conditions anywhere in the country. Among these are onions and brassicas (e.g., cabbages, cauliflower, broccoli, and kale). They often have to be imported from temperate countries or grown in cooler, elevated regions.

Production of dry seeds of tropical species is not necessarily best done in the country. Most seeds require a cool and dry climate particularly during the seed ripening stage, a condition that is best achieved only in the northern part of the country and a few other areas during the dry season. Thus, highly localized production may not be feasible even for dry seeds.

For the major crops such as rice, corn, and vegetables, a vibrant private seed industry based predominantly on hybrid technology is already in place. It will be prudent for the government to support the private sector instead of duplicating its work. For the other items such as crops that are not covered by the private sector, livestock, poultry, and fish, government support needs to be continued and enhanced.

Energy and Mechanization

The modern food system is energy intensive. Energy is needed for farming, processing, transport, cooking, and waste management. Historically, energy use has shifted from humans to animals, then to machines. For machines, energy use is in the process of shifting from fossil fuel to renewable forms of energy such as solar, wind, bioethanol, and biodiesel. This is justified initially because of the environmental impact of fossil fuel. Lately, socio-economic and food security issues are becoming more important. Alternative forms of energy are turning out to be price competitive, and they can be produced locally, generating jobs and securing their supply.

The NAFMIP commits to shift to renewable energy in all steps of the food system. Among them are farm machinery (water pumps, tractors), transport, cold storage, and rice mills.

The Plan further favors shifting to electric machines, which are easier to build and maintain. Machines such as electric motors can be produced locally, unlike diesel and gasoline engines. Compared to internal combustion engines that have thousands of moving parts, the electric motor has only one. The shift can be triggered by DA procuring electric machines for distribution to farmers.

One major environmental concern with the design of machines pertains to machines that cannot be repaired, posing both economic and waste disposal problems. Other countries have initiated measures to ensure the repairability of machines. NAFMIP pushes for a national law mandating the repairability of machines used by the agri-fishery sector.

Another issue with machines is that not all varieties of crops are adapted to mechanization. For example, local varieties of mungbeans produce dry beans over a fairly extended period. If they are harvested mechanically too early, the late beans may be lost. If they are harvested

mechanically too late, the early beans may be lost. We need special varieties that are suitable for mechanization.

Peripherals for tractors such as plows, harrows, and more sophisticated ones such as planters and harvesters have been designed locally by the Philippine Center for Postharvest Development and Mechanization (PhilMech), Philippine Rice Research Institute (PhilRice), International Rice Research Instiute (IRRI), and state universities and colleges (SUCs). In the 1970s, IRRI and the University of the Philippines Los Baños (UPLB) had programs for producing these peripherals involving small-scale fabricators. NAFMIP will support anew the development of peripherals and their mass production through SMEs. Similarly, production facilities for hand tools such as hoes, shovels, and bolos should be upgraded. The Department of Science and Technology (DOST) has Small Enterprise Technology Upgrading Program (SETUP), which is designed to upgrade SMEs.

The fishery and aquaculture sectors need as much attention with regard to energy and mechanization as the terrestrial food producers. Ocean-going boats and their engines require as much attention as tractors.

Water

Water will always be essential in the food system regardless of the level of technology. The water problem is two-fold: too much and too little. In past government programs, the problem of too much water is hardly addressed, but this is bound to become more serious with climate change. Too much water can be addressed in at least two ways: genetics (crop varieties that can thrive under waterlogged soil conditions), and engineering (provision of drainage and site selection). Regrettably, very few crop species have the genetics for waterlogged conditions. In addition, the most productive areas are generally flood prone, because it is the floods that sustain soil fertility. Therefore, a program to adapt terrestrial farming to excess water is badly needed. Of special mention is the need to incorporate drainage facilities in farm infrastructures.

Too little water for primary food production of terrestrial species is also expected. The driver of this problem is not only climate change; competition for domestic and industrial uses, reduced capacity of watersheds to store water, and declining underground resources are equally responsible. Coincidentally, the food items that use a lot of water (rice and cattle) are the commodities that are projected in NAFMIP to decrease in demand given its dietary shift strategy. Thus, the dietary shift will have a big role in reducing water requirements in farming. Plant base, with emphasis on efficient dryland crops. is part of this strategy. The dietary shift also recommends use of minimally processed food and recycling water at all stages of the food value chain. This will reduce water use in processing and generally reduce demand for water.

At the farm level, adoption of water-saving practices such as drip irrigation and mulching may be recommended. Artificial intelligence systems can detect moisture requirements of crops and apply water in the proper amount and timing.

Another strategy for reducing water use in food production is the use of controlled environment technology such as vertical farming and hydroponics.

Finally, varieties of crops must be bred for the extreme conditions of too much and too little water. Among the new possibilities is the breeding of crops that are suited for production in floating farms using fresh water lakes and coastal waters. In the case of the latter, breeding for tolerance to salinity is needed. Floating farms will increase the land area used for farming and open up possibilities for integration with aquaculture.

Land

The most advanced controlled environment technology such as hydroponics and aeroponics for plants and laboratory production for meat will not require land. But in the near future, land will always be needed for food production.

Access to land for agriculture is beset by complicated issues: (a) its conversion to other uses; (b) decreasing farm size to the point that the typical farm is no longer economically viable; and (c) idle lands due to speculation and fear of tenancy, as well as unfavorable peace and order (e.g., in BARMM), which discourages investment in farming.

These issues require policy solutions. So far, the most visible solution offered by the DA is land consolidation addressing issue (b) above. Other possibilities include: (a) discouraging land conversion by making it more costly to do so through a "conversion tax" representing the cost of improvements (e.g., irrigation, drainage, and farm roads) paid for by the government, preventing further reduction in economically viable farm size: (b) taxing idle lands; and (c) solving the peace and order problem. All of these require in-depth studies. Meanwhile, a bill on Comprehensive Land Use is waiting to be acted upon by the legislature.

Fertilizers and Soil Amendments

In theory, soil fertility is naturally restored by decomposition of biological materials and action of microorganisms in the soil. Both of these require time and are therefore unsuitable in intensive systems. In addition, not all of the biomass is returned to the soil. Some are harvested as food, others are burned to allow intensive cropping. Whatever is left for recycling can also be lost by erosion, leaching, and other natural means—all of which are accelerating because of destructive human activities and climate change. Finally, modern varieties have a high proportion of edible materials that are not returned to the soil. The high yield is supported by high extraction of plant nutrients from the soil. The high rates of extraction and low rates of replenishment in the modern food system means that external sources of nutrients should be applied in quantities that are proportional to the losses. Fertilizers supply this need.

Synthetic chemical fertilizers are preferred by growers because they have a high nutrient concentration (easier and cheaper to transport) and their effects are quickly observed. The downside is that they do not supply all the nutrients needed by plants, and their continued use can cause nutrient imbalances. In spite of attempts to increase the efficiency of their use, as much as 50% of synthetic fertilizer nutrients can be lost, resulting in pollution of water bodies and ecological damage. Finally, the sustainability of synthetic fertilizer supply is at issue because of the high energy requirement of their value chains. The war in Ukraine threatens global fertilizer supply because Russia and Ukraine are major producers of fertilizer.

In the short term, smart technologies such as sensors that detect parts of the field requiring chemical fertilizers and, with the use of artificial intelligence, limit applying to those areas at quantities and timing that correspond to the needs of the crop, can be mainstreamed.

In the long term, NAFMIP recommends reduced reliance on chemical fertilizers and increasing use of alternatives. Among the alternatives that can be used immediately in scale are biofertilizers developed by government R&D institutions, which are now commercially available or ready for expanded use. Their expanded production and utilization should be encouraged initially by government action supporting increased production of concentrates at Biotech (UPLB) and reactivating the dormant mixing plants in the regions so they can produce the final product. Incentives must be provided to the private sector to invest in R&D and commercialization of biofertilizers.

The downside of biofertilizers, like that of synthetic fertilizers, is that they do not supply all the nutrients needed by plants. In addition, their reliability is at issue. Their effectiveness is highly variable according to the environmental conditions at the level of biofertilizer production, handling, and field application. Like synthetic fertilizers, biofertilizers alone may not be sufficient to sustain soil fertility and health.

Soil carbon, which can only come from organic matter, is essential for soil health. Philippine agricultural soils generally need carbon replenishment and build-up to restore soil health and its ability to provide a balanced supply of nutrients. Organic matter comes in different forms: compost, vermicast, animal manure, or crop residues incorporated into the soil. They provide not only carbon, but also a balanced supply of nutrients and an environment for useful soil microorganisms to thrive. Organic matter is therefore essential for maintaining soil fertility and health, in a manner that is not provided by synthetic fertilizers and biofertilizers.

At present, organic matter for the farms are mostly produced at the level of the farms. Their production can be enhanced by integrating animals, preferably ruminants, in the farming system. Ruminant manure is an excellent organic fertilizer. Other methods include incorporating crop residues, compost, and vermicast. Leguminous crops that fix atmospheric nitrogen must also be a part of all farming systems. The role of ruminants and legumes in soil health reinforce the NAFMIP direction to drastically increase grain legume production and integrate livestock with crop production.

But all of these are not sufficient to supply the needed organic matter to the farms. NAFMIP will exert a big effort to return to the farms organic matter that is transported to the urban areas in the form of food and end up in landfills and septic tanks or otherwise simply disposed of in waterways, causing pollution. We need to establish a system of return logistics to facilitate their recovery and return to the farms. One example of this is the practice of collecting urine in metal receptacles in public toilets for application in urban farms. This was done in Metro Manila in the 1960s and 70s before the introduction of cheap synthetic fertilizers.

By-products of industrial processing of such products as alcohol, sugar, and oils can also be used as fertilizers.

Lastly, development of varieties that are efficient in using nutrients can reduce the need for externally sourced fertilizers.

Animal/Fish Feeds

Feeds constitute the main direct cost of raising livestock, poultry, and fish. Many feed ingredients can be sourced locally to ensure security and stimulate the local economy. The main feed ingredients are those derived from rice, corn, coconut, and fish. Localized value adding and diversification/integration can improve the availability, cost, and quality of these ingredients.

The wisdom of integrating crops with livestock, together with involving cooperatives with such integration, is aptly demonstrated in the case of the Sorosoro Ibaba Development Cooperative (SIDC) in Batangas City. In this case, individual members of the cooperative may specialize in pig raising, feed milling, or corn production, but the profit from the integrated operation is shared among the members. The individual members need not be physically close to each other too.

In the same manner, livestock feeding of ruminants may be integrated with coconut production, with the land area between coconut trees serving to grow pasture crops. Ruminants fertilize the coconut and other crops grown with coconut with their manure.

If coconut production is integrated with value adding, the by-products may be used as feed components for pigs and poultry.

Fishery and aquaculture may also be integrated with pigs and poultry as trash fish and other aquatic plants and animals serve as feed ingredients. On the other hand, animal manure may be used as fertilizer for plants and fish feed.

Rice production is traditionally integrated with animal production, so it is relatively easy to introduce this practice. The rice straw and rice bran serve to feed ruminants and pigs, respectively.

Pest Management

The pest problem in agri-fishery is likely to be aggravated by increasing temperatures and rainfall that come with climate change. An added factor is greater international mobility of live plants and animals as well as processed products that can potentially carry diseases.

Recent outbreaks in diseases of livestock and poultry highlight the need for greater vigilance in preventing introduction and spread of diseases that affect crops, livestock, poultry, and fish. Plant and animal quarantine services require improvement. Exclusion is still the most effective way of pest management.

The NAFMIP direction for diversifying the farms should be the main strategy if pest exclusion fails. Proven concepts such as ecological engineering may be applied. This requires granular knowledge about the ecological roles of plant species, crops, and wild plants alike. Regrettably, this knowledge is rudimentary at best. More R&D is needed to understand and enhance (through genetic improvement) the ecological roles of plants.

Other pest management measures are biological control agents and chemical control. Their use should be carefully integrated in a localized pest management program for agricultural crops. For livestock and poultry, vaccines are essential. Since the government has recently approved a virology institute in response to the COVID-19 pandemic, the DA should push for inclusion of animal vaccines in the program of this institute.

The adverse effects of chemical pesticides may be minimized through an effective regulatory system that screens out hazardous chemicals and use of artificial intelligence in systems that monitor pests at the field level and direct the timing and intensity of application in areas that need them.

But still, the most effective and cost-efficient strategy for pest management of agricultural crops, livestock, and fish is host resistance. Existing efforts in this area need enhancement, with emphasis on crops, livestock, and fish that are not yet covered by the private sector.

Other Farm/Fishery Supplies
(For trellising, fish cages, mulching, and packaging)

Producing and marketing food requires materials that can be produced locally, or by the farmers themselves. Among the various uses are for trellising plants such as *ampalaya*, *sitao*, and *patola*; mulching; construction of housing for livestock, fish cages, and fishpens; and for packaging farm products. Bamboo is a useful material for many such purposes, therefore NAFMIP supports the current program of DA to develop bamboo. For tying, abaca twine is suitable. Using these organic materials will reduce using plastics in the food system.

For mulching, rice straw is traditionally used for garlic and onion. These two crops easily integrate with rice production. For coconut-based farming, coco coir may be used as mulching material.

For packing farm products, jute, abaca, bamboo, wood, palm leaves, and banana leaves were traditional materials before the age of plastics. For industrial products, glass bottles and cans were used. These should be revived to reduce the use of plastics. For fish boxes that require ice, coco coir has been used as an insulator.

Marketing in the Transformed Food System

The food marketing landscape has been quickly reshaped by technology. When home quarantine was imposed during the COVID-19 pandemic, there was a surge in demand for online food purchases. To meet this demand, entrepreneurs quickly organized home food deliveries ranging from 25-kg rice bags to ready-to-eat meals. Many of the entrepreneurs are farmers while the others partnered with farmers. This system is more flexible than existing wet markets, ambulant vendors, and deliveries from restaurants, because they can deliver a wider choice of foodstuff in fresh form. Since long distance transport was hampered by travel restrictions, most of these products were sourced within or near communities. New trade relationships were established, and it is likely that these relationships will endure as consumers have realized the advantages of this new system. This new marketing model can benefit from improved quality control and traceability.

Toward a Circular Food Economy

Every step in the food system generates waste. In a rice farm, this consists of straw. During marketing, packaging materials made of plastic and wasted food end up in the landfill. At the consumer level, they end up as sewage. These wastes have the potential to be converted into energy and useful materials such as fertilizer. Instead, they pollute the soil, water, and air.

Reverse logistics and waste processing will enable efficient utilization of these wastes, but more importantly for farming, recover nutrients and send them back to the farms. Of critical importance is phosphorus, a nutrient needed by plants in large quantities. It is mined and mixed in commercial fertilizer, but its traditional sources are close to being depleted. With improved waste handling and extraction technology, more valuable materials that are in short supply can be recovered from waste. Eventually, waste processors will pay for the waste as its value as a resource is recognized.

Moreover, using biodegradable food packaging will create an additional industry that will offer new opportunities for farmers. Diversified and integrated farming and clean aquaculture technologies will reduce pollution by recycling nutrients.

Digital technologies will enable an efficient marketing system and a closer connection of consumers to their food sources. Real time feedback mechanisms also allow consumers to rate suppliers, and suppliers to know market demand.

Rice straw, one of the main waste materials in the Philippine food system, has many uses. Yet farmers still burn them in spite of legal prohibitions. If the law cannot stop burning, economics will. In areas where onions and garlic follow rice, rice straw is sold for use as mulching material. This resource can also be used to feed livestock, or as mushroom substrate. If production of these products will be stimulated by increased demand, rice straw burning will stop, and rice straw will become a regular revenue source. An ongoing project is developing the technology for collecting methane gas produced by rotting straw. Another project aims to utilize rice straw directly as energy source by controlled combustion.

Rice hull and rice bran are by-products of rice milling. They are now being used in many ways and bring additional income. Specifically, rice bran is not only useful as livestock feed; it is a raw material for extraction of high-value health, nutrition, and pharmaceutical products.

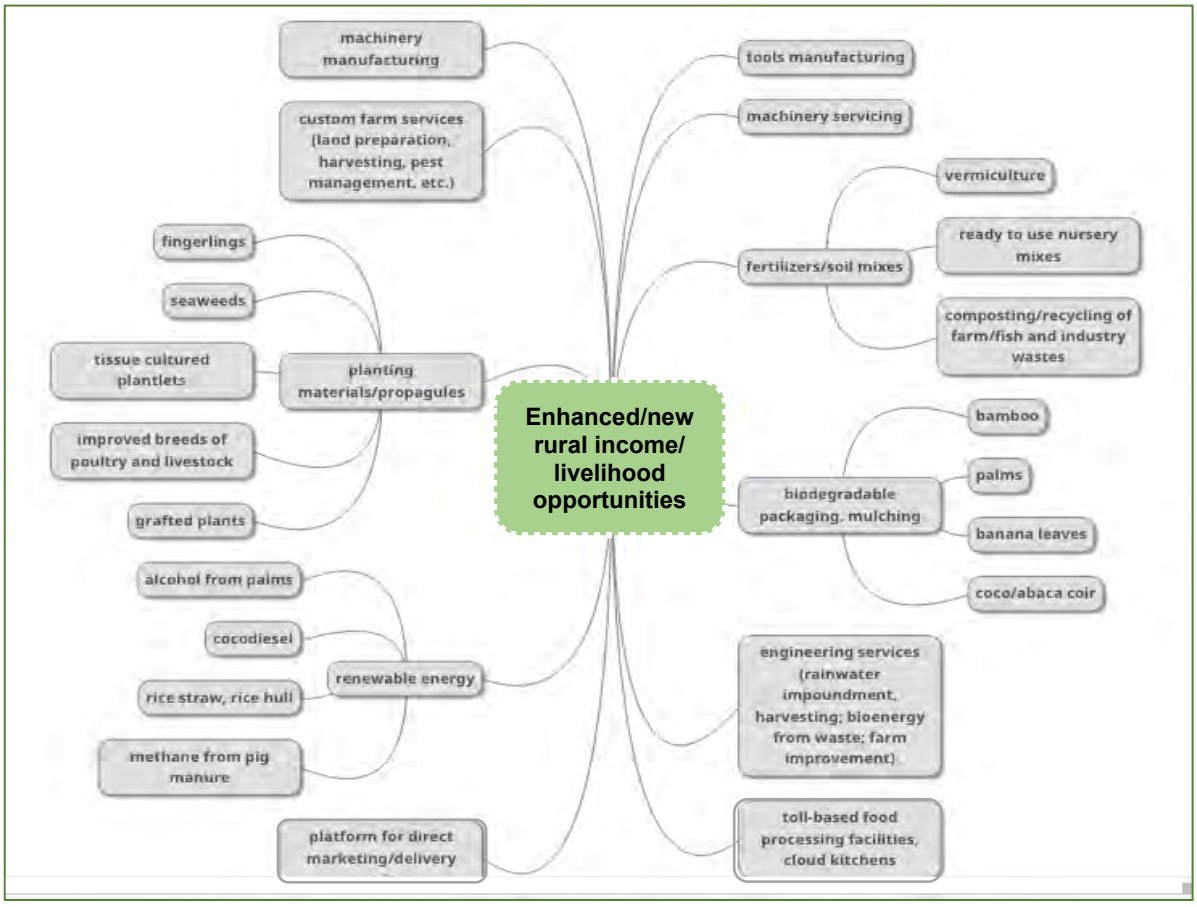
The economic benefits from converting biomass wastes into energy and value-added products are among the advantages of producing our own rice rather than importing. With good processing technology, they can substantially contribute to the local economy. Imported rice comes in the form of milled grain, thus the valuable waste and by-products are left in the country of origin.

Food Systems: Engine for Job Generation and Rural Transformation

One advantage of the systems approach in assessing possibilities for an agri-fishery led development is that it opens new opportunities that either have not been noticed before or have been taken for granted. Provision of goods and services to the farming sector is among these. Belonging to this category are tools manufacturing (we now import most of our hand tools such as hoes, bolos, rakes, and shovels), and machinery fabrication. The range of possibilities is illustrated in in Figure 4.15.

It may be noted that these possibilities are open to investors and entrepreneurs who are not necessarily farmers. Skills needed range from digital technology to designing irrigation systems. Exploited properly, these possibilities can offer jobs to those who became jobless because of the pandemic during the NAFMIP recovery phase, and will continue to generate jobs into the farm future.

Figure 4.15: Pathways to Enhanced/New Rural Income/Livelihood Opportunities



Areas of Policy Imperatives toward Food System Improvement

Many enabling laws such as those covering agri-fisheries modernization, rice tariffication, farm tourism, and seed industry development are already in place. The most recent is the *Balik Probinsya* (back to rural communities) program, which seeks to decongest Metro Manila by making it attractive for its population to relocate to the countryside. Additional policy initiatives are needed in the following areas:

1. ***Education*.** A comprehensive food system education is needed at all levels. This program will highlight the consequences of personal food choices on important society issues. Urban agriculture focused on the new controlled environment food production technologies must be developed as a distinct branch of agriculture or a new branch of technology altogether. Education of health care workers must cover nutrition, health, and preventive medicine.
2. ***Feeding programs*** based on the traditional Filipino diet/TFD must be sustained in all primary schools and in all government programs where some government subsidy for food is provided.
3. ***Preventive medicine.*** The traditional Filipino diet must be recognized as an essential preventive health care component of the Universal Health Care (UHC) program. The government must actively and sustainably campaign for the general acceptance of the TFD using funds from the UHC.
4. ***Research and development*** *(R&D).* The trajectory of modern technology for the food system is three-fold: (a) digital, (b) biological, and (c) physical. Digital technology cuts across production systems and methods as well as across the various components of the food system, not the least transparency in governance, so it should be given highest priority. Biological technology is needed for seed and propagules, but also for fertilizer and pest management. This should come next in priority. Physical technology refers to materials and machines; it should be integrated with digital technology.
5. **Provide increased funding for government R&D and incentives for companies** to apply Fourth Industrial Revolution (4IR) technologies in the food system. Suggested priority areas:
   a. Food technology to convert commodities and new food materials such as insects and microorganisms into high value products;
   b. Controlled environment food production;
   c. Processing and packaging technologies that prolong shelf-life and improve nutritional content of agriculture and fishery products in the priority R&D area;
   d. Waste management;
   e. Conservation and culture of neglected crops, aquatic species, and potential future sources of food such as microorganisms and insects;
   f. Multi-species integrated farming on land and water; and
   g. Digital platforms for enhanced integration of components of the food system.
6. **Initiate and strengthen partnerships and collaboration between and among government agencies involved in R&D** (e.g., DA, DOST, and SUCs) and private research institutions. This will pool technical knowledge and expertise, and R&D funds which may lead to the generation of better-quality outputs and efficient use of financial resources.
7. **Rationalize restrictions on bioprospecting and biotechnology**. Of equal importance to soil and water are biological resources. Recent policies have had negative impacts on access to biological resources; among them are the Bioprospecting Law and Wildlife Act.

The NAFMIP supports the position of NAST that access to biological resources must be facilitated so they can be used.

8. ***Global competitiveness and farmer income.*** The recently implemented Rice Tariffication Law (RTL) provides substantial funds for mechanization to ensure competitiveness of the rice sector. Other critical policy areas for rice and the rest of the farming sector are:
   a. Land and water use laws including passage of the National Land Use Act;
   b. Farm consolidation;
   c. Private sector participation in priority areas such as integrated multi-trophic aquaculture (IMTA) and rural agri-based industrialization;
   d. Direct selling by farmers by promoting such activities as online marketing, farmers' markets, community supported agriculture, and food terminals; and
   e. Direct and indirect compensation for farm workers.
9. ***Calamities.*** Prepare for calamities by:
   a. Geographic dispersal of production areas of all foodstuff that are needed/will be needed in quantity, such as rice, fish, corn, grain legumes, vegetables, root and tuber crops; and
   b. Expansion of food storage and handling capacity.
10. ***Environment.*** In addressing the degradation of the natural reources for agriculture, among the needed policies measures are:
   a. Sustained community involvement in the clean-up of Manila Bay, Laguna Lake, and rivers of Metro Manila;
   b. Rewarding environment-friendly farm and aquaculture practices and taxing those unable to improve farming practice; linking subsidy programs to environmental care targets;
   c. Rewarding recycling and other activities that promote circularity in the food system; e.g., rainwater collection and possibly, floodwater harvesting;
   d. Developing and mainstreaming policies and facilities for green logistics;
   e. Banning or reducing the use of plastics; and
   f. Encouraging the use of local biodegradable materials for food packaging.
11. ***Finance.*** Part of government funds for the rice and coconut sectors (e.g., tariff and levy funds) must be allocated for farm diversification to improve farmers' income to a level above subsistence. Additionally,
   a. Banks are required by law to allocate 25% of their loanable funds for farming. Government should help the banks to comply (Agri-Agra Reform Credit Act of 2009 or Republic Act No. 10000).
   b. Full utilization of digital technology in banking particularly in rural areas ought to provide easy access of capital by farmers.
12. ***Infrastructure.*** This refers specifically to digital and physical infrastructure. Lowering the cost and increasing efficiency of inter-island logistics to broaden the food supply base of Metro Manila is a priority concern. The consideration of mainstreaming a national logistics master plan that will dovetail with transport and infrastructure investments can significantly boost the (NAFMIP) Program. Initiatives directed toward pursuing digital transformation should focus on increasing investments in electrification and ICT infrastructure to leverage digital technology in the food system and close ICT gaps in the rural areas.
13. ***Food security.*** Prioritizing food security would require policy measures toward:
   a. Tightly regulating farm land fragmentation and conversion;

b. Promoting new community and housing designs to provide for rainwater collection and facilities for controlled environment production systems within residential buildings;
c. Securing fishery resources, particularly in the West Philippine Sea;
d. Protecting watershed areas; and
e. Making food and nutrition security a local government priority.

14. ***Energy.*** Low-cost, decentralized renewable energy will be needed for irrigation, primary processing, cold storage, and controlled-environment food production, among others. Pioneering cultivation of corn for bio-ethanol can expand the realm of agriculture to energy supply. Aggressive policies such as tax exemption or subsidy are needed to make this happen soon.
15. ***Develop climate-smart and resource-efficient irrigation.*** In support of the rice-based commodity systems plan/approach espoused by the NAFMIP, this policy action should align with the priority thrusts and irrigation investments embodied in the National Irrigation Master Plan 2022-2030, particularly on (a) developing a geodatabase system and generating updated geospatial data to facilitate strategic and effective irrigation system planning and design; (b) integrating emerging water-efficient technologies, and climate change adaptation and disaster risk reduction and management in irrigation development; and (c) realigning irrigation development to support crop diversification and diversified agricultural production systems.
16. ***Explore creating a Department of Fisheries and Oceans.*** If instituted, this new executive department should be at the same level as the Department of Agriculture and would complement its work. This should generate the amount of support that the country's fisheries sector deserves given our vast marine and aquatic resources. This is further discussed in Chapter 8.

Training of Manpower for Food System Transformation

The NAFMIP sees strengthening food systems-oriented cooperatives as essential for the Plan's success. Therefore, considerable resources are needed for operating the proposed BAFC. BAFC will organize programs for training leaders and members of cooperatives and help organize and provide continuing assistance in the operation of these cooperatives.

The transformed food system will create new jobs and new skills for old jobs. Workers for these jobs need training, and appropriate programs are needed at all levels, including degree-oriented and informal training. These training needs should be addressed by DepEd, CHED, TESDA, and DA, among others. Below is an indicative list of jobs and industries that will be created.

1. Trainers in urban farming and farm tourism
1. Transport/delivery logistics – refrigerated trucks and cold chain operators
2. Integrated farm designers
3. Additive manufacturing technicians
4. Customized equipment designers
5. Software designers
6. Maintenance technicians for farm equipment
7. Farm machinery operators
8. Gadget repair
9. Apps designer/programmer

10. Farm tourism guide
11. Organic farm certifiers
12. Carbon footprint auditors, components of the system as well as the entire system
13. Controlled environment technicians – construction and maintenance
14. Food as medicine researchers – chemical analysis, feeding trials, surveys
15. Genomics lab technicians
16. Growers of bamboo and other raw materials for packaging
17. Manufacture of biodegradable and reusable (e.g., crates) packaging
18. Food safety inspectors
19. Waste recycling technicians
20. Single cell protein factory workers
21. Edible insect factories
22. Seed producers – stem cells, spawn for mushroom, biopesticide cultures, biofertilizer cultures, insect collection/egg producer, fingerlings, seaweed planting materials, quality control inspectors, earthworm eggs, hybrid poultry, pigs, vegetative propagules (potato, sweet potato, banana, cassava, exotic foodstuff/rootcrops)
23. Pens and cages for mariculture – manufacturing, installation, maintenance
24. Feed industry for fish, pigs, and chicken
25. Greenhouse manufacturing, installation, maintenance; drip irrigation equipment
26. Social media employees
27. Teachers at all levels to teach food systems concepts, operation, and management

Specific Operational Interventions

For each of the five commodity systems presented in this chapter, the following directions are offered to the joint planning and implementation teams of regional/national agencies and the LGUs:

1. Prioritize areas for massive diversification using the following criteria:
    a. Farm family income is below poverty line;
    b. Road and logistics connection to markets; and
    c. Willingness and capability of LGUs to support diversification.
2. Preparatory to implementing the commodity systems and their value chains include:
    a. Establishing target scope and extent of diversification using national (TFD-based) or local (traditional food based) target consumption patterns;
    b. Providing training on business literacy and technology;
    c. Setting up mechanisms for consolidation, whether farm consolidation, product consolidation, input consolidation, and/or labor consolidation; and
    d. Establishing market links and the needed infrastructure via:
        i. Contract growing,
        ii. Value adding, and
        iii. Improvement of roads and logistics facilities.

Another area for operational intervention is in providing materials and services for the various commodity systems. Materials may cover such items as machinery, fuel, fertilizers, pesticides, seeds, and other planting materials, fingerlings, mulching materials, packaging materials. On the other hand, services may cover such items as machinery repair and servicing, development of Apps for marketing, and planning for diversified farming operations.

An example of a worksheet that can be used in commodity system-based planning at the provincial level is shown in Annex 2.

A Way Forward to Commodity System Planning

The shift from the single commodity approach to a commodity system approach will be progressively achieved over the life of the Plan. The shift will necessitate actions and decisions starting but not exclusively at the central level. A pivotal first step will be to update and **convert existing single Commodity Industry Roadmaps into Commodity System Roadmaps** using NAFMIP as Directional Plan. At the operational level, illustrative key activities shown below demonstrate how to effect the shift to commodity system planning.

Local Governments

Step 1. Strengthen LGU capability to plan for food system transformation. The workshop-consultations conducted by DA during NAFMIP preparation raised LGU awareness about NAFMIP innovations. DA and other NGAs will organize and deliver follow-up training in line with national level Steering Functions.

Step 2. LGUs will create commodity system-based teams. As part of capacity development, organizational adjustments will be made at the LGU level to re-orient planning and implementation of agri-fishery programs, projects, and activities. The LGU teams are expected to include personnel from the office of the agriculturist, planning coordinator, and local finance committee.

Step 3. Create joint planning and implementation teams with national government agencies. The “multi-level convergence” envisioned to be enhanced during NAFMIP implementation will build on national-regional-local interface piloted under the DA Philippine Rural Development Program (PRDP). This will include cost-sharing schemes.

National Level

Step 1. Single commodity programs will jointly plan for commodity system-based programs. In the progressive transition from single commodity to commodity system planning, commodity program directorates and budgets are envisioned to be adjusted along the five NAFMIP commodity systems. In the meantime, individual directorates will coordinate with each other; for example, the rice and high-value crops directorates.

Step 2. Transform single commodity teams to commodity system teams. Organize teams based on production and post-production methods that cut across commodity systems: halal, organic, and the like. This adjustment will be done in parallel with LGU level adjustments.

Step 3. Create joint planning teams with national government agencies, i.e., National Convergence Initiative for Sustainable Rural Development (NCI SRD) involving DA, DAR, DENR, and DILG. NAFMIP will expand and enhance convergence initiatives by developing inter-agency programs, projects, and activities in target geographical areas.

CHAPTER 5

Agri-Fisheries Modernization and Industrialization in the Regions

The Regional Perspective

The NAFMIP Regional Plans presented in this chapter serve two major purposes in Transformative Planning. First, the Regional Plans provide a spatial context for Commodity System-Based Planning and Implementation presented in the previous Chapter. They will disaggregate commodity system plans by region and province—providing guidance on blending commodity system planning and integrated spatial planning. Second, the Regional Plans will define and meld into a nationwide framework each region's spatial role in pursuing inclusive sector transformation, as envisioned to be progressively achieved over the plan period. The Regional Plans will operationalize integrated spatial planning principles, strategies, and techniques including GIS applications. *Based on guidance provided in NAFMIP as Directional Plan, Regional Plan details will be provided in DA Regional Field Office (RFO) plans*, such as regional commodity system plans and annual plans.

This region-by-region guidance starts by presenting the Regional Planning Profile as basic parameters, followed by a more detailed geo-spatial analysis of agri-fishery resources reflecting based on an initial analysis of each region's spatial comparative advantages. Next, the regional spatial framework is presented, taking off from the agri-fishery and spatial framework chapters in current Regional Development Plans (RDP). Considering the interplay among the regional planning profile, spatial analysis of resources, and spatial framework as background information, the Chapter then presents priority commodity systems per region, based on multilevel and multisector planning workshops and consultations held during NAFMIP preparation. Finally, the region's contribution to sector-wide outputs is presented, to show how regional plans are linked to overall national targets.

Regionalizing the Commodity Systems Approach

NAFMIP does not specify a long list of regional priority commodities and activities. This is a major change compared to previous AFMPs. Instead, NAFMIP focuses on strategies, frameworks and models for the region to prioritize viable combinations of different commodities and activities. Guidance in NAFMIP as Directional Plan will be complemented by more detailed RFO plans containing regional level programs, projects, and activities, referencing the spatial and resource analysis provided in this Chapter. The combination of commodity systems and spatial planning substantially expands the potential scope and impact of investments and interventions to industrialize the sector, while promoting multisector prosperity encompassing smallholder farmers and fisherfolk. In a transformative setting, commodity systems/farming systems diversification will entail either or both combining crops, livestock, poultry, and/or fishery commodities (production diversification involving "anchor" and "linked" commodities—see Table 5.5 as example); and/or venturing into the post-production segments of a value chain (value-adding diversification—see "linked enterprises" in column 3 of Table 5.5).

Regional Spatial Analysis in Practice

The agricultural resources in various regions of the country were analyzed using existing land cover maps. These land cover maps were mainly generated using satellite imageries and were subjected to different pre-processing and classification methods to derive finite types of land cover.

The analysis included two periods—the 2015 land cover map generated by the National Mapping and Resource Information Authority (NAMRIA) and the 2020 land cover map produced by the Environmental Systems Research Institute (ESRI).[1] For the 2015 land cover map, the agricultural resources were defined by two types—the annual crops and the perennial crops. However, for the 2020 land cover map, the categories are different from the former period, but the agricultural resources were only defined by the crops category, and these areas are of similar description with the annual crops of NAMRIA.

Hence, this is one of the constraints in the analysis where only the annual crops in the 2015 land cover map and crops in the 2020 land cover map were properly compared. This gives an estimate of the extent of gains or losses in the respective regions in terms of agricultural resources from the two given periods. Conversion of annual crops to other land cover types from 2015 to 2020 was also determined, but this was limited only to built-up areas and tree cover.

Apart from the land cover change analysis, the potential distribution and areas for the different commodity systems were also modeled. This mainly considers the biophysical characteristics of the area, and this can serve as an input for future types of spatial-based analysis especially on the expansion of the different commodity systems.

Strategies and Interventions

Transformative strategies will guide the DA Regional Field Offices in articulating their detailed regional plans (Table 5.1).

Table 5.1: Illustrative Investments and Interventions in Regional Planning Transformative Strategies

TRANSFORMATIVE STRATEGIES IN REGIONAL PLANNING	ILLUSTRATIVE INVESTMENTS AND INTERVENTIONS

1. Using spatial criteria to determine optimum location of investments	• Mainstreaming PRDP initiatives at the regional and sub-regional levels:
	  ○ Edaphic, agri-climatic and socioeconomic criteria to prepare provincial commodity system investment plans
	  ○ Ridge-to-reef (R2R) Ecological Landscape Framework integrating biodiversity to guide prioritization of investments

2. Spatial frameworks to trigger agglomeration effects	• Developing existing and potential spatial frameworks to focus investments and interventions: AFIBC, FMA, ARC, NPAAAD/SAFDZ, IP areas, others

[1] A global company that builds ArcGIS software and apps that combine mapping and data analytics to deliver location intelligence and meet digital transformation needs for organizations of all sizes (https://www.esri.com/en-us/about/about-esri/what-we-do)

TRANSFORMATIVE STRATEGIES IN REGIONAL PLANNING	ILLUSTRATIVE INVESTMENTS AND INTERVENTIONS
3. Integrating sustainable land and water including coastal area management	• Combining sustainable land management (SLM), sustainable water resources management, and coastal marine spatial planning to promote integrative long-term resilience of the agri-fishery resource base
4. Agropolitan development: promotion of urban and peri-urban agriculture	• Pilot controlled-environment production, e.g., dairy products without animals • Replicating upscaled home food gardens widely • Constructing or expanding processing and distribution facilities close to population/ consumption centers
5. Rural-urban integration, recognizing that agri-fishery sector is not confined to rural areas	• Enhancing physical connectivity between production and processing areas on the one hand, and market and consumption centers on the other hand • Along with improved physical connectivity, enhancing institutional connectivity between and among value chain players
6. Crisis- and emergency-proofing of food corridors and food supply systems	• Applying lessons from the COVID 19 pandemic: • Establishing community-managed food stockpile • Agreements to ensure continually open food supply corridors • Institutional arrangements to carry out protocols to include law enforcement agencies
7. Optimizing ICT applications in regional and local planning	• Full development of National Information Network (NIN) mandated under AFMA of 1997 • Establishing Planners' ePortal with nationwide coverage
8. Nutrition-sensitive agriculture	• Campaigning to promote food-based health and nutrition • Synchronizing food supply plans with rising consumer awareness about healthy and balanced Filipino diet
9. Institutionalizing integrated spatial planning	• Capacity development on investment location criteria, GIS-supported planning including mapping, SLM, sustainable water resources management, and carrying capacity assessment
10. Consolidating and enhancing lower-level plans	• Value-adding enhancements in the process of integrating lower-level plans • Upscaled and technology-equipped food terminals in mega/metropolitan areas connected to integrated transport and logistics systems (modern, commercial-scale *bagsakan*) • Training program on NAFMIIP innovations

Profiling the Regions through the Applicability Index

One NAFMIP spatial planning innovation that would help regional planners is the Applicability Index (APPDEX) developed specifically for this Plan (NAFMIP Preparation Team, 2022).

The APPDEX is a rating system to determine the general profile of a certain area, town, city, district, province or region on the basis of ten (10) indicators from the standpoint of logistics and commodity systems. The indicators are composed of seven developmental indices and three natural environment indices. These are the following:

1. Agricultural production level
2. Fishery production level
3. Industrial development level
4. Road development level
5. Seaports development level
6. Airport development level
7. Urbanization level
8. Geographic location
9. Terrain / slope
10. Weather / disaster vulnerablility

Values ranging from 0 to 5 correspond to the level of development or natural profile of the 10 indicators or indices where 5 is the highest, 1 is the lowest and 0 denotes the non-applicability of the rating (Table 5.1). The respective Regional Planning Profiles presented at the beginning of each region-focused discussion that follows includes this index and their logistics assets.

Table 5.2: Applicability Index Rating System

APPDEX CATEGORY	RATING	
1. Agricultural production 2. Fishery production	**5**	The ***highest level*** of development or condition be it natural or man-made
3. Industrial development level 4. Road development level	**4**	The ***medium-high level*** of development or condition be it natural or man-made
5. Seaports development level 6. Airport development level	**3**	The ***medium level*** of development or condition be it natural or man-made
7. Urbanization level 8. Geographic location	**2**	The ***medium-low level*** of development or condition be it natural or man-made
9. Terrain / slope level 10. Weather / disaster vulnerablility	**1**	The ***lowest level*** of development or condition be it natural or man-made
	0	Not applicable

The APPDEX regional ratings are consistent with the 2021 Gross Regional Domestic Product released by NEDA. This shows the importance of having significant development which can contribute to the production of commodities (including non-food) and the logistics involved to move the commodities across the regions.

It is also noted that although there are agricultural activities in the Luzon island, the regions with less built-up environment and more agri-fishery territories will naturally yield the higher GRDP, which are consistent with the APPDEX ratings from the perspective of logistics infrastructure.

Cordillera Administrative Region (CAR)

REGIONAL PLANNING PROFILE			
Total Population			
1,797,660 (PSA, 2020)	48.93% women (PSA, 2015)	316,000 are farmers[2] (PSA, 2018)	28% farmers fall below the poverty threshold[3] (PSA 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)	
290 B or 2% (PSA, 2020)	27 (Moderate)	0.25 M Ha	
Airports	**Roads** (Total km)		
3 (NAFMIP Preparation Team or NPT, 2022)	2,269 (NPT, 2022)		
Priority Commodities in AFMP 2018-2023		**Provinces**	
• HVC (Semi-temperate vegetables – white potato, *ube*, banana, cabbage, crucifers, carrots; fruits – mango, cacao, citrus, strawberry, lychee, pears, longan; coffee, cut flowers, ornamentals) • Rice • Corn and cassava • Livestock • Fisheries (*tilapia*)		• Abra • Apayao • Benguet • Ifugao • Kalinga • Mountain Province	

Spatial Analysis of CAR's Agri-Fishery Resources

The Cordillera Administrative Region (CAR) has an estimated total cropland area of about 251,783 ha in 2015, which was a combination of the annual and perennial crop areas. The annual crop area in 2015 was around 247,213 ha. This declined in 2020 by about 48% or an approximate area loss of 117,979 ha. Out of the total area in 2015, about eight percent or an equivalent of 19,556 ha were converted into built-up areas in 2020. On the other hand, a large portion of the former annual crop areas became covered by trees in 2020 (25% or 62,279 ha). Figure 5.1 shows the land cover maps of CAR in 2015 and 2020, plus the potential commodity system distribution in the region.

[2] Data as of 2015 from PSA; none on fisherfolk

[3] Poverty incidence among fisherfolk refers to their proportion with per capita incomes less than the per capita poverty threshold. Per PSA, the poverty incidence estimate for fishermen in CAR were excluded due to very low level of precision (with CV > 50 percent) and small sample size.

Figure 5.1: Land Cover Map of CAR in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in CAR (C)

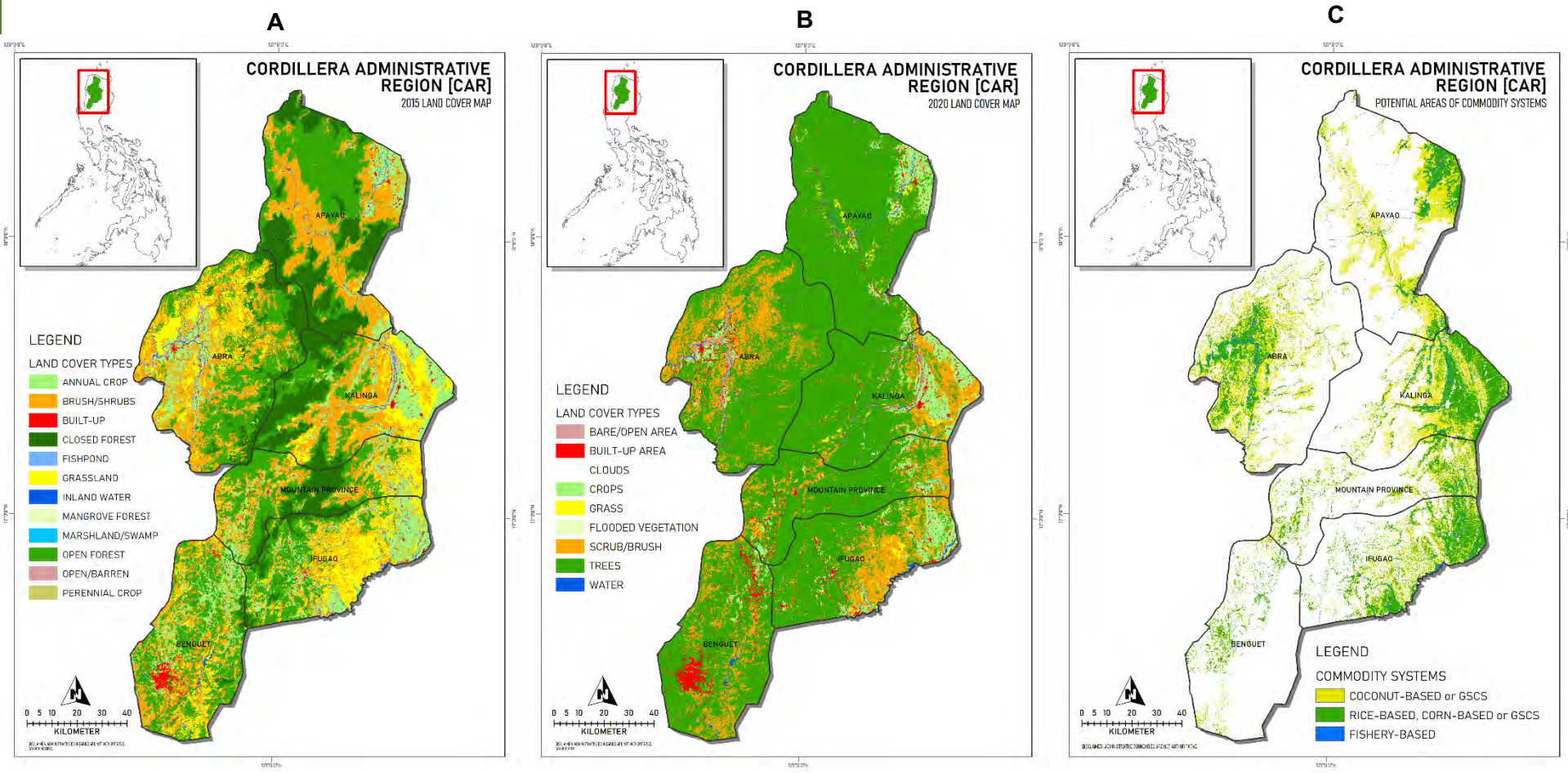


Table 5.3 shows the analysis of changes in CAR cropland areas from 2015 to 2020.

Table 5.3: Change Analysis of Cropland Areas in CAR from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	247,213.34	129,233.87	-117,979.46	-47.72	19,555.65	62,278.99
Perennial Crop	4,569.29	-	-	-	-	-

In terms of the different commodity systems, CAR primarily grows geographically specialized commodity systems (GSCS). The GSCS is estimated around 253,837 ha, which means that these areas can be mixed with some perennial crops in the area. On the other hand, the GSCS-linked areas with rice or corn-livestock-poultry as anchor comprised approximately around 238,828 ha. Lastly, aquaculture and fishery-based areas are estimated at 17,046 ha as of 2020 (Table 5.4).

Table 5.4: Potential Areas for the Different Commodity Systems in CAR

COMMODITY SYSTEM	AREA (Ha)
GSCS	253,836.77
Rice-based or corn-livestock-poultry-based or GSCS	238,828.11
Aquaculture and coastal fishery-based[1]	17,045.80
TOTAL	**509,710.69**

[1]This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Spatial Framework for Sector Transformation, CAR

The envisioned agri-fishery spatial development framework complements the NEDA Regional Spatial Strategy establishing two growth centers: Baguio City-La Trinidad-Itogoan-Sablan-Tuba-Tula (BLISTT)) metropolitan areas as southern growth node; and the eastern Kalinga (Tabuk-Pinukpuk-Rizal) as Northern growth node (NEDA, CAR Regional Development Plan 2017-2022).

Using the ISPF, NAFMIP will address long-standing modernization constraints unique to the agri-climatic and topographic conditions in the Cordillera Administrative Region. These include limited physical connectivity of remote, highland settlements; lack of modern storage facilities; and inadequate capacity and costly transport to lowland areas including metropolitan areas. CAR can more effectively achieve agri-industrialization objectives and targets by enhancing support facilities and services tailored to the envisioned spatial role of particular provinces and cities, as shown in Table 5.5.

Table 5.5: Cordillera Region's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/INTERVENTIONS BASED ON SPATIAL ROLE
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agri-climatic suitability and carrying capacity • Reducing food miles	Abra Kalinga Apayao	• Farm-to-market highland infrastructure – tramlines, repair/upgrading/new hanging bridges, foot paths/passage for highland vegetables and other crops and commodities from mountainside production areas to target markets • Production support focusing on five anchor and their linked commodities – greenhouse/ nurseries; fertilizer and pesticide hubs • Farm level commodity systems demonstration sites (on-farm R&D)
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas		• Input Supply and Distribution – cold storage facilities including cryogenics, slaughter house, controlled environment facilities for cold-weather produce • Postharvest facilities – temporary holding areas/ silos for harvest; washing/cleaning facilities; canning and packaging- labeling enterprise development
3. Machinery, equipment and tools supply and service centers Basis for spatial role Accessibility to production areas		• Establishment/expansion of private distributors/ after-sales service centers/repair shops catering to machinery, equipment and tools (both production and post-production – tractors; harvesters; articulated farm vehicles; all-terrain vehicles (ATVs); customized agri-fishery drones; hauling, lifting, clamping, handling tools • Apprenticeship/hands-on training program on maintenance and operation of machinery, equipment and tools
4. Recycling/waste management zones Basis for spatial role Proximity to production areas		• Establishment or expansion of materials recovery facility – bio-digesters; waste-to-energy • Institutional linkages with universities/colleges on agri-fishery waste management • On-site research and development – materials/ bio-engineering; ethanol fuel applications in agri-fishery
5. Food and market terminals Basis for spatial role	La Trinidad and Betag, Benguet Baguio City	• Establishment of large-scale Food Terminal Inc. (FTI)-type facilities in urban centers, with smallholder farmers and fisher participation, and networked with an integrated transport and logistics system

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/INTERVENTIONS BASED ON SPATIAL ROLE
Centrality vis-a-vis buyer/consumer settlements	Tabuk City Bangued City, Abra	• Establishment or modernization of one-stop shop for agri-fishery marketing logistics • Digital infrastructure/e-platforms to support agri-fishery production and marketing • Trade fairs and exhibits; knowledge sharing events
6. Transshipment centers (for inter-province, inter-regional, and/or international trade) <u>Basis for spatial role</u> Capacity of transport and logistics facilities		• Construction/rehabilitation/expansion of airport, land transport/cargo terminals • Establishment/strengthening of regulatory, quarantine and sanitary and phytosanitary (SPS) service facilities (Food safety; personnel /worker safety); Standardized Safe Pass System • Border Control Protocols (BCP) – digital monitoring/tracking; Anti-smuggling measures; non-physical clearance

Breakdown of CAR Commodity Systems

Around 70% of the Cordillera (1.27 million hectares) is composed of highland areas with an elevation of more than 500 meters above sea level, locations ideal for semi-temperate high-income generating cash crops that cannot be grown profitably in lower elevations (NEDA, CAR Regional Development Plan 2017-2022). Thus, CAR will highlight (among other commodity systems) what in NAFMIP is referred to as “geographically specialized commodity systems” (GSCC)—profitable commodity systems including organic vegetables like cabbage, broccoli and white potato; coffee; and heirloom rice (Table 5.6).

Table 5.6: CAR’s Priority Commodity Systems
(Basis for commodity system-based multi-dimensional diversification plans)

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Rice-based	• Bamboo • Corn • Dairy • Garlic • Livestock • Mungbean • Mushroom • Onion • Peanut • Poultry	• Niche marketing (domestic and export) of special highland rice, coffee and ornamentals varieties • Farm machinery, equipment, and tools fabrication/manufacturing (e.g., waste-to-energy setup harvesters, compost bins, water pumps and small electric engines • Local shops specializing in regular maintenance and repair of farm and fishing machinery, equipment and tools
Corn and livestock-based	• Corn • Dairy • Rabbit • Rice • Swine	

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Fisheries-based	• Aquaculture commodities • *Tilapia*	• Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app) • Production of baskets and packaging materials that are environment-friendly and/or will prolong shelf life • Vermicompost/production of vermicast, biofertilizer • Processing, packing. Marketing, recycling • Feed milling, milk processing, slaughtering, freezing
Geographically specialized	• Banana • Coffee • Corn • Heirloom rice • Lowland vegetables • Rabbit • Strawberry • Swine • Upland vegetables	

The region's topographic and climatic characteristics make commodity systems more vulnerable to natural hazards and climate change. This challenge will be addressed among others by greater physical investments and capacity development in climate-resilient agriculture diversification espoused under the commodity system approach inherently reduces risks associated with single commodity production. The region will focus on linking the agriculture sector to industry, specifically agri-business development and agricultural products processing—reducing the risk of financial losses in delicate and perishable fresh produce. Various income and employment enhancing opportunities are shown on the matrix, following the NAFMIP commodity systems approach.

Cordillera Region's Contribution to Sector Outputs

CAR accounted for 1.6% of the country's Gross Value Added (GVA) in Agriculture, forestry, and fishing in 2020. This share reflects a 2.2% decline compared to the previous year. Relative to the country's Gross Regional Domestic Product (GRDP), CAR contributed 2% or PHP290 billion in 2020. The regional share went down by 10% compared to the previous year.

Over the plan period, CAR will scale-up, modernize and improve access to household income and employment through diversification-oriented agri-fishery industrialization facilities and services. Most of the region's efforts will be concentrated toward achieving two sector-wide major outputs: (1) commodity system-based value chains established; and (2) capacities of LGUs, agri-fishery groups, and individuals strengthened (Table 5.7). The region will seek to develop more rapidly high-value commodity systems uniquely suited to its agri-climatic conditions, including highland vegetables and coffee-based farming systems. Household income opportunities may also include non-food products such as flowers and ornamentals which can be marketed as part of agri-tourism activities.

Table 5.7: Cordillera Region Contributions to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF CAR SUB-OUTPUTS BY SECTOR-WIDE OUTPUT (% Sub-outputs, N = 180)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. Commodity system-based value chains established	70%	• Restored/enhanced solar powered irrigation • Improved physical connectivity via tramline • Commodity-neutral postharvest facilities • Village service facilities such as multi-species hatcheries, laboratories and cold storage • Alternative Livelihood opportunities: Aquaponics and Aquaparks
2. Capacities of LGUs, agri-fishery groups, and individuals strengthened	22%	• Accreditation of Coffee Nurseries meeting quality standards • Village Learning Sites complementing village facilities • Training on Agriculture Innovation System training, Good Agriculture Practices, Organic Agriculture • Upscaled marketing of products to other regions
3. Research, extension, and training for development (RETD) system intensified	3%	• Organic farming and fishery models upscaled • Genetic improvement of aquaculture species and Improvement of hatchery techniques • Low cost feeds commercialized
4. ICT- and AF technology-enabled market support systems strengthened	3%	• Clustered Commercial Farms integrated into agri-fishery corridor
5. Policy environment to accelerate and sustain sector transformation enhanced	1%	• Improved enforcement of regulations supported by Chemical Residue Testing Laboratories
6. Agriculture and fisheries industrial business corridors (AFIBC) operationalized	1%	• Modified intensive *tilapia* hatchery located within agri-fishery corridors

Region I: Ilocos Region

REGIONAL PLANNING PROFILE			
Total Population			
5,301,139 (PSA, 2020)	49.54% women (PSA, 2015)	539,000 are farmers[4] (PSA, 2018)	12% farmers and 22% fisherfolk fall below the poverty threshold (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)	
582 B or 3% (PSA, 2020)	30 (Moderate)	0.47 M Ha	
Airports	**Combined Seaports**	**Roads** (Total km)	
8 (NPT, 2022)	6 (NPT, 2022)	1,699 (NPT, 2022)	
Priority Commodities in AFMP 2018-2023		**Provinces**	
• HVCs (mango, mungbean, onion, garlic, peanut, tomato) • Livestock (Goat) • Fisheries (Milkfish) • Rice • Corn		• Ilocos Norte • Ilocos Sur • La Union • Pangasinan	

Spatial Analysis of Ilocos Region's Agri-Fishery Resources

The total cropland area in Region I (Figure 5.2) is estimated at 467,922 ha where majority is composed of annual crop areas (423,759 ha, Table 5.8). However, this total area of annual crops declined by about 30% in 2015 to 2020. This is roughly around 127,089 ha loss in the annual crop area or an estimated 13%, represented by about 53,258 ha of the annual crop areas in 2015 that were converted into built-up areas in 2020. But some of these areas have improved their cover and about 10% of the former annual crop areas have been covered with trees already in 2020. This accounts to about 41,022 ha (Table 5.8). Figure 5.2 shows the region's land cover maps in 2015 and 2020, plus the potential commodity system distribution here, while Table 5.8 shows the analysis of changes in Region I cropland areas from 2015 to 2020.

[4] No available data on population of fisherfolk in Region I

Figure 5.2: Land Cover Map of Region I in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)

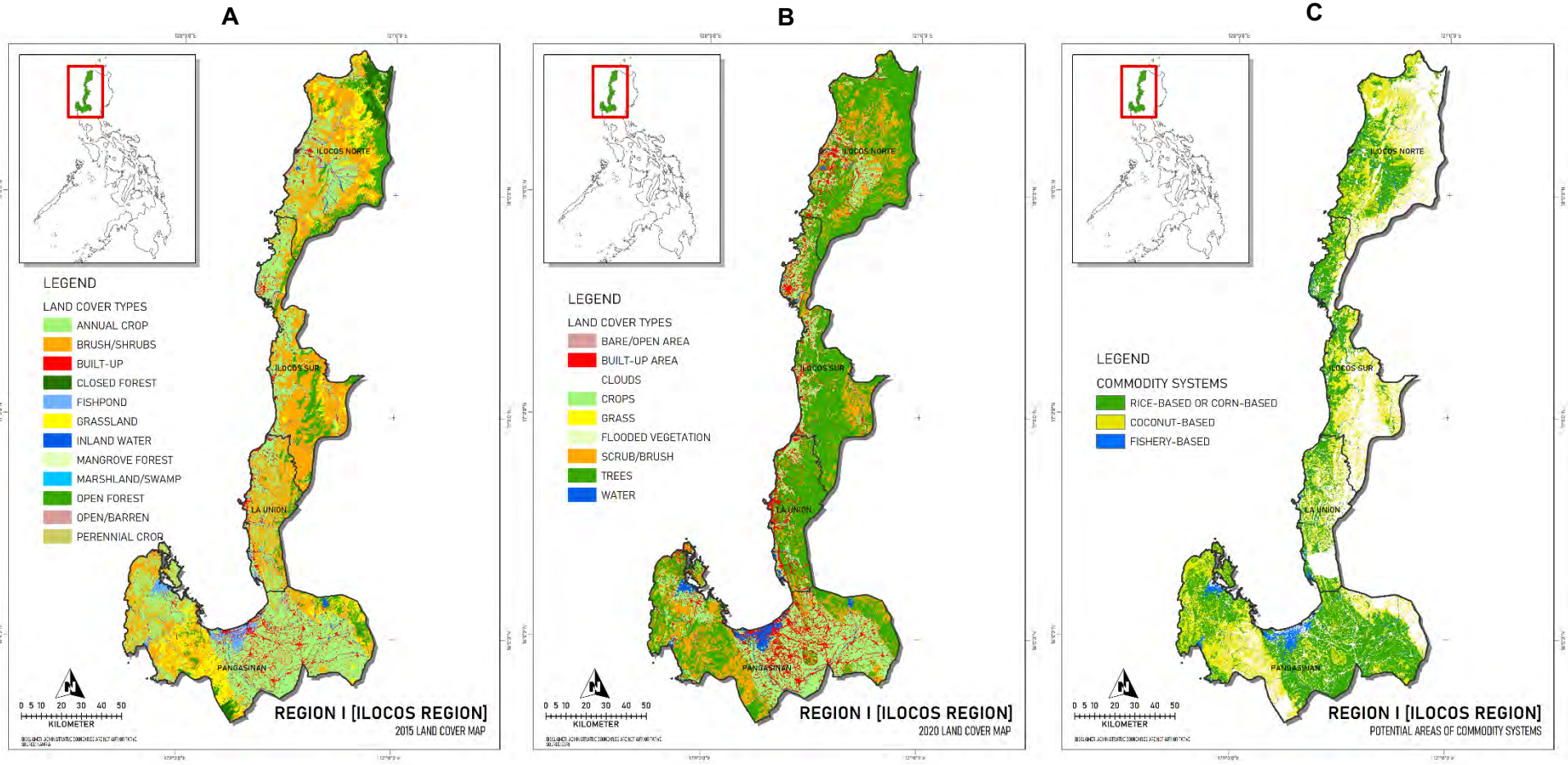


Table 5.8: Change Analysis of Cropland Areas in Region I from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	423,758.79	296,670.17	-127,088.62	-29.99	53,258.17	41,022.03
Perennial Crop	44,163.39	-	-	-	-	-

In terms of the potential areas for the different commodity systems, about 417,219 ha can be devoted for rice-based or corn-based commodity system (Table 5.9). On the other hand, about 342,004 ha has potential for the coconut-based commodity system in the region. Lastly, the potential areas for the aquaculture and fishery-based system are estimated at 33,764 ha.

Table 5.9: Potential Areas for the Different Commodity Systems in Region I

COMMODITY SYSTEM	AREA (Ha)
Coconut-based	342,003.87
Rice-based or Corn-Livestock-Poultry-based	417,218.79
Aquaculture and Coastal Fishery-based[1]	33,764.15
TOTAL	**792,986.81**

[1]This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions

Spatial Framework for Sector Transformation, Region I

Region I settlements are situated on narrow coastal lowlands and are economically close to larger markets in Metropolitan Manila, with access via Central Luzon (NEDA, Ilocos Regional Development Plan 2017-2022). The regional centers are Laoag City and San Fernando City; while the sub-regional centers are Dagupan City, Alaminos City, Urdaneta City and Vigan City. NAFMIP will build on the role of these cities as connection to, and service centers of, smaller provincial and local centers of agri-fishery production and primary processing.

In NAFMIP regional development planning, the potential impact of proposed investments and interventions can be enhanced using the ISPF. In the Ilocos Region, NAFMIP will establish or expand to commercial scale agri-fishery production and post-production support facilities and services based on the envisioned spatial role of particular provinces and cities, as shown in Table 5.10. Key interventions will include construction, rehabilitation and/or improvement of "Farm and Coastal areas-to-market roads"—in the context of developing an integrated transport network. FMRs and coast-to-market roads will include all types of connecting bridges, and will be linked to major roads and access to commercial hubs located in regional and sub-regional centers.

Table 5.10: Ilocos Region's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agri-climatic suitability and carrying capacity • Reducing food miles	Pangasinan Ilocos Norte Ilocos Sur	• Consolidation and capacity building of farmers and fisherfolk to diversify production and value-adding • Production-related R&D in partnership with extension department of agri-fishery universities and colleges • Farm- and coastal areas-to-market roads – to strengthen the integrated transport system including all types of bridges, linked to major roads and access to processing and marketing centers • Production Facilities – greenhouse/nursery; Fertilizer and pesticide hubs
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas/fishing communities		• Construction or expansion of large-scale commodity-neutral facilities under PPP-type funding and management arrangements • Cold storage for marine and aquaculture products • Postharvest facilities – temporary holding areas/silos for harvest, washing/cleaning facilities, canning, packaging, labeling
3. Machinery, equipment and tools supply and service centers Basis for spatial role Accessibility to production areas/ fishing communities		• Expansion of artisanal fishing boats suppliers and services… • … as well as gear and supplies for marine, coastal and aquaculture fisheries • Incentivizing private investors to establish or expand distributorship of production and post-production machinery, equipment and tools such as tractors and customized drones
4. Recycling/waste management zones Basis for spatial role Proximity to production areas		• Capacity development on the circular food system • Recovery, recycling, storage and re-use of farm and fishery waste as fertilizer, feed and for other purposes • Setting up and expansion of Materials Recovery Facility – bio-digesters, waste-to-energy facilities

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
		• Research on Materials/bio-engineering; ethanol fuel development for agri-fishery use
5. Food and market terminals Basis for spatial role Centrality vis-a-vis buyer/consumer settlements	Urdaneta City, Pangasinan Tayug Pangasinan Candon City, Ilocos Sur Santa Maria, Ilocos Sur Dagupan City Vigan City	• Establishment or upscaling of smallholder farmers and fisherfolk cooperatives market outlets in commercial malls • Using PPP-type business models, establishment of large-scale Food Terminal Inc. (FTI)-type facilities in urban centers, with smallholder farmer and fisher participation, and networked with an integrated transport and logistics system • Improvement of feeder and connector roads to facilitate access to market centers
6. Transshipment centers Basis for spatial role Capacity of transport and logistics facilities		• Ports development, modernization, and rehabilitation coordinate and integrated with cold storage and processing centers • Airports development or rehabilitation • Enhancement of quarantine, sanitary and phytosanitary (SPS) and biosecurity protocols • Border Control Protocols (BCP) to include digital monitoring/tracking, anti-smuggling measures using no-contact or non-physical clearance systems and procedures

Breakdown of Commodity Systems in Ilocos Region

The Ilocos Regional Development Plan 2017-2022 includes major strategies that are similarly articulated in the NAFMP: (1) strengthening the linkage between the agriculture and industry sector to promote product competitiveness and increase economic productivity; (2) aggressive investment promotion of the region's strategic commodities and other agri-fishery products; and (3) adoption of appropriate production inputs, farming systems and technologies that are adaptive to the adverse effects of climate change. These strategies will be operationalized using the combination of commodity systems planning and integrated spatial planning.

The commodity systems identified in Table 5.11 will be detailed in Commodity System-Based Roadmaps (e.g., corn, livestock and poultry system-based roadmap), in lieu of the usual single commodity plans. The system roadmaps will be prepared by DA in consultation with stakeholders, using NAFMIP as directional plan.

Table 5.11: Ilocos Region's Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Rice-based	• Corn • Bamboo • Onion • Garlic • Tobacco • Mungbean • Peanut • Mushroom • Dairy • Vegetables	• Commercial scale production of cakes and noodles from rice (suman, bibingka, etc.) • Farm machinery, equipment and tools fabrication/manufacturing (e.g., waste-to-energy setup harvesters, compost bins, water pumps and small electric engines) • Processing, packing, cold storage, marketing • Local shops specializing in regular maintenance and repair of machinery, equipment and tools • Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app) • Production of baskets and packaging materials that are environment-friendly and/ or will prolong shelf life • Vermicompost/production of vermicast, biofertilizer • Fish cage supplies (bamboo poles, abaca ropes, nets) • Fish cage design and construction services • Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season • Fisher enterprise market outlets in urban centers • Recycling
Corn and livestock-based	• Cassava • Cattle (meat and dairy) • Carabao • Chicken • Corn • Goat • Swine	
Coconut-based	• Banana • Cacao • Coconut • Coffee • Palms	
Fisheries-based	• *Bangus* • Others aquaculture commodities • *Tilapia*	
Geographically specialized	• Banana • Rabbit • Cassava • Cacao • Garlic • Lowland vegetables • Mango • Mungbean • Tobacco • Rice • Upland vegetables	

In Region I, economic opportunities targeting smallholder farmers and fisherfolk have been identified in the following commodity systems: (1) corn/livestock/poultry-based; and (2) coconut-based (Table 5.10). Significant increases in total household income are anticipated to result from the diversified commodity systems, comprised of five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities—both food and non-food.

Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled “anchor” and “linked commodities.” Diversifying by venturing into profitable post-production segments of a value chain, in turn, is shown in the column labelled “linked enterprises.” NAFMIP as directional plan will guide DA, other national agencies, LGUs and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., corn, livestock and poultry system-based roadmap), in lieu of the usual single commodity plans.

Ilocos Region’s Contribution to Sector Outputs

Region I accounted for 6.3% of the country’s Gross Value Added in Agriculture, forestry, and fishing in 2020. This share reflects a 0.9% increase compared to the previous year. In terms of the country’s Gross Regional Domestic Product (GRDP), Region I accounted for 3% or PHP582 billion in 2020. The regional share went down by 8% compared to the previous year.

In pursuit of agri-fishery industrialization, the Ilocos Region will focus interventions on four sector-wide major outputs: (1) commodity system-based value chains established; (2) agriculture and fisheries industrial business corridors (AFIBCs) operationalized; (3) capacities of LGUs, AF groups and individuals strengthened; and (4) ICT- and AF technology-enabled market support systems strengthened (Table 5.12). The region envisions to integrate the establishment of agri-fishery industrial business corridors with regional programs to establish economic development zones.

Table 5.12. Ilocos Region’s Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	**DISTRIBUTION OF REGION I SUB-OUTPUTS BY SECTOR-WIDE OUTPUT** (% Sub-outputs, N = 103)	**ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS** (From Regional Planning Workshop)
1. Commodity system-based value chains established	50%	• Investment in high-value chain segments, such as Production/Processing Centers for coconut water, *bucayo*, and virgin coconut oil • Contract with radio programs • Expansion of areas under coconut for intercropping • Establishment of feed production facilities/ feed mill
2. agriculture and fisheries industrial business corridors (AFIBCs) operationalized	16%	• Milkfish Fry Production Enhancement Program implemented inside a fishery corridor • Establishment of Hatchery Facilities within business corridors
3. Capacities of LGUs, agri-fishery groups,	11%	• Entrepreneurial training for coconut farmers to tap opportunities in numerous value-adding products derived from coconut

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION I SUB-OUTPUTS BY SECTOR-WIDE OUTPUT (% Sub-outputs, N = 103)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
and individuals strengthened		
4. ICT- and AF technology-enabled market support systems strengthened	10%	• Establishment of Central Seafood Market Complex • Establishment of Ice Plant Facility • Integration of of logistics support including hauling trucks and refrigerated vans • Establishment of Cold Storage, Warehouse, Onion Hanger Storage
5. Enhanced policy environment to accelerate and sustain sector transformation	7%	• Establishment of Mobile Diagnostic Fish Health Laboratory • Crop insurance for coconut-based farmers expanding to diversified farming
6. Research, extension, and training for development (RETD) system intensified	6%	• Commercialization of feeds manufacture using widely available local raw materials

Region II: Cagayan Valley

REGIONAL PLANNING PROFILE				
Total Population				
3,685,744 (PSA, 2020)	49.04% women (PSA, 2015)	706,000 are farmers (PSA, 2018)	95,422 are fisherfolk	8.8% farmers fall below the poverty threshold[5] (PSA, 2015)
Gross Regional Domestic Product (PHP)		**APPDEX**		**Total Cropland Area** (Hectares)
371 B or 2% (PSA, 2020)		25 (Moderate)		0.92 M Ha

[5] Poverty incidence among fisherfolk refers to their proportion with per capita incomes less than the per capita poverty threshold. Per PSA, the poverty incidence estimate for fisherfolk in Region II was excluded due to very low level of precision (with CV > 50 percent) and small sample size.

Airports	Combined Seaports	Roads (Total km)
13 (NPT, 2022)	4 (NPT, 2022)	2,019 (NPT, 2022)

Priority Commodities in AFMP 2018-2023	Provinces
• HVC (banana, coconut, coffee, cacao, mandarin, mango, mungbean, peanut, pineapple, spices, sugarcane, tobacco, vegetables) • Livestock and poultry (dairy, beef cattle/carabao, chicken, goat, sheep, swine) • Fisheries (inland and marine species) • Rice • Corn (white and yellow) • Cassava, sweet potato	• Batanes • Cagayan • Isabela • Nueva Vizcaya • Quirino

Spatial Analysis of Regional Level Agri-Fishery Resources, Region II

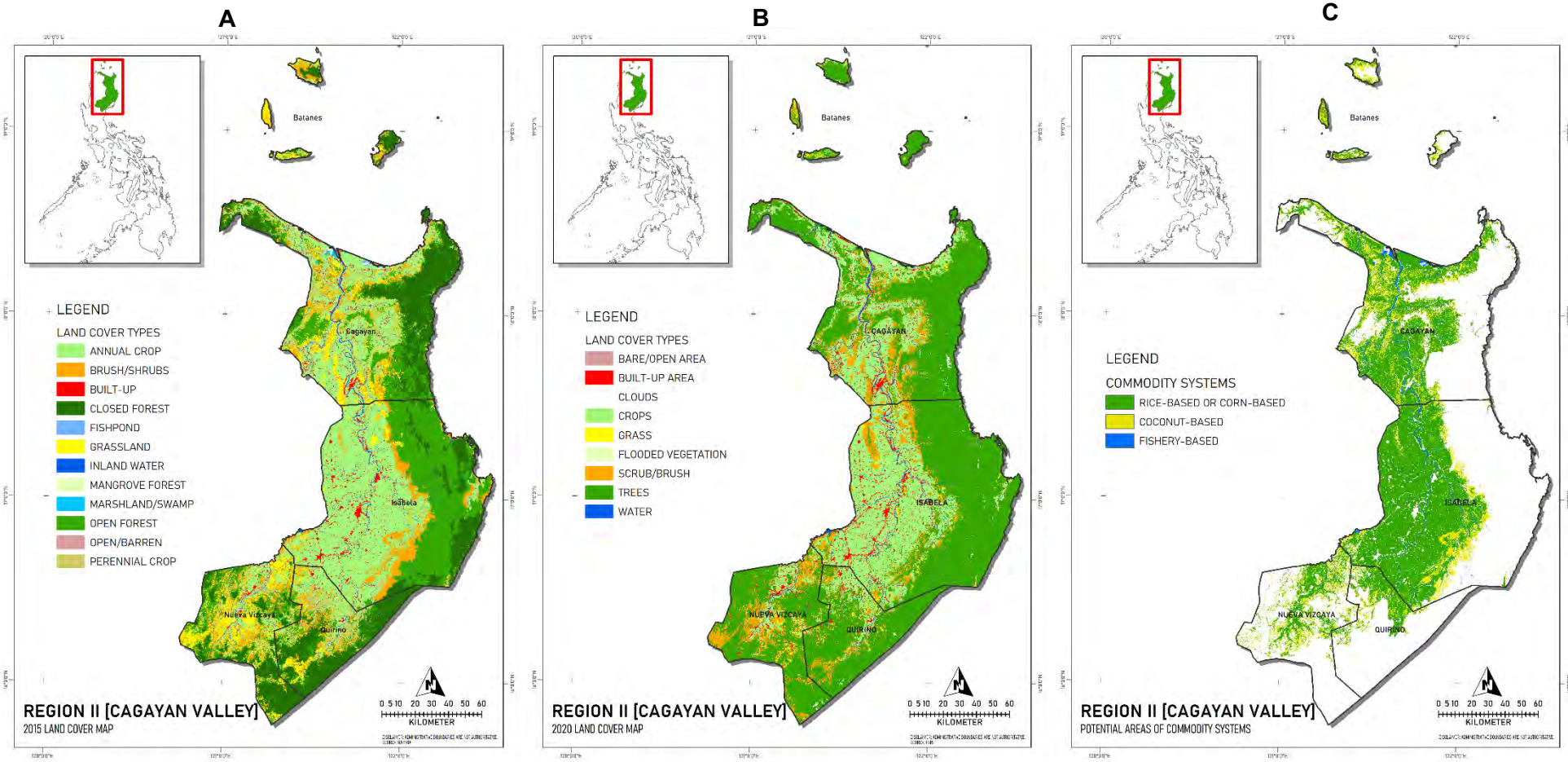
The total cropland area of Region II in 2015 is estimated around 985,986 ha. About 93% or roughly 916,292 ha is considered as annual crop. This makes the region one of the largest areas in the country planted with agricultural commodities. Despite this coverage in 2015, about 19% decline is observed from 2015 to 2020 in annual crops, and this is about 171,100 ha. About 3% or 30,924 ha of annual crops in 2015 were also converted into built-up areas in 2020. On the other hand, around 9% or roughly 82,275 ha of annual crops have been converted into areas covered with trees in 2020. Table 5.13 shows the analysis of changes in of its cropland areas from 2015 to 2020.

Table 5.13: Change Analysis of Cropland Areas in Region II from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	916,292.45	745,192.08	-171,100.38	-18.67	30,924.33	82,274.91
Perennial Crop	69,693.19	-	-	-	-	-

Figure 5.3 shows the land cover maps of Region II in 2015 and 2020, plus the potential commodity system distribution in there.

Figure 5.3: Land Cover Map of Region II in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)



In terms of the potential areas for the different commodity systems, the region has been found to be highly suitable with rice-based or corn-based commodity system, having an estimated area of around 904,884 ha (Table 5.14). This is followed by the coconut-based commodity system with an approximate area of 241,120 ha. Finally, the area for aquaculture and fishery-based system is estimated at 31,484 ha.

Table 5.14: Potential Areas for the Different Commodity Systems in Region II

COMMODITY SYSTEM	AREA (Ha)
Coconut-based	241,120.26
Rice-based or corn-livestock-poultry-based	904,883.95
Aquaculture and coastal fishery-based[1]	31,483.87
TOTAL	**1,177,488.08**

[1] This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Spatial Framework for Sector Transformation in Region II

Region II adopted the Midrib Peripheral Growth Optimization Strategy (NEDA, Cagayan Valley Regional Development Plan 2017-2022). The "Midrib" refers to the existing major road network, which serves production areas in the alluvial plains and the natural forest. The regional centers—Santiago and Tuguegarao cities—are major market and service centers.

The provincial growth centers connect to smaller provincial and local centers. These are: Sta. Ana and Tuao in Cagayan; Cauayan City, Ilagan City and Roxas-Mallig Corridor in Isabela; and Cabarroguis in Quirino and Solano-Bayombong-Bambang Corridor in Nueva Vizcaya. Finally, sub-provincial growth centers support growth of municipalities servicing the more remote parts of the region.

Complementing the spatial hierarchy presented in the Regional Development Plan, NAFMIP investments and interventions during the plan implementation period will be guided by the envisioned spatial role of provinces and cities corresponding to major value chain segments. The envisioned spatially-guided larger-scale investments will thus be able to generate greater synergistic economic impacts (Table 5.15).

Table 5.15: Cagayan Valley's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agri-climatic suitability and carrying capacity • Reduced food miles	Isabela Cagayan Nueva Vizcaya	• Climate-proofing of farm-to-market roads and bridges including connecting footpaths (e.g., concreting, elevating, improving drainage) • Production support focusing on five anchor and their linked commodities – greenhouse/nursery; fertilizer and pesticide hubs

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
		• Research and development – commodity system-oriented trials and wider replication under PAFES/LGUs; • Enterprise development focusing on coastal and aquaculture value chain enhancements
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas		• Crisis-proofing of food supply corridors (e.g., system to ensure continued food supply from warehouses to consumers during emergencies) • Input supply and distribution – Cryogenics, slaughterhouse, controlled environment facilities • Postharvest facilities – temporary holding areas/silos for harvest, washing/cleaning, canning, packaging and labeling
3. Machinery, equipment, and tools supply and service centers Basis for spatial role Accessibility to production areas		• Agglomeration of private enterprises engaged in production and postharvest machinery, equipment and tools – such as tractors; harvesters; articulated farm vehicles; all-terrain vehicles (ATVs); fishing vessels/artisanal fishing boats • Tie-ups between private farm machinery distributors and financing sources
4. Recycling/waste management zones Basis for spatial role Proximity to production areas		• Training of small famer and fisher households on circular food systems practices • Expansion/addition of materials recovery facilities catering to agri-fishery – bio-digesters; waste-to-energy conversion • Research on materials/bio-engineering; ethanol fuel development for agri-fishery use
5. Food and market terminals Basis for spatial role Centrality vis-a-vis buyer/ consumer settlements	Roxas, Isabela Bagabag and Bambang, Nueva Vizcaya	• Establishment of large-scale Food Terminal Inc. (FTI)-type facilities in urban centers under PPP-type business arrangement • Improvement of connectivity between and among above terminal, producers and consumers

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
	Sta. Ana, Cagayan Tuguegarao City Cauayan City Solana City Santiago City Bayombong City	• Business linkaging between market terminals and clustered and organized smallholder farmers and fisherfolk
6. Transshipment centers Basis for spatial role Capacity of transport and logistics facilities		• Ports development, modernization, and rehabilitation integrated with cold storage and processing centers • Airports development or rehabilitation • Enhancement of quarantine and sanitary and phytosanitary (SPS) clearance and border control protocols (BCP) • One-stop shop for domestic and international shipping of agri-fishery products

Breakdown of Region II Commodity Systems

Region II is a top rice and corn producer and thus play a key role in ensuring the adequacy of food supply, as well as regional and even nationwide price stabilization (NEDA, Cagayan Valley Regional Development Plan 2017-2022). The RDP seeks to intensify efforts to improve productivity of major crops and production in the livestock and poultry and fisheries, and to facilitate access of smallholder farmers and fisherfolk to technology, value chains, financing and land and water resources. The RDP emphasizes growth generation through diversifying crops and other commodity products, shown in Table 5.16.

In Region II, economic opportunities targeting smallholder farmers and fisherfolk have been identified in the following commodity systems: (1) corn/livestock/poultry-based; (2) coconut-based; and (3) geographically specialized commodities-based (Table 5.16). Significant increases in total household income are anticipated to result from the diversified commodity systems, comprised of five “Anchor commodities” under which can be subsumed any and all other agri-fishery commodities – both food and non-food.

Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled “anchor” and “linked commodities” in Table 5.16. Diversifying by venturing into profitable post-production segments of a value chain, in order to generate on-farm, off-farm and non-farm incomes and employment, is shown in the column labelled “linked enterprises.” NAFMIP as directional plan will guide DA, other national agencies, LGUs and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., corn, livestock and poultry system-based roadmap), in lieu of the usual single commodity plans.

Table 5.16: Cagayan Valley: Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Rice-based	• Bamboo • Mungbean	• Commercial production of cakes and noodles from rice (*suman, bibingka, etc.*) • Farm machinery, equipment and tools fabrication/manufacturing (e.g., waste-to-energy setup harvesters, compost bins, water pumps and small electric engines) • Increased efficiency of *muscovado* sugarcane millers and milling facilities • Local shops specializing in regular maintenance and repair of machinery, equipment and tools • Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app) • Production of baskets and packaging materials that are environment-friendly and/ or will prolong shelf life • Vermicompost/production of vermicast, biofertilizer • Fish cage supplies (bamboo poles, abaca ropes, nets) Fish cage design and construction services • Recycling
Corn and livestock-based	• Cassava • Cattle • Chicken • Corn • Duck • Goat • Sorghum • Soybean	
Coconut-based	• Abaca • Cacao • Cattle • Chicken • Coconut • Coffee • Goat • Palm	
Fisheries-based	• All species	
Geographically specialized	• Banana • Cacao • Citrus • Coffee • Garlic • Lowland vegetables • Mango • Mungbean • Peanut • Pineapple • Red onion • Saba banana • Sweet potato • Sugar/sugarcane • Upland vegetables	

Cagayan Valley's Contribution to Sector Outputs

Region II accounted for 6.5% of the country's Gross Value Added in agriculture, forestry, and fishing in 2020. This share reflects a 0.2% decline compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region II accounted for 2% or PHP371 billion in 2020. The regional share went down by 10% compared to the previous year.

Numerous possible interventions to modernize the agri-fishery sector will be guided by three sector-wide major outputs: (1) commodity system-based value chains established;

(2) ICT- and AF technology-enabled market support systems strengthened; and (3) capacities of LGUs, agri-fishery groups, and individuals strengthened (Table 5.17).

Table 5.17: Cagayan Valley Region Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION II SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 337)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. Commodity system-based value chains established	56%	• Establishment and upscaling of processing facilities for coconut products including coconut oil; garlic, pineapple, mango, peanut and other commodities produced in large scale in the region
2. ICT- and AF technology-enabled market support systems strengthened	21%	• Establishment and replication of LGU-led marketing system for of rice-based and other commodities and product forms • Promotional and agri-fishery trade fairs organized jointly by DA, DTI and LGUs • Packaging and Labelling Assistance Program targeting Pilot Clusters of farmers and fisherfolk
3. Capacities of LGUs, agri-fishery groups, and individuals strengthened	14%	• On-line and face-to-face training of smallholder farmers and fisherfolk about coconut products and by-products and its uses in collaboration with DTI Negosyo Centers • Provision of health and medical program for coconut farmers and farm workers • Promotion of Coconut Intercropping with cacao, coffee, banana and pineapple
4. Agriculture and Fisheries Industrial Business Corridors (AFIBCs) operationalized	4%	• Orientation of farmers about Good Agricultural Practices and Standards as part of programs to integrated with investors in business corridors
5. Research, extension, and training for development (RETD) system intensified	4%	• Upscaling of activities in Coconut Farmers Business School • Studies on yield-boosting and cost-reducing technologies as input for policy formation
6. Policy environment to accelerate and sustain sector transformation enhanced	1%	• Inclusion of Agriculture as indicator in the issuance of the DILG Seal of Good Local Governance

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION II SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 337)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
		• On-line processing of feed establishments and transport carriers registration and livestock handlers license

Region III: Central Luzon

REGIONAL PLANNING PROFILE				
Total Population				
12,422,172 (PSA, 2020)	49.46% women (PSA, 2015)	650,000 are farmers (PSA, 2018)	208,127 are fisherfolk (BFAR, 2018)	8.4% farmers fall below the poverty threshold[6]
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area (Hectares)**		
1880 B or 11% (PSA, 2020)	34 (Moderate)	0.81 M Ha		
Airports	**Combined Seaports**	**Rail Lines**	**Roads** (Total km)	
21 (NPT, 2022)	7 (NPT, 2022)	1 (NPT, 2022)	2,344 (NPT, 2022)	
Priority Commodities in AFMP 2018-2023		**Provinces**		
• HVC (banana, cacao, coconut, mango, mungbean, pineapple, sugarcane, sweet potato, onion, vegetables) • Fisheries (black tiger prawns, milkfish, mudcrab, sardine, *tilapia*) • Livestock and poultry (carabao, cattle, chicken, chicken eggs, ducks, duck eggs, goat, hog) • Rice • Corn and cassava		• Aurora • Bataan • Bulacan • Nueva Ecija • Pampanga • Tarlac • Zambales		

Spatial Analysis of Central Luzon's Agri-Fishery Resources

The total cropland area in Region III is estimated around 811,630 ha where about 84% of this is considered as annual crops (or a total of 680,094 ha). The annual crop has declined by about 14% in 2020, which accounts to about 97,487 ha of area loss. Around 10% of this annual

[6] Per PSA, the poverty incidence estimate for fisherfolk in Regions III were excluded due to very low level of precision (with CV > 50 percent) and small sample size.

crop in 2015 is also found to have been converted into built-up areas in 2020. This is approximately 68,103 ha of land converted into built-up. Only around two percent or 13,389 ha of the annual crop before were already covered with trees in 2020. This somehow indicates the focus of development that has happened in the region for the past five (5) years, which also greatly affected some of the annual crop areas. Figure 5.4 shows its land cover maps in 2015 and 2020, plus the potential commodity system distribution in the region.

Figure 5.4: Land Cover Map of Region III in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)

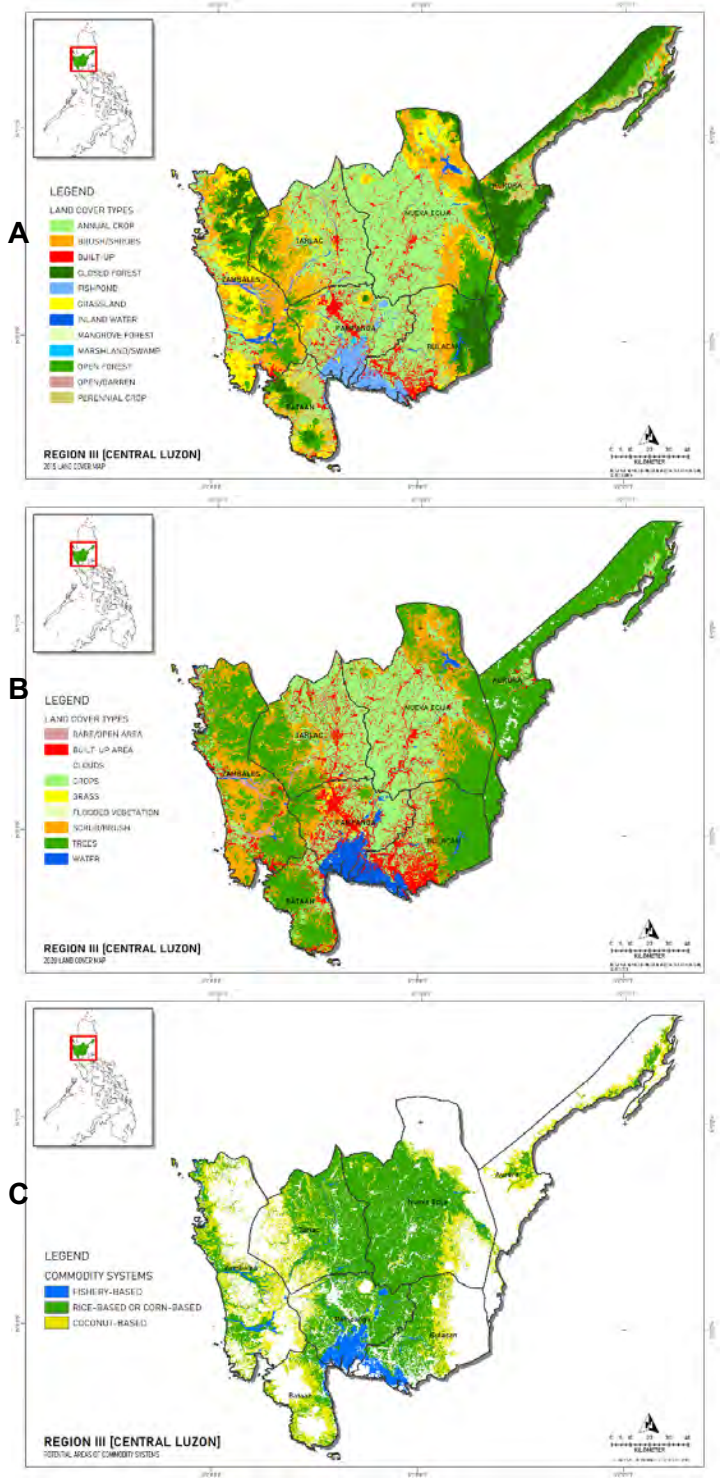


Table 5.18 shows the analysis of changes in Region III cropland areas from 2015 to 2020.

Table 5.18: Change Analysis of Cropland Areas in Region III from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	680,093.53	582,606.04	-97,487.49	-14.33	68,102.75	13,389.46
Perennial Crop	131,536.65	-	-	-	-	-

On the other hand, in terms of the potential areas for the different commodity systems, a large potential of the region is seen especially for rice-based or corn-based commodity systems. About 744,320 ha shows as potential rice-based or corn-based system, while about 327,710 ha shows potential for coconut-based commodity system. Lastly, the aquaculture and fishery-based system is estimated around 84,371 ha (Table 5:19).

Table 5.19: Potential Areas for the Different Commodity Systems in Region III

COMMODITY SYSTEM	AREA (Ha)
Coconut-based	327,709.77
Rice-based or Corn-Livestock-Poultry-based	744,320.26
Aquaculture and Coastal Fishery-based[1]	84,371.17
TOTAL	**1,156,401.20**

[1]This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Spatial Framework for Sector Transformation in Region III

The food security programs of government hinge on the production capacities of regions north of Metropolitan Manila such as Central Luzon (NEDA, Central Luzon Regional Development Plan 2017-2022). The proximity among Central Luzon, Metropolitan Manila, and CALABARZON (Region IV-A to be discussed in the next section) is an essential spatial planning consideration. On the other hand, rapid urbanization and population growth in Central Luzon entail sprawl-type spatial development and reducing areas for food production, which is another key spatial planning consideration.

In the agri-fishery sector, NAFMIP will amplify and further articulate the spatial development framework presented in the Regional Development Plan (Table 5.20). Trade routes and commodity and product flows between Central Luzon, Metropolitan Manila, and CALABARZON will continue to be crisis-proofed to avoid disruptions in food supply, and upscaled to commercial levels. At the same time, LGUs, in partnership with the concerned national government agencies, will heighten attention to more effectively manage allocating land between agri-industrial and non-agriculture uses in support of food security—along with NAFMIP-espoused nutrition security—objectives.

Table 5.20: Focal Areas in Central Luzon's Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial levels Basis for spatial role • Agri-climatic suitability and carrying capacity • Reduced food miles	Nueva Ecija Tarlac Zambales	• LGU capacity enhancement on sustainable land and water resources allocation between agri-fishery and non-agri-fishery uses • Enhancement (infrastructure expansion, surface improvement, construction) of physical connectivity between commodity system production areas and major markets • Production system support focusing on five anchor and their linked commodities – network of Greenhouses and nurseries; Fertilizer and pesticide hubs
2. Integrated storage and processing centers Basis for spatial role • Physical connectivity to production areas		• Establishment of commercial agri-fishery enterprises linked to smallholder farmers and fisherfolk • Establishment of network of large and smaller scale storage and processing facilities in strategic locations throughout the region ○ Canning, fermentation, frozen, packaging, fortification, health/ specialty food • Commercial scale cold storage/ cryogenics, expansion of central and satellite slaughter houses, piloting of controlled environment facilities in urban areas

3. Machinery, equipment and tools supply and service centers
 	
Basis for spatial role
Accessibility to production areas
		• Wide adoption of larger-scale
		  ○ Production and post-production Machinery and
		  ○ Equipment – tractors
		  ○ Harvesters; Articulated farm vehicles
		  ○ All-terrain vehicles (ATVs)
		• Postharvest machinery and equipment
		• Vehicles: trucks (wing van), trailers, forklifts
		• Machineries: articulated special functions, vehicles

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
		• Tools: hauling, lifting, clamping, handling
4. Recycling/waste management zones <u>Basis for spatial role</u> Proximity to production areas		• Training of small famer and fisher households on circular food systems practices • Commercialization of materials Recovery facilities (MRF) – bio-digesters; waste-to-energy conversion • Research – materials/bio-engineering; ethanol fuel development
5. Food and market hubs <u>Basis for spatial role</u> Centrality vis-a-vis buyer/ consumer settlements	Cabanatuan City, Nueva Ecija Tarlac City San Fernando City Olongapo City Angeles City	• Establishment of electronic market hub (e-market hub) linking commercial, institutional and other buyers to smallholder farmers and fisherfolk • Establishment of large-scale Food Terminal Inc. (FTI)-type facilities in urban and peri-urban areas under PPP-type business models • Business linkaging between market terminals and clustered and organized smallholder farmers and fisherfolk

6. Transshipment centers
 	
<u>Basis for spatial role</u>
Capacity of transport and logistics facilities
	Cabanatuan City	• Airports and seaports upgrading, modernization, and/or rehabilitation integrated with professionally-managed cargo transport networks
		• Upgrading and modernization of institutional platforms enabling brisk and transparent domestic and international trade
		• Quarantine and sanitary and phytosanitary (SPS) clearance
		  ○ Food safety measures
		  ○ Safe pass system
		  ○ Border control protocols (BCP) and biosecurity
		  ○ Digital infrastructure-enabled anti-smuggling measures
		  ○ Non-physical clearance

Breakdown of Region III Commodity Systems

As one of the country's food baskets, Central Luzon has a major role in helping the country reach the goal of reducing inequality. It seeks to improve the well-being of poor farming/fishing communities particularly in the rural and coastal areas. The region is a top producer of rice, onion, pork, chicken meat, duck meat, and duck eggs. It ranks first in corn yield while ranking 10th in corn production. It has also been a top producer of *tilapia* and black tiger prawns (NEDA, Central Luzon Regional Development Plan 2017-2022). The diversity in Region III products is reflected in Table 5.21.

In Region III, economic opportunities targeting smallholder farmers and fisherfolk have been identified in all five commodity systems (Table 5.21). Significant increases in total household income are anticipated to result from diversifying commodity systems, comprising five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities—both food and non-food. Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" of Table 5.21. On the other hand, diversifying by engaging in profitable post-production segments of a value chain, in order to generate on-farm, off-farm, and non-farm incomes and employment, is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., corn, livestock and poultry system-based roadmap), in lieu of the usual single commodity plans.

Table 5.21: Priority Commodity Systems for Central Luzon

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Rice-based	• Bamboo • Dairy • Duck • Lowland vegetables • Mungbean • Mushroom • Red onionSweet potato	• Niche marketing (domestic and export) of organic, gourmet, and other food products • Commercial-scale production and marketing (domestic and export) of *tupig* (glorious rice cake) • *Local hopia* production from mungbean • Upscaled and technology-equipped food terminals in mega/metropolitan areas connected to integrated transport and logistics systems (modernized *bagsakan*) • Value-adding centers located in urban and semi-urban areas, specializing on: • Processing • Marketing/trading • Waste recycling • Cloud kitchen, Filipino food delivery service and tie-up farmer and fisher coops with restaurants • Farm machinery, equipment and tools fabrication/manufacturing (e.g., four-
Corn and livestock-based	• Carabao • Cassava • Cattle • Chicken • Corn • Swine	
Coconut-based	• Cacao • Coconut • Coffee • Palm	
Fisheries-based	• Aquaculture commodities • Shellfish • Shrimp • *Tilapia* • Tuna and tuna-like species	

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Geographically specialized	• Cassava • Corn • Dairy • Lowland vegetables • Mango • Red onion • Sugarcane/sugar	wheel drive tractors for sugarcane production, waste-to-energy setup harvesters, compost bins, water pumps and small electric engines) • Local shops specializing in regular maintenance and repair of machinery, equipment and tools • Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app) • Waste recycling by cooperatives (e.g., rice hull, rice straw to energy; duck manure as fertilizer) • Production of baskets and packaging materials that are environment-friendly and/ or will prolong shelf life • Vermicompost/production of vermicast, biofertilizer • Processing, packing. Marketing, recycling • Feed milling, milk processing, slaughtering, freezing • Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season • Fisher enterprise market outlets in urban centers Fish cage supplies (bamboo poles, abaca ropes, nets

Central Luzon's Contribution to Sector Outputs

Central Luzon Region accounted for 14.3% of the country's Gross Value Added in agriculture, forestry and fishing in 2020. This share reflects a 5.0% decline compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region III accounted for 11% or PHP1,880 billion in 2020. The regional share went down by 14% compared to the previous year.

Region III is trailblazing integrated spatial planning applications in agri-fishery sector modernization. The prototype Clark Agri-Industrial Hub will be home to large-scale agri-industrial investments, anchored onto the Clark International Airport and the New Clark City, proximity to Metropolitan Manila markets, and region-wide transport infrastructure development plans and programs. The Central Luzon Region will focus agri-fishery interventions to achieve two sector-wide major outputs: (1) commodity system-based value chains established; and (2) capacities of LGUs, agri-fishery groups, and individuals strengthened. As shown on Table 5.22, Region III will be spatially and strategically integrating

investments and interventions within agri-industrial corridors and freeport and economic zones. Agri-fishery development will capitalize on the expected increased passenger and cargo traffic in the Clark International Airport.

Table 5.22: Central Luzon Region Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION III SUB-OUTPUTS BY SECTOR OUTPUT (% Sub-outputs, N = 150)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. Commodity system-based value chains established	67%	• Establishment and expansion of processing facility for cacao, mango and other commodities • Improved cold storage facilities for onion and other products • Common service facilities for biotechnology applications and pesticide residue analysis
2. Capacities of LGUs, AF groups and Individuals strengthened	10%	• Climate Resilient Farm Business School operational • Coco-agri hub linked to tourism industry and secondary schools • Scholarship grants in agri-fishery
3. ICT- and AF technology-enabled market support systems strengthened	9%	• Establishment of Trading Center • Region-wide coconut products-based enterprises • Market Outlet for mango and other value-added products at Clark International Airport • Export market development linked to Clark Airport programs
4. RETD system intensified	5%	• Organic mango production • Training Course on Integrated Diversified Organic Farming • Farm mechanization using 4WD Tractors, Pelletizer Machine, Pneumatic Four-row planter, and other equipment
5. Policy environment to accelerate and sustain sector transformation enhanced	5%	• Establishment of Agri-Laboratory Corridor • Strict implementation of policy on land reclassification and conversion • Certification of organic mango farms
6. AFIBCs operationalized	4%	• Food Terminal Hub (Clark Fresh Food Market Project) in Clark Freeport and Special Economic Zone (CFSEZ) • Establishment/upgrading of National Seed Technology Park, Dingalan Incubation Hub and similar initiatives

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION III SUB-OUTPUTS BY SECTOR OUTPUT (% Sub-outputs, N = 150)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
		• BCDA-DA Agri-Industrial Business Corridor in New Clark City

Region IV-A: CALABARZON

REGIONAL PLANNING PROFILE			
Total Population			
16,195,042 (PSA, 2020)	49.90% women (PSA, 2015)	526,000 are farmers[7] (PSA, 2018)	16.7% farmers and 19% fisherfolk fall below the poverty threshold (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**		**Total Cropland Area** (Hectares)
2535 B or 14% (PSA, 2020)	43 (High)		0.90 M Ha
Airports[8]	**Combined Seaports**[8]	**Rail Lines**[8]	**Roads** (Total km)
46 (NPT, 2022)	26 (NPT, 2022)	1 (NPT, 2022)	2,542 (NPT, 2022)
Priority Commodities in AFMP 2018-2023		**Provinces**	
• HVC (lowland vegetables, sugarcane, coconut, mango, banana, pineapple) • Fisheries (*tilapia*, milkfish, seaweeds, shrimp) • Livestock and poultry (chicken, chicken egg, swine, dairy cattle, carabao) • Rice • Corn and Rootcrops		• Batangas • Cavite • Laguna • Quezon • Rizal	

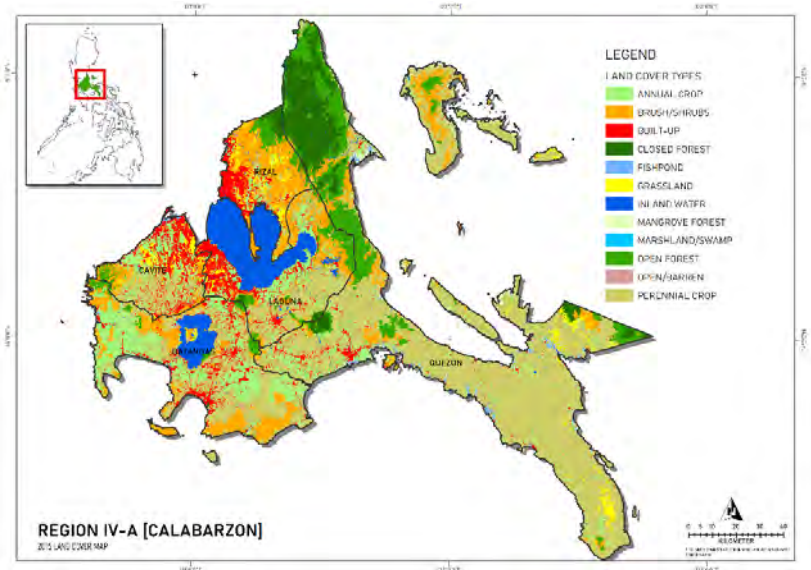
Spatial Analysis of Agri-Fishery Resources, Region IV-A

Figure 5.5 shows Region IV-A's land cover maps in 2015 and 2020, plus the potential commodity system distribution in the region. In Region IV-A or CALABARZON, the total cropland area is estimated around 902,999 ha where majority of these lands is dedicated to perennial crops (78% or 703,661 ha) (Table 5.23). Contrary to the other regions in the north and central parts of Luzon, these areas are mostly known for coconut and fruit bearing trees.

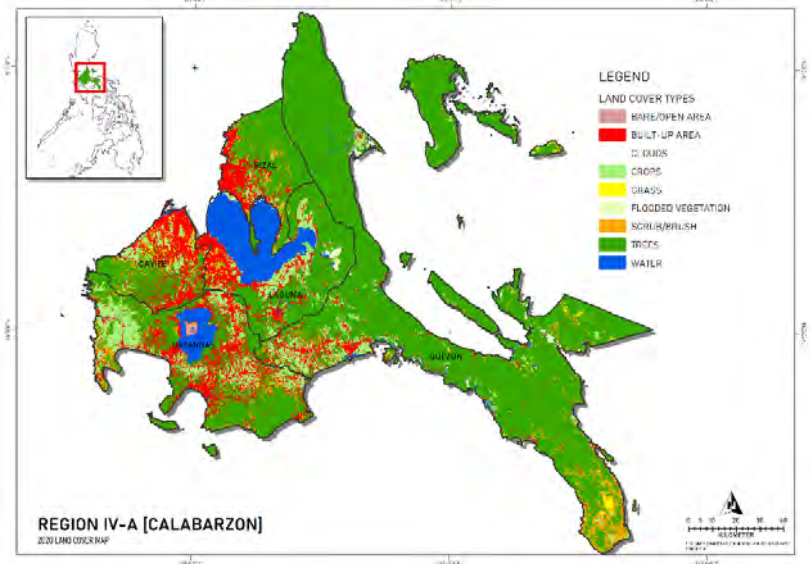
[7] No data on fisher population in Region IV-A
[8] Only one data set (combined) for airports, rail lines, and seaports for Regions IV-A and IV-B

Figure 5.5: Land Cover Map of Region IV-A in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)

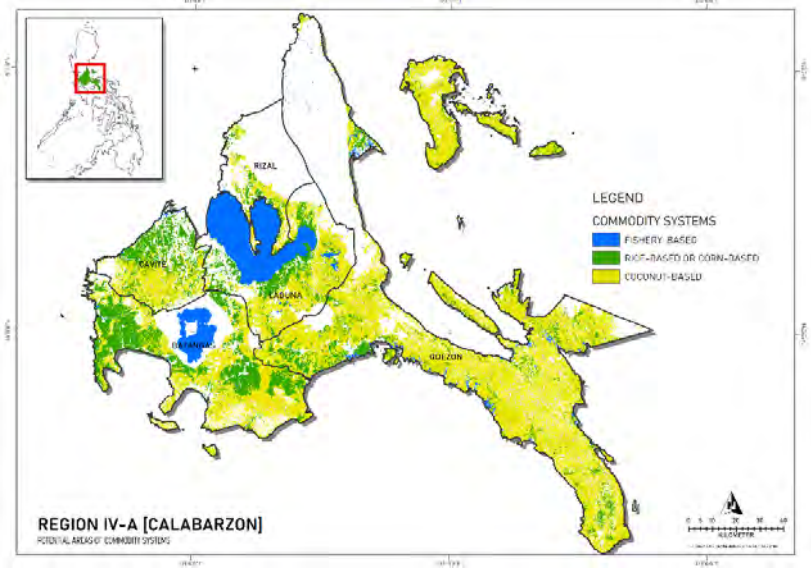
A



B



C



Considering the 199,338 ha of annual crops in the region in 2015, this has been further decreased by 25% or about 50,147 ha was lost from this period. About 37,439 ha were converted into built-up areas in 2020 (Table 5.23). This accounts for 19% of the former annual crop areas that have transitioned into impervious surfaces in 2020. Despite this land conversion rate, about 28,524 ha of annual crops in 2015 were converted into lands with tree cover already in 2020 and this attributes to around 14% of the annual crops in 2015.

Table 5.23: Change Analysis of Cropland Areas in Region IV-A from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	199,337.97	149,190.78	-50,147.19	-25.16	37,438.90	28,523.77
Perennial Crop	703,660.56	-	-	-	-	-

In terms of the potential areas for the different commodity systems, majority of the region has high potential for coconut-based system, which is estimated at 668,729 ha (Table 5.24). Only about 211,106 ha and 129,961 ha were generated in the maps for the rice-based or corn-based commodity system and for the aquaculture and fishery-based commodity system, respectively. The large area estimated for the latter commodity system (aquaculture and fishery-based) is attributed to the presence of Laguna Lake and Taal Lake in the region. In addition, the presence of other lakes like Caliraya and Lumot lakes have also contributed to this estimate.

Table 5.24: Potential Areas for the Different Commodity Systems in Region IV-A

COMMODITY SYSTEM	AREA (Ha)
Coconut-based	668,728.96
Rice-based or corn-livestock-poultry-based	211,106.10
Aquaculture and coastal fishery-based[1]	129,960.66
TOTAL	**1,009,795.71**

[1] This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions

Spatial Framework for Sector Transformation in Region IV-A

CALABARZON adopted the Centers, Corridors, and Wedges (CCW) spatial development strategy consisting of an hierarchy of settlements defined based on the following criteria: contiguity, complementation of roles, growth potentials (economic and population), and similarities of issues and concerns (NEDA, CALABARZON Regional Development Plan 2017-2022). The strategy links urban and rural populations, directs growth from west to east, as well as strengthens north-south development and access corridors. The five-tier network of settlements consists of Metro Manila as island group center; five regional centers (cities of Antipolo, Batangas, Calamba, Dasmarinas, and Lucena); 20 sub-regional centers; 39 provincial centers; and 78 local centers.

Consistent with the Regional Development Plan, NAFMIP will build on the rapid industrial progress achieved by CALABARZON over the years. Physical and digital Infrastructure; power, water supply, and other services; transport and communication facilities; and other enabling support will be further developed to support agri-industrialization and to showcase replicable models for agri-fishery modernization. NAFMIP value-adding in regional growth is envisioned to be in terms of greater inclusive growth by linking smallholder farmers and fisherfolk to existing and prospective large businesses; accelerating symbiotic rural-urban economic linkages; and articulating measures toward enhancing the health of communities and the environment. Table 5.25 presents these developments in Region IV-A.

Table 5.25: CALABARZON's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agri-climatic suitability and carrying capacity • Reduced food miles	Quezon Batangas Laguna	• Enhancement (upgrading, expansion, reliability) of transport networks to Metro Manila and major markets for agri-fishery products • Research, extension, and training for development on commercial scale commodity systems production focusing on region's priority anchor commodities • Production support facilities – such as Greenhouse/nursery Fertilizer hubs focusing on five anchor and their linked commodities
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas		• Establishment of AFIBC in one or more of the five regional centers as prime location for investments such as: o Cold storage/cryogenics o Modern slaughterhouses o Controlled environment processing o Large silos for harvest, washing/cleaning o Canning, packaging, other processing
3. Machinery, equipment and tools supply and service centers Basis for spatial role Accessibility to production areas		• Multicommodity-oriented machinery, equipment and tools: o Production – large tractors; harvesters; all-terrain vehicles (ATVs); o Postharvest – trucks (wing van), trailers, forklifts; articulated special function vehicles; tools for hauling, lifting, clamping, handling o Fishery facilities/vessels; artisanal fishing boats
4. Recycling/waste management zones Basis for spatial role		• Integration with existing large investors on the re-use of recycled agri-fishery waste products • Commercialization of materials recovery facilities (MRF) – bio-digesters; waste-to-energy conversion

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
Proximity to production areas		• Training of small famer and fisher households on circular food systems practices
5. Food and market terminals Basis for spatial role Centrality vis-a-vis buyer/consumer settlements	Tayabas City, Quezon Lucena City, Quezon Sariaya, Quezon Tanuan City, Batangas Lemery, Batangas Ibaan, Batangas Batangas City Calamba City Cavite City Santa Rosa City	• Facilitation of business/trading tie-ups between malls and farmers and fisherfolk • Establishment of large-scale Food Terminal Inc. (FTI)-type facilities in urban centers under PPP-type business arrangements • Enhancement of physical connectivity (e.g., roads and roads management) and institutional connectivity (inter-agency arrangements) complementing the establishment of FTI-type facilities
6. Transshipment centers Basis for spatial role Capacity of transport and logistics facilities		• Establishment, expansion, modernization or rehabilitation of airports and seaports and linked land transport systems and terminals • Enhancement of systems for quarantine and sanitary and phytosanitary (SPS), biosecurity, food safety • Standardized safe pass system enhancement • Border control protocols (BCP) • Anti-smuggling measures – such as non-physical (ICT-supported) permits and clearances • Maritime security/protection • Border patrol • Coastal monitoring • Regulatory documents processing • Transport and trade facilitation RDE

Region IV-A Breakdown of Commodity Systems

The CALABARZON Regional Development Plan 2017-2022 notes the importance of alternative income sources because agriculture is exposed to risks such as pests and diseases, extreme weather conditions, erratic cost of production, and regulatory measures, among others. Intercropping coconut production with cash crops and/or high value commercial crops such as coffee or cacao can result in additional income and reduced losses of coconut farmers. Another area that may be considered, especially by those engaged in aquaculture production, is to explore ornamental fisheries production. Income diversification is the focus of commodity systems planning (Table 5.26).

In CALABARZON, various economic opportunities targeting smallholder farmers and fisherfolk have been identified in the following commodity systems: (1) corn/livestock/poultry-based; (2) coconut-based; (3) fisheries-based; and (4) geographically specialized commodities-based (Table 5.26). Significant increases in total household income are anticipated to result from diversifying commodity systems, composed of five “anchor

commodities" under which can be subsumed any and all other agri-fishery commodities—both food and non-food.

Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" of Table 5.26. On the other hand, diversifying by engaging in profitable post-production segments of a value chain, in order to tap potential on-farm, off-farm and non-farm incomes and employment, is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., corn, livestock, and poultry system-based roadmap), in lieu of the usual single commodity plans.

Table 5.26: CALABARZON's Priority Commodity Systems

ANCHOR COMMODITY	**LINKED COMMODITIES** (From Regional Planning Workshop)	**POTENTIAL LINKED ENTERPRISES** (From Planning Consultations and Presentations)

Rice-based	• Bamboo
	• Duck
	• Lowland vegetables
		• Large-scale processing of coconut into many possible high value products such as virgin coconut oil, coco coir, insulation, etc.
		• Farmer-linked value-adding centers to be located in the region's 21 cities and suburbs, specializing in:
		  ○ Processing
		  ○ Marketing/trading
		  ○ Waste recycling
		• Cloud kitchen, "Filipino diet products" delivery service, and tie-ups between farmer and fisher coops and restaurants
		• Production of baskets and packaging materials that are environment friendly and/ or will prolong shelf life
		• Vermicompost/production of vermicast, biofertilizer
		• Feed milling, milk processing, slaughtering, freezing
		• Farm machinery, equipment and tools fabrication/manufacturing (e.g., waste-to-energy setup harvesters, compost bins, water pumps and small electric engines)

Corn and livestock-based	• Cattle • Chicken • Corn • Goat • Swine	
Coconut-based	• Cacao • Coconut • Coffee • Palm	
Fisheries-based	• Others aquaculture commodities • Seaweeds • Shellfish • Shrimp	

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Geographically specialized	• Banana • Cacao • Coffee • Lowland vegetables • Mango • Pineapple • Sugarcane/sugar • Upland vegetables	• Local shops specializing in regular maintenance and repair of machinery, equipment and tools • Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app) • Large-scale mechanization, e.g., four-wheel drive tractors for sugarcane production • Waste recycling by cooperatives (e.g., rice hull, rice straw to energy; duck manure as fertilizer) • Fish cage design, construction and supply (bamboo poles, abaca ropes, nets) services

CALABARZON'S Contribution to Sector Outputs

Region IV-A accounted for 8.1% of the country's Gross Value Added in agriculture, forestry and fishing in 2020. This share reflects a 6.6% decline compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region IV-A accounted for 14% or PHP2,535 billion in 2020. The regional share went down by 10% compared to the previous year.

CALABARZON, named after its provinces of Cavite, Laguna, Batangas, Rizal, and Quezon, is spatially strategic in terms of agri-fishery modernization planning, given the confluence of two key factors: (a) proximity to Metropolitan Manila; and (b) its large agri-fishery resources base. The region is experiencing rapid urbanization, now including 21 cities hosting an even-increasing number of manufacturing and high-tech industries. Thus, the region is a highly promising setting for the types of transformative investments envisioned in NAFMIP, including innovations in high-tech urban agriculture.

Aligning with the industrialization and manufacturing orientation of regional and local development plans, the regional AFMIP will accentuate and scale-up agri-fishery modernization efforts toward achieving the sector-wide major output, "commodity system-based value chains established" (Table 5.27). Processing and manufacture of agri-fishery based products will be pursued to include numerous possible downstream products from coconut, livestock and poultry, and fishery. Target markets will continue to include Metropolitan Manila, but will also be expanded to export destinations. Agri-industrialization initiatives will be underpinned by capacity building to reflect technological and other advancements.

Table 5.27: CALABARZON's Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION IV-A SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 185)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. Commodity system-based value chains established	58%	• Large-scale facilities to produce downstream products, e.g., virgin coconut oil, coco sugar and *lambanog* • Processing facilities for livestock, poultry and dairy products, with temperature control features • Expansion of fishery areas for sustainable aquaculture (RA 10654) • Strategic review of irrigation services • Improved management and maintenance of marine protected areas and fish sanctuary and enforcement of closed fishing season
2. Capacities of LGUs, AF groups and Individuals strengthened	14%	• Inclusion of indigenous peoples in Registry System for Basic Sectors in Agriculture (RSBSA) • Exporters' summits • Professionalization of machinery operations and repair • Enterprise development for youth and women
3. Policy environment to accelerate and sustain sector transformation enhanced	11%	• Local forums on land use conversion • Policy recommendations based on assessment of actual use of machinery and equipment on farmers' fields • Establishment of internationally-accredited laboratories
4. RETD system intensified	6%	• Establishment of coconut germplasm at UP Land Grant • Updating of technical advisories on climate-resilient technologies. e.g., tolerant crops, sustainable land and water management
5. AFIBCs operationalized	6%	• Linking between large investors in agri-fishery industrial corridors, and locally registered hatcheries including those with fry/fingerlings sourced from the wild

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION IV-A SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 185)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
		• Expansion of fish export facilities located within agri-fishery industrial business corridors
6. ICT- and AF technology-enabled market support systems strengthened	5%	• Market competitiveness support such as blast freezer and storage equipment • Upscaling of market matching and *KADIWA ni Ani at Kita* • Marketing of regional specialty commodities under geographically specialized commodity systems (GSCS) programs, e.g., fortified *tupig*

Region IV-B: MIMAROPA

REGIONAL PLANNING PROFILE			
Total Population			
3,228,558 (PSA, 2020)	48.70% women (PSA, 2015)	438,000 are farmers[9] (PSA, 2018)	26% farmers and 26.2% fisherfolk fall below the poverty threshold (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**		**Total Cropland Area** (Hectares)
357 B or 2% (PSA, 2020)	28 (Moderate)		0.70 M Ha
Airports[10]	**Combined Seaports**[10]	**Rail Lines**[10]	**Roads** (Total km)
46 (NPT, 2022)	26 (NPT, 2022)	1 (NPT, 2022)	2,298 (NPT, 2022)

* Data indicated for airports, combined seaports and rail lines for Regions IV-A and IV-B are combined data for both regions

[9] No data on fisher population for Region IV-B
[10] Only one data set (combined) for airports, rail lines, and seaports for Regions IV-A and IV-B

Priority Commodities in AFMP 2018-2023	Provinces
• HVC (Banana-saba, calamansi, cashew, coconut, onion) • Livestock and poultry (Goat, native pig) • Fisheries (Seaweeds, tuna) • Rice • Corn and cassava	• Marinduque • Occidental Mindoro • Oriental Mindoro • Palawan • Romblon

Spatial Analysis of Agri-Fishery Resources, Region IV-B

The total cropland area in Region IV-B or MIMAROPA is estimated at around 701,549 ha. Around 59% or 411,546 ha of the area is dedicated to perennial crops. The region's annual crops in 2015 were found to have further decreased by 68,391 ha or about 24% decline by 2020. It is estimated that about 5% of the 2015 annual crop has been converted into built-up areas in the region, and this accounts for about 15,539 ha. However, the spatial analysis shows significant increase in the tree cover from annual crops from 2015 to 2020. This estimates to about 15% increase from 2015 or 44,084 ha. Table 5.28 shows the analysis of changes in MIMAROPA cropland areas from 2015 to 2020.

Table 5.28: Change Analysis of Cropland Areas in Region IV-B from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	290,003.07	221,612.14	-68,390.94	-23.58	15,538.83	44,084.35
Perennial Crop	411,545.96	-	-	-	-	-

Based on the modeled potential areas for the different commodity systems, 796,985 ha were found to be appropriate for coconut-based commodity system (Table 5.29). Meanwhile, around 348,600 ha were estimated to be potential for the rice-based or corn-based commodity system and around 27,972 ha have potential for the aquaculture and fishery-based commodity system.

Table 5.29: Potential Areas for the Different Commodity Systems in Region IV-B

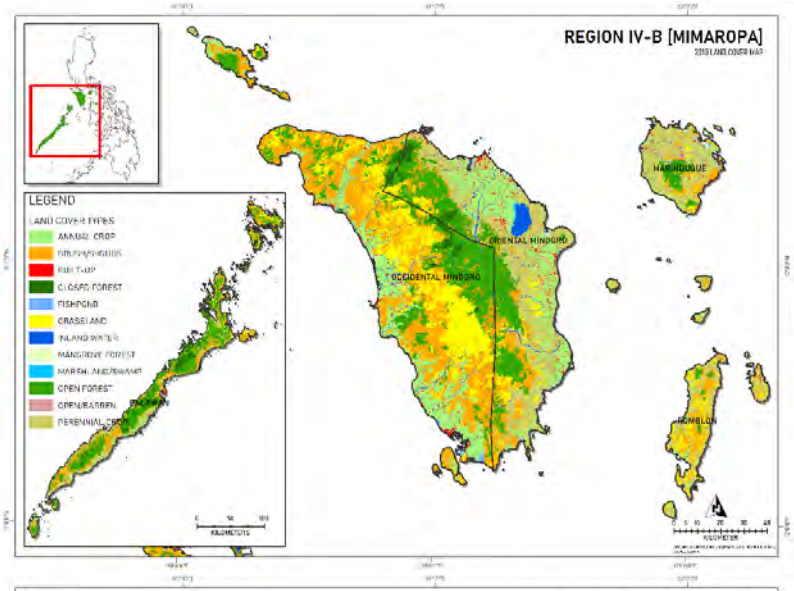
COMMODITY SYSTEM	AREA (Ha)
Coconut-based	796,984.72
Rice-based or Corn-Livestock-Poultry-based	348,599.76
Aquaculture and Coastal Fishery-based[1]	27,971.94
TOTAL	**1,173,556.41**

[1] This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Figure 5.6 shows the land cover maps of the region in 2015 and 2020, plus the potential commodity system distribution there.

Figure 5.6: Land Cover Map of Region IV-B in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)

A



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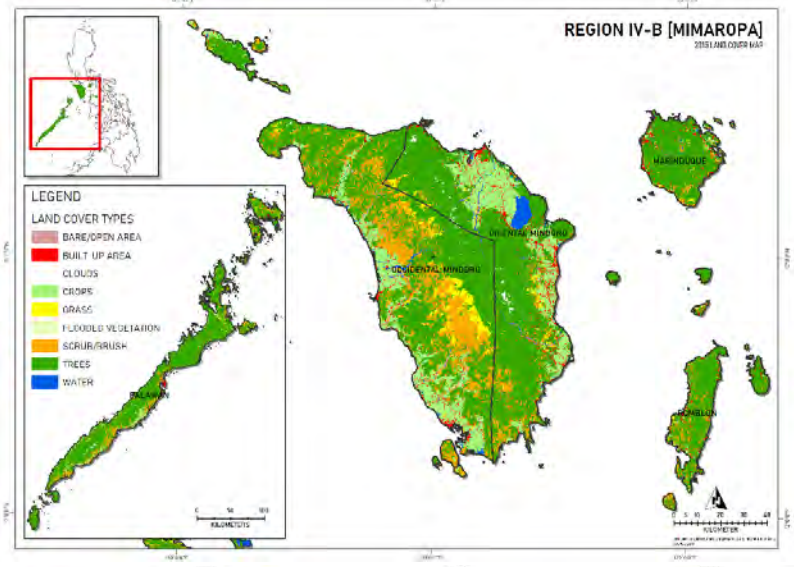
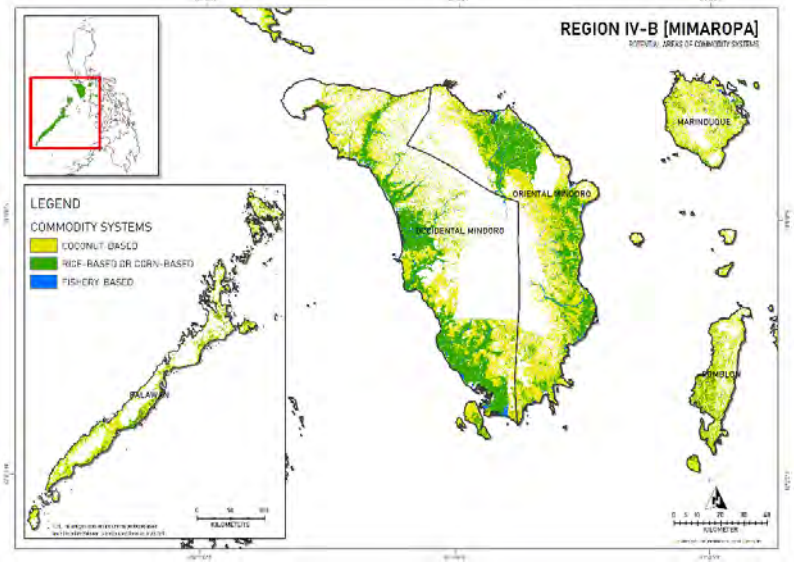


C



Spatial Framework for Sector Transformation in Region IV-B

MIMAROPA as archipelagic region adopted Island Development as spatial strategy (NEDA, MIMAROPA Regional Development Plan 2017-2022). Each of the four islands (Mindoro, Marinduque, Romblon, and Palawan) is being developed based on its economic, physical, and natural resource attributes. The Regional Development Plan identifies agribusiness opportunities shown in Table 5.30. The challenge in agri-fishery transformation is how to combine single commodities (e.g., coconut with abaca farming), or product forms (e.g., value-adding diversification to produce banana flour, puree, etc.), so that households can multiply their sources of income and employment; and (2) how to expand market-driven production ideally to commercial scale. The NAFMIP transformative list of local commodities indicates those that the Plan will support upscaling through private investment, value-adding, and related value chain segment development vis-à-vis these opportunities. Potentially transformative investments and interventions are then shown in Table 5.31.

Table 5.30: MIMAROPA Agribusiness Opportunities by Province

PROVINCE	AGRIBUSINESS OPPORTUNITIES
Marinduque	• Coco coir production • Butterfly industry • Abaca processing • Coconut sugar production
Occidental Mindoro	• Tuna production • Pickled fruits and vegetables • Aquamarine processing • Salt industry • Seaweeds
Oriental Mindoro	• Banana chips • Rice-based delicacies • Calamansi purees and concentrates • Virgin coconut oil • Bamboo-based products • *Lamayo*, dried *biya* and seaweeds • Abaca, buri and cogon handicrafts
Palawan	• Cacao • Seaweeds • Pineapple • Banana • Palm oil
Romblon	• Soft broom production (*walis tambo*) • Fish and other marine products processing • Meat processing • Peanut butter production • Coconut oil processing

Reference: NEDA, MIMAROPA Regional Development Plan 2017-2022

Table 5.31: MIMAROPA's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production and primary processing areas for commodity systems expansion to commercial levels Basis for spatial role • Agri-climatic suitability and carrying capacity • Reduced food miles	Occidental Mindoro Oriental Mindoro Romblon	• Development of NAFMIP Geographically Specialized Commodity Systems (GSCS) anchored on abaca, fruits, marine products and other major commodities • Enhancement of island core-periphery access network to facilitate movement of passengers and cargo to and from all locations in each island – to include production areas-to-market roads, bridges and footpaths as needed • Complementary enhancement in communications using ICT applications • On-site research, development and demonstration/ extension on value chain enhancements in coconut, banana, abaca and fiber crops, and other local crops, livestock, poultry and fishery • Provision of primary processing facilities keyed to priority local commodities and products, e.g., large external market-oriented production of abaca mats; or fruit juices
2. Integrated storage and secondary/ further processing centers Basis for spatial role Physical connectivity to production areas		• Construction, improvement or expansion of storage facilities • Provision of necessary secondary processing facilities such as enhancing design and packaging of abaca mats; or canning, packing and labeling of fruit juices • Construction of climate-proof food storehouses in remote areas to ensure food supply in case of emergency
3. Machinery, equipment and tools supply and service centers Basis for spatial role 4. Accessibility to production areas		• Expansion of network of machinery, equipment and tools suppliers and service centers • Provision of production and postharvest machinery, equipment and tools such as for hauling, lifting, clamping, handling • Facilitation of access of households to sources of financing to establish, expand or modernize local resource-based enterprises
5. Recycling/waste management zones Basis for spatial role		• Household level training on circular food and non-food production systems practices

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
Proximity to production areas		• Advocacy to include as part of primary and secondary education re-use of recycled agri-fishery waste products • Establishment or expansion of materials recovery facilities (MRF) – bio-digesters; waste-to-energy conversion
6. Food and non-food products and consumer market hubs <u>Basis for spatial role</u> Centrality vis-a-vis buyer/consumer settlements	Puerto Princesa City, Palawan San Jose City Calapan City Romblon Ciity	• Establishment of retail outlets in urban commercial centers for agri-fishery processed and value-adding products • Facilitation of supplier-buyer contact and agreements between Philippines and foreign buyers and island-based producers • Development of potentials on domestic and international e-marketing of local agri-fishery products
7. Transshipment points <u>Basis for spatial role</u> Capacity of transport and logistics facilities		• Expansion, modernization or rehabilitation of inter-island transport infrastructure facilities, services, management, and operation and maintenance • Enhancement of systems for quarantine and sanitary and phytosanitary (SPS), biosecurity, food safety and border control

Breakdown of MIMAROPA Commodity Systems

MIMAROPA's significance to the agri-fishery sector is that it is the leading producer of cashew and calamansi; second largest producer of garlic; third among the regions in onion production; fifth largest producer of cacao; and sixth largest producer of peanut and palm oil. It is also one of the top producers of fishery products (NEDA, MIMAROPA Regional Development Plan 2017-2022). The RDP notes that major challenges are to increase productivity and to promote sustainable farming and fishing practices to avoid resource degradation, water shortage, and marine resource depletion. The NAFMIP commodity systems approach seeks to significantly raise total household incomes, while giving due attention to sustainable land and water management using an Integrated Spatial Planning Framework.

In MIMAROPA, economic opportunities targeting smallholder farmers and fisherfolk have been identified in the following commodity systems: (1) corn/livestock/poultry-based; (2) coconut-based; and (3) fisheries-based (Table 5.32). Significant increases in total household income are anticipated to result from the diversified commodity systems, composed of five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities—both food and non-food.

Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.32. On the other hand,

diversifying by engaging in profitable post-production segments of a value chain, in order to tap potential on-farm, off-farm, and non-farm incomes and employment is shown in the column labelled "inked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Table 5.32: MIMAROPA's Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)

Rice-based	• Bamboo
	• Mungbean
	• Mushroom
	• Onion
	• Sweet potato
	• Vegetables
		• Farmer-linked value-adding centers located in region's 21 cities and suburbs, specializing on:
		  ○ Processing
		  ○ Marketing/trading
		• Cloud kitchen, "Filipino diet products" delivery service and tie-ups between farmer and fisher coops and restaurants
		• Production of baskets and packaging materials
		• Vermicompost/production of vermicast, biofertilizer
		• Feed milling, milk processing, slaughtering, freezing
		• Farm machinery, equipment and tools fabrication/manufacturing (e.g., waste-to-energy setup harvesters, compost bins, water pumps and small electric engines)
		• Production of baskets and packaging materials that are environment-friendly and/ or will prolong shelf life
		• Vermicompost/production of vermicast, biofertilizer
		• Feed milling, milk processing, slaughtering, freezing
		• Local shops specializing in regular maintenance and repair of machinery, equipment and tools
		• Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app)
		• Waste recycling by cooperatives (e.g., rice hull, rice straw to energy)
		• Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season

Corn and livestock-based	• Cassava • Cattle • Chicken • Corn • Goat • Swine	
Coconut-based	• Cacao • Chicken • Coconut • Coffee • Dairy • Other ruminants • Swine • Palm	
Fisheries-based	• *Bangus* • Others aquaculture commodities • Seaweeds • Shellfish • Shrimp • *Tilapia* • Tuna and tuna-like species	
Geographically specialized	• Arrowroot • Banana • *Bangus* • Cassava • Cashew • Citrus • Coffee • Corn • Cattle • Garlic • Ginger • Lowland vegetables	

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
	• Mango • Red Onion • Rice • Seaweeds • Soybean • Sweet Potato • *Tilapia* • Turmeric • Upland vegetables	• Fisher enterprise market outlets in urban centers

MIMAROPA's Contribution to Sector Outputs

Region IV-B accounted for 3.9% of the country's Gross Value Added in agriculture, forestry and fishing in 2020. This share reflects a 2.2% decline compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region IV-B accounted for 2% or PHP357 billion in 2020. The regional share went down by 8% compared to the previous year.

MIMAROPA, comprising Occidental Mindoro, Oriental Mindoro, Marinduque, Romblon, and Palawan provinces, has a rich and diverse agri-fishery resource base. Major commodities include high-value produce such as garlic, onion, mango, banana, melon, and peanut. Its strategic importance, however, is in coastal and aquaculture fisheries, including production of salt, milkfish, prawn, tuna, octopus, and seaweed. Palawan accounts for two-thirds of fish supply in Metropolitan Manila markets. Meanwhile, Mindoro is a global center for biodiversity conservation.

Over the next 10 years, MIMAROPA will pursue agri-fishery diversification planning and implementation built around the commodity system approach (Table 5.32). It will diversify primary production by enabling households to engage in farming systems combining crops, livestock, poultry, and/or fishery. At the same time, farm and fishing households will also be supported to venture into profitable segments of priority value chain, including off-farm (e.g., manufacture of processed product), and even non-farm (e.g., repair of farm tools and equipment).

Table 5.33: MIMAROPA's Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION IV-B SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 345)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. Commodity system-based value chains established	62%	• Development of high-value products including from emerging commodities • Mushroom production and processing • Congress on Organic Agriculture • Multi-grain processing centers • Processing centers for mushroom, dairy, cashew, white copra

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION IV-B SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 345)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
		• Expansion of artificial reefs and fish sanctuaries
2. AFIBCs operationalized	10%	• Marketing facilities for regional agri-fishery products • Vegetable packaging center inside business corridor
3. Capacities of LGUs, AF groups and Individuals strengthened	9%	• Professionalized commodity growers' and processors' associations • Training on machinery and equipment • Regularization of School on the Air • Training on fishery laws regulation and enforcement
4. Policy environment to accelerate and sustain sector transformation enhanced	8%	• Enhanced system for Halal Certification • Incentives, recognition and awards to outstanding agri-fishery industrialization achievements
5. RETD system intensified	8%	• Packaging and delivery of updated information on production and processing of various regional commodity product forms, e.g., from cashew, soybean
6. ICT- and AF technology-enabled market support systems strengthened	3%	• Establishment of a strategically located Food terminal with cold storage facilities and linked to existing and planned transport networks • Hybrid derby field day

Region V: Bicol Region

REGIONAL PLANNING PROFILE				
Total Population				
6,082,165 (PSA, 2020)	49.09% women (PSA, 2015)	741,000 are farmers (PSA, 2018)	190,256 are fisherfolk (BFAR, 2022)	34.9% farmers and 48.5% fisherfolk fall below the poverty threshold (PSA, 2015)

Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)
517 B or 3% (PSA, 2020)	38 (High)	1.06 M Ha
Airports	**Combined Seaports**	**Roads** (Total km)
13 (NPT, 2022)	10 (NPT, 2022)	2,418 (NPT, 2022)

Priority Commodities in AFMP 2018-2023	**Provinces**
• HVC (abaca, coconut, pili, cacao, pineapple, taro) • Fisheries (seaweeds, mangrove crabs) • Rice • Corn • Lowland vegetables • Livestock (dairy cattle, goat, swine)	• Albay • Camarines Norte • Camarines Sur • Catanduanes • Masbate • Sorsogon

Spatial Analysis of Agri-Fishery Resources, Region V

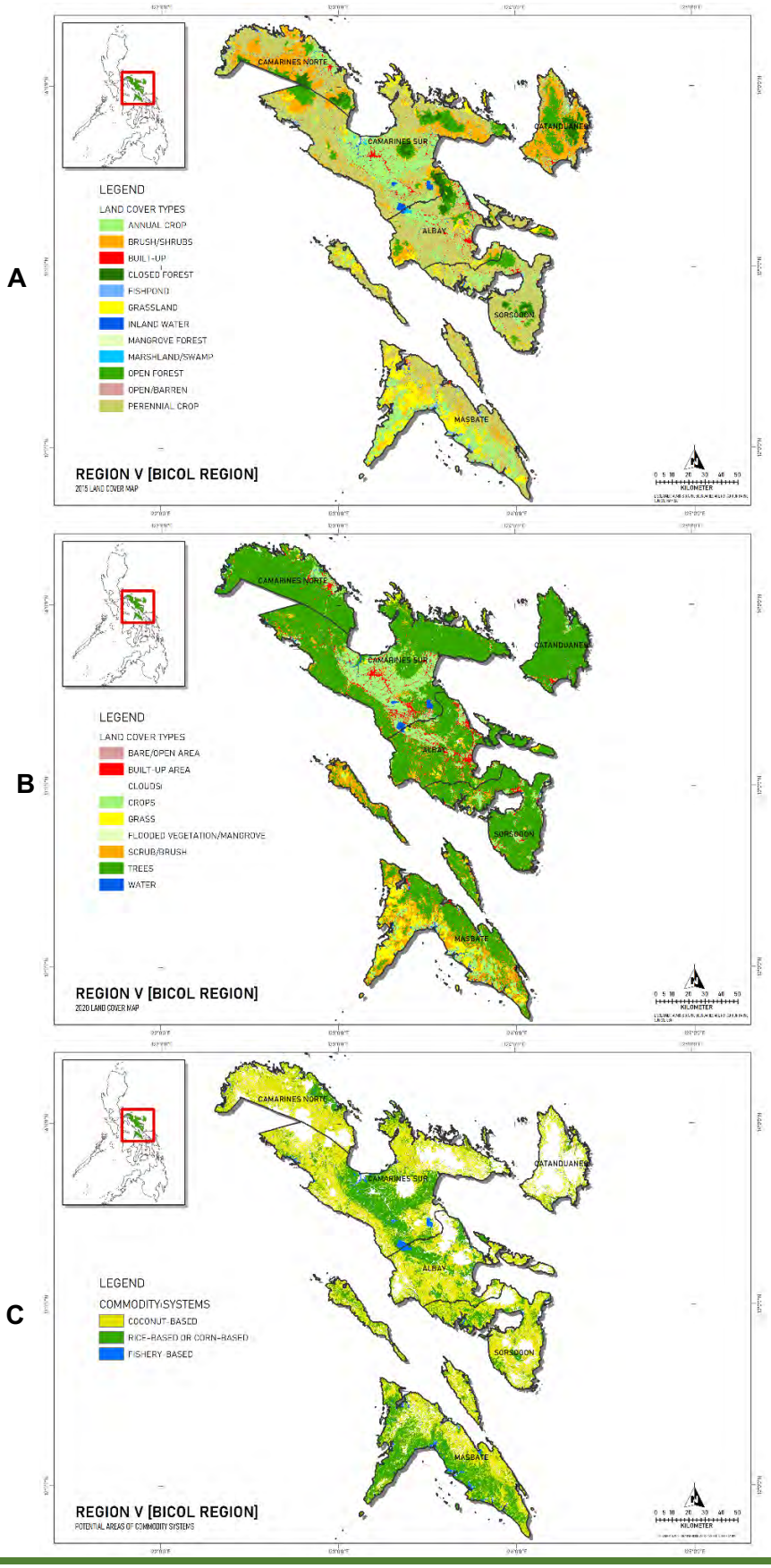
The total cropland area in Region V in 2015 is estimated at around 1.06 M ha and about 70% of these lands is dedicated to perennial crops (737,532 ha). In terms of its annual crops, the spatial analysis shows a 27% decline in area from 2015 to 2020. This is equivalent to a loss of about 87,104 ha. About 6% of the 2015 annual crops were converted to built-up areas comprising about 18,880 ha. On the other hand, around 12% or 38,704 ha of the 2015 annual crops have improved its vegetation into tree cover in 2020. Table 5.34 shows the analysis of changes in Bicol cropland areas from 2015 to 2020.

Table 5.34: Change Analysis of Cropland Areas in Region V from 2015 to 2020

LAND COVER	**AREA** (Hectare)		**RELATIVE CHANGE**		**CONVERSION OF ANNUAL CROPS** (Ha) **[2015-2020]**	
	2015	**2020**	**Gain/Loss**	**Percent**	**Built-Up**	**Trees**
Annual Crop	322,932.33	235,827.89	-87,104.44	-26.97	18,879.93	38,703.71
Perennial Crop	737,531.83	-	-	-	-	-

Figure 5.7 shows the land cover maps of the region in 2015 and 2020, plus the potential commodity system distribution there.

Figure 5.7: Land Cover Map of Region V in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems (C)



In terms of the potential areas for the different commodity systems, large areas approximately about 778,012 ha were found to be potential for the coconut-based commodity system. The rice-based or corn-based commodity system is also quite large which is estimated at 417,488 ha. Finally, the aquaculture and fishery-based commodity system is calculated around 33,885 ha (Table 5.35).

Table 5.35: Potential Areas for the Different Commodity Systems in Region V

COMMODITY SYSTEM	AREA (HA)
Coconut-based	778,012.32
Rice-based or Corn-Livestock-Poultry-based	417,488.15
Aquaculture and Coastal Fishery-based[1]	33,885.04
TOTAL	**1,229,385.52**

[1]This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Spatial Framework for Sector Transformation in Region V

The NEDA Regional Development Plan 2017-2022 references Bicol Region as producer of agricultural commodities and agri-based products using abaca, pili, pineapple, coconut, marine products, and cattle as the prime commodities. Germane to agri-fishery sector transformation are three other regional features: (a) ecotourism destination; (b) gateway to the Visayas and Mindanao; and (c) international gateway to the Pacific and other global destinations via the Bicol International Airport.

The region has a four-tiered hierarchy of settlements. The two regional centers are Metro Naga (agglomeration of Naga City and 14 municipalities in Camarines Sur), and Metro Legazpi (Legazpi City and the municipality of Daraga). It has nine sub-regional centers; 32 provincial centers; and 71 local centers. The sub-regional centers are Daet, Camarines Norte; Iriga City; Ligao City; Masbate City; Matnog, Sorsogon; Pili, Camarines Sur; Sorsogon City; Tabaco City; and Virac, Catanduanes.

NAFMIP will help articulate the spatial roles in terms of agri-industrialization and sector modernization, through the commercial development of geographically specialized commodity systems (GSCS) covering processed, high-value products from abaca, pili, pineapple, and other agri-fishery based commodities for which Bicol Region is known (Table 5.36). Commodity and product diversification investments will be guided by the NAFMIP Integrated Spatial Planning Framework that includes edaphic, agri-climatic, and sustainable land and water management criteria.

Table 5.36: Bicol Region's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agri-climatic suitability and carrying capacity • Reduced food miles	Camarines Sur Masbate Albay	• Development of geographically specialized commodity systems (GSCS) to commercially produce high-value processed products/product forms from abaca, pili, pineapple, and marine resources • Advocacy and facilitation of credit and insurance covering commodity systems rather than single commodities • Continuing/further upscaling of business transactions and institutional linkages across the value chains of GSCS and other priority commodities • Research, extension, and training for development to cover primary production diversification as well as value-adding diversification
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas		• Private investments to expand and modernize Cold storage/cryogenics, slaughterhouses, controlled environment facilities • Establishment of large-scale postharvest Facilities – temporary holding areas /silos for harvest, washing/cleaning, canning, packaging, labeling
3. Machinery, equipment and tools supply and service centers Basis for spatial role Accessibility to production areas		• Agglomeration of private enterprises specializing in large and modern machinery, equipment and tools o Production – tractors; harvesters; articulated farm vehicles; fishery facilities/vessels; artisanal fishing boats o Postharvest – trucks (wing van), trailers, forklifts; articulated special functions, vehicles; equipment and tools for hauling, lifting, clamping, handling o Facilitation of credit for upgrading farm and fishery machinery, tools and equipment
4. Recycling/waste management zones		• Household level training on circular food and non-food production systems practices

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
Basis for spatial role Proximity to production areas		• Credit facilitation for capacitated cooperatives to acquire equipment for profitable recycling activities • Advocacy to include as part of primary and secondary education re-use of recycled agri-fishery waste products
5. Food and non-food market terminals Basis for spatial role Centrality vis-a-vis buyer/consumer settlements	Vinzons, Camarines Norte Tabaco City, Albay Uson, Masbate Pili, Camarines Norte Sorsogon City Naga City Tabaco City Iriga City	• Market development toward domestic and international e-marketing of high-value processed agri-fishery products • Establishment of retail outlets in commercial malls for agri-fishery processed and value-adding products • Facilitation of supplier-buyer contact, negotiation and agreement between Philippines and foreign buyers and cooperatives and similar organizations
6. Transshipment points Basis for spatial role Capacity of transport and logistics facilities		• Further expansion and modernization or rehabilitation of Bicol International Airport to handle large cargo planes • Continuing improvement of seaports and inter-island transport infrastructure facilities, services, management, and operation and maintenance • Enhancement of systems for quarantine and sanitary and phytosanitary (SPS), biosecurity, food safety and border control

Breakdown of Bicol Region's Commodity Systems

The Regional Development Plan 2017-2022 notably underscores the link between agriculture and nutrition as proactively espoused in NAFMIP. The RDP Chapter 8 states that the agri-fishery sector provides food for daily nutritional needs and at the same time employs 40% of Bicolanos, especially those in rural areas who draw livelihood from farming, fishing, and livestock and poultry raising. The RDP further notes that the sector is a major contributor to abaca, coconut, and marine product exports, and provides raw materials for the manufacturing industry. A key observation is that in many developed countries, the agriculture sector was strengthened first because it supports the other sectors of the economy by supplying raw materials (NEDA, Bicol RDP 2017-2022). In NAFMIP, the region expects to upscale the production of various value-adding products from abaca, pili, and pineapple

In Bicol Region, economic opportunities targeting smallholder farmers and fisherfolk have been identified in the following commodity systems: (1) corn/livestock/poultry-based; (2) coconut-based; and (3) fisheries-based (Table 5.37). Significant increases in total household income are anticipated to result from the diversified commodity systems, composed of five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities, both food and non-food.

Table 5.37: Bicol Region's Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)

Rice-based	• Bamboo
	• Lowland vegetables
		• Production of natural fiber packaging materials (*bayong*, etc. to replace plastic bags) using abaca, tiger grass, and other locally abundant materials
		• Farmer- and fisher-linked value-adding centers located in Naga, Iriga, Legaspi and various other cities and peri-urban areas, specializing on:
		  ○ Processing
		  ○ Marketing/trading
		• Farm machinery, equipment and tools fabrication/manufacturing (e.g., four-wheel drive tractors for sugarcane production, waste-to-energy setup harvesters, compost bins, water pumps and small electric engines)
		• Local shops specializing in regular maintenance and repair of machinery, equipment and tools
		• Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app)
		• Production of baskets and packaging materials that are environment-friendly and/ or will prolong shelf life
		• Feed milling, milk processing, slaughtering, freezing
		• Vermicompost/production of vermicast, biofertilizer
		• Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season
		• Fisher enterprise market outlets in urban centers
		• Fish cage supplies (bamboo poles, abaca ropes, nets)
		• Fish cage design and construction services

Corn and livestock-based	• Cassava • Cattle • Chicken • Corn • Duck • Goat • Other poultry animals • Other ruminants • Rabbit • Sorghum • Soybean • Swine	
Coconut-based	• Abaca • Banana • Cacao • Carabao • Cassava • Cattle • Chicken • Coconut • Coffee • Corn • Goat • Palm • Sweet potato	
Fisheries-based	• Others aquaculture commodities • Seaweeds	
Geographically specialized • Abaca • Pili	• Lowland vegetables • Pineapple • Rice • Sugarcane • Sweet potato	

Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.37. On the other hand, the

column labelled “linked enterprises” lists profitable post-production segments of a value chain in order to tap potential on-farm, off-farm, and non-farm incomes and employment. NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Bicol Region’s Contribution to Sector Outputs

Region V accounted for 5.2% of the country’s Gross Value Added (GVA) in agriculture, forestry, and fishing in 2020. This share reflects a 1.3% decline in GVA compared to the previous year. In terms of the country’s Gross Regional Domestic Product (GRDP), Region V accounted for 3% or PHP517 billion in 2020. The regional share went down by 8% compared to the previous year.

The Bicol Region will direct agri-fishery growth toward diversifying income and employment opportunities of smallholder farmers and fisherfolk, while shifting away from primary production and toward higher-value manufacture of diverse products from abaca, coconut, *pili*, pineapple, cassava, vegetables, banana, and other commodities for which the region is known. As Bicol Region is typhoon-prone, science-based climate risk analysis, adaptation measures, and disaster risk management will be enhanced during the plan period. The DA Adaptation and Mitigation Initiative in Agriculture (AMIA) Program, including the AMIA Village Model, will be institutionalized regionwide.

As seen in Table 5.38, majority of the planned investments and interventions in Region V will focus on achieving two sector outputs: (1) commodity system-based value chains established; and (2) capacities of LGUs, agri-fishery groups, and individuals strengthened.

Table 5.38: Bicol Region Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	**DISTRIBUTION OF REGION V SUB-OUTPUTS BY SECTOR OUTPUT** (% of Sub-outputs, N = 478)	**ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS** (From Regional Planning Workshop)
1. Commodity system-based value chains established	65%	• Fiber industry programs to mechanize production and processing • Value chain analysis to guide investments in processing and manufacture of high-value products using abaca (*sinamay* and *pinukpok*), local fruits, and other raw materials • Utilization of peel extract for manufacture of beauty products (soap, body wash, shampoo and cream)
2. Capacities of LGUs, agri-fishery groups, and individuals strengthened	16%	• Training with livelihood equipment, e.g., twining device/handloom weaving • Enterprise development targeting the youth and women • Locals capacitated on fabrication and repair of fiberglass-reinforced plastic (FRP) boats

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION V SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 478)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
3. RETD system intensified	8%	• Pineapple waste extract as liquid electrolyte for wet-cell battery • Enhanced packaging materials for fresh pineapple • Design, fabrication, testing, and evaluation of queen pineapple leaves scraper, portable decorticator, automated decorticator • Recycling of abaca waste
4. ICT- and AF technology-enabled market support systems strengthened	6%	• Training of entrepreneurs on Product Packaging and Labelling • Updated database on players along the value chain (input suppliers, producers, traders, processors) • KADIWA stores in located in strategic areas
5. Policy environment to accelerate and sustain sector transformation enhanced	3%	• Coordination with LGUs in consonance with Mandanas Ruling implications on the implementation of abaca development programs
6. AFIBCs operationalized	2%	• Good Manufacturing Practice (GMP) - designed pili oil demo-processing and service facility • Establishment and maintenance of abaca twine processing center within corridor

Region VI: Western Visayas

REGIONAL PLANNING PROFILE				
Total Population				
7,954,723 (PSA, 2020)	49.17% women (PSA, 2015)	970,000 are farmers (PSA, 2018)	164,526 are fisherfolk (BFAR, 2017)	25.7% farmers and 18.6% fisherfolk fall below the poverty threshold (PSA, 2015)

Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)
825 B or 5% (PSA, 2020)	35 (Moderate)	1.01 M Ha
Airports	**Combined Seaports**	**Roads** (Total km)
19 (NPT, 2022)	16 (NPT, 2022)	3,062 (NPT, 2022)

Priority Commodities in AFMP 2018-2023	**Provinces**
• HVC (abaca, muscovado, mango, coffee, cacao, banana, coconut) • Fisheries (seaweeds, oyster) • Livestock and poultry (native chicken, swine, goat) • Rice • Corn	• Aklan • Antique • Capiz • Guimaras • Iloilo • Negros Occidental

Spatial Analysis of Agri-Fishery Resources, Region VI

The total cropland area of the region is estimated at around 1.01M ha and about 85% of these areas are considered as dedicated to annual crops. This accounts for about 859,542 ha. However, the annual crop declined significantly in 2020 by about 24% or roughly around 208,042 ha from 2015. Of the total annual crop area in 2015, around 51,851 ha or 6% of the annual crop in 2015 were converted into built-up areas in 2020. On the contrary, conversion from annual crops to tree cover were found to have increased from 2015 to 2020. This accounts to 14% or a total of 119,573 ha. Table 5.39 shows the analysis of changes in Region VI cropland areas from 2015 to 2020.

Table 5.39: Change Analysis of Cropland Areas in Region VI from 2015 to 2020

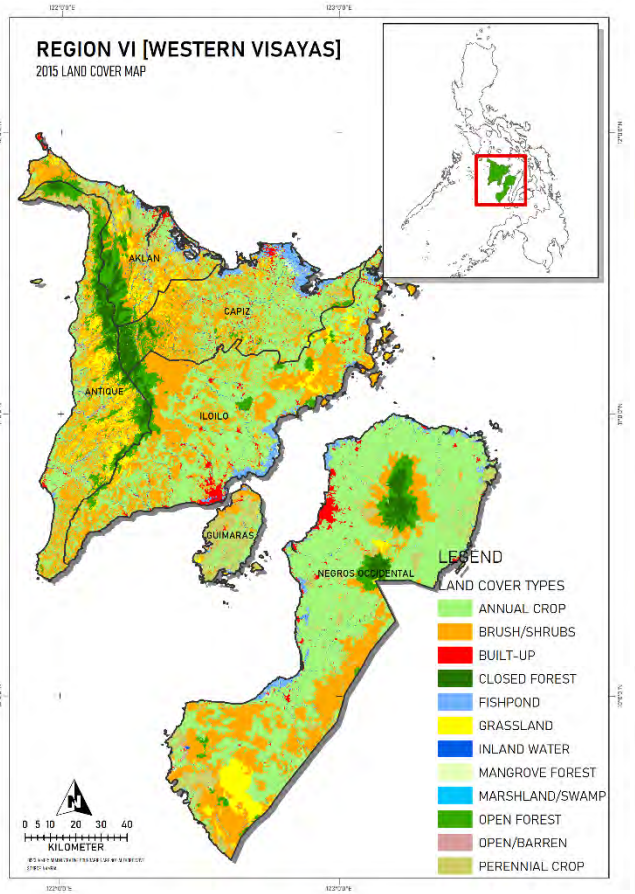
LAND COVER	**AREA** (Hectare)		**RELATIVE CHANGE**		**CONVERSION OF ANNUAL CROPS** (Ha) **(2015-2020)**	
	2015	**2020**	**Gain/Loss**	**Percent**	**Built-Up**	**Trees**
Annual Crop	859,542.35	651,499.96	-208,042.39	-24.20	51,851.48	119,572.65
Perennial Crop	148,423.36	-	-	-	-	-

Figure 5.8 shows the land cover maps of Region VI in 2015 and 2020, plus the potential commodity system distribution there.

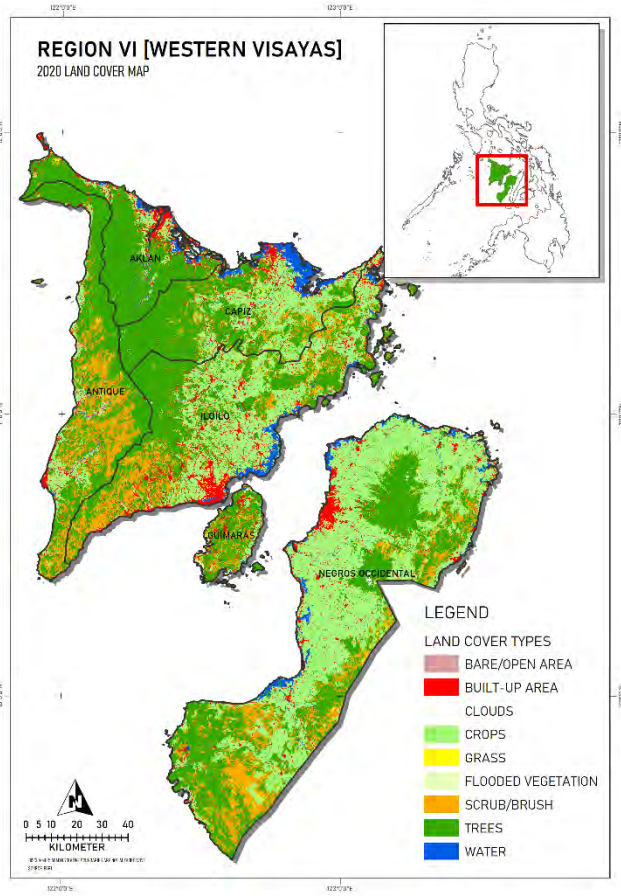
Based on the potential areas of the region to various commodity systems, rice-based or corn-based commodity system is observed with the largest area generated. This attributes to about 790,898 ha. Meanwhile, an estimate of about 488,871 ha was found for the coconut-based commodity system. As for the aquaculture and fishery-based commodity system, an area of around 57,819 ha is expected (Table 5.40).

Figure 5.8: Land Cover Map Region VI in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)

A



B



C

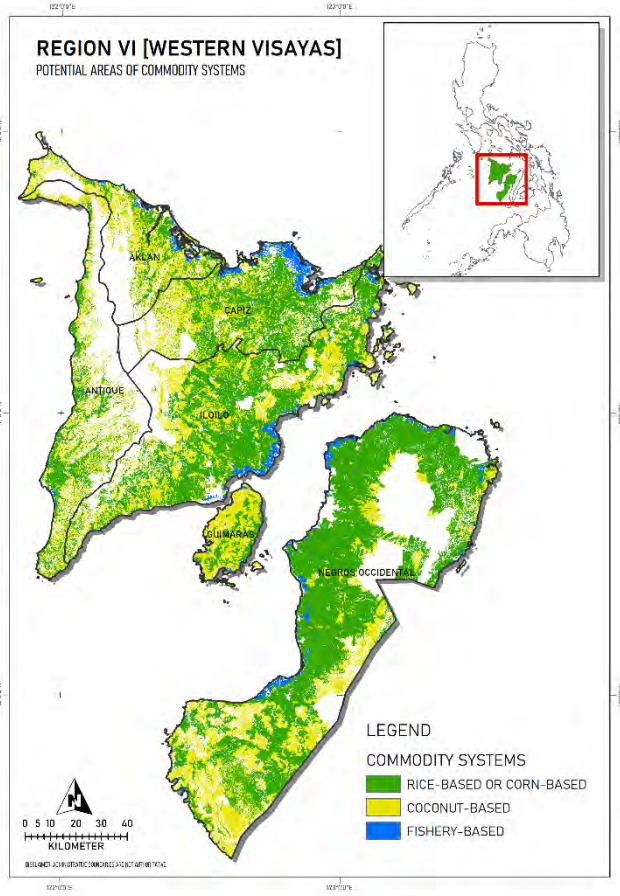


Table 5.40: Potential Areas for the Different Commodity Systems in Region VI

COMMODITY SYSTEM	AREA (HA)
Coconut-based	488,870.96
Rice-based or Corn-Livestock-Poultry-based	790,898.26
Aquaculture and Coastal Fishery-based[1]	57,818.97
TOTAL	**1,337,588.19**

[1] This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Spatial Framework for Sector Transformation, Region VI

As spatial development strategy, the NEDA Western Visayas Regional Development Plan 2017-2022 adopted National Spatial Strategy of concentration, connectivity, and vulnerability reduction. The RDP presents a network of settlements in Western Visayas consisting of four tiers: regional centers, sub-regional centers, provincial centers, and local centers. Two regional metropolitan areas are considered as regional centers: (1) Metro Iloilo, encompassing the highly-urbanized city of Iloilo and the municipalities of Pavia, Oton, Leganes, Sta. Barbara, Cabatuan, and San Miguel; and (2) Metro Bacolod composed of Bacolod City and the cities of Bago, Silay and Talisay and the municipality of Murcia. The sub-regional centers include Roxas City, Kalibo, San Jose in Antique, San Carlos City, and Kabankalan City both in Negros Occidental, and Jordan in Guimaras Province.

NAFMIP will support the regional spatial development strategy by locating transformative programs and projects in the agri-fishery sector according to spatial development roles—following the principles of concentration, connectivity, and vulnerability reduction. Marketing and trade efficiencies will be further enhanced by strengthening inter-regional connectivity via improving physical infrastructure and institutional coordination (Table 5.41).

Table 5.41: Western Visayas' Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial levels Basis for spatial role • Agri-climatic suitability and carrying capacity • Reduced food miles	Negros Occidental Iloilo Capiz	• Modernization (upgrading, expansion) of irrigation systems to be able to serve diversified on-farm commodity production systems rather than any single commodity • Production and value-adding diversification research, extension, and training for development • Assessment and enhancement of road/ physical network connectivity based on NAFMIP integrated spatial planning framework, e.g., to reduce food miles by coordinating the expansion of production areas with the projected direction of human settlements development

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas		• Construction, rehabilitation or expansion and modernization (e.g., cold storage/ cryogenics capacity) of commodity-neutral or multi-commodity storage and processing facilities to be located in AFIBCs • Crisis-proofing of food supply corridors through physical enhancement (e.g., flood-proofing of roads) and organizational measures, i.e., multisector coordination
3. Machinery, equipment and tools supply and service centers Basis for spatial role Accessibility to production areas		• Geographic redistribution to bring service centers closer to production areas, or otherwise facilitate customer access • Agglomeration of private enterprises distributing: o Production machinery, equipment, and tools – large tractors, harvesters, articulated farm vehicles, fishery equipment, artisanal fishing boats o Postharvest machinery and equipment – trucks (wing van), trailers, forklifts; tools for hauling, lifting, clamping, handling
4. Recycling/waste management zones Basis for spatial role Proximity to production areas		• Updating and dissemination of applied research on regional food systems circularity potentials • Household level training on circular food and non-food systems • Credit facilitation for capacitated cooperatives to acquire equipment for profitable recycling activities
5. Food and food product market terminals Basis for spatial role Centrality vis-a-vis buyer/ consumer settlements	Leon, Iloilo Sibalom, Antique Iloilo City Roxas City Cadiz City Bacolod City	• Establishment in regional centers and/or sub-regional centers of large-scale Food Terminal Inc. (FTI)-type facilities in urban and peri-urban centers under PPP-type business arrangements • Market development toward domestic and international e-marketing of high-value processed agri-fishery products • Expansion of retail outlets in commercial malls for agri-fishery processed and value-adding products

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
6. Transshipment centers Basis for spatial role Capacity of transport and logistics facilities		• Further expansion and modernization or rehabilitation of airports and seaports to efficiently handle larger volumes of cargo • Continuing improvement of inter-island sea transport between the two regional centers and the rest of the region (infrastructure, services and management) • Enhancement of systems for quarantine and sanitary and phytosanitary (SPS), biosecurity, food safety and border control

Region VI Breakdown of Commodity Systems

The agri-fishery sector plays a crucial role in the economic progress of Western Visayas. With about 40% of the region's labor force employed in the sector, expanding and diversifying opportunities for employment in this sector are seen to significantly help reduce poverty and inequality in rural areas. Aside from the slow progress in diversification, notable among other observations are the low rate of farm mechanization and inadequate postharvest facilities. Thus, the region seeks to expand and diversify economic opportunities for those engaged in producing agriculture and fishery products, and to increase access to economic opportunities for smallholder farmers and fisherfolk (NEDA, Western Visayas Regional Development Plan 2017-2022). Diversifying income and employment is a core strategy underpinning the NAFMIP commodity systems approach.

In Western Visayas, substantial economic opportunities targeting smallholder farmers and fisherfolk have been identified in the following commodity systems: (1) corn/livestock/poultry-based; (2) fisheries-based; and (3) geographically specialized (Table 5.42). Significant increases in total household income are anticipated to result from the diversified commodity systems, comprising five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities, both food and non-food.

Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.42. On the other hand, diversifying by engaging in profitable post-production segments of a value chain, in order to tap potential on-farm, off-farm, and non-farm incomes and employment is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-based Roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Table 5.42: Western Visayas' Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)

Rice-based	• Aquaculture commodities
	• Bamboo
	• Mungbean
	• Sweet potato
	• Vegetables
		• Manufacture of natural fiber packaging materials (*bayong*, etc. (to replace plastic bags) using locally abundant raw materials
		• Tie-up between natural fiber bags producers and supermarkets/commercial centers
		• Farmer- and fisher-linked value-adding centers located in Iloilo and various other cities and peri-urban areas, specializing on:
		  ○ Processing
		  ○ Marketing/trading
		• Farm machinery, equipment and tools fabrication/manufacturing (e.g., sugar milling, waste-to-energy setup harvesters, compost bins, water pumps and small electric engines)
		• Local shops specializing in regular maintenance and repair of machinery, equipment and tools
		• Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app)
		• Production of baskets and packaging materials that are environment-friendly and/ or will prolong shelf life
		• Vermicompost/production of vermicast, biofertilizer
		• Processing, packing. marketing
		• Feed milling, milk processing, slaughtering, freezing
		• Waste recycling by cooperatives (e.g., rice hull, rice straw to energy)
		• Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season
		• Fisher enterprise market outlets in urban centers
		• Fish cage design, construction and supplies (bamboo poles, abaca ropes, nets) services

Corn and livestock-based	• Cassava • Chicken • Goat • Other poultry animals • Other Ruminants • Sorghum • Swine	
Coconut-based	• Abaca • Banana • Breadfruit • Cacao • Coffee • Garlic • Lowland vegetables • Mungbean • Mushroom • Palm • Peanut • Red Onion • Soybean • Sugarcane • Sweet potato • Upland vegetables • Yellow onion	
Fisheries-based • Capture species • Seaweeds • Shellfish • Aquaculture commodities	• Mungbean • Poultry • Swine • Vegetables	
Geographically specialized • Sugar/ sugarcane • Mango	• Aquaculture commodities • *Bangus* • Cacao • Cattle • Carabao • Goat • Mungbean • *Tilapia* • Vegetables	

Western Visayas' Contribution to Sector Outputs

Region VI accounted for 9.2% of the country's Gross Value Added in agriculture, forestry, and fishing in 2020. This share reflects a 6.2% increase compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region VI accounted for 5% or PHP825 billion in 2020. The regional share went down by 10% compared to the previous year. Table 5.43 shows the region's contribution to achieving the AF sector outputs.

Table 5.43: Western Visayas' Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION VI SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 613)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (Source: Regional Planning Workshop)
1. Commodity system-based value chains established	52%	• Increased efficiency of *muscovado* sugarcane millers and milling facilities • Farm mechanization, e.g., four-wheel drive tractors for sugarcane production • Enforcement of biosecurity measures • Construction of consolidating areas for mango (with sold storage) abaca, and other commodities
2. AFIBCs operationalized	22%	• Fishery law enforcement within corridors • Operational management board in fisheries management areas (FMA) • Techno demo centers on sorghum, cassava and other commodities located in corridors
3. Capacities of LGUs, AF groups and Individuals strengthened	10%	• *Bantay Peste* Brigade Training • GAP training on muscovado sugarcane, cacao and other commodities • Information caravans/festivals/world food day celebrations • Operation of Fisheries and Aquatic Resources Management Council (FARMC) Centers • School-on-air
4. RETD system intensified	10%	• Alternative substrate materials for production of oyster mushroom (*Pleurotus* sp.) • Various models of integrated farming system (rice – vegetables + poultry) in irrigated lowland areas
5. ICT- and AF technology-enabled market support	5%	• Agri-fishery trade fairs and exhibits (mango and other commodities) – domestic and international

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION VI SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 613)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (Source: Regional Planning Workshop)
systems strengthened		• Agri-vet enterprises specializing in ethno-vet medicine and locally-produced supplemental feed formulation • Clustering of community organization for non-cluster interventions
6. Policy environment to accelerate and sustain sector transformation enhanced	1%	• Policy incentives promoted in road shows/Rice Summit/similar events • Establishment of native chicken industry board • Co-management of bay/fishery areas

Region VII: Central Visayas

REGIONAL PLANNING PROFILE				
Total Population				
8,081,988 (PSA, 2020)	49.39% women (PSA, 2015)	656,000 are farmers (PSA, 2018)	130,920 are fisherfolk (BFAR, 2016)	41.6% farmers and 31.2% fisherfolk fall below the poverty threshold (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)		
1130 B or 6% (PSA, 2020)	36 (Moderate)	0.77 M Ha		
Airports	**Combined Seaports**	**Roads** (Total km)		
12 (NPT, 2022)	19 (NPT, 2022)	2,331 (NPT, 2022)		
Priority Commodities in AFMP 2018-2023		**Provinces**		
• HVC (Coconut, mango, highland vegetables) • Fisheries (Seaweeds) • Livestock and poultry (Cattle, native chicken, dairy buffalo) • Rice • Corn and cassava		• Bohol • Cebu • Negros Oriental • Siquijor		

Spatial Analysis of Agri-Fishery Resources, Central Visayas

The total cropland area in Region VII is estimated around 768,323 ha. Of this area, around 43% or about 332, 725 ha is classified as dedicated to annual crops. Significant loss of annual crop area is observed in 2020 and this accounts for about 45% of decrease from the 2015 data. This loss is about 151,103 ha. In terms of annual crop conversion, about 6% or 20,274 ha of annual crop in 2015 has been converted into built-up areas. However, a large portion of the annual crop in 2015 has shifted into a land cover that is covered with trees. About 20% or 67,973 ha of annual crop in 2015 has transitioned into tree cover in 2020. Table 5.44 shows the analysis of changes in Central Visayas' cropland areas from 2015 to 2020.

Table 5.44: Change Analysis of Cropland Areas in Region VII from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	332,724.56	181,621.71	-151,102.86	-45.41	20,273.69	67,973.38
Perennial Crop	435,598.00	-	-	-	-	-

In terms of the potential areas for the different commodity systems, the coconut-based commodity system has a slightly larger area (589,454 ha) than the rice-based or corn-based commodity system (317,881 ha). Meanwhile, the potential areas for the aquaculture and fishery-based commodity system is estimated at around 11,861 ha (Table 5.45).

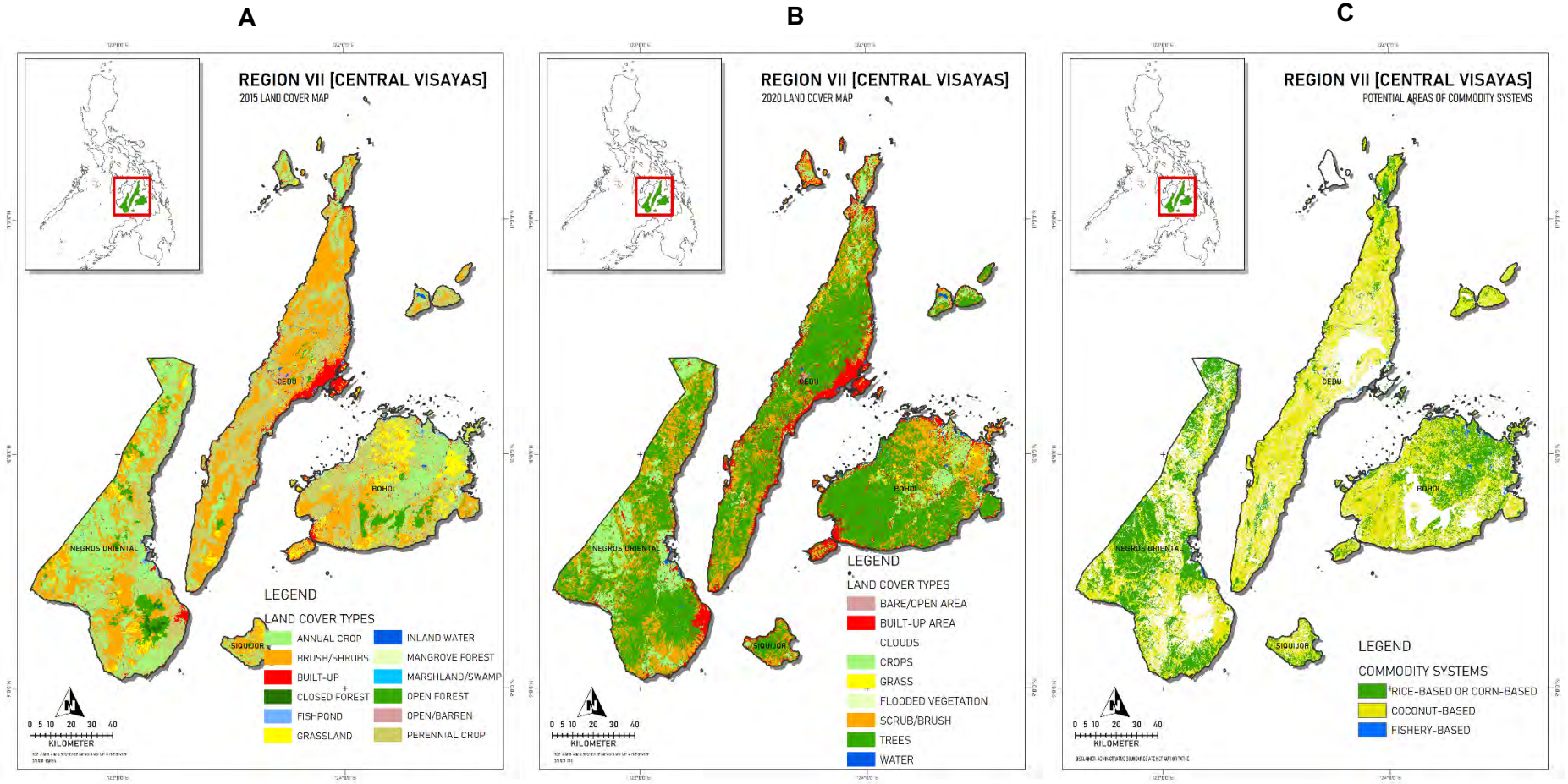
Table 5.45: Potential Areas for the Different Commodity Systems in Region VII

COMMODITY SYSTEM	AREA (Ha)
Coconut-based	589,453.72
Rice-based or Corn-livestock-poultry-based	317,881.18
Aquaculture and Coastal Fishery-based[1]	11,860.66
TOTAL	**919,195.56**

[1] This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Figure 5.9 shows the land cover maps of the region in 2015 and 2020, plus the potential commodity system distribution there.

Figure 5.9: Land Cover Map of Region VII I 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems (C)



Spatial Framework for Sector Transformation in Central Visayas

Central Visayas holds a special place in regional, inter-regional and even national spatial development because of the prominence of Metro Cebu as the country's second largest city—composed of the cities Carcar, Cebu City, Danao, Lapu-Lapu, Mandaue, Naga, and Talisay; and the municipalities of Compostela, Consolacion, Cordova, Liloan, Minglanilla, and San Fernando.

The region has a six-tier settlement network: (1) Metro Cebu as the metropolitan center, (2) Metro Tagbilaran as the regional center, (3) four sub-regional centers, (4) six provincial centers, (5) nine urban service centers/corridors, and (6) three special service centers (NEDA, Central Western Visayas Regional Development Plan 2017-2022).

Metropolitan Tagbilaran as regional center encompasses Tagbilaran City, Cortes, Baclayon, Dauis, and Panglao; while the sub-regional centers are the Bogo City-San Remigio (Cebu) urban corridor, Toledo City-Balamban (Cebu) urban corridor, Tubigon (Bohol), and Dumaguete City (Negros Oriental).

During the NAFMIP implementation period, substantial headway in terms of agri-industrialization, modernization, and more inclusive sector growth is anticipated. Reaching this desired state will require focusing large-scale private investments (PHP100 million and above) in growth centers identified in the NEDA regional plan. The expected types of investments are shown in Table 5.46. The NAFMIP ISPF will complement the NEDA spatial strategy by providing edaphic, agri-climatic, and sustainable land and water management (carrying capacity) criteria to guide decision-making.

Table 5.46: Central Visayas' Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agri-climatic suitability and carrying capacity • Reduced food miles	Negros Oriental Cebu Bohol	• Research, extension, and training for development on existing options and potentials to sustainably raise year-round incomes of smallholder farmers and fisherfolk through: ○ Commodity systems diversification and farming systems approach ○ Product diversification, i.e., venturing into post-production, profitable segments of value chains of target commodities • Upscaling of support infrastructure to match target magnitude of commodity systems production and product forms – such as upgrading of Farm-to-Market Roads including bridges – all connected to an integrated transport system
2. Integrated storage and		• Upscaling of network of modern storage and processing facilities strategically located in the growth centers identified in the RDP

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
processing centers Basis for spatial role Physical connectivity to production areas		spatial strategy and complemented by the NAFMIP integrated spatial planning framework – such as Cold storage/ cryogenics, modern slaughter houses, controlled environment facilities
3. Machinery, equipment and tools supply and service centers Basis for spatial role Accessibility to production areas		• Comprehensive technology, marketing, organizational, financing, procurement, and maintenance program to shift to larger, modern, more efficient, and cost-effective machinery, equipment and tools appropriate to the envisioned scale of well diversified commodity/farming systems: ○ Production – large tractors; harvesters; articulated farm vehicles; customized drones for monitoring, spraying, etc.; fishing vessels and equipment; Artisanal fishing boats ○ Postharvest – such as: trucks (wing van), trailers, forklifts; tools for hauling, lifting, clamping, handling
4. Recycling/waste management zones Basis for spatial role Proximity to production areas		• Establishment or upgrading of large-scale recycling and waste management facilities such as bio-digesters; waste-to-energy conversion • Updating and dissemination of applied research on regional food systems circularity potentials that can be managed at the regional or sub-regional levels • Household level training on circular food and non-food systems • Credit facilitation for capacitated cooperatives to acquire equipment for profitable recycling and waste management activities
5. Food and Market hubs Basis for spatial role Centrality vis-a-vis buyer/consumer settlements	Canlaon City, Negros Oriental Dalaguete, Cebu Mandaue City Lapu-Lapu City Toledo City	• Establishment in the Central Visayas sub-regional centers and/or provincial centers of modern, large-scale Food Terminal Inc. (FTI)-type facilities under PPP-type business models • Market development toward domestic and international e-marketing of high-value processed agri-fishery products • Further optimization of the comparative locational, infrastructure and logistics advantages of Metro Cebu as gateway to

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
	Sagbayan, Bohol	Luzon, Visayas, Mindanao, and international trade
6. Transshipment centers Basis for spatial role Capacity of transport and logistics facilities	City of Bohol	• Further expansion and modernization or rehabilitation of airports and seaports to efficiently handle larger volumes of cargo at a rapid pace • Continuing improvement of inter-island and international sea transport (infrastructure, services and management) • Enhancement of systems for quarantine and sanitary and phytosanitary (SPS), biosecurity, food safety and border control covering all forms of smuggling

Breakdown of Central Visayas' Commodity Systems

The Central Visayas agri-fishery sector accounts for close to one-third of total regional employment. However, low production and productivity, coupled with vulnerability to natural disasters, render more than half of the region's farmers and fisherfolk poor. To increase farm income, the NEDA Regional Development Plan 2017-2022 seeks to sustainably boost farm productivity and competitiveness, and to reduce inequality in economic opportunities. The Plan employs a two-pronged approach to inclusivity by increasing smallholder farmer and fisher access to economic opportunities on one hand, while expanding economic opportunities of those who are currently engaged in producing food and non-food agriculture/forestry and fishery-based products on the other (NEDA, Central Visayas Regional Development Plan 2017-2022).

In the region, numerous economic opportunities targeting smallholder farmers and fisherfolk have been identified in all five NAFMIP commodity systems (Table 5.47). Significant increases in total household income are anticipated from the diversified commodity systems approach comprising five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities, both food and non-food.

Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.47. On the other hand, diversifying by engaging in profitable post-production segments of a value chain, for on-farm, off-farm, and non-farm incomes and employment is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Table 5.47: Central Visayas: Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Rice-based	• Bamboo • Carabao • Cattle • Duck • Lowland vegetables • Mushroom • Peanut • Upland vegetables	• Large-scale mango and other fruit processing facilities • Cloud kitchen, "Filipino diet products" delivery service and tie-ups between farmers and fisher coops and restaurants • Manufacture of nature-based packaging materials (*bayong*, etc. to replace plastic bags) using locally abundant raw materials • Tie-up between natural fiber bags producers and supermarkets/ commercial centers • Farmer- and fisher-linked value-adding centers located in Cebu and various other cities and peri-urban areas, specializing on: • Processing • Marketing/trading • Waste recycling • Farm machinery, equipment and tools fabrication/manufacturing (e.g., four-wheel drive tractors for sugarcane production, waste-to-energy setup harvesters, compost bins, water pumps, and small electric engines) • Local shops specializing in regular maintenance and repair of machinery, equipment, and tools • Direct online selling by farmers' groups of food system products, inputs, and services (e.g., Filipino diet app) • Production of baskets and packaging materials that are environment-friendly and/ or will prolong shelf life • Vermicompost/production of vermicast, biofertilizer
Corn and livestock-based	• Cassava • Cattle • Chicken • Dairy • Dragonfruit • Durian • Ginger • Goat • Jackfruit • Lanzones • Lowland vegetables • Mango • Mungbean • Peanut • Rambutan • Sheep • Sorghum • Soybean • Sweet Potato • Swine • Upland vegetables • Yam	
Coconut-based	• Banana • Cacao • Cattle • Chicken • Coconut • Coffee • Dairy • Goat • Saba Banana • Swine • Palm	
Fisheries-based • *Bangus* • Others aquaculture commodities • Seaweeds • Shellfish	• Livestock (carabao, cattle, goat, swine) • Mungbean • Vegetables	

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
• Shrimp • *Tilapia*		• Processing, packing, marketing, recycling • Feed milling, milk processing, slaughtering, freezing • Waste recycling by cooperatives (e.g., rice hull, rice straw to energy; duck manure as fertilizer) • Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season • Fisher enterprises market outlets in urban centers • Fish cage design, construction and supplies (bamboo poles, abaca ropes, nets) services
Geographically specialized	• Banana • Cattle • Cacao • Chicken • Coffee • Dairy • Dragonfruit • Durian • Garlic • Ginger • Jackfruit • Lanzones • Lowland vegetable • Mango • Mungbean • Mushroom • Papaya • Rambutan • Rice • Seaweeds • Sorghum • Sugar/sugarcane • Sweet potato • Swine • *Tilapia* • Upland vegetables	

Central Visayas' Contribution to Sector Outputs

Region VII accounted for 4.7% of the country's Gross Value Added in agriculture, forestry, and fishing in 2020. This share reflects a 4.2% increase compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region VII accounted for 6% or PHP1,130 billion in 2020. The regional share went down by 10% compared to the previous year.

Table 5.48 shows that the Central Visayas Region plans to focus most investments and interventions to achieve Sector Output No. 1, commodity system-based value chains established. This means introducing, developing, and large-scale replication of diversified farm + fishery systems spanning the entire value chain—from input supply to production, storage, processing raw materials into higher value product forms, marketing, consumption, and waste management including recycling.

Table 5.48: Central Visayas' Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION VII SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 938)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. Commodity system-based value chains established	87%	• Specialized farm systems diversification training on peanut, ginger, banana, seaweed, highland vegetable, and other commodities • Processing hub for coconut coir and allied products • Upscaling of processing facilities for virgin coconut oil and other food and non-food products • Establishment and expansion of trading posts • Integrated coconut hub, wet process • Meat processing plant for native animals such as swine and poultry
2. AFIBCs operationalized	---	• Production and marketing facility located in industrialization corridors, specializing in coconut-based novelty items and handicraft
3. Capacities of LGUs, agri-fishery groups, and individuals strengthened	6%	• Enhanced capacities on entrepreneurship, value-adding, and enterprise management • Participation in domestic and international Investment and technology fora • Participation in national and international organic agriculture congress
4. ICT- and AF technology-enabled market support systems strengthened	4%	• Trade fairs on coconut-based products • Expansion of livestock auction market
5. Policy environment to accelerate and sustain sector transformation enhanced	2%	• Stronger Fishery Law enforcement • Impact assessment on rice mechanization (farmer-managed)
6. RETD system intensified	1%	• Mass media airing of audio/video documentation on success stories,

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION VII SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 938)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
		farming systems technologies, and research breakthrough • Community-based participatory action research (CPAR)

Region VIII: Eastern Visayas

REGIONAL PLANNING PROFILE				
Total Population				
4,547,150 (PSA, 2020)	48.53% women (PSA, 2015)	626,000 are farmers (PSA, 2018)	173,710 are fisherfolk (BFAR, 2017)	46.4% farmers and 40.0% fisherfolk fall below the poverty threshold (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)		
433 B or 2% (PSA, 2020)	33 (Moderate)	1.10 M Ha		
Airports	**Combined Seaports**	**Roads** (Total km)		
16 (NPT, 2022)	14 (NPT, 2022)	2,560 (NPT, 2022)		
Priority Commodities in AFMP 2018-2023		Provinces		
• Rice • Corn and cassava • HVC (Abaca, banana-saba, cacao, coconut, coffee, ginger, jackfruit, pineapple, pili, assorted vegetables) • Fisheries (Seaweeds, milkfish, *tilapia*) • Livestock (Goat, carabao, swine)		• Biliran • Eastern Samar • Leyte • Northern Samar • Samar • Southern Leyte		

Spatial Analysis of Agri-Fishery Resources, Eastern Visayas

Region VIII has an estimated total cropland of about 1.10M ha in 2015 where 82% is classified as dedicated to perennial crops. The annual crop is accounted only to about 204,357 ha. In 2020, this annual crop area further decreased to 133,808 ha or about 35% decline from 2015 to 2020. Only around 8,426 ha of annual crop in 2015 was converted into built-up areas. On the other hand, significant or about 29% or 59,148 ha of annual crop transitioned to good tree

cover from 2015 to 2020. Table 5.49 shows the analysis of changes in Eastern Visayas' cropland areas from 2015 to 2020.

Table 5.49: Change Analysis of Cropland Areas in Region VIII from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) [2015-2020]	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	204,357.04	133,807.98	-70,549.06	-34.52	8,426.14	59,147.62
Perennial Crop	900,283.08	-	-	-	-	-

Meanwhile, in terms of the potential areas for the different commodity systems, a large portion of the region has potential for coconut-based commodity system (834,039 ha). As for the rice-based or corn-based commodity system, an estimated area of 208,069 ha is generated. Lastly, the aquaculture and fishery-based commodity system is estimated at 19,151 ha (Table 5.50).

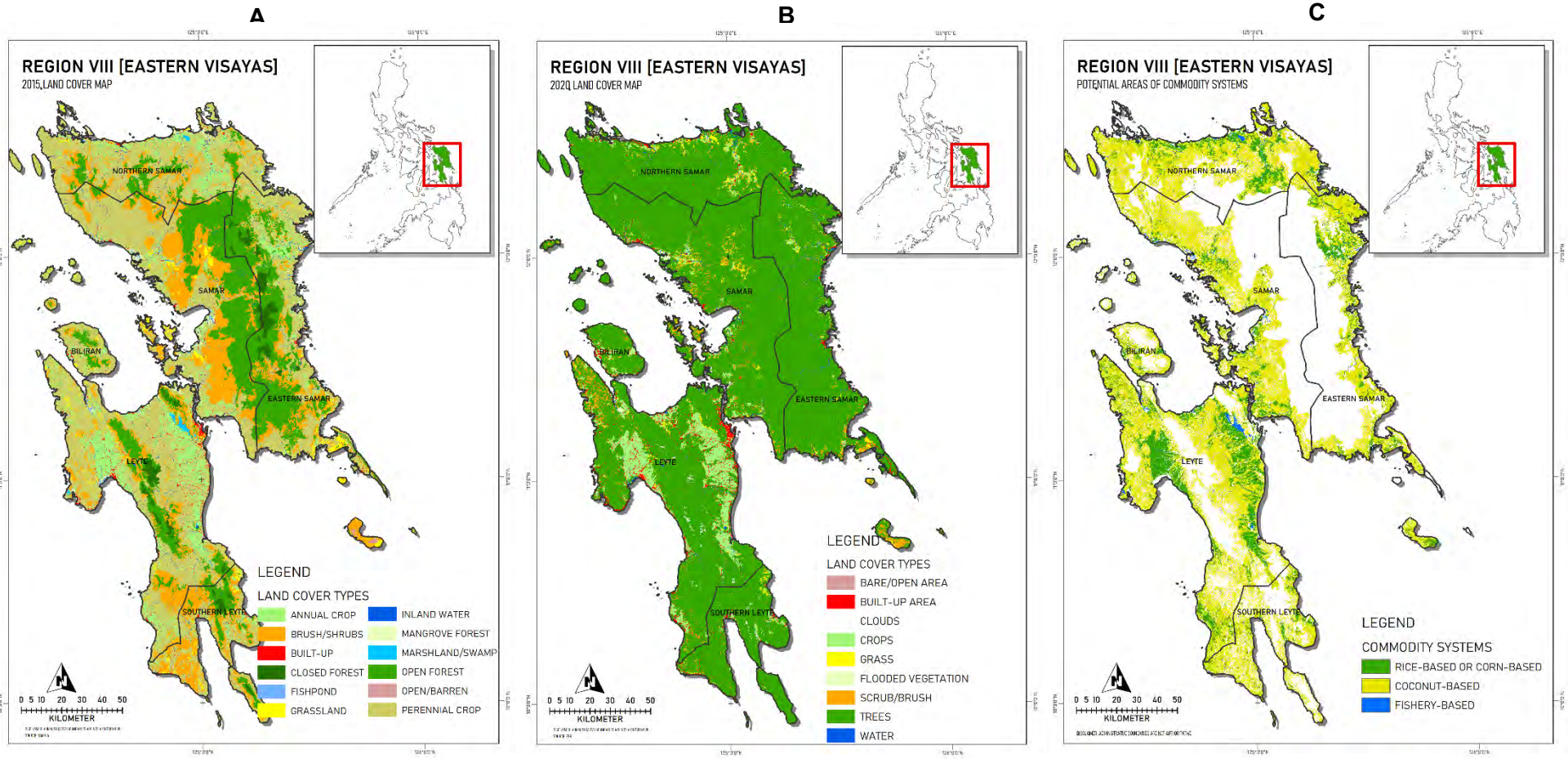
Table 5.50: Potential Areas for the Different Commodity Systems in Region VIII

COMMODITY SYSTEM	AREA (Ha)
Coconut-based	834,038.72
Rice-based or Corn-Livestock-Poultry-based	208,069.43
Aquaculture and Coastal Fishery-based[1]	19,151.39
TOTAL	**1,061,259.54**

[1] This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Figure 5.10 shows the land cover maps of the region in 2015 and 2020, plus the potential commodity system distribution there.

Figure 5.10: Land Cover Map of Region VIII in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems (C)



Spatial Framework for Sector Transformation in Eastern Visayas

The Eastern Visayas network or hierarchy of settlements for spatial planning is based on: (1) population size; (2) scale and type of activities; (3) economic activities; (4) location; (5) adherence to the principle of concentration (the larger the settlements in terms of population, the greater the concentration); and (6) strategic role (NEDA, Eastern Visayas Regional Development Plan 2017-2022).

The network of settlements (growth centers) in Eastern Visayas is composed of four tiers: (1) two regional centers (Metro Tacloban, composed of Tacloban City, Babatngon, Palo, and Tanauan growth corridor), and Metro Ormoc; (2) two sub-regional centers Calbayog City and Catbalogan City**,** both located in Samar Island; (3) provincial centers; and (4) local centers.

The regional centers serve as market and service centers vis-à-vis provinces, with direct air and sea links to and from Metro Manila, Metro Cebu and other destinations. On the other hand, the sub-regional centers serve smaller provincial and local centers. Provincial centers are large cities or municipalities, serving as market and service centers to a lesser extent compared to sub-regional centers.

NAFMIP will involve diversification and scaling-up toward commercialization of commodity/ farming systems. As a result, substantial headway in terms of agri-industrialization, modernization, and more inclusive sector growth is anticipated. The expected types of investments are shown in Table 5.51. The NAFMIP Integrated Spatial Planning Framework will complement the NEDA spatial strategy by providing edaphic, agri-climatic, and sustainable land and water management (carrying capacity) criteria to guide decision-making.

Table 5.51: Eastern Visayas' Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
Major production areas for commodity systems development and upscaling to commercial levels Basis for spatial role • Agri-climatic suitability and carrying capacity • Shorter food miles	Leyte Samar Northern Samar	• Research, extension, and training for development on existing and potential options to sustainably raise year-round incomes of smallholder farmers and fisherfolk through: ○ Commodity systems diversification and farming systems approach ○ Product diversification, i.e., venturing into post-production, profitable segments of value chains of target commodities • Construction or rehabilitation of access infrastructure supporting one or more commodity systems—to include Farm-to-Market Roads and bridges integrated into a wider area transport system to avoid accessibility gaps
Integrated storage and processing centers		• Establishment or strengthening of the network of modern storage and processing facilities, strategically located in the growth centers identified in the RDP spatial strategy and complemented by the NAFMIP

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
Basis for spatial role Physical connectivity to production areas		integrated spatial planning framework—such as cold storage/cryogenics, modern slaughter houses, controlled environment facilities
Machinery, equipment and tools service centers Basis for spatial role Accessibility to production areas		• Comprehensive technology, marketing, organizational, financing, procurement, and maintenance program to progressively shift from more traditional to larger, modern, more efficient, and cost-effective machinery, equipment and tools: ○ Production—large tractors; harvesters; articulated farm vehicles; customized drones for monitoring, spraying, etc.; fishing vessels and equipment; artisanal fishing boats ○ Postharvest—such as: trucks (wing van), trailers, forklifts; Tools for hauling, lifting, clamping, handling
Recycling facilities/waste management centers Basis for spatial role Proximity to production areas		• Capacity development on waste management and circular food and non-food systems • Credit facilitation for capacitated cooperatives to acquire equipment for profitable recycling and waste management activities • Establishment or upgrading of recycling and waste management facilities such as Bio-digesters; Waste-to-energy conversion
5. Market hubs Basis for spatial role Centrality vis-a-vis buyer/ consumer settlements	Javier, Leyte Tacloban City Borongan City	• Establishment in the Eastern Visayas sub-regional centers and/or provincial centers of modern, large-scale Food Terminal Inc. (FTI)-type facilities under PPP-type modalities • Market development toward domestic and international e-marketing of high-value processed agri-fishery products
6. Transshipment centers Basis for spatial role Capacity of transport and logistics facilities	Catbalogan City Calbayog City Ormoc City	• Further expansion and modernization or rehabilitation of land transport systems (to include roll-on, roll-off), as well as airports and seaports, to efficiently handle larger volumes of more diverse cargo, at a rapid pace • Continuing improvement of inter-island sea transport (infrastructure, services and management)

Breakdown of Eastern Visayas' Commodity Systems

The NEDA Regional Development Plan notes that despite the region's transition to an industry and service-led economy, the agri-fishery sector lags behind and has even contracted. The AF sector's continuing underperformance in Eastern Visayas, linked to economic and social issues such as low labor productivity and high poverty incidence, calls for closer attention. The Plan seeks to boost the sector's production base, while generating sustainable livelihood for more than a third of the labor force in the sector (NEDA, Eastern Visayas Regional Development Plan 2017-2022).

Economic opportunities targeting Eastern Visayas' smallholder farmers and fisherfolk have been identified in three of the five NAFMIP commodity systems: (1) corn/livestock/poultry-based; (2) fisheries-based; and (3) geographically specialized (Table 5.52). Significant increases in total household income are anticipated from the diversified commodity systems approach comprising five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities, both food and non-food.

Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.52. On the other hand, diversifying by engaging in profitable post-production segments of a value chain, in order to tap potential on-farm, off-farm, and non-farm incomes and employment, is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Table 5.52: Eastern Visayas: Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Rice-based	• Bamboo • Corn • Lowland vegetables	• Manufacture of natural fiber packaging materials (*bayong*, etc. (to replace plastic bags) using locally abundant raw materials • Tie-up between natural fiber bags producers and supermarkets/ commercial centers • Farmer- and fisher-linked value-adding centers located in Tacloban and various other cities and peri-urban areas, specializing on: o Processing o Marketing/trading • Farm machinery, equipment and tools fabrication/manufacturing (e.g., four-wheel drive tractors for sugarcane production, waste-to-energy setup harvesters, compost bins, water pumps and small electric engines)
Corn and livestock-based	• Carabao • Cassava • Chicken • Dairy • Lowland **v**egetables • Other **c**rops • Swine	
Coconut-based	• Abaca • Coconut • Other crops • Ruminants	
Fishery-based	• *Bangus* • Other capture species • Others aquaculture commodities • Seaweeds • Shellfish • *Tilapia*	

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
	• Tuna and tuna-like species	• Local shops specializing in regular maintenance and repair of machinery, equipment and tools • Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app) • Production of baskets and packaging materials that are environment-friendly and/ or will prolong shelf life • Feed milling, milk processing, slaughtering, freezing • Vermicompost/production of vermicast, biofertilizer • Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season • Fisher enterprise market outlets in urban centers • Fish cage design, construction, and supply (bamboo poles, abaca ropes, nets) services • Recycling
Geographically specialized	• Abaca • Banana • Corn • Indigenous vegetables • Jackfruit • Lowland vegetables • RiceSugar/sugarcane • Sweet potato • Upland vegetables	

Eastern Visayas' Contribution to Sector Outputs

Region VIII accounted for 3.6% of the country's Gross Value Added in agriculture, forestry, and fishing in 2020. This share reflects a 0.9% increase compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region VIII accounted for 2% or PHP433 billion in 2020. The regional share went down by 8% compared to the previous year.

The Eastern Visayas Region will highlight programs and projects to achieve two major sector outputs: (1) AFIBCs operationalized and (2) commodity system-based value chains established. Regional planners envision that a large part of the investments will be located within designated agri-fishery industrial business corridors, reflecting a strong appreciation for the benefits of agglomeration in priority geographical areas (Table 5.52). The wide range of programs and projects to engage in diversified, value-adding agri-fishery activities can also be seen in Table 5.53.

Table 5.53: Eastern Visayas' Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION VIII SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 105)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. AFIBCs operationalized	39%	• Mechanization: solar-powered equipment/tools in scaled-up provincial production centers and postharvest facilities within designated corridors • Establishment/upgrading/rehabilitation of mariculture parks • Solar-powered fertigation system • Solar-powered irrigation • Fabrication of fiberglass paddle and motorized boats
2. Commodity system-based value chains established	30%	• Assessment on preferred seed variety of farmers • Climate proofing: concreting of road dikes to protect seedstock-producing stations; diversion dams • Use and maintenance of 90 Hp tractors and other farm machinery • Abaca stripping centers • Coconut processing plants
3. ICT- and AF technology-enabled market support systems strengthened	14%	• Hog steel with biosecurity features • Establishment of livestock consolidation facilities under private-public partnership type of arrangement
4. Capacities of LGUs, agri-fishery groups, and individuals strengthened	9%	• Information caravan on NAFMIP in local languages • Engagement of youth in agribusiness • Financial assistance to the existing coconut groups to pursue a commodity system approach • Periodic advisory on credit and financial management
5. Policy environment to accelerate and sustain sector transformation enhanced	5%	• Food safety compliant buying stations for fresh chilled tuna • Policy to increase local consumption and utilization of coconut and other coco-based products
6. RETD system intensified	3%	• Studies on application of commodity systems approach in priority regional commodities

Region IX: Zamboanga Peninsula

REGIONAL PLANNING PROFILE			
Total Population			
3,875,576 (PSA, 2020)	49.01% women (PSA, 2015)	601,000 are farmers[11] (PSA, 2018)	46.2% farmers and 34.2%fisherfolk fall below the poverty threshold (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)	
376 B or 2% (PSA, 2020)	30 (Moderate)	0.78 M Ha	
Airports	**Combined Seaports**	**Roads** (Total km)	
10 (NPT, 2022)	4 (NPT, 2022)	1,652 (NPT, 2022)	
Priority Commodities in AFMP 2018-2023		**Provinces**	
• HVC (Banana, coconut, mango, rubber) • Fisheries (Sardines, seaweeds, milkfish, shrimps, oyster, *tilapia*) • Livestock (Swine) • Rice • Corn and cassava		• Zamboanga City • Zamboanga del Norte • Zamboanga del Sur • Zamboanga Sibugay	

Spatial Analysis of Agri-Fishery Resources, Zamboanga Peninsula

The total cropland area in Region IX in 2015 is estimated around 778,054 ha. Of this total, about 85% is considered dedicated to perennial crops (658,608 ha) while an estimated area of 119,447 ha is classified as dedicated to annual crops. The latter declined by 10% or about 12,178 from 2015 to 2020. From these changes, about 6% or 7,102 ha of the annual crop in 2015 was converted into built-up areas. Meanwhile, about 17% of the annual crop in 2015 changed into tree cover by 2020, accounting for about 20,398 ha. Table 5.54 shows the analysis of changes in Region IX's cropland areas from 2015 to 2020.

[11] No available data on fisher population in Region IX

Table 5.54: Change Analysis of Cropland Areas in Region IX from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	119,446.72	107,268.95	-12,177.77	-10.20	7,101.52	20,397.70
Perennial Crop	658,607.53	-	-	-	-	-

Based on the potential areas for the different commodity systems, majority of the region has high potential for coconut-based commodity system. The estimate is calculated at 703,950 ha for coconut-based systems while only around 171,914 ha for the rice-based or corn-based commodity system. Lastly, the analysis derived a potential area of about 27,977 ha for the aquaculture and fishery-based commodity system (Table 5.55).

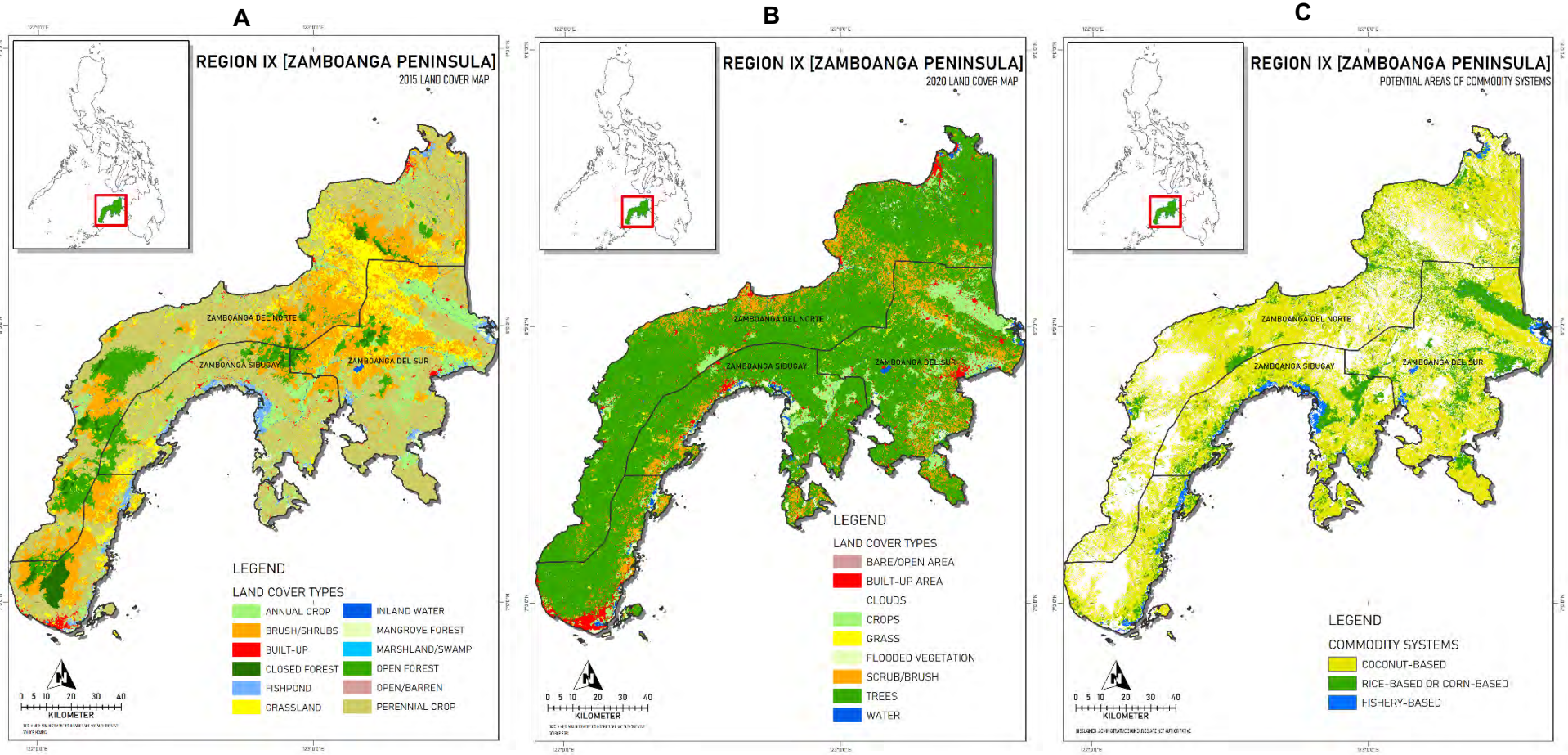
Table 5.55: Potential Areas for the Different Commodity Systems in Region IX

COMMODITY SYSTEM	AREA (Ha)
Coconut-based	703,949.51
Rice-based or Corn-Livestock-Poultry-based	171,913.59
Aquaculture and Coastal Fishery-based[1]	27,977.11
TOTAL	**903,840.20**

[1] This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Figure 5.11 shows the land cover maps of the region in 2015 and 2020, plus the potential commodity system distribution there.

Figure 5.11: Land Cover Map of Region IX in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)



Spatial Framework for Sector Transformation in Zamboanga Peninsula

The Zamboanga Peninsula has a "Concentric Y" spatial strategy anchored to its peninsular topography and areas of economic concentration (NEDA, Zamboanga Peninsula Regional Development Plan 2017-2022). The areas located at the upper portion of the letter "Y" are the twin cities of Dipolog and Dapitan, while on the right side of the "Y" is the regional administrative center of Pagadian City. The midpoint is Ipil, Zamboanga Sibugay as convergence area, and the bottom of the "Y" is Zamboanga City.

The network of settlements thus comprises three levels: (1) regional center (Pagadian City); (2) sub-regional centers—initially, the cities of Dipolog, Dapitan, Pagadian and Isabela; and (3) provincial centers. The number of centers per level is anticipated to increase over time, along with the expansion of manufacturing and industrial activities. To ensure sustainable growth, resilience, and competitiveness, the region is developing Green Growth Centers to promote ecological integrity through effective natural resource management.

During the NAFMIP implementation period, crops, livestock and poultry, and fisheries will be combined in spatially-focused commodity systems or farming approach. These initiatives to diversify and scale up agri-fishery livelihood will be linked to larger scale investments toward agri-fishery industrialization. The expected types of investments are shown in Table 5.56. The types, scale, and location of projects are vital considerations. The NAFMIP ISPF will complement the NEDA spatial strategy by providing edaphic, agri-climatic, and sustainable land and water management (carrying capacity) criteria to guide decision-making.

Table 5.56: Zamboanga Peninsula's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONSBASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale <u>Basis for spatial role</u> • Agri-climatic suitability and carrying capacity • Reduced food miles	Zamboanga del Norte Zamboanga del Sur Zamboanga Sibugay	• Further upscaling of canned fishery product exports • RETD re-oriented toward combined commodity systems approach and integrated spatial planning • Coastal- and farm-to-market roads construction or rehabilitation, integrated in location planning for diversified commodity system-based farms and fish farms • Expansion or upgrading of production support facilities catering to one or more commodities, such as: ○ Seed banks/greenhouse/nursery ○ Fertilizer and pesticides
2. Integrated storage and processing centers		• Guided by the RDP spatial strategy, complemented by the NAFMIP integrated spatial planning framework, establishment or upgrading of the network of large and modern storage and processing facilities, such as:

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONSBASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
<u>Basis for spatial role</u> Physical connectivity to production areas		○ Cold storage/cryogenics ○ Modern slaughter houses ○ Controlled environment facilities
3. Machinery, equipment and tools supply and service centers <u>Basis for spatial role</u> Accessibility to production areas		• One-stop shop for private suppliers, farmers/fisherfolk and financing sources to convene for business purposes • Agglomeration of private suppliers of larger, modern, more efficient, and cost-effective machinery, equipment and tools: ○ Production – such as large tractors; harvesters; fishing equipment; artisanal fishing boats ○ Postharvest – such as trucks, trailers, forklifts; Tools for hauling, lifting, clamping, handling
4. Recycling/waste management zones <u>Basis for spatial role</u> Proximity to production areas		• Capacity development on agri-fishery waste management and circular food and non-food systems • Enterprise development: capacitated cooperatives to engage in profitable recycling activities • Establishment or upgrading of recycling and waste management facilities such as bio-digesters; waste-to-energy conversion
5. Food and market hubs <u>Basis for spatial role</u> Centrality vis-a-vis buyer/ consumer settlements	Zamboanga City Pagadian City Dapitan City Dipolog City	• Establishment in the Eastern Visayas sub-regional centers and/or provincial centers of modern, large-scale Food Terminal Inc. (FTI)-type facilities under PPP-type modalities • Market development toward domestic and international e-marketing of high-value processed agri-fishery products
6. Transshipment centers <u>Basis for spatial role</u> Capacity of transport and logistics facilities		• Aggressive improvements in inter-island sea transport (infrastructure, services and management) • Further expansion and modernization or rehabilitation of land transport systems (to include roll-on, roll-off), linked to aggressive improvements in inter-island commercial transport

Breakdown of Zamboanga Peninsula's Commodity Systems

The NEDA Regional Development Plan 2017-2022 recognizes the need for government to more proactively enhance the enabling environment for the private sector to invest more in the region. It advocates for concerted action of the public and private sectors to reach the region's vision of making the Zamboanga Peninsula as the center of sustainable agri-fishery industries in the country. As similarly underscored in NAFMIP, sector transformation will require no less than concerted action by stakeholders, based on a shared vision. The challenges highlighted in the RDP include the lack of postharvest facilities; infrastructure support such as power, farm-to-market roads, irrigation canals and facilities; and vulnerability to natural calamities including typhoons and pest infestations.

A number of income and employment opportunities targeting smallholder farmers and fisherfolk had been identified in all five NAFMIP commodity systems (Table 5.57). Significant increases in total household income are anticipated from the diversified commodity systems comprising five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities, both food and non-food.

Diversifying by combining crops, livestock, poultry and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.57. On the other hand, diversifying by engaging in profitable post-production segments of a value chain, in order to tap potential on-farm, off-farm, and non-farm incomes and employment, is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Table 5.57: Zamboanga Peninsula: Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)

Rice-based	• Bamboo
	• Corn
	• Lowland vegetables
	• Mungbean
	• Sweet potato
	• Upland vegetables
		• Large-scale processing of coconut into many possible high value products such as virgin coconut oil, coco coir, insulation, etc.
		• Manufacture of biodegradable packaging materials (*bayong*, etc. to replace plastic bags) using locally abundant raw materials
		• Tie-up between natural fiber bags producers and supermarkets/ commercial centers
		• Farmer- and fisher-linked value-adding centers located in Zamboanga, Pagadian, and various other cities and peri-urban areas, specializing on:
		  ○ Processing
		  ○ Marketing/trading
		  ○ Recycling

Corn and livestock-based	• Corn • Swine	
Coconut-based	• Abaca • Coconut • Indigenous fruit • Indigenous Vegetables	
Fisheries-based	• Abaca • Others aquaculture commodities • Seaweeds	

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Geographically specialized	• Banana • Lowland vegetables • Rubber	• Farm machinery, equipment, and tools fabrication/manufacturing (e.g., waste-to-energy setup harvesters, compost bins, water pumps, and small electric engines) • Local shops specializing in regular maintenance and repair of machinery, equipment, and tools • Direct online selling by farmers' groups of food system products, inputs, and services (e.g., Filipino diet app) • Production of baskets and packaging materials that will prolong shelf life • Feed milling, milk processing, slaughtering, freezing • Vermicompost/production of vermicast, biofertilizer • Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season • Fisher enterprise market outlets in urban centers • Fish cage design, construction, and supply (bamboo poles, abaca ropes, nets) services

Zamboanga Peninsula's Contribution to Sector Outputs

Region IX or Zamboanga Peninsula accounted for 4.1% of the country's gross value added in agriculture, forestry, and fishing in 2020. This share reflects a 1.0% decline compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region IX accounted for 2% or PHP376 billion in 2020. The regional share went down by 5% compared to the previous year.

Zamboanga Peninsula will pursue sector transformation by establishing commodity system-based value chains, in lieu of single commodity programs (Sector-wide major Output No. 1 in Table 5.58). The major strategies are to diversify sources of income and employment, while providing the necessary market support, policy incentives, research and development, and capacity development.

Table 5.58: Zamboanga Peninsula's Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION IX SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 39)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. Commodity system-based value chains established	73%	• Processing facilities for major commodities • Modified intensive *tilapia* hatcheries • Fisherfolk capacitated to venture into value-adding and processing • Information caravans on emerging agri-fishery income and employment opportunities resulting from diversification
2. ICT- and AF technology-enabled market support systems strengthened	13%	• Smallholder farmers/fisherfolk linked with processing facilities to accommodate surplus produce, for subsequent processing
3. Policy environment to accelerate and sustain sector transformation enhanced	5%	• Province-level forums on potential PPP financing of storage, processing, and other facilities • Enhancement of incentives available to local investors
4. Capacities of LGUs, agri-fishery groups, and individuals strengthened	3%	• Producers and entrepreneurs' capacities strengthened on the use and maintenance of large farm machinery and equipment
5. AFIBCs operationalized	3%	• Location of production and processing facilities inside corridors • Improvement of FMRs linking farmers and fisherfolk to designated business corridors
6. RETD system intensified	3%	• Establishment of rubber testing and other laboratories in strategic areas, i.e., near production areas and processing plants

Region X: Northern Mindanao

REGIONAL PLANNING PROFILE			
Total Population			
5,022,768 (PSA, 2020)	48.90% women (PSA, 2015)	748,000 are farmers[12] (PSA, 2018)	54% farmers fall below the poverty threshold[13] (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)	
823 B or 5% (PSA, 2020)	32 (Moderate)	0.92 M Ha	
Airports	**Combined Seaports**	**Roads** (Total km)	
4 (NPT, 2022)	9 (NPT, 2022)	1,978 (NPT, 2022)	
Priority Commodities in AFMP 2018-2023		**Provinces**	
• HVC (Abaca, banana, calamansi, cacao, coconut, coffee, lanzones, peanut, vegetables, white potato) • Fisheries (Seaweeds, milkfish, *tilapia*, shrimp) • Livestock and poultry (Swine, cattle, chicken) • Rice • Corn and Cassava		• Bukidnon • Camiguin • Lanao del Norte • Misamis Occidental • Misamis Oriental	

Spatial Analysis of Agri-Fishery Resources, Northern Mindanao

The total cropland area in Region X is estimated around 919,692 ha where 53% of these areas are classified as dedicated to annual crops (490,474 ha). However, the total annual crop area in 2020 decreased by 6% or a loss of about 14,098 ha by 2020. Also, 16,043 ha or 3% of the total annual crop in 2015 was converted to built-up areas by 2020. On the other hand, around 79,076 ha of annual crop in 2015 was converted into tree cover in 2020 and this constitutes about 16% of the annual crop in 2015. Table 5.59 shows the analysis of changes in Region X's cropland areas from 2015 to 2020.

[12]No available data on fisher population in Region X

[13]Per PSA, the poverty incidence estimate for fisherfolk in Regions X was excluded due to very low level of precision (with CV > 50 percent) and small sample size.

Table 5.59: Change Analysis of Cropland Areas in Region X from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	490,474.18	389,139.75	-14,098.33	-5.62	16,043.37	79,067.58
Perennial Crop	429,127.46	-	-	-	-	-

Meanwhile, the potential areas for the different commodity systems revealed that around 496,815 ha can be attributed to the coconut-based commodity system in the region. As for the rice-based or corn-based commodity system, around 455,909 ha is estimated. Lastly, about 16,995 ha is found to be potential for the aquaculture and fishery-based commodity system (Table 5:60).

Table 5.60: Potential Areas for the Different Commodity Systems in Region X

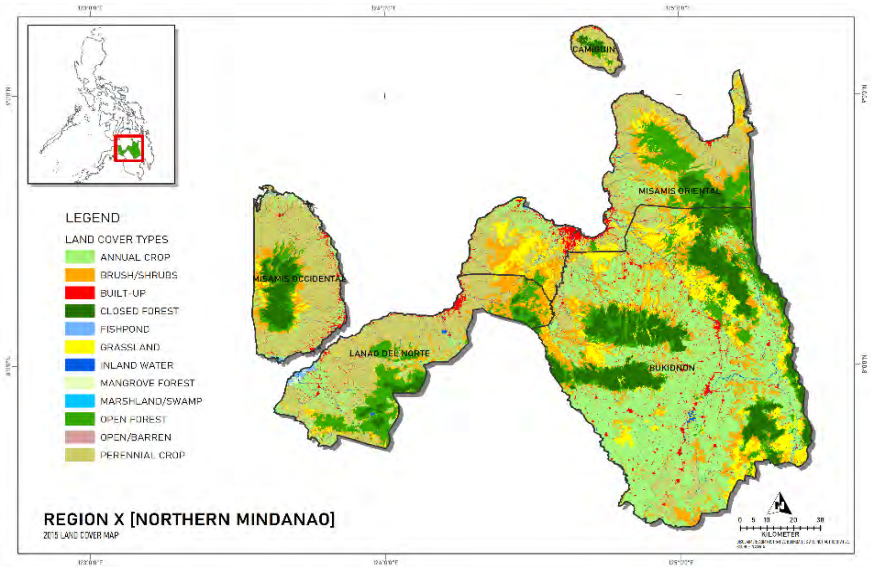
COMMODITY SYSTEM	AREA (HA)
Coconut-based	496,814.51
Rice-based or Corn-Livestock-Poultry-based	455,908.77
Aquaculture and Coastal Fishery-based[1]	16,994.50
TOTAL	**969,717.78**

[1]This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

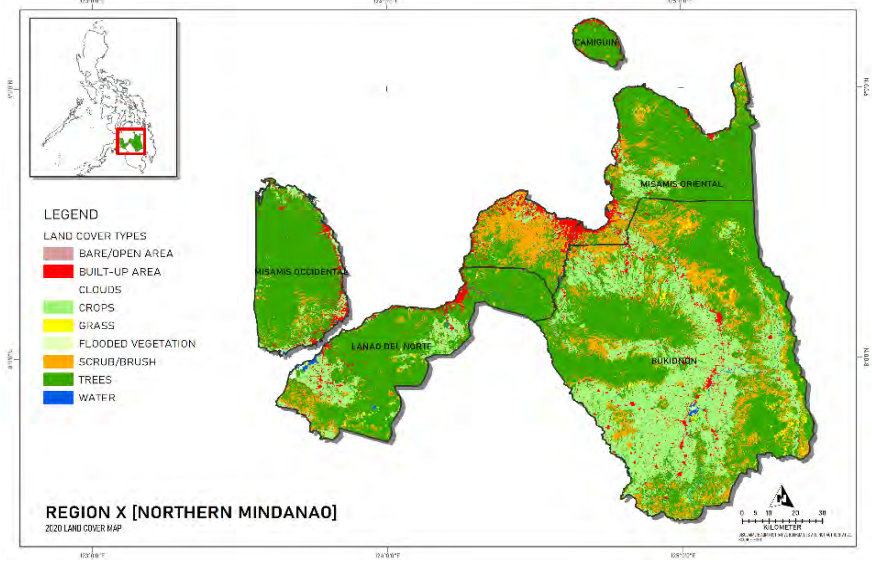
Figure 5.12 shows the land cover of Region X in 2015 and 2020 and the potential distribution of commodity systems in the region.

Figure 5.12: Land Cover Map of Region X in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)

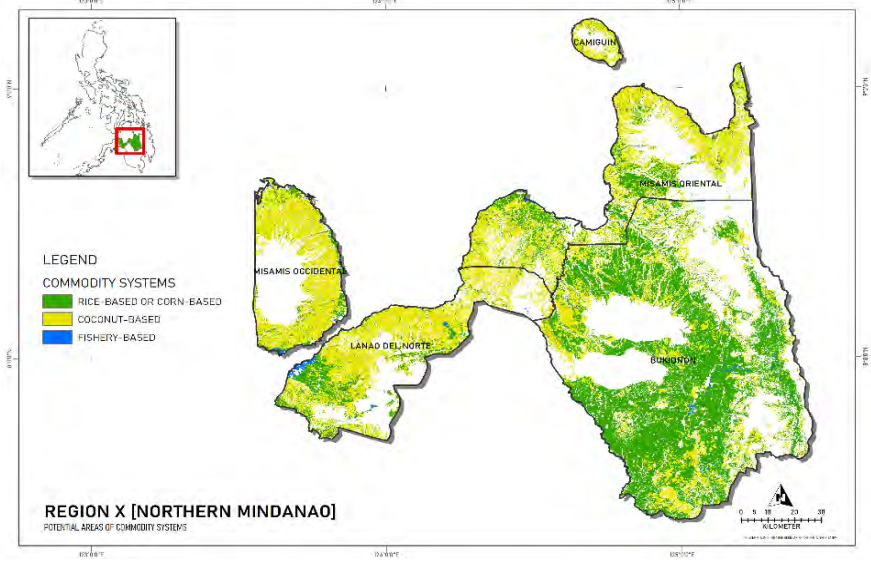
A



B



C



Spatial Framework for Sector Transformation in Northern Mindanao

The Northern Mindanao Region has four strategic development areas (SDA), namely: (1) Cagayan-Iligan Industrial and Trade Corridor; (2) Agri-fishery and Eco-Cultural Tourism in Lanao del Norte and Misamis Occidental; (3) Agribusiness in Bukidnon; 4) Gingoog-Camiguin Tourism Adventure Loop (NEDA, Northern Mindanao Regional Development Plan 2017-2022). The hierarchy of settlements includes seven levels: secondary metropolitan center (Metro Cagayan de Oro); sub-regional centers (cities of Iligan, Ozamis, and Valencia); large cities (cities of Malaybalay and Gingoog); 11 small-to-medium cities; emerging centers (26 municipalities); urbanizing centers (28 Municipalities); and small-to-medium towns (22 municipalities).

Consistent with the identified strategic development areas particularly SDAs 2 and 3, NAFMIP will promote agri-industrialization and sector modernization by promoting a spatially-focused commodity systems approach. Farm and fish farm-level projects will be linked to larger scale investments by investors who will be incentivized through a combination of legislative and executive measures. The expected types of investments are shown in Table 5.61. The NAFMIP ISPF will complement the NEDA spatial strategy by providing more specific edaphic, agri-climatic, and sustainable land and water management (carrying capacity) criteria to guide decision-making.

Table 5.61: Northern Mindanao's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agri-climatic suitability and carrying capacity • Reduced food miles	Bukidnon Misamis Oriental Lanao del Norte	• Geographically specialized commodity systems (GSCS) – progressively larger scale production and domestic and export marketing of coffee, canned fruit juice, ornamentals, and other high-value products • RETD re-oriented toward adopting a commodity systems approach combined with integrated spatial planning and sustainable land and water resources management
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas		• Guided by the RDP spatial strategy, complemented by the NAFMIP integrated spatial planning framework, establishment or upgrading of the network of large and modern storage and processing facilities, such as: o Cold storage/cryogenics o Modern slaughterhouses o Controlled environment facilities
3. Machinery, equipment and tools supply and service centers		• Agglomeration of private suppliers of larger, modern, more efficient, and cost-effective machinery, equipment and tools:

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
<u>Basis for spatial role</u> Accessibility to production areas		○ Production – such as large Tractors; harvesters; fishing equipment; artisanal fishing boats ○ Postharvest – such as trucks, trailers, forklifts; tools for hauling, lifting, clamping, handling • One-stop shop for private suppliers, farmers/fisherfolk and financing sources to convene for business purposes
4. Recycling/waste management zones <u>Basis for spatial role</u> Proximity to production areas		• Capacity development on agri-fishery waste management and circular food and non-food systems • Enterprise development: capacitated cooperatives to engage in profitable recycling activities • Establishment or upgrading of recycling and waste management facilities such as bio-digesters; waste-to-energy conversion
5. Food and market hubs <u>Basis for spatial role</u> Centrality vis-a-vis buyer/ consumer settlements	Cagayan de Oro City Malaybalay, Bukidnon Valencia City Iligan City Ozamis City Tangub City	• Establishment in the Northern Mindanao sub-regional centers and large cities of modern, large-scale Food Terminal Inc. (FTI)-type facilities under PPP-type modalities • Market development toward domestic and international e-marketing of high-value agri-fishery products
6. Transshipment centers <u>Basis for spatial role</u> Capacity of transport and logistics facilities		• Aggressive improvements in inter-island sea transport (infrastructure, services and management) • Further expansion and modernization or rehabilitation of land transport systems (to include roll-on, roll-off), linked to aggressive improvements in inter-island commercial transport

Breakdown of Northern Mindanao's Commodity Systems

The agri-fishery sector is the source of livelihood for more than one-third of the region's labor force, especially among poor farmers and fisherfolk in rural areas. The sector also supplies raw materials to the manufacturing and service sectors to expand their respective agri-processing business ventures. Interventions are directed toward increasing opportunities to stimulate the participation of smallholder farmers and fisherfolk. Constraints include low adoption of technologies on sustainable farming practices, lack of farm mechanization, and

inadequate infrastructure and logistics support (NEDA, Northern Mindanao Regional Development Plan 2017-2022).

Numerous income and employment opportunities targeting smallholder farmers and fisherfolk had been identified in all five NAFMIP commodity systems (Table 5.62). Significant increases in total household income are anticipated from the diversified commodity systems comprising five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities, both food and non-food.

Diversifying by combining crops, livestock, poultry, and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.62. On the other hand, diversifying by engaging in profitable post-production segments of a value chain, in order to tap potential on-farm, off-farm and non-farm incomes and employment, is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Table 5.62: Northern Mindanao: Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Rice-based	• Bamboo • Cattle • Corn • Duck • Jackfruit • Lanzones • Lowland vegetables • Mango • Mungbean • Other crops • Other miscellaneous fruits • Upland vegetables	• Niche marketing (domestic and export) of special highland rice, coffee, and ornamental varieties • Large-scale processing of coconut into many possible high value products such as virgin coconut oil, coco coir, insulation, etc. • Large-scale jackfruit and other fruit processing facilities • Cloud kitchen, "Filipino diet products" delivery service and tie-ups between farmer and fisher coops and restaurants • Commercial scale production of cakes and noodles from rice (*suman, bibingka, etc.*) • Manufacture of biodegradable packaging materials (like *bayong*. to replace plastic bags) using locally abundant raw materials • Tie-up between natural fiber bags producers and supermarkets/ commercial centers • Farmer- and fisher-linked value-adding centers located in Cagayan de Oro, Iligan, Oroquieta, Malabalay, and
Corn and livestock-based	• Carabao • Cassava • Cattle • Chicken • Corn • Dairy • Ginger • Goat • Lowland vegetables • Other non-food commodities • Other poultry animals • Other ruminants • Palm • Sorghum • Upland vegetables	
Coconut-based	• Abaca • Banana	

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
	• Cacao • Cattle • Coconut • Coffee • Corn • Dairy • Durian • Jackfruit • Lanzones • Lowland vegetables • Mangosteen • Other crops • Other miscellaneous Fruits • Rambutan	various other cities and peri-urban areas, specializing on: ○ Processing ○ Marketing/trading ○ Recycling • Farm machinery, equipment and tools fabrication/manufacturing (e.g., four-wheel drive tractors for sugarcane production, waste-to-energy setup harvesters, compost bins, water pumps and small electric engines) • Local shops specializing in regular maintenance and repair of machinery, equipment and tools • Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app) • Production of baskets and packaging materials that are environment-friendly and/ or will prolong shelf life • Vermicompost/production of vermicast, biofertilizer • Feed milling, milk processing, slaughtering, freezing • Waste recycling by cooperatives (e.g., rice hull, rice straw to energy; duck manure as fertilizer) • Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season • Fisher enterprise market outlets in urban centers • Fish cage design, construction and supply (bamboo poles, abaca ropes, nets) services
Fisheries-based	• *Bangus* • Other capture species • Others aquaculture commodities • Seaweeds • *Tilapia*	
Geographically specialized	• Banana • Cacao • Coffee • Cassava • Coconut • Coffee • Corn • Durian • Indigenous vegetables • Lowland vegetables • Mango • Mungbean • Pineapple • Rice • Rubber • Shrimp • Sorghum • Sugar/sugarcane • Sweet potato • Upland vegetables	

Northern Mindanao's Contribution to Sector Outputs

Region X accounted for 10.0% of the country's Gross Value Added in agriculture, forestry, and fishing in 2020. This share reflects a 1.5% increase compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region X accounted for 5% or PHP823 billion in 2020. The regional share went down by 5% compared to the previous year.

In Northern Mindanao, majority of programs and projects will contribute to two Sector-wide major Outputs: (1) commodity system-based value chains established and (2) capacities of

LGUs, agri-fishery groups, and individuals strengthened (Table 5.63). Regional planners also envision pursuing economic opportunities in geographically specialized commodity systems (GSCS), such as projects to diversify and expand production, packaging, handling and transport to final markets of perishable but high-value highland vegetables, flowers, and ornamentals.

Table 5.63: Northern Mindanao Region Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	**DISTRIBUTION OF REGION X SUB-OUTPUTS BY SECTOR OUTPUT** (% of Sub-outputs, N = 565)	**ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS** (From Regional Planning Workshop)
1. Commodity system-based value chains established	60%	• *Bantay presyo* quarterly meeting • Success stories about coconut farmers' venture in dairy cattle livelihood (Coconut-based Farming System Program) • Processing facilities producing *salabat* and other products • Feed mills operational
2. Capacities of LGUs, agri-fishery groups, and individuals strengthened	15%	• Credit programs for high value segments of value chain • Enterprises capacitated to comply with GMP/HACCP and sustainable practices • Stakeholder consultations on NAFMIP • Deputized fish warden (DFW) training • Diversification and entrepreneurial skills program for fisherfolk
3. RETD system intensified	11%	• Development of wide range of agri-fishery products and product-mixes • Rice-based products value-addition • Conduct of irrigation studies for rice-based farm diversification
4. AFIBCs operationalized	5%	• Credit window for agri-industrialization projects • Large investors linked to smallholder farmers and fisherfolk engaged in commodity system-based value chains • Agri-industrialization loan program • Dairy goat processing facilities set up within designated business corridors
5. ICT- and AF technology-enabled market	5%	• Innovations in packaging and promotion of smallholder farmers and fisherfolk produce and derivative produces

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION X SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 565)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
support systems strengthened		• Transport improved through deployment of hauling trucks and other support
6. Policy environment to accelerate and sustain sector transformation enhanced	4%	• Policy covering capacity building, consultation, data/sharing across government agencies • Public policy advocacy supporting transformative agenda such as commodity systems approach, gender equity, and mobilization of the youth sector

Region XI: Davao Region

REGIONAL PLANNING PROFILE				
Total Population				
5,243,536 (PSA, 2020)	48.62% women (PSA, 2015)	633,000 are farmers (PSA, 2018)	55,020 are fisherfolk (BFAR, 2017)	29.3% farmers and 43.8% fisherfolk fall below the poverty threshold (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)		
832 B or 5% (PSA, 2020)	40 (High)	0.81 M Ha		
Airports	**Combined Seaports**	**Rail Lines**	**Roads** (Total km)	
36 (NPT, 2022)	3 (NPT, 2022)	1 (NPT, 2022)	1,704 (NPT, 2022)	
Priority Commodities in AFMP 2018-2023		**Provinces**		
• HVC (Abaca, banana, cacao, coconut, coffee, durian, mango, mangosteen, rubber, vegetables, pomelo) • Fisheries (Milkfish, eel, catfish, ornamental fish, oyster, seaweeds, shellfish, shrimp, *tilapia*, tuna, mud crab) • Livestock and poultry (Dairy cattle, • chevon, native chicken, swine) • Rice, organic rice • Corn		• Davao de Oro • Davao del Norte, Davao del Sur, • Davao Occidental, Davao Oriental		

Spatial Analysis of Agri-Fishery Resources, Davao Region

The total cropland area in Region XI in 2015 is approximately 814,264 ha. About 88% of these areas is classified as dedicated to perennial crops, while the remaining area of around 95,968 ha is classified as dedicated to annual crops. However, the annual crop in 2020 significantly increased by 83% or a total of 175,383 ha. Despite the increase in annual crop, some of the areas in 2015 were converted into built-up areas and this accounts for about 4% or a total of 3,898 ha. Also, around 14,351 ha transitioned from annual crop to tree cover during this period. Table 5.64 shows the analysis of changes in Region XI's cropland areas from 2015 to 2020.

Table 5.64: Change Analysis of Cropland Areas in Region XI from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (HA) [2015-2020]	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	95,968.03	175,382.60	79,414.57	82.75	3,897.88	14,350.83
Perennial Crop	718,295.68	-	-	-	-	-

Based on the potential areas for various commodity systems (Table 5.65), a large part of the region has potential for coconut-based type, estimated at around 813,542 ha. Only around 11,329 ha is generated for the rice-based or corn-based commodity system. Lastly, the potential areas for aquaculture and fishery-based commodity system is approximately 19,101 ha.

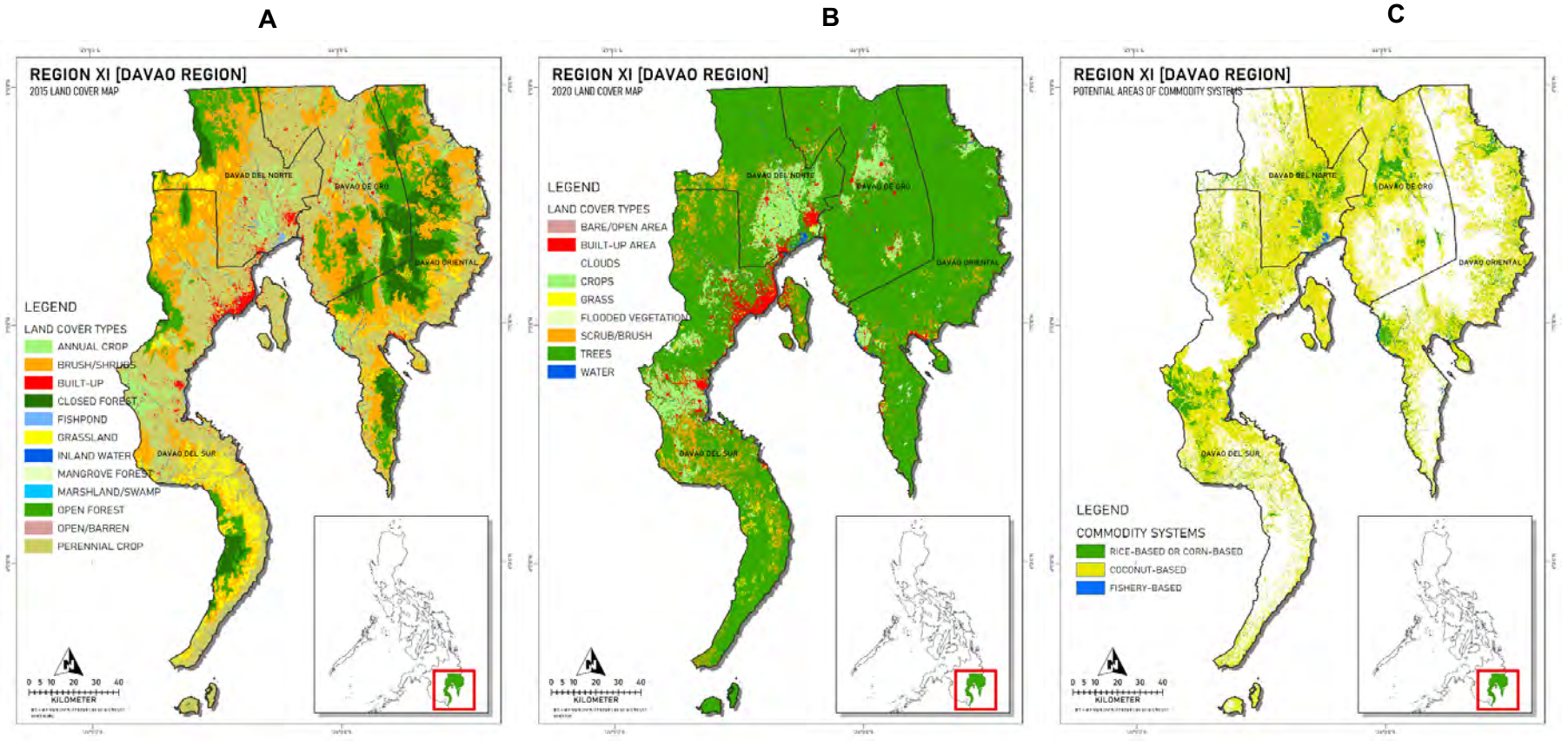
Table 5.65: Potential Areas for the Different Commodity Systems in Region XI

COMMODITY SYSTEM	AREA (Ha)
Coconut-based	813,542.15
Rice-based or Corn-Livestock-Poultry-based	119,328.96
Aquaculture and Coastal Fishery-based	19,101.42
TOTAL	**951,972.53**

[1] This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Figure 5.13 shows the land cover of Region X in 2015 and 2020, and potential distribution of commodity systems there.

Figure 5.13: Land Cover Map of Region XI in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)



Spatial Framework for Sector Transformation in Davao Region

The Davao Region's existing network of growth centers reflects population size and the presence of basic services, commodities, and facilities (NEDA, Davao Region Development Plan 2017-2022). Davao City is the regional center, serving as locus of regional government administration, as political and industrial center, and as an area with high access to basic services. The cities of Tagum, Panabo, Digos, and Mati are the sub-regional centers serving as secondary hubs of growth. Besides the afore-enumerated regional and sub-regional centers, 19 cities and municipalities are classified as provincial centers (emerging growth centers for urban expansion), and the rest as local centers considered agricultural production areas.

NAFMIP will promote commodity systems approach in the local centers identified in the Regional Development Plan. Smallholder farmers and fisherfolk engaged in diversified livelihood will be consolidated to facilitate business transactions with large investors in the provincial and higher-order centers identified above. The Davao Region bears significant food systems implications owing to size of Metro Davao. The expected types of investments are shown in Table 5.66. The NAFMIP ISPF will complement the NEDA spatial strategy by providing more specific edaphic, agro-climatic, and sustainable land and water management (carrying capacity) criteria to guide decision-making.

Table 5.66: Davao Region's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agro-climatic suitability and carrying capacity • Reduced food miles	Davao del Sur Davao de Oro Davao del Norte	• Upscaling of urban agriculture including home, office, and commercial center food gardens; as well as establishment of high-technology controlled environment facilities for vertical food production, e.g., producing dairy products without animals • RETD reoriented toward a commodity systems approach combined with integrated spatial planning and sustainable land and water resources management
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas		• Guided by the RDP spatial strategy complemented by the NAFMIP ISPF, establishment or upgrading of the network of large and modern storage and processing facilities, such as: ○ Cold storage/cryogenics ○ Modern slaughter houses ○ Controlled environment facilities
3. Machinery, equipment and tools		• Agglomeration of private suppliers of larger, modern, more efficient, and

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
supply and service centers Basis for spatial role Accessibility to production areas		cost-effective machinery, equipment and tools: ○ Production – such as large tractors; harvesters; fishing equipment; artisanal fishing boats ○ Postharvest – such as trucks, trailers, forklifts; tools for hauling, lifting, clamping, handling • One-stop shop for private suppliers, farmers/fisherfolk and financing sources to convene for business purposes
4. Recycling/waste management zones Basis for spatial role Proximity to production areas		• Capacity development on agri-fishery waste management and circular food and non-food systems • Enterprise development: capacitated cooperatives to engage in profitable recycling activities • Establishment or upgrading of recycling and waste management facilities such as bio-digesters; waste-to-energy conversion
5. Food and market hubs Basis for spatial role Centrality vis-a-vis buyer/consumer settlements	Davao City Digos City Mati City Panabo City Tagum City	• Establishment in the Davao Region sub-regional centers of modern, large-scale Food Terminal Inc. (FTI)-type facilities under PPP-type business models • Market development toward domestic and international e-marketing of high-value processed agri-fishery products • Further optimization of the comparative locational, infrastructure and logistics advantages of Metro Davao
6. Transshipment centers Basis for spatial role Capacity of transport and logistics facilities		• Further expansion and modernization or rehabilitation of airports and seaports to efficiently handle larger volumes of domestic and international cargo at a rapid pace • In support of inter-regional trade, continuing improvement of inter-island and international sea transport (infrastructure, services and management)

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
		• Enhancement of systems for quarantine and sanitary and phytosanitary (SPS), biosecurity, food safety and border control covering all forms of smuggling

Breakdown of Davao Region's Commodity Systems

The NEDA Regional Development Plan indicates that while the Davao Region's economy is largely agriculture-based, the growth of the agri-fishery sector is slowest compared to other sectors, and farmers and fisherfolk in the region remain to be the poorest among the basic sectors. Fourteen out of the 18 priority industry clusters in the region are agriculture and fisheries-based. Thus, improvements in productivity and quality of agri-fishery produce are expected to spur the development of agribusiness industries, and to open up opportunities for the industry clusters to engage in global value chains (NEDA, Davao Region Development Plan 2017-2022).

A wide range of potentially transformative income and employment opportunities targeting smallholder farmers and fisherfolk were identified in all five NAFMIP commodity systems (Table 5.67). Significant increases in total household income are anticipated from the diversified commodity systems comprising five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities, both food and non-food.

Diversifying by combining crops, livestock, poultry, and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.67. On the other hand, diversifying by engaging in profitable post-production segments of a value chain, in order to tap potential on-farm, off-farm, and non-farm incomes and employment, is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Table 5.67: Davao Region's Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations And Presentations)
Rice-based	• Bamboo • Duck • Lowland vegetables • Mushroom • Upland vegetables	• Large-scale processing of coconut into many possible high value products such as virgin coconut oil, coco coir, insulation, etc. • Cloud kitchen, "Filipino diet products" delivery service and tie-ups between farmer and fisher coops and restaurants • Manufacture of biodegradable packaging materials (like *bayong*.
Corn and livestock-based	• Cassava • Cattle • Chicken • Corn • Goat • Other poultry animals	

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations And Presentations)
	• Other ruminants • Sorghum • Swine • Upland vegetables	to replace plastic bags) using locally abundant raw materials • Tie-up between natural fiber bags producers and supermarkets/ commercial centers • Farmer- and fisher-linked value-adding centers located in Davao and various other cities and peri-urban areas, specializing on: ○ Processing ○ Marketing/trading ○ Waste recycling • Farm machinery, equipment and tools fabrication/manufacturing (e.g., sugar milling, waste-to-energy setup harvesters, compost bins, water pumps and small electric engines) • Local shops specializing in regular maintenance and repair of machinery, equipment and tools • Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app) • Production of packaging materials that will prolong shelf life • Vermicompost/production of vermicast, biofertilizer • Feed milling, milk processing, slaughtering, freezing • Waste recycling by cooperatives (e.g., rice hull, rice straw to energy; duck manure as fertilizer) • Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season • Fisher enterprise market outlets in urban centers • Fish cage design, construction and supply (bamboo poles, abaca ropes, nets) services
Coconut-based	• Banana • Cacao • Carabao • Cattle • Chicken • Coffee • Goat • Palm • Upland vegetables	
Fisheries-based	• All species • *Bangus* • Other capture species • Others aquaculture commodities *** • *Tilapia* • Tuna and tuna-like species	
Geographically specialized	• Abaca • Adlay • Banana • Cacao • Cassava • Coffee • Corn • Dairy • Durian • Indigenous fruits • Indigenous vegetables • Hot pepper • Lanzones • Lowland vegetables • Mango • Mangosteen • Papaya • Rambutan • Rice • Rubber • Saba banana • Sugar/sugarcane • Sheep • Sweet potato • Upland vegetables	

Davao Region's Contribution to Sector Outputs

Region XI, also known as the Davao Region, accounted for 7.9% of the country's Gross Value Added in agriculture, forestry, and fishing in 2020. This share reflects a 1.2% increase compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region XI accounted for 5% or PHP832 billion in 2020. The regional share went down by 8% compared to the previous year.

The Davao Region sees itself focusing on programs and projects toward achieving two Sector-wide major Outputs: (1) commodity system-based value chains established and (2) capacities of LGUs, agri-fishery groups, and individuals strengthened (Table 5.68).

Table 5.68: Davao Region's Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION XI SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 412)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. Commodity system-based value chains established	57%	• Enterprise development and management based on commodity systems approach • Geotagging and profile of abaca farmers including their abaca varieties
2. Capacities of LGUs, agri-fishery groups, and individuals strengthened	21%	• Facilitate accreditation of local fabricators to PhilMech • Capacity building on enterprise and financial management • Dissemination of regional climate outlook and weather forecast • Training on proper use of postharvest machinery and equipment • Partnership with DePEd re inclusion of agri-fishery subject in the curriculum
3. ICT- and AF technology-enabled market support systems strengthened	8%	• Conduct of market forums and determination of commodity flow • Promotion and adoption on the use of online platforms for marketing and other related activities • Establishing market linkages between FCAs and buyers in Luzon and Visayas-DO
4. Policy environment to accelerate and sustain sector transformation enhanced	8%	• Formation and strengthening of farmers' banana councils • Strengthening land conversion regulation and zoning policies

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION XI SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 412)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
		• Proposing forage and pasture zone (CLUP)
5. RETD system intensified	5%	• Provision of mobile veterinary clinic • Establishment of municipal satellite animal diagnostic laboratory
6. AFIBCs operationalized	1%	• Establishment of warehouse and drying facility • Establishment of community-based multiplier farm

Region XII: SOCCSKSARGEN

REGIONAL PLANNING PROFILE			
Total Population			
4,901,486 (PSA, 2020)	48.89% women (PSA, 2015)	776,000 are farmers[14] (PSA, 2018)	45.7% farmers fall below the poverty threshold[15] (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)	
450 B or 3% (PSA, 2020)	33 (Moderate)	0.91 M Ha	
Airports	**Combined Seaports**	**Roads** (Total km)	
18 (NPT, 2022)	16 (NPT, 2022)	1,556 (NPT, 2022)	

Priority Commodities in AFMP 2018-2023	Provinces
• HVC (Abaca, cacao, coffee, coconut, rubber) • Livestock and poultry (Carabao, dairy cattle, goat, chicken) • Rice • Corn	• Cotabato • Sarangani • South Cotabato • Sultan Kudarat

[14]No available data on fisher population in Region XII

[15]Per PSA, the poverty incidence estimate for fisherfolk in Region XII was excluded due to very low level of precision (with CV > 50 percent) and small sample size.

Spatial Analysis of Agri-Fishery Resources, SOCCSKSARGEN

In 2015, Region XII had an estimated total cropland area of around 908,642 ha. About 58% of this is considered as dedicated to annual crops totaling about 523,600 ha in area. This area has declined by 14% to 450,341 ha in 2020, or less 73,259 ha from 2015. Conversion of annual crop into built-up areas is estimated at around 21,294 ha. This accounts for 4% of the total annual crops in 2015. But 16% or an area of about 82,147 ha were converted from annual croplands in 2015 to tree cover in 2020. Table 5.69 shows the analysis of changes in Region XII's cropland areas from 2015 to 2020.

Table 5.69: Change Analysis of Cropland Areas in Region XII from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	523,600.05	450,341.41	-73,258.64	-13.99	21,293.97	82,146.85
Perennial Crop	385,042.40	-	-	-	-	-

Moreover, the potential areas for the different commodity systems were also generated for the region. Around 527,196 ha is found to have potential for coconut-based commodity system, and this is followed by the rice-based or corn-based commodity system, totaling 479,944 ha. Finally, the potential areas for the aquaculture and fishery-based commodity system is estimated at around 37,607 ha (Table 5.70).

Table 5.70: Potential Areas for the Different Commodity Systems in Region XII

COMMODITY SYSTEM	AREA (Ha)
Coconut-based	527,196.05
Rice-based or Corn-Livestock-Poultry-based	479,944.35
Aquaculture and Coastal Fishery-based[1]	37,607.46
TOTAL	**1,044,747.86**

[1] This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Figure 5.14 shows the land cover maps of the region in 2015 and 2020, plus its potential commodity system distribution.

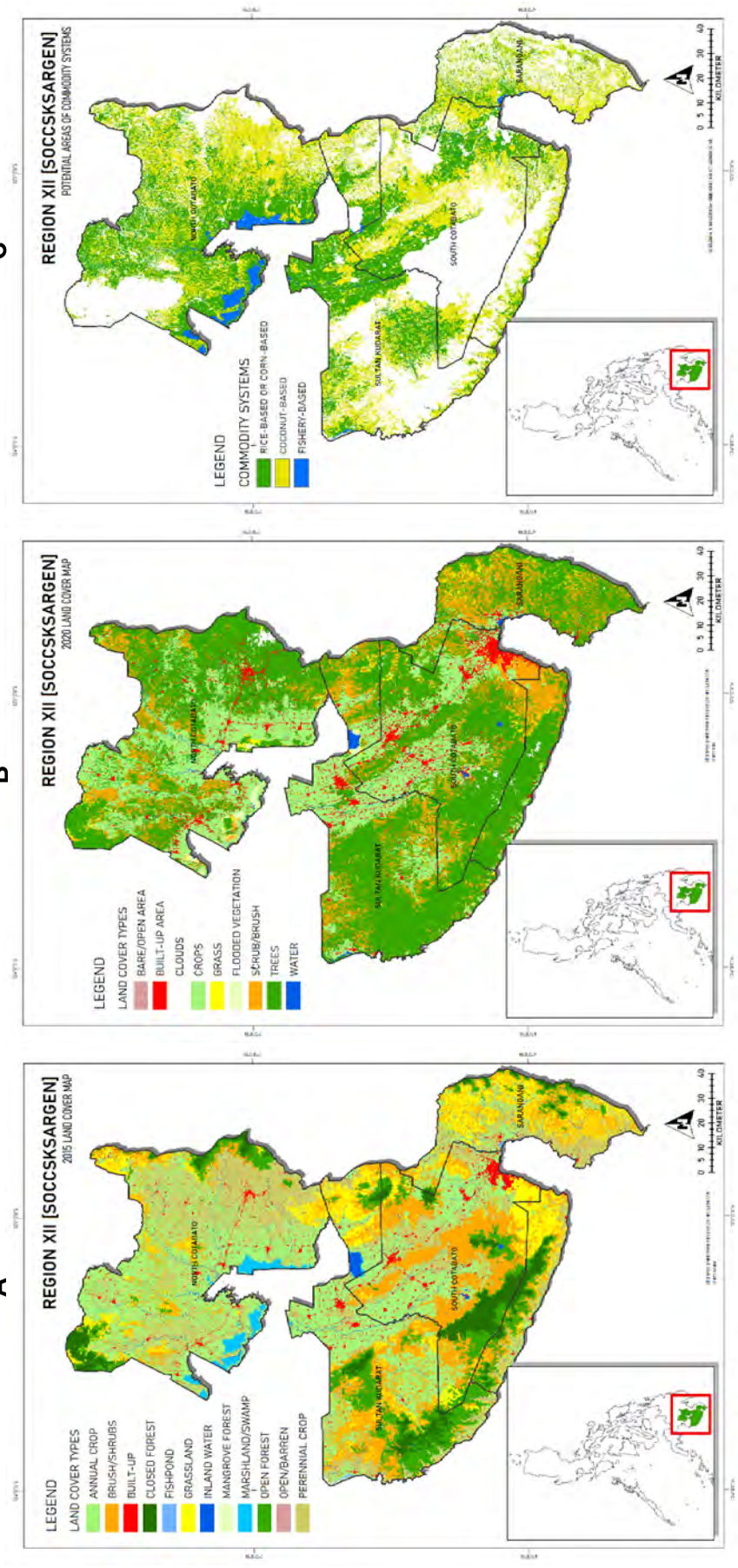


Figure 5.14: Land Cover Map of Region XII in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)

Spatial Framework for Sector Transformation, SOCCSKSARGEN

The SOCCSKSARGEN Regional Spatial Development Framework defines the region's desired spatial structure based on trends in population, economic activities, and services (NEDA, SOCCSKSARGEN Regional Development Plan 2017-2022). The regional spatial strategy encourages establishing ecozones to support industry clusters. A tri-corridor development approach seeks to establish small- to medium-scale processing centers, agriculture and commercial hubs, among others—made resilient by mainstreaming disaster risk reduction and climate change adaptation.

The three corridors are: (1) Cotabato City-Kidapawan City Agri-Industrial and Eco-Tourism Corridor, with Midsayap as intermediate urban center; (2) Isulan-General Santos Agri-Industrial and Eco-Tourism Corridor, in which Koronadal and Tacurong are intermediate centers; and (3) Lebak-Maasim-Alabel-Glan Coastal Development Zone. Major industries are high-value commercial crops, corn, and other agri-based products, fishery-based products, and ICT. The primary center includes Kalamansig, with Kiamba and Maasim as intermediate centers. Major industries include marine fishing, coconut, coffee.

NAFMIP's innovative approaches strongly complement the regional spatial strategy. NAFMIP will promote diversification in both primary production as well as in other profitable segments of value chains, i.e., product diversification through processing, packaging, and other enhancements. As similarly envisioned in NAFMIP, the SOCCSKSARGEN Region will develop supply and demand linkages with the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), as well as with other adjacent regions. The expected types of NAFMIP investments are shown in Table 5.71. The NAFMIP ISPF will complement the NEDA spatial strategy by providing more specific edaphic, agri-climatic, and sustainable land and water management (carrying capacity) criteria to guide decision-making.

Table 5.71: SOCCSKSARGEN's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agro-climatic suitability and carrying capacity • Reduced food miles	North Cotabato Sultan Kudarat South Cotabato	• Commercialization of halal agri-fishery food production for Philippines and global markets, following a commodity system rather than a single commodity or product approach • RETD on existing and potential options to sustainably raise year-round incomes of smallholder farmers and fisherfolk through: ○ Commodity systems diversification and farming systems approach ○ Product diversification, i.e., venturing into post-production, profitable segments of value chains of target commodities • Construction or rehabilitation of access infrastructure supporting one or more commodity systems—to include farm-to-

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
		market roads and bridges integrated into a wider area transport system to avoid accessibility gaps
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas		• Establishment of modern and scale-appropriate storage and processing facilities under PPP-type modalities inside AFIBCs, planned in context of ecozones envisioned in the Regional Development Plan
3. Machinery, equipment and tools supply and service centers Basis for spatial role Accessibility to production areas		• Comprehensive technology, marketing, organizational, financing, procurement, and maintenance program to progressively shift from more traditional to larger, modern, more efficient, and cost-effective machinery, equipment and tools: ○ Production – large tractors; harvesters; articulated farm vehicles; customized drones for monitoring, spraying, etc.; fishing vessels and equipment; artisanal fishing boats ○ Postharvest – such as: trucks (wing van), trailers, forklifts; Tools for hauling, lifting, clamping, handling
4. Recycling/waste management zones Basis for spatial role Proximity to production areas		• Capacity development on waste management and circular food and non-food systems • Credit facilitation for capacitated cooperatives to acquire equipment for profitable recycling and waste management activities • Establishment or upgrading of recycling and waste management facilities such as bio-digesters; waste-to-energy conversion
5. Food and market hubs Basis for spatial role Centrality vis-a-vis buyer/ consumer settlements	Mlang, North Cotabato Kidapawan City General Santos City	• High-value halal agri-fishery products: market development toward domestic and international conventional and e-marketing • Establishment of large-scale Food Terminal Inc. (FTI)-type facilities under PPP-type modalities inside agriculture and fisheries industrial business corridors, planned in context of

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
	Koronadal City Tacurong City	ecozones envisioned in the Regional Development Plan
6. Transshipment centers Basis for spatial role Capacity of transport and logistics facilities		• Further expansion and modernization or rehabilitation of land transport systems (to include roll-on, roll-off), as well as airports and seaports, to efficiently handle larger volumes of more diverse cargo, at a rapid pace • Continuing improvement of inter-island sea transport (infrastructure, services and management)

Breakdown of SOCCSKSARGEN's Commodity Systems

The agri-fishery sector accounts for more than half of the region's labor force, supplies raw materials to the manufacturing and service sectors, and creates forward linkages in terms of higher-paying and more stable job opportunities. Interventions and investments are being channeled to expand existing opportunities and to develop new ones, thus, inducing greater participation of smallholder farmers and fisherfolk (NEDA, SOCCSKSARGEN Regional Development Plan 2017-2022).

A significant number of income and employment opportunities targeting smallholder farmers and fisherfolk have been identified in four out of five NAFMIP commodity systems: (1) rice-based; (2) corn/livestock/poultry-based; (3) fisheries-based; and (4) geographically specialized (Table 5.71). Significant increases in total household income are anticipated to result from the diversified commodity systems approach comprising five "anchor commodities" under which can be subsumed any and all other agri-fishery commodities, both food and non-food.

Diversifying by combining crops, livestock, poultry, and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.72. On the other hand, diversifying by engaging in profitable post-production segments of a value chain in order to tap potential on-farm, off-farm, and non-farm incomes and employment is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational Commodity System-Based Roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Table 5.72: SOCCSKSARGEN: Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (Reference: Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Rice-based	• Bamboo • Coffee • Corn • Lowland vegetables	• Production of cakes and noodles from rice (*suman, bibingka, etc.*)

ANCHOR COMMODITY	LINKED COMMODITIES (Reference: Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)

	• Others aquaculture commodities
	• Upland vegetables
		• Manufacture of biodegradable packaging materials (like *bayong*. to replace plastic bags) using locally abundant raw materials
		• Tie-up between natural fiber bags producers and supermarkets/ commercial centers
		• Farmer- and fisher-linked value-adding centers located in Cotabato, Gensan, Koronadal, and various other cities and peri-urban areas, specializing on:
		  ○ Processing
		  ○ Marketing/trading
		• Farm machinery, equipment and tools fabrication/manufacturing (e.g., four-wheel drive tractors for sugarcane production, waste-to-energy setup harvesters, compost bins, water pumps and small electric engines)
		• Local shops specializing in regular maintenance and repair of machinery, equipment and tools
		• Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app)
		• Production of packaging materials that will prolong shelf life
		• Feed milling, milk processing, slaughtering, freezing
		• Vermicompost/production of vermicast, biofertilizer
		• Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season
		• Fisher enterprise market outlets in urban centers

Corn and livestock-based	• Cassava • Cattle • Chicken • Coffee • Dairy • Duck • Goat • Lowland vegetables • Other crops • Palm • Soybean • Sweet potato • Swine • Upland vegetables	
Coconut-based	• Coffee • Cacao	
Fisheries-based	• *Bangus* • Others aquaculture commodities • Seaweeds • Shrimp • *Tilapia*	
Geographically specialized	• Abaca • Adlai • Avocado • Bamboo • Banana • Cacao • Cassava • Citrus • Coconut • Corn • Coffee • Dairy • Dragonfruit • Durian • Garlic • Geese • Ginger • Guyabano • Jackfruit • Indigenous vegetables • Lanzones • Lowland vegetables • Malunggay • Mango	

ANCHOR COMMODITY	LINKED COMMODITIES (Reference: Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
	• Mangosteen • Mushroom • Ornamentals/ foliages/cutflowers • Passion fruit • Red onion • Rubber • Rice • Saba banana • Shrimp • Strawberry • Sugar/sugarcane • Swine • Soybean • *Tilapia* • Turkey • Turmeric • Upland Vegetables • White potato • Yellow onion	

SOCCSKSARGEN's Contribution to Sector Outputs

Region XII accounted for 7.3% of the country's gross value added in agriculture, forestry, and fishing in 2020. This share reflects a 1.5% increase compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region XII accounted for 3% or PHP450 billion in 2020. The regional share went down by 4% compared to the previous year.

Region XII or SOCCSKSARGEN produces a wide variety of commodities including rice, corn, coconut, pineapple, oil palm, coffee, sugarcane, banana, rubber and mango. Planning-wise, the region holds significant agri-fishery growth potential because of its rich natural resource endowment.

SOCCSKSARGEN, a contraction of the names of four provinces and one highly urbanized city (South Cotabato, Cotabato, Sultan Kudarat, Sarangani and General Santos) offers a wide range of opportunities for rural as well as urban agri-fishery development. The regional center in Koronadal and commercial center in General Santos City can host urban agriculture initiatives such as controlled environment production of dairy and other commodities.

Table 5.73 shows that the region will prioritize agri-fishery programs and projects toward achieving three Sector-wide major Outputs: (1) commodity system-based value chains established; (2) capacities of LGUs, AF groups and Individuals strengthened; and (3) ICT- and AF technology-enabled market support systems strengthened. The integrated spatial planning approach will consider the forward and backward linkages with production areas as well as market centers within the provinces of the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM).

Table 5.73: SOCCSKSARGEN's Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION XII SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 120)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
1. Commodity system-based value chains established	60%	• Halal product development: goat and other poultry and livestock multiplier farms; storage and processing facilities • Coffee development hub and similar hubs for other major commodities • Wide use of modern agri-fishery equipment such as rice color sorter • Processing and marketing facilities dedicated to highland vegetables
2. Capacities of LGUs, agri-fishery groups, and individuals strengthened	13%	• Agri-enterprise training of smallholder farmers and fisherfolk to diversify and upscale their agri-fishery activities • Young Farmers Challenge Fund in operation
3. ICT- and AF technology-enabled market support systems strengthened	12%	• Information, education, and communication (IEC) caravans to educate stakeholders on potential export-worthy commodities • Cold storage facilities strategically located • Expanded KADIWA
4. AFIBCs operationalized	9%	• Integrated food terminal inside corridor • Large-scale and modern postharvest facilities including consolidation, processing, cold storage, and other facilities and services located within designated business corridors
5. RETD system intensified	4%	• Wide use of climate-resilient crop varieties and animals • Upgraded automated weather station with services accessible by mobile phone
6. Policy environment to accelerate and sustain sector transformation enhanced	2%	• Radio, TV, digital plugs to disseminate and advocate policy shifts such as diversification and investments refocused on rural and semi-urban agri-fishery projects

Region XIII: CARAGA

REGIONAL PLANNING PROFILE			
Total Population			
2,804,788 (PSA, 2020)	48.54% women (PSA, 2015)	400,000 are farmers[16] (PSA, 2018)	46.0% farmers and 38.9% fisherfolk fall below the poverty threshold (PSA, 2015)
Gross Regional Domestic Product (PHP)	**APPDEX**	**Total Cropland Area** (Hectares)	
284 B or 2% (PSA, 2020)	29 (Moderate)	0.60 M Ha	
Airports	**Combined Seaports**	**Roads** (Total km)	
13 (NPT, 2022)	5 (NPT, 2022)	1,521 (NPT, 2022)	
Priority Commodities in AFMP 2018-2023		**Provinces**	
• HVC (Abaca, banana, cacao, coconut, coffee, mango, oil palm, rubber, vegetables) • Fisheries (Lobster, shrimp, crabs, *tilapia*, grouper, milkfish, shellfish, seaweeds) • Rice • Corn and cassava		• Agusan del Norte • Agusan del Sur • Dinagat Islands • Surigao del Norte • Surigao del Sur	

Spatial Analysis of Agri-Fishery Resources, CARAGA

The total cropland area in Region XIII is estimated at around 597,632 ha. The annual crop area constitutes about 73% or 437,476 ha of the entire cropland area. Annual crop land is around 160,156 ha. However, this area decreased a little in 2020 to 132,089 ha. This has translated to a decrease of about 28,067 ha or a 18% loss of annual crop area from 2015 to 2020. In terms on land conversion, only around 4,789 ha of annual crop in 2015 were estimated to have been converted into built-up areas. This only accounts for three percent of the total annual crop area in 2015. Meanwhile, around 21% has been converted into tree cover from 2015 to 2020. This is translated into an area of about 33,418 ha. Figure 5.15 shows the land cover maps of the region in 2015 and 2020, plus the potential commodity system distribution there. Table 5.74 shows the analysis of changes in Region XIII's cropland areas from 2015 to 2020.

[16] No available data on fisher population in CARAGA

Figure 5.15: Land Cover Map of Region XIII in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems (C)

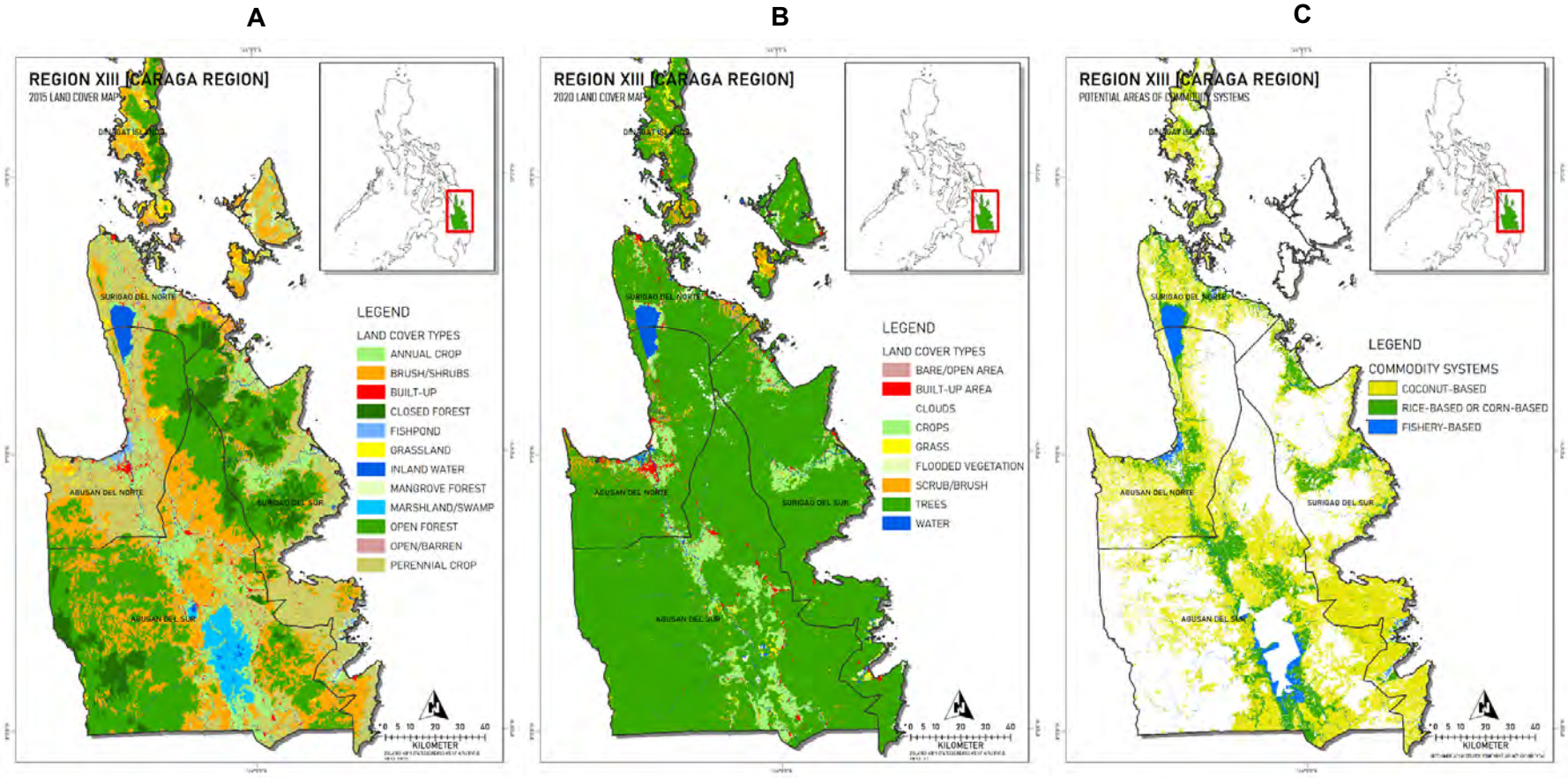


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Table 5.74: Change Analysis of Cropland Areas in Region XIII from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	160,156.12	132,089.38	-28,066.74	-17.52	4,788.77	33,418.21
Perennial Crop	437,476.03	-	-	-	-	-

In terms of the potential areas for the different commodity systems, Table 5.75 shows that majority of the region is found to have the most potential for coconut-based commodity system (587,450 ha). In terms of rice-based or corn-based commodity system, only around 161,610 ha was estimated. Finally, the area for aquaculture and fishery-based commodity system is calculated at around 52,114 ha.

Table 5.75: Potential Areas for the Different Commodity Systems in Region XIII

COMMODITY SYSTEM	AREA (HA)
Coconut-based	587,449.60
Rice-based or Corn-Livestock-Poultry-based	161,609.55
Aquaculture and Coastal Fishery-based[1]	52,114.35
TOTAL	**801,173.49**

[1]This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

Spatial Framework for Sector Transformation in CARAGA

The CARAGA Regional Spatial Development Framework 2015-2045 provides spatial and development directions to transform the region into a dynamic and sustainable economy where everyone equitably benefits from the fruits of progress (NEDA, CARAGA Regional Development Plan 2017-2022). CARAGA envisions to become the Fishery, Agro-Forestry, mineral and Eco-tourism (FAME) Center of the Philippines. Toward this end, it adopted a polycentric network of development, and functional roles are assigned to cities: Butuan as regional center; Surigao as commercial and trading center; Bislig as center of organic high-value crops and aquamarine products; and Tandag as institutional, tourism, and trading hub. Functional roles are similarly assigned to other cities, provinces, and zones in the region.

NAFMIP will promote diversification in both primary production as well as in other profitable segments of value chains, i.e., product diversification through processing, packaging, and other enhancements. Following a commodity systems rather than single commodity or product approach, NAFMIP will support organic high-value crops and aquamarine development prioritized by the region. The expected types of NAFMIP investments are shown in Table 5.76. The NAFMIP ISPF will complement the NEDA spatial strategy by providing more specific edaphic, agro-climatic, and sustainable land and water management (carrying capacity) criteria to guide decision-making.

Table 5.76: CARAGA's Focal Areas in Sector Transformation

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
1. Major production areas for commodity systems expansion to commercial scale Basis for spatial role • Agro-climatic suitability and carrying capacity • Reduced food miles	Agusan del Sur Surigao del Sur Agusan del Norte	• NAFMIP geographically specialized commodity system (GSCS): commercialization of organic and aquamarine production and processing (following a commodity system rather than a single commodity or product approach)—targeting special domestic and international consumer markets • RETD on existing and potential options to sustainably raise year-round incomes of smallholder farmers and fisherfolk through: ○ Commodity systems diversification and climate-resilient agriculture approach ○ Product diversification, i.e., venturing into post-production, profitable segments of value chains of target commodities • Climate-proofing of access infrastructure supporting one or more commodity systems
2. Integrated storage and processing centers Basis for spatial role Physical connectivity to production areas		• Establishment of modern and climate-proof storage and processing facilities under PPP-type modalities inside AFIBCs • Cold storage facilities including cryogenics, slaughter house, controlled environment facilities
3. Machinery, equipment and tools supply and service centers Basis for spatial role Accessibility to production areas		• Comprehensive technology, marketing, organizational, financing, procurement, and maintenance program to progressively shift from more traditional to larger, modern, more efficient, and cost-effective machinery, equipment, and tools: ○ Production – large tractors; harvesters; articulated farm vehicles; customized drones for monitoring, spraying, etc.; fishing vessels and equipment; artisanal fishing boats ○ Postharvest – such as: trucks (wing van), trailers, forklifts; Tools for hauling, lifting, clamping, handling
4. Recycling/waste management zone		• Capacity development on waste management and circular food and non-food systems

SPATIAL ROLE CORRESPONDING TO VALUE CHAIN SEGMENTS	FOCAL PROVINCES AND CITIES	TYPES OF POTENTIAL INVESTMENTS/ INTERVENTIONS BASED ON SPATIAL ROLE (From Planning Workshops + Other Recommendations)
Basis for spatial role Proximity to production areas		• Credit facilitation for capacitated cooperatives to acquire equipment for profitable recycling and waste management activities • Establishment or upgrading of recycling and waste management facilities such as bio-digesters; waste-to-energy conversion
5. Food and market hubs Basis for spatial role Centrality vis-a-vis buyer/ consumer settlements	Siargao, Surigao del Norte Butuan City Tandag City	• High-value organic and aquamarine products: market development toward domestic and international conventional and e-marketing • Establishment of large-scale market facilities under PPP-type modalities inside AFIBCs
6. Transshipment centers Basis for spatial role Capacity of transport and logistics facilities		• Further expansion and modernization or rehabilitation of land transport systems (to include roll-on, roll-off), as well as airports and seaports, to efficiently handle larger volumes of more diverse cargo, at a rapid pace • Continuing improvement of inter-island sea transport (infrastructure, services, and management)

Breakdown of CARAGA's Commodity Systems

The agri-fishery sector accounts for one-third of total employment in the CARAGA Region. The NEDA Regional Development Plan notes that despite the vast development opportunities in the sector, poverty is pronounced among farmers and fisherfolk and the sector had been observed as "spiraling downward" (NEDA, CARAGA Regional Development Plan 2017-2022).

Various income and employment opportunities targeting smallholder farmers and fisherfolk have been identified in four out of five NAFMIP commodity systems: (1) corn-livestock-poultry-based; (2) coconut-based; (3) fisheries-based; and (4) geographically specialized (Table 5.76). Significant increases in total household income are anticipated from the diversified commodity systems comprising five anchor commodities under which can be subsumed any and all other agri-fishery commodities, both food and non-food.

Diversifying by combining crops, livestock, poultry, and/or fishery commodities is shown in the columns labelled "anchor" and "linked commodities" in Table 5.77. On the other hand, diversifying by engaging in profitable post-production segments of a value chain, in order to tap potential on-farm, off-farm, and non-farm incomes and employment, is shown in the column labelled "linked enterprises." NAFMIP as directional plan will guide DA, other national agencies, LGUs, and other stakeholders to craft more detailed and operational commodity system-based roadmaps (e.g., fisheries-based system roadmap), in lieu of the usual single commodity plans.

Table 5.77: CARAGA's Priority Commodity Systems

ANCHOR COMMODITY	LINKED COMMODITIES (From Regional Planning Workshop)	POTENTIAL LINKED ENTERPRISES (From Planning Consultations and Presentations)
Rice-based	• Mushroom • Vegetable	• Commerical-scale manufacture of biodegradable packaging materials (like *bayong*. to replace plastic bags) using locally abundant raw materials • Tie-up between natural fiber bag producers and supermarkets/ commercial centers • Farmer- and fisher-linked value-adding centers located in Butuan, Surigao, Tandag, and various other cities and peri-urban areas, specializing on: o Processing o Marketing/trading • Farm machinery, equipment, and tools fabrication/manufacturing (e.g., waste-to-energy setup harvesters, compost bins, water pumps, and small electric engines) • Local shops specializing in regular maintenance and repair of machinery, equipment and tools • Direct online selling by farmers' groups of food system products, inputs and services (e.g., Filipino diet app) • Production of baskets and packaging materials • Feed milling, milk processing, slaughtering, freezing • Vermicompost/production of vermicast, biofertilizer • Alternative non-farm (e.g., handicraft) livelihood enterprises to reliably support fisherfolk during the annual fishing off-season • Fisher enterprise market outlets in urban centers • Fish cage design, construction, and supply (bamboo poles, abaca ropes, nets) services
Corn and livestock-based	• Carabao • Cassava • Cattle • Chicken • Corn • Goat • Swine	
Coconut-based	• Cacao • Carabao • Cattle • Chicken • Coconut • Coffee • Goat • Indigenous vegetables • Other ruminants • Rubber	
Fisheries-based	• *Bangus* • Other aquaculture commodities • Seaweeds • *Tilapia*	
Geographically specialized	• Abaca • Banana • Lowland vegetables • Rubber • Soybean	

CARAGA's Contribution to Sector Outputs

Region XIII accounted for 7.3% of the country's Gross Value Added in agriculture, forestry, and fishing in 2020. This share reflects a 1.5% increase compared to the previous year. In terms of the country's Gross Regional Domestic Product (GRDP), Region XIII accounted for 2% or PHP284 billion in 2020. The regional share went down by 7% compared to the previous year.

The CARAGA Region, named after the *Kalagan* ("spirited") people, comprises five provinces: Agusan del Norte, Agusan del Sur, Dinagat Islands, Surigao del Norte, and Surigao del Sur. Majority of the CARAGA Region's investments and interventions to modernize the agri-fishery sector will be directed toward achieving Sector-wide major Output No. 1, commodity system-based value chains established (Table 5.78). As in the case of the Bicol Region, CARAGA is typhoon-prone; it is also flood-prone. Thus, it is important that science-based climate risk analysis, adaptation measures, and disaster risk management—especially those under the DA Adaptation and Mitigation Initiative in Agriculture (AMIA) Program—be integrated into the design and implementation of all programs and projects.

Table 5.78: CARAGA's Contribution to Sector Output Achievement

SECTOR-WIDE MAJOR OUTPUTS (6)	**DISTRIBUTION OF REGION XIII SUB-OUTPUTS BY SECTOR OUTPUT** (% of Sub-outputs, N = 280)	**ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS** (From Regional Planning Workshop)
1. Commodity system-based value chains established	82%	• Establishment of community-based *tilapia* hatcheries • Bio-fertilizer plant operational • Modern production, postharvest, processing, and storage facilities, machinery and equipment supporting cluster area development
2. Capacities of LGUs, agri-fishery groups, and individuals strengthened	6%	• Enhanced capacities of PCA extension workers on: (a) large and small ruminant production; (b) basics in organizing farm service crews and operation and maintenance of farm machinery used in coconut-based farming system • Learning sites established
3. ICT- and AF technology-enabled market support systems strengthened	1%	• Wide-scale replication of: (a) *KADIWA ni Ani at Kita*; (b) *KADIWA ng Masa*; and (c) *KADIWA* on Wheels
4. Policy environment to accelerate and sustain sector	7%	• Supply and demand information system for buyers and producers • Surveillance/early warning system on various hazards

SECTOR-WIDE MAJOR OUTPUTS (6)	DISTRIBUTION OF REGION XIII SUB-OUTPUTS BY SECTOR OUTPUT (% of Sub-outputs, N = 280)	ANTICIPATED ILLUSTRATIVE CONTRIBUTIONS TO SECTOR-WIDE MAJOR OUTPUTS (From Regional Planning Workshop)
transformation enhanced		
5. RETD system intensified	1%	• Agri-fishery product storage and handling (shelf life)
6. AFIBCs operationalized	3%	• Credit program directed to smallholder farmers and fisherfolk to be linked to large investors in agri-fishery business corridors • Establishment of share-service facilities

Bangsamoro Autonomous Region in Muslim Mindanao (BARMM)

The BARMM Ministry of Agriculture, Fisheries, and Agrarian Reform (MAFAR) is a key stakeholder in the NAFMIP 2021-2030, considering the region's role in national agri-fishery development, and particularly the current and potential economic and spatial linkages between BARMM provinces and non-BARMM provinces, such as those in Region XII or SOCCSKSARGEN.

BARMM is a vital growth pole in the Philippine agri-fishery sector. It accounted for 5.0% of the country's gross value added in agriculture, forestry, and fishing in 2020. This share reflects a 2.7% increase compared to the previous year, a noteworthy trend considering that the share of other regions went down over the same period. In terms of the country's Gross Regional Domestic Product (GRDP), BARMM accounted for 1% or PHP244 billion in 2020. The regional share went down by 2% compared to the previous year.

The BARMM Food Security and Nutrition Roadmap 2020-2030 is anchored to the Vision, "A self-reliant, food-secure, and resilient Bangsamoro." Its Goals are: (1) sustainable, competitive and accessible food supply chain for Bangsamoro; (2) balanced intake of halal food; and (3) adaptive capacity of Bangsamoro communities. The Roadmap is organized into eight "Dimensions": (a) improve livelihood with focus on agricultural productivity; (b) Increase resilience of vulnerable populations and communities; (c) improve information system, research, and innovation for agriculture and nutrition; (d) expand markets and value chains; (e) Improve policies and institutions for food security; (f) enhance nutrition and dietary intake; (g) enhance management of natural resources and adaptation to climate change; and (h) improve gender equality and women's empowerment.

The BARMM Roadmap and NAFMIP share the following: (1) all of the afore-enumerated dimensions; (2) highlighting pursuit of integrated food and nutrition planning and implementation; and (c) a common 10-year timeframe. During NAFMIP preparation, the DA Planning and Monitoring Service (PMS) consulted with MAFAR planners. Mutually beneficial DA-BARMM collaboration is expected to continue over the 10-year NAFMIP implementation period. The NAFMIP multisector, multilevel stakeholders' forums will serve as platform for productive engagement. BARMM MAFAR and the concerned DA Regional Field Offices (RFOs) will liaise at the regional level. As acclaimed and affirmed by multisector stakeholders during the NAFMIP national consultation held on 25 March 2022, we will "Transform the Philippine Food Systems –Together."

(Reference: BARMM Food Security and Nutrition Roadmap 2020-2030 (October 2020)

Spatial Analysis of Agri-Fishery Resources, BARMM

The total cropland area in 2015 in BARMM is estimated at around 597,075 ha. Of the total, around 42% or 250,652 ha is considered as dedicated to annual crops. The total area for annual crops slightly dropped from 2015 to 2020 and about 6% or 14,098 ha of loss is estimated between these periods. Conversion of annual crop into built-up areas from 2015 to 2020 is calculated at 8,788 ha or 4% change between the two periods. Improvement in cover from annual crop to tree cover is also observed in the region. A total of 28,200 ha has been changed from annual crop to tree cover areas. This change accounts for about 11% of the annual crop in 2015. Table 5.79 shows the analysis of changes in BARMM's cropland areas from 2015 to 2020.

Table 5.79: Change Analysis of Cropland Areas in BARMM from 2015 to 2020

LAND COVER	AREA (Hectare)		RELATIVE CHANGE		CONVERSION OF ANNUAL CROPS (Ha) (2015-2020)	
	2015	2020	Gain/Loss	Percent	Built-Up	Trees
Annual Crop	250,651.97	236,553.64	-14,098.33	-5.62	8,788.39	28,200.09
Perennial Crop	346,423.39	-	-	-	-	-

BARMM has been found to be mostly favored for the coconut-based commodity system. The analysis generated around 434,192 ha with potential for this type of commodity system (Table 5.80). This is followed by the rice-based or corn-based commodity system which accounts for about 220,570 ha. Lastly, the estimated area for the aquaculture and fishery-based commodity system is around 73,352 ha.

Table 5.80: Potential Areas for the Different Commodity Systems in BARMM

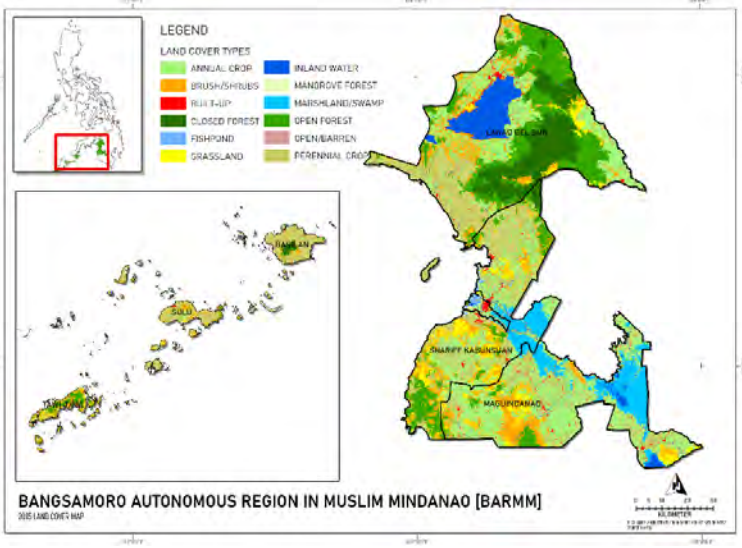
COMMODITY SYSTEM	AREA (Ha)
Coconut-based	434,191.66
Rice-based or Corn-Livestock-Poultry-based	220,569.90
Aquaculture and Coastal Fishery-based	73,352.18
TOTAL	**728,113.74**

[1]This estimate only considers the inland waters (including lakes) in the regions and does not include the coastal areas, municipal waters, and other marine areas of the different regions.

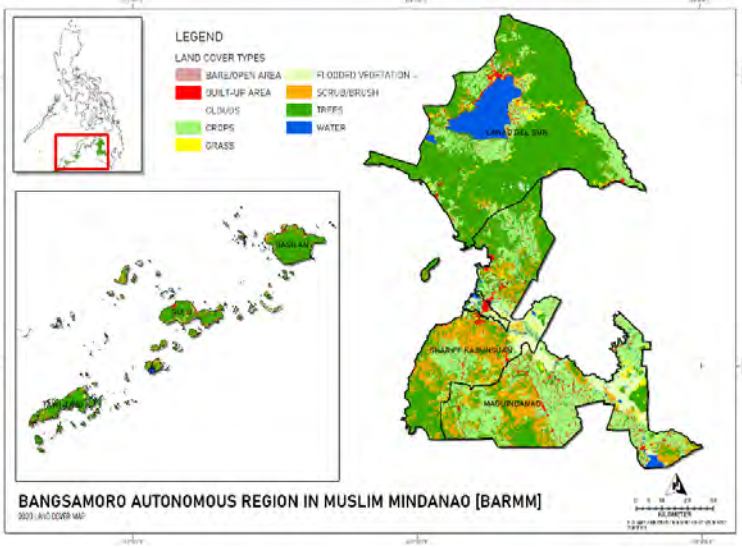
Figure 5.16 shows the land cover maps of BARMM in 2015 and 2020, plus the potential commodity system distribution there.

Figure 5.16: Land Cover Map of BARMM in 2015 (A), 2020 (B), and Potential Distribution of Commodity Systems in the Region (C)

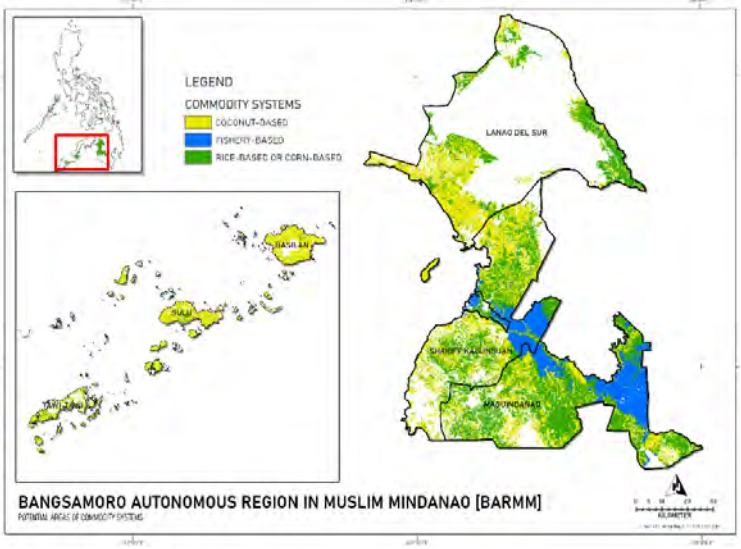
A



B



C



CHAPTER 6

Functional Plans: Centrally Supported Decentralized Services Delivery

Steering Role and Rowing Functions

This chapter covers Functional Plans for the delivery of a package of agri-fishery facilities and services to smallholder farmers, livestock and poultry raisers, fisherfolk, and other AF stakeholders. Functional Plans essentially present: (1) main types of interventions needed along the value chain of each of the five main commodity systems presented in this Plan; (2) responsibility for delivering such facilities and services; and (3) recommended strategies and methods for delivery. Based on guidance provided in ***NAFMIP as a Directional Plan***, Functional Plan details will be provided in the operational plans of the concerned operating units, such as the DA Policy Research Service (PRS) responsible for transformative policy review, formulation and updating, hand-in-hand with LGUs responsible for policy implementation.

Box 3: Steering vs. Rowing Functions

Department of Agriculture and other NGAs
1. Formulate polices and plans, advocacy and monitoring and evaluation
2. Regulatory and products standards-setting
3. Develop credit, insurance, and financing
4. Agribusiness and market development
5. Promote private investment and organize industry coalitions/linkages
6. Infrastructure and facilities construction and establishment
7. Develop capacity of LGUs and private sector
8. Develop transformative R&D and ICT-enabled sector

Local Government Units
1. Enforce policies, regulations, and standards
2. Facilitate credit, insurance, and financing
3. Link farmers/fisherfolk to Agriculture and Fisheries Industrial Business Corridors (AFIBC) and markets
4. Develop capacity of farmers, livestock and poultry raisers, and fisherfolk
5. Strengthen farmer/ fisher cooperatives and associations
6. Conduct research, extension, and training for development
7. Provide production support services
8. Organize and manage production and post-harvest infrastructure, facilities, machinery, and equipment

Sector transformation, as a whole-of-nation, multisector, agri-fishery industrialization covenant (principle of "mass cooperation"), will require multisector, multilevel service providers to coalesce in effectively delivering a wide range of support services. This institutional arrangement is a major departure from previous AFMPs that focused implementation responsibility on DA operating units. In line with NAFMIP innovations, functional plans will highlight multi-risk proofing and sex- and ethnic targeting of delivery systems, as well as support to structural transformation in value chains.

In NAFMIP, functional planning takes on new meaning because of the "further devolution"—and eventual full devolution—expected with the Mandanas-Garcia Ruling. The functional plans describe how facilities and services will be packaged and delivered through central-regional-local collaboration during the plan implementation period. Vertical institutional arrangements will be defined by a decentralized governance regime which, in light of a paradox of decentralization, will necessitate a strong central level support.[1] The role of DA and national government agencies (NGAs) is to perform a "**steering**" role vis-à-vis the

[1] A strong, supportive center is necessary for decentralization to work.

"**rowing**" functions of local government units (LGUs). These complementary functions are shown in Box 3. Toward the end of NAFMIP implementation, LGUs are also anticipated be able to perform some of the steering functions, even as NGAs will progressively shift toward assuming an enabling role.

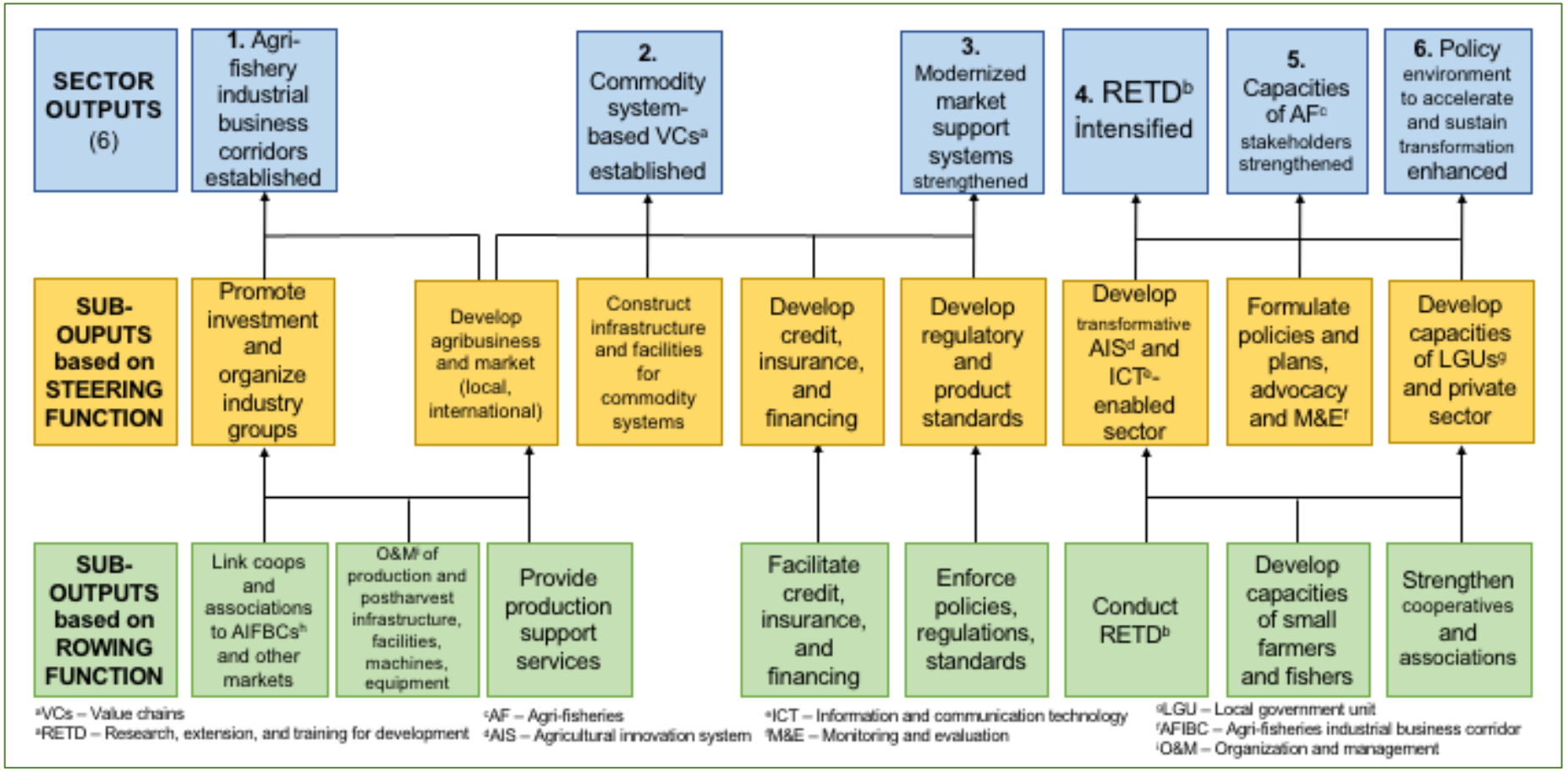
At the national level, DA will lead other national government agencies (NGAs) in planning, coordinating, and delivering services to local government units (LGUs). At the local level, provincial, municipal, and city LGUs will perform decentralized functions based on the Local Government Code (LGC) of 1991 and the Mandanas Ruling. This Chapter now presents how national and local functions will be collaboratively and systematically planned and delivered during the life of NAFMIP, based on the complementary functions shown in the box. The following sections will juxtapose **rowing** with the related **steering** functions, to facilitate central-local coordination of services planning and delivery.

Noteworthy in the NAFMIP transformative planning approach is the provision of "production support services" defined to cover: (1) production inputs such as seeds and fertilizer (including organic); and (2) smallholder farmer and artisanal fishing machinery, equipment, and tools. While this particular function comprises the bulk of highly visible services and interventions being dispensed from the central level, responsibility for this was devolved to the LGUs over 30 years ago by the Local Government Code of 1991. *NAFMIP highlights the importance of enabling LGUs to finance, package, and effectively deliver well-planned production support to smallholder farmers and fisherfolk. Meanwhile, DA and central agencies must focus on more strategic policy, regulatory, capacity development, and other enabling functions.*

Functional Planning to Achieve Sector Outputs

Essentially, Functional plans manifest the types, range, mix and scale or magnitude of facilities and services necessary for agri-fisheries to industrialize. Each of the steering and rowing functions listed in Box 1 links directly to one or more of the six sector outputs that NAFMIP aims to deliver. In terms of the NAFMIP logframe, steering functions will define the central level operating units' Sub-outputs; while rowing functions, the LGU level Sub-outputs. Figure 6.1 shows how steering and rowing functions work together to achieve one or more of the six sector-wide Outputs.

Figure 6.1: Sector Outputs, Steering Roles, and Rowing Functions: One-to-Many Relationships



Strategies and Interventions

Functional Planning, and particularly the preparation and refinement of detailed operational plans by the concerned agencies and offices, will be guided by transformative strategies shown in Table 6.1.

Table 6.1. Transformative Strategies to Guide Functional Planning

TRANSFORMATIVE STRATEGIES IN FUNCTIONAL PLANNING	ILLUSTRATIVE INVESTMENTS AND INTERVENTIONS
1. Integration of commodity systems and functional planning	• Re-orientation of all steering and rowing functions toward commodity systems approach • Plans and budgets covering two or more commodities
2. Integration of spatial planning and functional planning	• Packaging of facilities and services based on AFIBC, FMA, ARC, IP community, SAFDZ, and other spatial/ *agropolitan* (peri-urban) frameworks, to optimize synergistic agglomeration/ concentration benefits
3. Whole-of-nation approach to functional planning	• Beyond enhancing DA-LGU coordination in services delivery, integrate fully with other service providers such as private firms, academe and NGOs (e.g., "pluralistic R&D")
4. Further devolution of services delivery, and full devolution by end of the NAFMIP implementation period	• Joint DA-LGU preparation and implementation of Service Delivery Transition Plans to avoid gaps in services delivery (including funding and packaging of production support to smallholder farmers and fisherfolk) • Progressive enhancement of services delivery capacities and efficiency under decentralized set-up
5. Follow through on investments promotion including Ease-of-doing business initiatives	• Passage of game-changing legislation to incentivize private investments ○ By Congress ○ By *Sanggunians* at all LGU levels
6. Democratization of e-marketing, information and other digital platforms	• Direct online selling by farmers' groups of food system products, inputs and services • Development of smallholder farmer- and fisher-dedicated e-marketing platforms
7. Restructuring of exports toward high value products	• Promotion of manufactured rather than raw material exports • Leveling up of products standards enforcement and reporting including biosecurity
8. Multi-risk proofing of service and food delivery systems	• Upgrading of infrastructure standards and unit cost estimates to cover resilience-enhancing design features • Joint institutional arrangements among NGAs and LGUs including law enforcement units • Leveling-up African swine fever (ASF) measures such as establishment of quarantine area and local supply of vaccine for ASF
9. Mainstreaming of social and environmental safeguards in	• Functional plans to disaggregate target beneficiaries by sex, ethnicity and age group to capture the youth sector

TRANSFORMATIVE STRATEGIES IN FUNCTIONAL PLANNING	ILLUSTRATIVE INVESTMENTS AND INTERVENTIONS
decentralized service delivery systems	• Plan impact evaluations to differentiate according to social and environmental criteria including biodiversity and sustainable land and water management
10. Support to structural transformation in value chains	• Farmer- or fisher-owned value-adding centers in urban and agropolitan (peri-urban) areas, specializing on: o Controlled environment production such as soilless agriculture, dairy production without animals o Processing o Marketing/ trading o Waste recycling

Policies, Plans, Advocacy, and RBME; Regulations and Standards

Strategic Objective
Establish clear, cohesive, and enabling policy, planning, and regulatory frameworks to guide whole-of-nation concerted action toward agri-fishery industrialization (”mass cooperation”)

Basic Interventions
1. Enabling environment review and assessment, policy and executive-legislative agenda-setting, and policy formulation;
2. Sector-level planning cycle management (plan formulation, performance management, updating);
3. Regulations and standards evaluation and updating to support policy directives and international trade agreements;
4. Greater emphasis on sustainable land and water policies and planning based on carrying capacity and biodiversity studies.

DA Cluster
PRS, PMS, PDS, RFO PMED, BAI, FDC, PRDP, BFAR, OURI, OASR, BAFS, others as needed

Partners
Including but not limited to Congress, AFCs, NCI, DAR, DENR, DOH, DTI, DILG, DHSUD, NAPC, LGUs, business groups

Central Steering Role

DA and national government agencies with related mandates will closely coordinate in formulating and ensuring coherence of polices and plans, related advocacy campaigns, and results-based monitoring and evaluation (M&E). DA, DAR and DENR will continue use the rural convergence platform for services delivery. DA will reach out to the other concerned agencies including but not limited to DOH, DTI and DILG.

The national Steering functions will include but will not be limited to the following services:

1. Setting directions toward agri-fishery industrialization and modernization during the plan implementation period

2. Preparing and periodically updating commodity system-based roadmaps and other operational plans aligned with NAFMIP as directional plan, including integration of food security and nutrition security
3. Preparing executive and administrative orders and issuances to operationalize NAFMIP transformative strategies
4. Enhancing and updating agri-fishery regulations and standards in support of transformative strategies in the context of a global economy
5. Supporting international agreements on related trade and standards
6. Preparing and promoting Legislative Agenda supporting and financing sector transformation, innovations, commodity system diversification, and other transformative strategies
7. Conducting and disseminating commodity system-oriented value chain studies; project feasibility studies; and other studies to incentivize agri-fishery industrialization investment
8. Developing ICT applications to continually raise the quality of policy, planning, M&E, and setting regulations and standards
9. Holding periodic stakeholder consultations to freely discuss NAFMIP implementation progress and concerns
10. Mobilizing resources from the Philippines (including PPP-types) and international sources

Local Rowing Functions

Complementing the steering role of the Central level, the LGUs will continue to be responsible for enforcing policies, regulations, and product standards. Various LGU levels will coordinate to plan and deliver related services, with Steering—and eventually Enabling—support from DA and other agencies. Local functions will include, but will not be limited to, coverage of the services enumerated below.

The Local Government Code of 1991 serves as main reference for LGU functions in this chapter. Section 17 on Basic Services and Facilities provides that:

> "Local government units shall discharge the functions and responsibilities of national agencies and offices devolved to them, including exercising other powers and discharging other functions and responsibilities as are necessary, appropriate, or incidental to efficient and effective provision of the basic services and facilities."

LGUs are responsible for policy, planning, and related functions including but not limited to the following:

Cross-cutting LGU Levels

1. Aligning/integrating local plans with NAFMIP as directional plan
2. Issuing executive and administrative orders to officialize adoption of NAFMIP planning and implementation frameworks, strategies, and guidelines
3. Enacting ordinances and resolutions to enhance the environment for agri-fishery industrialization including major private investments
4. Enforcing policies, regulations, and standards based on central level issuances and guidance

Provincial

1. Coordinating with cities and municipalities in agri-fishery planning, program and project implementation, and M&E
2. Conducting periodic stakeholder consultations including investment forums

Municipal and barangay

Coordinating with provinces and cities in agri-fishery planning, program and project implementation, and M&E

City

1. Coordinating with provinces and municipalities in agri-fishery planning, program and project implementation, and M&E
2. All other related services and facilities of the municipality and province

Policy, Planning and Regulatory Services

NAFMIP will pursue policies, plans and regulations to enable the sector to leapfrog from, rather than simply build on, previous AFMPs. “Leapfrog planning” is founded on the realization that “agri-fishery modernization”—as called for under the Agriculture and Fisheries Modernization Act (AFMA) of 1997—cannot be achieved using business-as-usual planning approaches. Rather, sector modernization will require no less than transformative planning that employs innovative sector development strategies, rather than incremental planning that only builds on previous sector planning efforts. NAFMIP will pursue the “Agro-Industrialization Pathway to Sector Modernization.”

As part of transformative-leapfrog planning, NAFMIP will operationalize spatial planning, taking off from the DA’s Agriculture and Fisheries Industrialization Business Corridor (AFIBC) (economic zone) approach. A “business corridor” will be a designated geographic area (provincial or inter-provincial) where: (1) large agri-fishery industrialization investments (each “hub” valued at least PHP100 million), and focusing on profitable value chain segments, will be located; (2) organized clusters of smallholder farmers and/ or fisherfolk will be linked (e.g., for raw materials supply) to promote broad-based growth; and (3) DA, other national agencies, LGU, private sector, and other support services will converge. The agri-fishery corridors and hubs already identified by DA will be supplemented by others to be recommended by planners at all levels. Spatial planning will be coordinated with existing economic zone authorities.

The NAFMIP Integrated Spatial Planning Framework (ISPF), combined with the commodity systems approach, will boost potential impacts of facilities and services to be delivered over the course of NAFMIP implementation. The spatial framework combines edaphic, agro-climatic, socio-economic, and sustainable land management (SLM) criteria as bases for determining the preferred location of agri-fishery investments and interventions. NAFMIP further adds sustainable water resource management criteria to sustain the carrying capacity and biodiversity of coastal areas, lakes, and other water resources to sustain long-term production.

Investment Programming Services

Investment programming, understood as the process of rational listing of programs, projects, and activities (PPAs) to be undertaken within the short- and medium-term, will be enhanced under NAFMIP. Under a whole-of-nation approach, investment programming takes on new challenges transcending traditional sources. As above discussed, DA and other NGA investments in "steering functions" are expected to rise significantly alongside a decline in central level investments in "rowing functions" long devolved to LGUs. Central vs. local expenditure patterns will progressively conform with devolution policy.

The distribution of investment resources across AFMA components has remained practically the same over the years, with the DA allocating a major share for production support services combined with agricultural machinery and facilities. Over the period of NAFMIP implementation, expected major shifts will include:

1. Sizeable increases in DA budget and investments to support agribusiness and market development;
2. Appreciable allocations in Policy, Planning and Advocacy Services particularly to support NAFMIP implementation consultations and reporting to multisector stakeholders, and performance monitoring and evaluation;
3. Continuing significant downward trend in the DA budget and investments for production support services, and consequently, a corresponding increase in LGU fund allocations for these;
4. Marked increases in LGU budget and investments in irrigation, postharvest facilities, farm-to-market and coastal areas-to-market roads, and agri-fishery equipment and facilities;
5. Substantial increases in provincial LGU budgets for research, extension, and training for development.

Along with increases in LGU investments in the agri-fishery sector, larger private sector investments are also expected to be incentivized.

Project Development Services

Project development, understood to mean the process of translating and operationalizing NAFMIP directional priorities into more specific and fundable project proposals, encompasses project identification and assessment based on feasibility criteria, and project packaging tailored to the target source of financing. It often requires strong technical and coordinative support from the central level, due to the analytical skills and costs involved in the process of generating, processing, vetting and eventually, packaging data in the form of a project study.

At DA central, the Project Development Service (PDS) serves as focal point for coordinating and guiding, as well as for fund sourcing. The NAFMIP's whole-of-nation approach will significantly enlarge the PDS' coordinative and capacity building role to more closely liaise with other National Government Agencies (e.g., DTI, BOI, PEZA, PPP Center) and LGUs, and to accentuates its resource mobilization role to draw a "transformative" magnitude of investments from Philippines and international private investors.

Within DA, the PDS will continue to closely coordinate with the Investment Programming Division of PMS. This would strengthen the strategic links between proposed projects and medium-term and annual Investment Programs. In addition, PDS will coordinate closely with DA operating units expected to be directly involved in project implementation in order to

address if not minimize the gap between anticipated project implementation requirements and current actual implementation capacities.

Over the 10-year life of NAFMIP, project development as a Functional Service will involve delivering four major types of inter-connected services: (1) training on project development and management; (2) actual preparation of project pre-feasibility studies; (3) reviews and enhancement of project designs, including logframes based on established guidelines; and (4) project resource mobilization.

Training Services

PDS will continuously enhance capacities on project development, management, and results-based monitoring and evaluation. It will organize/ coordinate/deliver short-term training for DA OSEC units (including PDS itself for refresher/ updated content), bureaus, agency corporations; and equally important under decentralized sector, training tailored to LGUs. The training objective is to provide project development knowledge and skills at par with global quality standards. Training content and delivery should match the transformative types and large scale of projects prioritized under NAFMIP. Training success will be measured by the quality of project studies—aiming to achieve a balance of commodity system-based projects—crops, livestock and poultry, and fishery. PDS will include in its budget resources to outsource standardized training packages, both for face-to-face delivery, as well as for on-line delivery.

Study Preparation Services

With PDS serving as focal unit, project studies will be conducted either internally within DA and other NGAs, or outsourced using annual budgets allocated for this purpose. PDS will build on its long experience in project development to guide development of transformative and large-scale projects. To incentivize private investors, LGUs, and other development partners, PDS will take the initiative to prepare pre-feasibility studies (FS) on commodity system-based projects to be located in areas identified through the NAFMIP Integrated Spatial Planning Framework. The list of projects for which a pre-FS will be conducted will be based on a Project Development Agenda resulting from consultation and advocacy forums discussed below. The pre-FS will be presented in similar consultation and advocacy forums to be jointly organized by PDS, DA Communications Group, and other concerned DA units.

Review/Enhancement of Project Design Services

With PDS at the helm, all locally-funded projects for implementation by DA Operating Unit will be reviewed for consistency and *evaluability* prior to actual implementation to ensure that the project outputs, outcomes and impact of said projects add significant value to the overall NAFMIP outcomes and goals.

Resource Mobilization Services

Successful NAFMIP implementation will be driven by the magnitude of resources that DA—and the rest of the nation—can mobilize to support the desired transformation of the agri-fishery sector. Thus, the NAFMIP Communication Program includes forums to engage with multisector stakeholders about progress and constraints to implementation. PDS will continue to conduct periodic development partners' meetings as well as forums on public private partnership (PPP)—in Manila and in the regions. The DA Information and Communication Technology (ICT) Service will enable foreign investors to participate in these forums online. The pre-FS discussed above will be presented as part of the agenda and posted on the DA, DTI, BOI, PEZA, PPP Center, and other websites.

Results-Based Monitoring and Evaluation

Results-based monitoring and evaluation (RBME), within the NAFMIP context, refers to the systematic and interconnected approach applied to the consistent tracking the performance of development program and project (including all kinds of interventions) and the assessment and evaluation of their respective achievements expressed as outcomes and impacts. To attain optimal development results, RBME advocates strong results-orientation and robust interconnection among functions, particularly: planning, budgeting, implementation, monitoring, and evaluation. Installing a strong RBME system would enable DA to shine equal focus on monitoring sector performance rather than mainly on spending and on evaluating outcome and impacts (10-year results) beyond outputs (three-year outputs).

RBME, i.e., ensuring the delivery of science-based/evidence-based results, is widely understood to be the responsibility of all top executives, senior managers, and even middle managers within the entire DA Family. At DA Central, the Planning and Monitoring Service (PMS) will serve as focal point for coordinating and guiding the various RBME initiatives. The PMS will initiate the series of activities designed to formulate, install, and operationalize the NAFMIP RBME System as outlined in Chapter 9 of this Plan. The NAFMIP RBME System follows a value-chain approach that starts with identifying input requirements (e.g., budget and people) up to communicating and using evidenced-based results. It includes, among others, formulation of a NAFMIP RBME Roadmap in keeping with a whole-of-nation approach; a NAFMIP RBME Institutional Arrangement that advocates participation and inclusiveness; and NAFMIP Implementing Guidelines for the use of M&E budget and creation of the NAFMIP RBME Unit.

Credit, Insurance, and Financing Facilities

Strategic Objectives
Adapt/adjust credit, insurance, and financing policies and facilities to:

1. Match the commodity systems/commodity and product diversification-oriented approach, *in lieu* of the single commodity approach;
2. Better suit rural, smallholder farmer/fisher culture and behavior ("less formal requirements to access formal credit"); and
3. Support large-scale financing requirements of the private sector to participate in agri-fishery industrialization.

Basic Interventions

1. Evaluate and adjust policies, programs, and projects to support agri-fishery industrialization;
2. Facilitate to enable substantial improvements in access to facilities and services; and
3. Develop innovative/new financing instruments/products to respond to risks from climate, plant and animal diseases, and threats to human health.

DA Cluster
ACPC, PCIC, RFOs, others, as needed

Partners
Including but not limited to government and other financing institutions, AFCs, commercial banks, NAPC, LGUs, bankers' associations

Credit, insurance, and financing facilities are financial products offered to agricultural producers for various purposes. Credit and financing facilities grant producers access to

additional capital in order to improve production and output. These products take the form of loans and subsidies, and are available through formal credit providers such as universal and thrift banks, rural and cooperative banks, and government financial institutions (GFIs).

On the other hand, insurance facilities are tools that hedge against the risk of profit loss from various threats to production, such as natural disasters, plant diseases, pest infestations, etc. Agricultural insurance products are available through the Philippine Crop Insurance Corporation, as well as private insurance providers.

Central Steering Role

DA and particularly ACPC and PCIC will plan and deliver credit, insurance, and financing facilities supporting NAFMIP frameworks and strategies. Foremost will be adjustments to allow credit, insurance, and financing facilities to: (1) cover commodity systems/ diversified farming and fishing, rather than single commodities; (2) support large agri-fishery industrialization investments of PHP 100 million and above; and (3) further enhance smallholder farmer and fisherfolk protection from crop/ livelihood damage or failure from climate events, pests and diseases, and other risks. The concerned DA agencies will work closely with the afore-enumerated credit providers.

The national steering functions will include but will not be limited to the following services:

1. Assessing loans, credit, insurance, and financing portfolios to effectively support innovative frameworks and strategies in NAFMIP
2. Developing credit, insurance, and financing policies and facilities geared toward sector-wide transformation for inclusive agri-fishery industrialization and modernization
3. Pursuing weather-based insurance potentials
4. Identifying, developing, negotiating, and financing:
    - Agri-fishery industrialization large private sector projects to be located in AFIBCs
    - Farmers' and fisherfolk's diversification in high-value segments of target commodities
    - Development of adequate formal credit products and protocols better suited to the "financing culture" of farmers and fisherfolk (e.g., very simple requirements, less formal, more personal, etc.)
    - Massive loan and financing syndication reflecting the magnitude of resources required for sector transformation over the plan period
5. Advocating financing programs for farmers and fisherfolk

Local Rowing Functions

LGUs will continue to enhance performance of credit, insurance and financing facilitation services complementing the development of said facilities at the central level. Various LGU levels will coordinate to plan and deliver related services, with **steering**—and eventually **enabling**—support from DA and other agencies. Local functions will include but will not be limited to the following services:

Cross-cutting LGU levels

1. Facilitating credit, insurance, and financing
2. Enacting ordinances and resolutions to enhance the environment for financing agri-fishery industrialization including: (a) smallholder farmer and fisher level diversification and income protection; and (b) major private investments located preferably within AFIBCs

Provincial

1. Coordinating with cities and municipalities in facilitating credit, insurance and financing
2. Toward enhancing access to credit, insurance, and financing, assistance in organizing farmers' and fisherfolk's cooperatives and other collective organizations

Municipal and City

1. Coordinating with provinces in facilitating credit, insurance, and financing
2. All the services and facilities of the municipality and province

Outcomes

The outcomes that NAFMIP 2021-2030 will strive for in the area of credit, insurance, and financing are two:

1. Increased access to formal credit and financing of smallholder farmers and fisherfolk (SFF)
    a. Higher bank compliance to the Agri-Agra Law, lower bank penalties
    b. Share of SFF in agricultural loans granted (in %)
    c. Micro-agricultural loans granted by universal and thrift banks (in %)
2. Agricultural and fisheries insurance expanded as a social protection mechanism
    a. Share of SFF and land area insured
    b. Number of claimants and indemnity paid
    c. Number of risks covered by agricultural insurance
    d. Number of relevant insurance products in the market
    e. Expanded market reach of the PCIC as an agricultural insurance regulator

Developing credit, insurance, and financing facilities will aid in expanding the agricultural sector via increasing investment in granting producers access to additional credit and financing as support to production. Moreover, agricultural risks will be managed through the development of insurance programs and services. The Department of Agriculture's coverage in the development of facilities include:

1. Agriculture Modernization Credit and Financing Program
2. Agri-Agra Law implementation monitoring
3. Weather Index Based Crop Insurance development
4. Registry System for Basic Sectors in Agriculture (RSBSA)
5. Agricultural Value Chain Facility Framework development
6. Assessment and monitoring of credit, insurance, and financing facilities
7. Institutional and capacity building in the LGU-level

The strategies toward the NAFMIP outcomes outlined are detailed in Table 6.2.

Table 6.2: Strategies toward NAFMIP Outcomes in Credit, Financing, and Insurance

OUTCOMES	STRATEGIES
Credit and financing	
Increased access to formal credit and financing	1. Develop and improve credit and financing programs that cater to different types of agricultural producers across the entire value chain through the AMFCP 2. Assess and monitor existing credit and financing programs and facilities under the Department of Agriculture; address potential gaps, challenges, and lessons learned from these programs for more effective and efficient implementation 3. Improve agricultural microcredit policies by conducting research studies on consumer behavior (employing needs-based assessment) and leveraging on the successes and lessons documented related to the conduct of microfinancing, both locally and globally 4. Expand the reach of the Registry System for Basic Sectors in Agriculture (RSBSA) to increase regional information on the agricultural financial market 5. Enhance the RSBSA to include additional information on borrower profile, including but not limited to socio-demographic variables/factors 6. Strengthen through institutional capacity building for viable organizations and LGUs as lending conduits able to access and manage credit support for the agri-fishery sector 7. Incorporate agricultural credit to financial technology, particularly digital wallets and e-payment systems, for wider and more efficient credit access 8. Improve financial literacy among SFFs through learning programs led by and or in partnership with the private sector 9. Relaxing requirements that impede SFFs from availing financial products 10. Promoting non-collateral-based loans sand financial products 11. Establishing and strengthening a set of targeted incentives for financial institutions that cater to SFF market
Insurance	
Agricultural and fisheries insurance as a tool to mitigate risks against agricultural production	1. Expand insurance coverage that provides protection against weather and exposure to other risks of crops and produce, farm and fishery machinery and equipment, work and farm animals, fisheries, and other non-crop agricultural assets 2. Work with government financial institutions such as the Land Bank of the Philippines, to encourage competition within the agricultural insurance market 3. Develop life and health insurance products that cater to SFFs 4. Provide full premium subsidy to the agri-fishery sector listed in the RSBSA, with emphasis to SFF market

Agribusiness and Market Development

Strategic Objectives

1. Promote large-scale investments (PHP100 million and above) in profitable segments of target value chains;
2. Promote export of processed/manufactured agri-fishery high-value products; and
3. Maximize online platforms to integrate Philippine suppliers with local and international markets and value chains.

Basic Interventions

1. Organize face-to-face and online forums bringing together Filipino and international players in various value chains;
2. Facilitate to enable substantial improvements in access to market development facilities and services; and
3. Develop ICT applications to support a wide range of market development interventions.

DA Cluster

AMAS, BFAR, ICTS, ATI, RFO AMAD, others as needed

Partners

Including but not limited to NFA, DTI, DOST, AFCs, LGUs, Philippines and international business groups

In the AFMP 2018-2023, one of the sectoral outcomes is to broaden farmers' and fisherfolk's access and participation in value chain development. Based on previous learnings and challenges, this is in line with one of the intervention themes identified: agribusiness and agripreneurship (2018-2023 AFMP). First, the value chain must be clearly and well defined, identifying where traditional producers, farmers and fisherfolk can participate. Improving their financial capacity, technical know-how, organizations, and market linkages follow. All these help in tapping market potentials and maximizing societal welfare. "Farmers and fisherfolk can benefit from the increased capacity of the chains to monitor markets and respond innovatively to changing conditions and requirements" (2018-2023 AFMP).

Central Steering Role

DA and particularly AMAS at the central level and the AMADs at the regional level, will lead in planning, implementing/delivering and coordinating agribusiness and market development services. DA will liaise with DTI, agribusiness groups, business chambers, and other public and private stakeholders. Service delivery mechanisms will highlight adaptation of existing and planned electronic platforms as vehicles for domestic and international marketing.

The national steering functions will include but will not be limited to the following services:

1. Support construction, operation and maintenance of market- based green infrastructure and facilities strategically located based on the NAFMIP integrated spatial planning framework;
2. Organize Philippines and international market matching using face-to-face and electronic platforms;
3. Establish, operate and maintain e-Commerce platforms accessible to smallholder farmers and fisherfolk;
4. Conduct and disseminate:

- Public-funded investment opportunity studies (e.g., feasibility studies, updated value chain analyses) relevant to the shift to agripreneurship in high-value segments of target commodities,
- Project feasibility studies to support micro, small, and medium agribusiness enterprise development; and

5. Facilitate support to establishment and registration of agri-fishery SMEs.

Local Rowing Functions

The fundamental role of LGUs in agribusiness and market development is to link smallholder farmers and fisherfolk to agriculture and fisheries industrial business corridors (AFIBC) and markets. Various LGU levels will coordinate to plan and deliver related services, with **steering**—and eventually enabling—support from DA and other agencies. Local functions will include but will not be limited to the following services:

Cross-cutting LGU Levels

1. Issue executive or administrative orders supporting LGU adoption of NAFMIP agribusiness and market development frameworks and strategies
2. Enact ordinances and resolutions to enhance the environment for agri-fishery industrialization including major private investments

Provincial

1. Construct or rehabilitate infrastructure to support agribusiness and market development such as provincial roads and bridges, flood control facilities, and irrigation systems
2. Coordinate with cities and municipalities to synergize inter-LGU level support of agribusiness and market development
3. Toward agribusiness and market development, assist in organizing farmers' and fisherfolk's cooperatives and other collective organizations

Municipal

1. Coordinate with provinces and cities on interventions aimed at agribusiness and market development
2. Extension and on-site research services and facilities related to agriculture and fishery activities
   a. Dispersal of livestock and poultry, fingerlings, and other seeding materials for aquaculture palay, corn, and vegetable seed farms for purposes of enterprise development
   b. Medicinal plant gardens as household or enterprise;
3. Public markets, slaughterhouses and other municipal enterprises

City

1. Coordinate with provinces and municipalities in agribusiness and market development
2. All the services and facilities of the municipality and province

Outcomes

Specifically, the following are the outcomes under the 2018-2023 AFMP AMD Services to "provide or facilitate activities and services that support or promote the entry, sale, and consumption of agricultural and fisheries products and by-products in domestic and international markets":

1. Domestic market matching/linkage between agribusinesses and farmers and fisherfolk intensified
   - Farmers/fisherfolk (individuals) linked/subcontracted by traders, processors, exporters, etc. increased (no.)
   - Beneficiary farmers/fisherfolk, enterprises (groups) served (no.)
   - Resulting transactions increased (value)
2. Export market matching/linkage between agribusiness and farmers and fisherfolk with exporters intensified
   - Farmers/fisherfolk (individuals) linked to/subcontracted by traders, processors, exporters, foreign buyers, etc. increased (no.)
   - Farmers/fisherfolk, enterprises (groups) served (no.)
   - Resulting transactions increased (value)
3. Investment opportunities generated, facilitated and promoted to encourage agribusiness investments particularly in postharvest activities:
   - Storage, Processing, Packaging, Marketing (domestic and foreign)
   - Investment opportunities facilitated (no.)
   - Investment opportunities promoted (no.)
   - Beneficiaries served (no.)
   - Investors venturing in agribusiness increased (no. and value of investment, disaggregated by value-adding activity)
4. Smallholder farmers and fisherfolk engaged in agripreneurship increased
   - Smallholder farmers/fisherfolk with access to market increased (%)

Aside from DA-AMAS, the implementing units involved in AMD Services are: DA Regional Field Office (RFO)-Agribusiness and Marketing Assistance Division, DA-Information and Communications Technology Service, Bureau of Agricultural Research (BAR), Agricultural Training Institute (ATI), Local Government Units (LGUs), Philippine Chamber of Commerce and Industry (PCCI), Philippine Statistics Authority (PSA), state universities and colleges (SUCs), Agriculture Development Council (ADC), Department of Trade and Industry (DTI), Department of Science and Technology (DOST) (2018-2023 AFMP).

With all of these in mind, there is a need to determine where we had been (based on AFMP 2011-2017, where we want to go (based on AFMP 2018-2023), and how we can further improve the ways in getting there in terms of market development services (MDS). This section is structured as follows: (1) the budget allocation for DA's market development services (2015-2020); (2) services and programs offered by AMAS and their accomplishments (2011-2017); (3) the potentials and strategies related to marketing and value chain (VC) development from the AFMP 2018-2023; (4) a discussion of the state of the various Philippine value chain studies, an identified strategy in agriculture sectoral development; (5) concepts and ideas in improving VCs in the country; (6) agro-industrialization strategies related to market development services aligned with DA's New Thinking; and (7) indicative policies and PPAs.

Accomplishments and Gaps in Agribusiness and Marketing Programs

This section gives the available data on MDS budget allocation from DBM'S General Appropriations Act (GAA) website; and AMAS services and programs, and their accomplishments as summarized in 2011-2017 AFMP Sectoral Assessment report.

DA Budget Allocation for Market Development Services

Under the Technical and Support Program of the DA's Office of the Secretary (DA-OSec) is the MDS Sub-program. Table 6.3 lists the available MDS GAA budget from 2015 to 2020.

Table 6.3: Market Development Service Budget Allocation (in Million PHP), by Type of Expense, by Program, and by Regional Field Office (RFO), 2015-2020

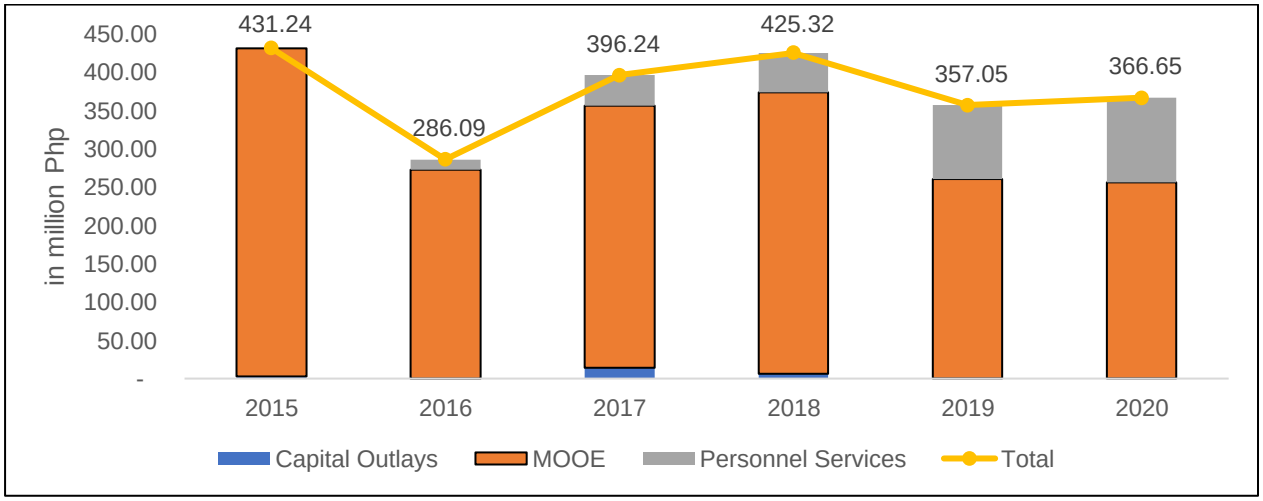
MDS GAA	2015	2016	2017	2018	2019	2020	AVE.
By Type of Expense							
MOOE	428.64	272.91	341.70	366.85	260.25	255.93	321.05
Personnel Services	-	13.18	40.42	52.05	96.64	110.57	52.14
Capital Outlays	2.60	-	14.12	6.42	0.15	0.15	3.91
Total	**431.24**	**286.09**	**396.24**	**425.32**	**357.05**	**366.65**	**377.10**
*By Program**							
Other Market Devt. Activities, n.e.c.	217.61	128.58	233.35	238.58	n.d.	n.d.	204.53
National HVC Program	105.75	78.91	70.20	73.46	n.d.	n.d.	82.08
Promotion and Devt. of Organic Agriculture	49.38	48.78	51.27	71.21	n.d.	n.d.	55.16
National Rice Program	18.14	16.72	24.57	24.92	n.d.	n.d.	21.09
National Livestock Program	17.34	6.84	9.71	9.88	n.d.	n.d.	10.94
National Corn Program	23.02	6.26	7.14	7.27	n.d.	n.d.	10.92
Total	**431.24**	**286.09**	**396.24**	**425.32**			
By DA Offices							
Central Office	137.28	93.22	102.75	113.89	64.15	71.29	97.10
RFO - CAR	12.09	13.70	26.65	33.20	26.87	25.4	22.99
RFO - I	11.29	13.69	16.99	21.42	12.72	18.89	15.83
RFO - II	14.44	11.84	22.38	21.82	24.44	23.45	19.73
RFO - III	11.15	13.37	18.72	19.24	24.96	24.08	18.59
RFO - IVA	18.39	8.30	18.42	17.59	17.25	18.32	16.38
RFO - IVB	40.92	14.04	29.10	30.18	25.76	24.38	27.40
RFO - V	19.14	19.99	22.44	32.26	24.47	23.67	23.66
RFO - VI	13.96	12.13	14.00	20.68	23.05	23.12	17.82
RFO - VII	8.92	9.41	18.48	19.35	17.19	17.65	15.17
RFO - VIII	10.75	10.26	10.17	17.98	13.77	13.27	12.70
RFO - IX	8.63	15.16	23.43	18.80	17.73	17.59	16.89

MDS GAA	2015	2016	2017	2018	2019	2020	AVE.
RFO - X	10.42	15.51	20.19	17.90	18.53	17.72	16.71
RFO - XI	82.37	9.02	14.91	16.55	17.02	17.50	26.23
RFO - XII	23.28	18.59	23.17	17.71	15.23	15.71	18.95
RFO - XIII	8.22	7.87	14.44	6.77	13.90	14.58	10.96
Total	**431.24**	**286.09**	**396.24**	**425.32**	**357.05**	**366.65**	**377.10**

* The annual average for MDS program was computed for the years 2015-2018 only. n.d.=no data. Note: There is no available data for MDS by type of expense, program, and region in the GAA from 2011 to 2014. Source: DA- OSec, GAA (DBM, various years).

In Figure 6.2, implementation of various market development activities (not under a specific program) occupied more than half (53%) of the MDS budget (Table 6.3 and Figure 6.2), on the average, from 2015 to 2018. In the same period, the average annual proportion relative to the MDS budget spent for high value crops (HVC) and organic agriculture was 22% and 15%, respectively. Both programs were flagship programs in the previous AFMP. The NAFMIP assessment report of Cororaton (2021) showed that one of the commodities with which the country had a revealed comparative advantage from 1996 to 2018 was edible fruit and nuts; peel of citrus fruit and melons. With relatively high cost and investment for organic agriculture, MDS is a much needed support since it remained a niche market. Interestingly, despite the government's focus on rice and corn particularly in the issue on food security and sufficiency, rice, corn, and livestock programs had relatively low MDS budget separately.

Figure 6.2: DA Market Development Service Program Budget, by Type of Expense, 2015-2020



Source: DA-OSec, GAA (DBM, various years).

Based on the data presented in Table 6.3, rice budget is increasing while budget shares for livestock and corn are declining. This has to be emphasized as this reflects the bias in the incentive system in agri-food. Overall livestock production is performing well relative to neighbors, yet its support is declining. Corn is input into livestock, and its shares are also declining. If one is serious in improving agri-food performance looking forward, this needs to be addressed in the plan.

Reforms in the incentive system involve reducing the relative price bias from agricultural commodities with comparative disadvantage to commodities with comparative advantage.

This is critical because financial resources are scarce; they need to be invested in commodities with the highest returns.

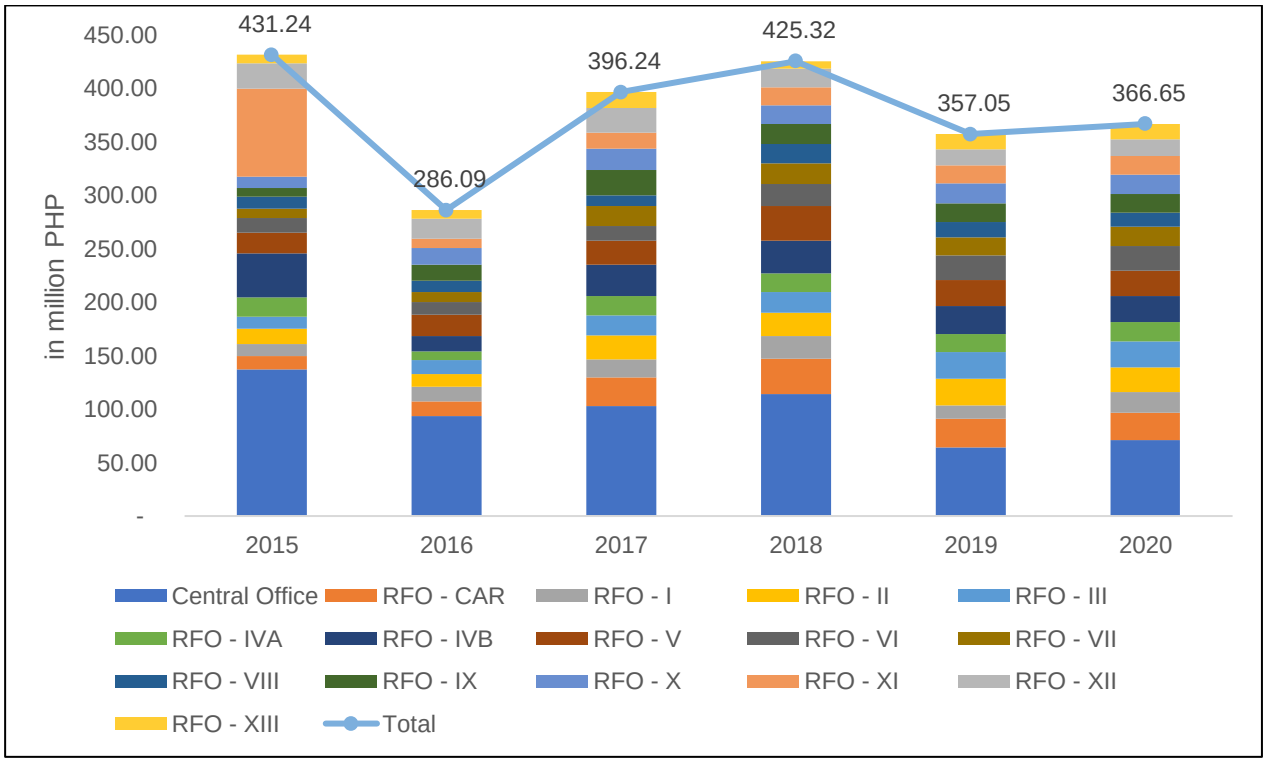
DA Market Development Service Programs, Accomplishments, Gaps, and Recommendations

The DA unit in charge of AMD is AMAS. Three divisions comprise the unit. They are Market Development Division (MDD), Agribusiness Promotion Division (APD), and Agribusiness Industry Support Division (AISD). DTI BSMED (2015) in Table 6.3 lists AMAS' programs for micro, small, and medium enterprises (MSMEs).

Figures 6.2 and 6.3 present MDS by type of expense (2015-2020), by regional field office (2015-2020) and by national programs (2015-2018), respectively. There is no available data for MDS by type of expense, program, and region in the GAA from 2011 to 2014.

From 2015 to 2020, the average annual budget allocated to MDS sub-programs was PHP377.10 million (Table 6.3) with most of the budget going to maintenance and other operating expenses (MOOE) (Table 6.3 and Figure 6.2). Although the MDS budget decreased in 2016, it recovered in succeeding years. Unfortunately, it did not reach as high as its 2015 level.

Figure 6.3: DA Market Development Service Program Budget, by Regional Field Office, 2015-2020



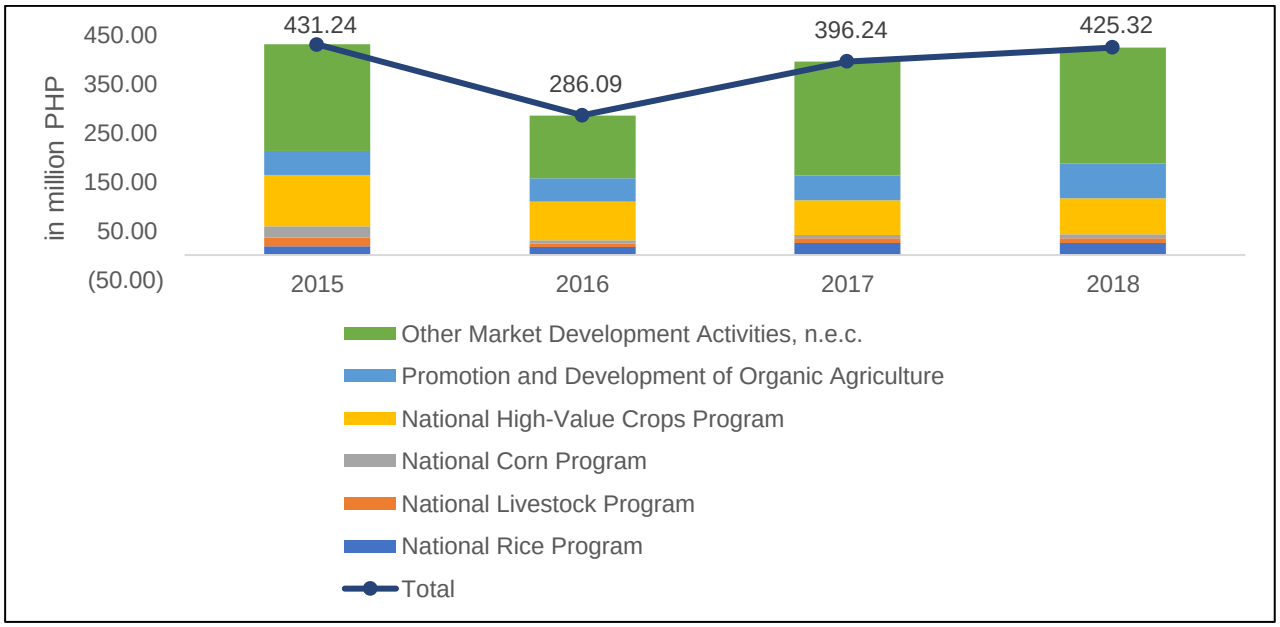
Source: DA-Osec, GAA (DBM, various years)

In terms of regional budget allocation from 2015 to 2020, National Capital Region (NCR) where the Central Office is located received the highest at PHP97.10 million, on the average (Table 6.3 and Figure 6.3). Completing the top five RFOs were: RFO-IVB (MIMAROPA) at a far second with PHP27.40 million, RFO-XI (Davao Region) in third with PHP26.23 million, RFO-V (Bicol Region) in fourth with PHP23.66 million, and RFO-CAR (Cordillera Administrative Region) in fifth with PHP22.99 million. RFO-IX may have received a substantial budget in

2015; but it significantly declined the following year, and it steadily grew from there. There is no MDS budget for RFO-ARMM/BARMM.

Implementation of various market development activities (not under a specific program) occupied more than half (53%) of the MDS budget (Table 6.3 and Figure 6.4), on the average, from 2015 to 2018. In the same period, the average annual proportion relative to total MDS budget spent for high value crops (HVC) and organic agriculture was 22% and 15%, respectively. Both programs were flagship programs in the previous AFMP. The NAFMIP assessment report of Cororaton (2021) showed that one of the commodities that the country had a revealed comparative advantage from 1996 to 2018 was "edible fruit and nuts; peel of citrus fruit or melons." With relatively high cost and investment for organic agriculture, MDS is a much-needed support since it remained a niche market. As earlier noted, rice, corn, and livestock programs had relatively low MDS budget separately despite the government's focus on rice and corn, particularly in the issue of food sufficiency and security.

Figure 6.4: DA Market Development Service Program Budget, by National Program, 2015-2018



Source: DA- Osec, GAA (various years)

Potentials and Constraints in Market Development Services toward Sector Transformation

This section shows the potentials, constraints and strategies identified in the various PRDP-funded value chains which were also summarized in the 2018-2023 AFMP. PRDP was a six-year project designed to establish the government platform for a modern, climate-smart, and market-oriented agri-fishery sector. The said program collaborated with the LGUs and the private sector in providing key infrastructure, facilities, technology, and information that will raise incomes, productivity, and competitiveness in the countryside (PRDP, 2021a).

Opportunities and Constraints

In identifying the various strengths, weaknesses, opportunities, and threats/constraints, value chain analysis can be used (see Chapter 5). As of 24 May 2021, 132 (out of 151) PRDP National Project Coordination Office (NPCO) value chain analyses (VCA) are already

approved (Table 6.4). Table 6.5 presents the common strengths, opportunities, and constraints identified among various commodities in the agriculture sector.

Table 6.4: VCA Summary by Status according to Region / Cluster as of May 24, 2021

CLUSTER	REGION	TOTAL NO. OF VCAs	STATUS OF VCAS		
			Ongoing Data Gathering/ Writing Of Report	For or Under NPCO Review For NOL	VCA Approved By NPCO (NOL Issued)
Luzon A	CAR	5	-	-	5
	Region 1	2	-	-	2
	Region 2	9	-	1	8
	Region 3	6	-	-	6
	Clusterwide	13	-	-	13
Sub-total		*35*	*0*	*1*	*34*
Luzon B	Region 4A	15	1	1	13
	Region 4B	16	1	1	14
	Region 5	17	-	5	12
	Clusterwide	4	-	-	4
Sub-total		*52*	*2*	*7*	*43*
Visayas	Region 6	11	1	-	10
	Region 7	8	-	2	6
	Region 8	6	-	2	4
	Clusterwide	3	1	-	2
Sub-total		*28*	*2*	*4*	*22*
Mindanao	Region 9	3	1	-	2
	Region 10	1	-	-	1
	Region 11	2	-	-	2
	Region 12	4	-	-	4
	Region 13	5	2	-	3
	ARMM	3	-	-	3
	Clusterwide	18	-	-	18
Sub-total		*36*	*3*	*0*	*33*
Total		**151**	**7**	**12**	**132**

Source: PRDP (2021b)

Outcomes and strategies

The AFMP 2018-2023: adopted two sectoral goals from the Philippine Development goals, namely, (1) expansion of economic opportunities for those engaged in producing agriculture, forestry, and fisheries (AFF) products; and (2) increased access of small and subsistence farmers and fisherfolk to economic opportunities. To achieve this in the NAFMIP 2021-2030, one of the three sectoral outcomes to serve as pathways is broadening the farmers' and fisherfolk's access and participation in value chain development. The five sub-outcomes under this MDS-related sectoral outcomes are:

1. Intensified market and industry linkage (export and domestic) with farmers and fisherfolk;
2. Increased access to innovative financing of value chain players;
3. Increased physical access to value chains (mainly farm-to-market roads);
4. Facilitated and generated agribusiness investments; and
5. Increased smallholder farmers and fisherfolk engaged in agripreneurship.

Table 6.5: Common Strengths, Opportunities, and Constraints among Various Agricultural Commodities

STRENGTHS	OPPORTUNITIES	CONSTRAINTS
Input Provision, Supply, Pre-Production		
• Available new and improved technologies particularly on planting materials	• PRDP and other grants provide grants in production and trading	• Limited technical information of government agencies on the commodity • Conversion of agricultural areas to real estate • Inadequate supply of good quality seedlings/planting materials • Lack of seedling production center • High cost of farm inputs • Improper handling of seeds • Lack of trained propagators and trainers • Adverse effect of climate change • Weak bargaining power • Insufficient feeds and water supply
Production		
• Existing and potential areas for the commodities • Third party certification on sustainability • Philippine land and climate suitable for growing product varieties • Year-round production technologies are available • NorMinVeggies: allowed family farmers to learn from independent farmers; quality assurance schemes, production schedules, traceability systems	• Growing need for plantation type approach to production • Introduce new approach in treatment of pests and diseases	• Growing need for plantation type approach to production • Introduce new approach in treatment of pests and diseases
Primary and Secondary Processing		
• Improved production, postharvest, and processing technologies are available	• Superior quality of some commodities • Some products offer zero-waste utilization	• High perishability of postharvest and processing technologies • High cost of investment • Use of chemicals in the processing of some materials in the factories • Limited drying and storage facilities

STRENGTHS	OPPORTUNITIES	CONSTRAINTS
		• Contaminated products with dirt, sand, and other foreign objects affecting quality • Decreased export demand due to bad publicity • Packaging does not meet standards of potential high-end market
Local Trading, Market		
• Existing quality standards • Stable domestic and global markets • Norminveggies: leveraged larger volumes and reliable quality to bypass various layers of traditional middlemen and engage directly with a range of markets	• Increasing awareness on green economy • Emerging new markets • Entry of new players, encouraging competition and pushing prices	• Poor farm-to-market roads • Poor condition of building and inadequate facilities • Far and crossing rivers • Lack of collective marketing system • Emergent substitutes for the product • Low level of consciousness on product quality and standards • Limited market information on industry products • Limited supply at the processing levels • Weak implementation of regulations
Final Sales, Logistics, Exporting		
• Strong linkage between and among industry players • Norminveggies: established consolidation center to improve efficiency	• Domestic market is vastly undersupplied • Impending global supply shortfalls on some products, demand on upward trend • Law stipulations on the use of specific domestic products	• Loose coordination among vc players • High transport cost • Stiff competition from other countries selling related products • Some products are not well-promoted in lowland areas • Imported products are cheaper

Source: various PRDP VCA and commodity roadmaps

Private Investments and Agri-Fishery Organizations

Strategic Objectives

1. Critically review and substantially improve the investment incentives and environment in agri-fishery sector;
2. Promote large-scale investments (PHP100 million and above) in profitable segments of target value chains;
3. Maximize online platforms to reach potential Philippine and international investors; and
4. Integrate into ATI and BAR of central support to LGU organizing functions

Basic Interventions

1. Strengthen investments incentives at central and sub-national levels;
2. Organize face-to-face and online investment forums (road shows, local and international fairs);
3. ICT-supported simplification of investment requirements and procedures;
4. Strengthen LGU cooperatives office; and
5. Mobilize organized farmers and fisherfolk in a large scale, inspired by local successes (e.g., Batangas SIDCI) and international models such as in Taiwan and Thailand.

DA Cluster

AMAS, ATI, BAR, PDS, ICTS, RFO AMAD, OUAIF, AFID, others as needed

Partners

Including but not limited to Congress, PPP Center, EPZA, economic zone authorities, DTI, BOI, AFCs, LGUs (Cooperatives office, *Sanggunians*), Philippines and international business groups

Central Steering Role

The types and magnitudes of transformative investments and interventions presented in NAFMIP pose a significant challenge to resource mobilization. Apart from public financing, different possible sources will be explored including international partners, Philippines and global capital markets, sale of assets, and so on. In this regard, DA will be responsible for the promotion of private investments, and relatedly, for organizing industry organizations in the agri-fishery sector. DA will collaborate with BOI, EPZA, PPP Center, and other national government agencies involved in incentivizing private investments. Equally important, DA and the Executive Branch will liaise with: (1) the Philippine Congress to review and strengthen laws to attract the types and magnitudes of investments necessary to industrialize and modernize the agri-fishery sector; and (2) agribusiness groups, business chambers, and large private investors.

The national **steering** functions will include but will not be limited to the following services:

1. Develop inter-agency and multisector investment programs, covering large projects for PPP or PPP-type funding
2. Support the establishment of market intermediaries impacting production decision-making, including commodity choice
3. Establish/strengthen electronic/ online platforms catering to potential Filipino and international investors and interested partner firms and individual businesspeople

4. Promote agribusiness enterprises to reliably supply quality inputs in local markets, especially in contexts where reliable access to quality, context-attuned technologies is poor or uncertain

Local Rowing Functions

The LGUs will complement DA and national agency efforts to deliver services promoting private investments and organizing industry associations in the agri-fishery sector. In parallel to central level initiatives, LGUs will engage with: (1) the *Sanggunian* to review and strengthen local ordinances and resolutions to attract the types and magnitudes of investments necessary to industrialize and modernize the agri-fishery sector; and (2) with local agribusiness groups, business chambers, and large private investors. Local functions will include but will not be limited to the following services:

Cross-cutting LGU Levels

1. Enact or strengthen local ordinances and resolutions to enhance the environment for agri-fishery industrialization including attracting major private investments
2. Pursue further steps toward ease-of-doing-business, e.g., online or face-to-face one-stop shops for potential Filipino and foreign investors

Provincial

1. Construct or rehabilitate infrastructure to support potential agri-fishery industrialization investments, such as provincial roads and bridges, flood control facilities, and irrigation systems
2. Enhance transportation and communication facilities and services
3. Assist in organizing and linking farmers' and fisherfolk's cooperatives and other collective organizations to investors
4. Investment support services
5. Facilitate credit access of target investors

Municipal

1. Coordinate with provinces and cities promoting private investments, and organizing and linking farmers and fisherfolk to investors
2. Information services which include investments and job placement information systems, tax and marketing information systems, and maintenance of a public library
3. Extension and on-site enterprise development services and facilities related to agriculture and fishery activities:
    a. dispersal of livestock and poultry, fingerlings, and other seeding materials for aquaculture palay, corn, and vegetable seed farms for business purposes
    b. development of medicinal plant gardens as livelihood enterprise
4. Public markets, slaughterhouses and other municipal enterprises

City

1. Coordinate with provinces and municipalities in programs to promote private investments linked to local agri-fishery organizations
2. All the services and facilities of the municipality and province

Infrastructure, Mechanization, and Facilities for Commodity Systems

Strategic Objectives

1. Critically review and substantially improve the investment incentives and environment in the agri-fishery sector;
2. Promote investments in large-scale infrastructure;
3. Climate- and crisis-proofing of infrastructure;
4. Shift to energy-efficient, repairable, and environment-friendly machinery, equipment and tools.

Basic Interventions

1. Convert/re-engineer commodity-specific infrastructure into commodity systems infrastructure, e.g., irrigation for farms combining rice and high-value crops, or cold storage facilities;
2. Accelerated development of commodity-neutral infrastructure;
3. Strengthen investments and incentives at central and sub-national levels; and
4. Local mass production of machinery, equipment, and tools by small and medium enterprises.

DA Cluster

BSWM, CRAO, PhilMech, PFDA, RFOs, others as needed

Partners

Including but not limited to Congress, PPP Center, EPZA, economic zone authorities, NIA, DOST, DTI, BOI, LGUs (Cooperatives office, *Sanggunian*), Philippines and international business groups

Central Steering Role

The core function is to construct and establish infrastructure and facilities to support agri-fishery industrialization and modernization. In this regard, DA and DPWH will continue to collaborate in planning and providing farm-to-market infrastructure, as well as coastal/ fishing area to market infrastructure—plus other types of infrastructure and facilities discussed in NAFMIP. NAFMIP will include two main innovations: (1) infrastructure will be commodity-neutral to the extent possible, in line with the commodity systems approach; and (2) infrastructure investments will be prioritized geographically using the NAFMIP integrated spatial planning framework.

The national steering functions will include but will not be limited to the following services:

1. Focus locating infrastructure and facilities based on regional spatial planning framework
2. Institutionalize geotagging to monitor the construction and inventory of infrastructure
3. Enhance climate-proofing of infrastructure facilities so that these are fully functional throughout crisis and emergencies
4. In relation to LGU responsibilities, ensure enforceable agreements with local authorities regarding operation and maintenance of completed infrastructure and facilities
5. Mainstream successful/ viable national-local cost-sharing schemes for infrastructure and facilities

The return of the NIA to the DA on 25 April 2022 augurs well for multi-dimensional diversification discussed in Chapter 4. In terms of irrigation management, the appropriate

operational adjustments will be reflected in the National Irrigation Master Plan. Expected adjustments will include: (1) retrofitting existing systems to serve two or more crops; (2) constructing new irrigation systems to cope with the expected surge in the number and area covered by diversified farms; and (3) developing modern, variable-scale, energy-efficient, and sustainable irrigation systems. NIA's return to the DA is further discussed in Chapter 8.

As commodity system value chains are developed to become more efficient and inclusive over the Plan period, corresponding investments and interventions will be provided to enhance infrastructure and modernize transport and logistics support. The aim is to provide a "nationwide mobility backbone" consisting of an integrated network of aviation, maritime, rail, road, and indigenous services and facilities that will enable and then accelerate sector transformation (Table 6.6).

Table 6.6: Framework for Integrating Infrastructure, Transport, and Logistics
(NAFMIP Preparation Team, 2022)

LOGISTICS INFRASTRUCTURE			LOCAL MARKET AND INDUSTRY SUPPORT		
	Aviation	Logistics by air and aviation-related commodities movement		Corridor and route	Regional clusters composed of trade routes connecting production areas with intra logistics corridors
	Maritime	Logistics by water and allied services by sea including inland waters, canals, channels		Facilities, machinery, equipment (FME)	Pre- and postharvest provisions to ensure food production, harvest, and processing for distribution
	Rail	Logistics by dedicated railroad, surface-type, elevated, underground (subway), or combination including monorail and cable-type trains		Farm-to-market road (FMR)	The road which connects the production areas to the trade hubs, market, consumers, or food processing areas
	Road	Logistics by (surface) road infrastructure		Food terminal	Large-scale barn for regional hub and/or cluster-wide warehouse for commodities
	Other modes	Logistics by air and aviation-related commodities movement		Storage	Barns or warehouses near the production areas that include dry chain and cold chain facilities
	Digital infra	Logistics by air and aviation-related commodities movement		Others	Non-infrastructure or non-physical support systems to boost marketability

Local Rowing Functions

The LGUs will complement DA and DPWH services in providing infrastructure and facilities—as well as production and post-harvest machinery and equipment—by ensuring proper, timely, and sustainable operation and maintenance thereof. LGU responsibility will cover O&M of production and post-production machinery and equipment. This responsibility will be covered in enforceable agreements covering national and local cost-sharing schemes. Local functions will include but will not be limited to the following services:

Cross-cutting LGU Levels

1. Align/integrate LGU service delivery plans with NAFMIP as directional plan
2. Issue executive or administrative orders to prioritize LGU support to the agri-fishery sector as basis for national-local cost-sharing schemes
3. Enact ordinances and resolutions to ensure financing the operation and maintenance of completed infrastructure and facilities

Provincial

1. Operate and maintain production and post-harvest Infrastructure, facilities, machinery and equipment to accelerate agri-fishery industrialization such as provincial roads and bridges, flood control facilities, and irrigation systems
2. Coordinate with cities and municipalities in O&M of Infrastructure and facilities, machinery and equipment
3. Assist in organizing farmers' and fisherfolk's cooperatives and other collectives/ organizations to participate in community-level O&M of production and post-harvest infrastructure, facilities, machinery, and equipment

Municipal

1. Coordinate with provinces and cities in O&M of production and post-harvest Infrastructure and facilities, machinery and equipment
2. Operate and maintain:
    a. Fruit tree, coconut, and other kinds of seedling nurseries;
    b. Demonstration farms;
    c. Inter-barangay irrigation systems;
    d. Water and soil resource utilization and conservation projects; and
    e. Enforcement of fishery laws in municipal waters including the conservation of mangroves.
3. Operate and maintain:
    a. Municipal roads and bridges;
    b. Communal irrigation, small water impounding projects, and other similar projects;
    c. Fish ports;
    d. Rainwater collectors and water supply systems;
    e. Seawalls, dikes, drainage and sewerage, and flood control.
4. Public markets, slaughterhouses and other municipal enterprises

City

1. Coordinate with provinces and municipalities in agri-fishery planning, programs, and project implementation and M&E
2. All the services and facilities of the municipality and province

Capacity Development

Strategic Objectives

1. Develop knowledge, skills and attitudes matching the desired paradigm shift, i.e., changes in the way we think and act, following the NAFMIP Integrative Food and Nutrition Security Paradigm;
2. Review organizational structures and relationships toward adjusting as appropriate to NAFMP strategies; and
3. Develop province-based network of training centers and trainers, integrated with PAFES.

Basic Interventions

1. Assess capacity and training needs;
2. Develop, use, and update standardized and quality-checked training modules for online and face-to-face delivery targeting both executive and legislative branches;
3. Organizational development (review of structure, staffing, supervision and relationships, and performance assessment and incentives system—toward raising overall performance levels to global standards)

DA Cluster

ATI, GESI, RFOs, others as needed

Partners

Including but not limited to DBM, CSC, TESDA, training units of concerned national government agencies, Local Government Academy, public and private colleges and universities, AFCs, LGUs

Central Steering Role

The complementary, shared responsibilities between DA and other NGAs on the one hand, and LGUs on the other hand, are well-delineated:

1. DA is responsible for capacity development of LGUs and the private sector; while
2. LGUs are responsible for capacity development of smallholder farmers, livestock and poultry raisers, and fisherfolk.

DA, particularly ATI, will lead other NGAs and LGUs in continuing to collaboratively plan delivery and follow-up capacity development interventions on knowledge and skills required for agri-industrialization and modernization, such as commodity systems planning, online marketing, and diversification toward the post-production segments of profitable value chains. ATI and other DA operating units will collaborate with public and private colleges, universities, and schools. Service delivery will optimize using online platforms particularly mobile phones commonly used by smallholder farmers and fisherfolk.

The national steering functions will include but will not be limited to the following services:

1. Organizational development
   a. Review and adjustment of organizational multisector, multilevel structures and staffing to match transformative strategies;
   b. LGU fora conducted to secure LGU commitments to prioritize agri-fishery development; and
   c. Orientation on transformative interventions integrated in the NAFMIP, e.g., private sector investments.

2. Training on topics such as:
   a. Transformative planning;
   b. Spatial planning;
   c. Investments programming;
   d. RBME;
   e. Strategic communication and tools e.g., stakeholder mapping;
   f. ICT applications;
   g. Digital marketing;
   h. Commodity systems value chain approach and agricultural innovation; and
   i. Food waste management and recycling along the value chain.

Local Rowing Functions

The LGUs will complement central level initiatives in capacity development targeting smallholder farmers, livestock and poultry raisers, and fisherfolk. Local functions will include but will not be limited to the following services:

Cross-cutting LGU Levels

1. Align and coordinate LGU capacity development plans and programs with those at the central level
2. Review local structures (executive and legislative) and relations to make these more conducive to agri-industrialization and sector modernization
3. Enact ordinances and resolutions to officialize adjustments in LGU structure ad relations matching NAFMIP strategies
4. Finance capacity development aimed at smallholder farmers, fisherfolk, livestock and poultry raisers and fisherfolk

Provincial

1. Coordinate with cities and municipalities in capacity development programs targeting smallholder farmers, livestock and poultry raisers, and fisherfolk
2. Capacity building for farmers' and fisherfolk's cooperatives and other collectives/ organizations

Municipal

Coordinate with provinces and cities in capacity development programs targeting smallholder farmers, livestock and poultry raisers, and fisherfolk

City

1. Coordinate with provinces and municipalities in capacity development programs targeting smallholder farmers, livestock and poultry raisers, and fisherfolk
2. All the services and facilities of the municipality and province

Research, Extension, and Training for Development

Strategic Objectives

1. Adapt agriculture and fishery science and technology advances and innovations;
2. Develop a pluralistic RETD network shared among public agencies, colleges and universities, and private sector groups, e.g., those in biotechnology research.

Basic Interventions

1. Adapt the agriculture innovation system;
2. Establish nationwide PAFES network; and
3. Network with international agencies involved in cutting-edge agri-fishery value chain technology development.

DA Cluster

BAR, CRAO, PhilRice, NFRDI, BAI, BPI, RFOs, others as needed

Partners

Including but not limited to IRRI, SEARCA, DOST, PCAARD and other international research agencies/ organizations, research units of public and private schools (Farm schools), colleges and universities, AFCs, LGUs

Central Steering Role

BAR, BPI, PhilRice, other DA agencies, and related NGAs like DOST PCAARRD will lead the planning and delivery of RETD services. DA will continue to partner with other concerned organizations particularly public and private colleges and universities. The national steering functions will include but will not be limited to the following services:

1. Assess and re-orient the RETD agenda to focus on agricultural diversification and shift from subsistence staple production into commodity systems and other NAFMIP innovations, such as:
   - R&D on crops suitable to large-scale mechanization;
   - R&D on new production methods including controlled environment production, hydroponics. and multitrophic aquaculture;
   - Adapt biological science advancements to increase local production of highly perishable/recalcitrant inputs, e.g., seeds for asexual propagation, mushroom spawns and fingerlings;
   - Shift from conventional to renewable and efficient energy sources in food systems; and
   - R&D to support the creation of circular food systems (e.g., rice straw and organic waste recycling, biogas production, nipa and coconut as source of alcohol fuel for small engines).
2. Set up agricultural innovation system (AIS) with corresponding funds, in collaboration with public institutions, private entrepreneurs, and other actors depend on the public good to be produced and the role of the public sector).
3. Conduct applied studies on agri-fishery innovations, e.g., sustainable extraction of water, nutrition-sensitive agriculture.
4. Disseminate research products through localized channels and publication in reputable outlets.
5. Leverage social networks to better target information and local extension services.

Local Rowing Functions

Complementing the steering role of the Central level, the LGUs will continue to be responsible for conducting applied, on-site level RETD. Local functions will include but not be limited to the following services:

Cross-cutting LGU Levels

1. Align/integrate research program using NAFMIP as directional plan;
2. Conduct research projects for target commodities, tested and commercialized in partnership with national and international research and private sector partnerships; and
3. Enact ordinances and resolutions to enhance RDE at the local level.

Provincial

1. Agricultural extension and on-site research services and facilities:
   - Prevent and control plant and animal pests and diseases,
   - Livestock markets, dairy farms,
   - Animal breeding stations and artificial insemination centers**;** and
2. Industrial research and development services, as well as the transfer of appropriate technology.

Municipal

1. Coordinate with provinces and cities in planning and implementing RETD programs;
2. Extension and on-site research services and facilities related to agriculture and fishery activities, such as:
   a. Dispersal of livestock and poultry, fingerlings, and other seeding materials for aquaculture *palay*, corn, and vegetable seed farms;
   b. Medicinal plant gardens;
   c. Fruit tree, coconut, and other kinds of seedling nurseries;
   d. Demonstration farms; and
   e. Quality control of copra and improvement and development of local distribution channels, preferably through cooperatives.

City

1. Coordinate with provinces and municipalities in planning and implementing research, extension, and training for development programs;
2. All the services and facilities of the municipality and province

An Innovation System for Rapid Sector Transformation

The Changing Paradigms of Research, Extension and Training for Development

Over the years, significant paradigm shifts have shaped agriculture and fisheries knowledge generation, dissemination, and utilization, posing new challenges such as organizational inefficiencies, lack of adequate stakeholder participation and responsiveness, decreasing investor confidence, inadequate staff motivation and low morale, limited research and service outputs, limited uptake and utilization of research findings, and a “brain-drain” from the public sector in the research, extension, and training for development sector (Anandajayasekeram et al., 2009).

From a linear technology transfer model in the 1960s, the paradigm has evolved to that on the agricultural innovation system in 2000s. In the 1970s/80s, the paradigm shifted to farming systems where research focused on identifying and tackling constraints (land and labor) of farmers. In the 1990s, the paradigm further shifted to the agricultural knowledge and information systems (AKIS) emphasizing the close collaboration between research, extension workers, and farmers in developing solutions for agricultural issues. The system linked people and institutions to promote mutual learning and generate, share, and utilize agriculture-related technology, knowledge, and information. The system integrated farmers, agricultural educators, researchers, and extensionists to harness knowledge and information from various sources for improved livelihoods. Farmers are at the heart of this knowledge triangle (World Bank, 2012). However, the approach has been criticized for its inability to move beyond the public sector and consider the heterogeneity, institutional contexts, and learning behaviors of actors and their surrounding environment (Saravanan, et. al, 2017).

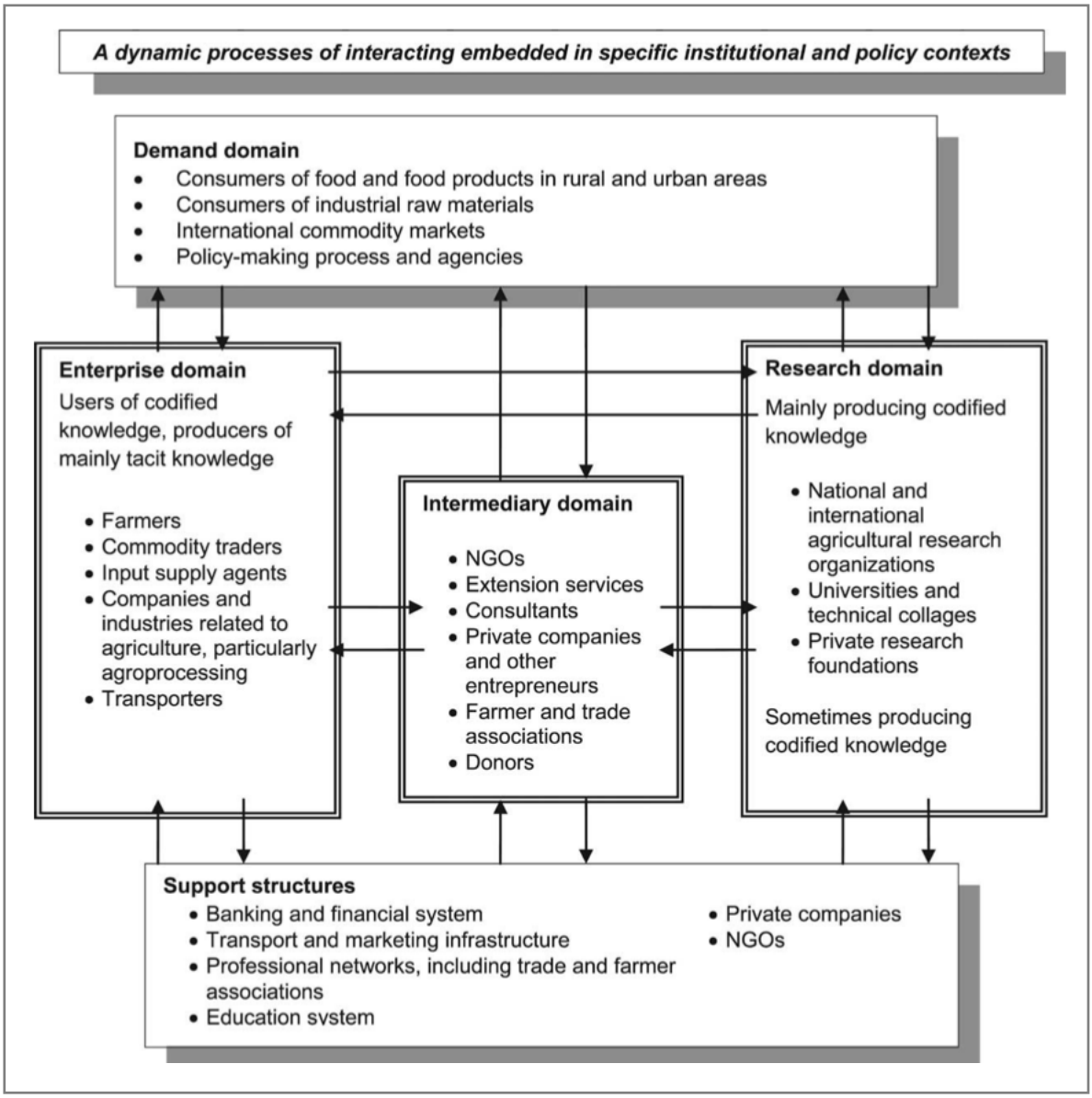
Over time, however, this centralized public R&D planning was challenged to respond to constant changes in demand-driven value chains, where decision making and management were decentralized. This was the period of 2000s that saw the emergence of the **agricultural innovation systems (AIS)** that **emphasized creating enabling environments for innovations**. Thus, while AKIS focused on the knowledge and innovation processes in the rural context, AIS focused more on building innovation capacities of stakeholders in a multi-stakeholder process with reduced focus on public research system for knowledge (Assefa et al., 2009 as cited by Saravanan, 2017). Entrepreneurs and primary producers became key players in assessing these policies and in managing performance within the system. However, as a result of this shift in approach to innovation systems in agriculture, designing, planning, and implementing agricultural research and development became more difficult without mechanisms to ensure that rapid adjustments can be made in response to new fundamental information, dramatic shifts in resource availability, or demands from new or different stakeholders.

The Agricultural Innovation System

An innovation system is defined as “a network of organizations, enterprises, and individuals focused on bringing new products, new processes and new forms of organization into economic use, together with the institutions and policies that affect their behavior and performance (World Bank, 2012). This is a framework that provides a better understanding of the process of knowledge generation, sharing, access, and exchange among stakeholders and puts them into social and economic use. The nature of the innovation may be technological (like ICTs, farm machineries, etc.), technical (like adoption of a better variety or package of practices), social (like System of Rice Intensification), organizational (like farmer organizations) or institutional, and not necessarily driven by research or agricultural extension and advisory services (Saravanan, 2017).

Figure 6.5 shows the four major domains of the AIS and the support structures. The first is the demand domain consisting of the demand for food and food products in both rural and urban areas, industrial raw materials, international commodity markets, and policy processes and agencies. The second is the enterprise domain consisting of farmers, traders of both inputs and outputs, agri-processors, and transporters. Third is the research domain that includes research organizations, universities and technical colleges, as well as private research foundations. The fourth is the intermediary domain between the enterprise and research domain that includes NGOs, extension services, consultants, private companies and entrepreneurs, professional networks, and the education system. These different domains are supported by the banking and financial system, transport and market infrastructure, NGOs, private companies, professional networks, and education system.

Figure 6.5: Elements of the Agricultural Innovation System
(Arnold and Bell, 2001 as cited by Saravanan, et al., 2017)



Six major developments have heightened the need to reexamine how innovation occurs in the agricultural sector. The first is the observation that markets, not production, is what increasingly drives agricultural development. Second is the increasingly dynamic and unpredictable environments for production, trade, and consumption of agriculture and agricultural products. Third is the increasing role of the private sector in knowledge, information, and knowledge generation and diffusion. Fourth, the exponential growth in information and communications technology (ICT) has facilitated the transfer of knowledge to other places. Fifth, the knowledge structure of the agricultural sector in many countries is changing markedly. And sixth, agricultural development is much more affected now by global developments in contrast to the previous decades when it was largely influenced by national and local interests (Rajalahti, et al., 2008).

Agricultural Innovation is important in transforming Philippine agriculture. It is important because agricultural development demands and depends on innovation and innovation systems. It is the major source of improved productivity, competitiveness, and economic

growth; and plays an important role in job creation, income generation, poverty alleviation, and driving self-development. Its purpose is to strengthen the capacity to innovate and create novelty throughout the agricultural production and marketing system. It is a collaborative effort involving potentially all actors in the public and private sectors in the creation, diffusion, adaptation, and use of all types of knowledge relevant to agricultural production and the entire value chain. Its organizing principle revolves around new uses of knowledge for social and economic change that is innovation-driven (World Bank, 2012).

Thus, the innovation systems perspective (ISP) implies the use of the innovation lens in designing, implementing, and evaluating the activities of the various actors involved in the innovation process within the value chain. Its focus is on innovation rather than on research, technology, or knowledge, as its organizing principle. It helps to identify the scope of the actors involved and the wider set of relationships in which innovation is embedded. It emphasizes that partnerships and linkages are integral in the innovation system. It sees the innovation performance of an economy as depending not only on how individual institutions (firms, research institutes, universities, etc.) perform in isolation, but on how they interact with each other as elements of a collective system and how they interplay with social institutions such as values, norms, and legal frameworks. It recognizes that innovation systems are social systems, focusing on connectivity, learning, as well as the dynamic nature of the process, and that learning and the role of institutions are critical in the innovation process (Anandajayasekeram, 2011).

Agricultural innovation typically results from the dynamic interaction of many actors with different perspectives and skills involved in growing, processing, packaging, distributing, and consuming or otherwise using agricultural products. These actors would have a strong capacity in R&D as well as in coordinating and exchanging knowledge. They should not only be open in their interactions and draw upon the most appropriate available knowledge but also have the incentive to form partnerships and develop businesses and conditions that make it possible for farmers or entrepreneurs to use the innovations (World Bank, 2012).

A number of efforts strengthen the key components of the innovation system, namely, research, extension, and agricultural education and training. Research is important because development cannot occur without knowledge, much of which must be generated and applied nationally and often more locally. Most of the efforts in AIS have centered on shifting investments away from physical infrastructure, equipment, human resource development, and operating funds; and toward improvements in the management of public research organizations. This would be through better planning, improved financial management, greater accountability, and more relevant programs for clients. It also focused much effort on increasing client participation and on the financing and overall development of pluralistic agricultural knowledge and information system (World Bank, 2012).

Public extension has been plagued by widespread problems such as limited funding, insufficient technology, poorly trained staff, weak links to research, and limited farmer participation. With the AIS, most extension programs are moving away from centralized systems and are trying to improve links with research and farmers. The PAFES is a move toward decentralization. Most programs now widely acknowledge the need to build social capital among farmers, pay greater attention to the needs of women and youth, and facilitate better links to markets. However, despite widespread agreement on the need for change, it is clear that no single extension model is universally relevant. This means that new models need to be developed, based not only on general principles but also on analyses of the specific farming systems and social conditions they are expected to address. These new models are more important than ever, because extension services are shifting their focus and changing their roles to improve service provision and act as brokers to the more diverse set of clients seen in an AIS (World Bank, 2012).

Meanwhile, education and training institutions are significant in an AIS because they develop human resources and at the same time serve as a source of knowledge and technology. The primary constraint for agricultural education and training, however, is that institutions have not kept pace with the labor market's demand for knowledge and practical competencies, especially in agribusiness, business and program management, and the problem-solving and interpersonal skills crucial for actors to function in an AIS (World Bank, 2012).

In summary, innovation systems are developing new management processes that seek to reconsider the underlying assumptions and theories of action that affect the sustainability of systems that perhaps are no longer effective and relevant in a changed environment. Managers must now deal with change and not simply administer under changing circumstances, described by analysts as a VUCA (volatile, uncertain, complex, and ambiguous) world. They must, for example, be able to define alternate scenarios and strategies that could influence or create opportunities for technical and institutional innovation. This would require redefining organizational mandates while ensuring participation and open communication about results with the different stakeholders.

Basic Considerations for the Agricultural Innovation System

The success of an agricultural innovation system relies on seven considerations, as follows: (1) coordination and collective action, (2) agricultural education and training; (3) investment in extension and advisory services (EAS); (4) agricultural research within an agricultural innovation system; (5) incentives and resources for innovation partnerships and business development; (6) creating an enabling environment; and (7) assessing, prioritizing, monitoring, and evaluating agricultural innovation systems (World Bank, 2012).

Coordination and Collective Action

AIS actors must coordinate in building capabilities for innovation, setting priorities jointly or engaging in technology foresight exercises, research, and/or innovation programs and efforts together to foster the emergence of innovation platforms and value chains, creation of venture capital, and support for establishing innovation brokers. Innovation brokers refer to persons or organizations that, from a relatively impartial third-party position, purposefully catalyze innovation through bringing together actors and facilitating their interaction. Innovation brokering expands the role of agricultural extension from that of a one-to-one intermediary between research and farmers to that of an intermediary that creates and facilitates many-to-many relationships.

Different kinds of coordination need to be enhanced in an AIS:

1. ***National coordination and governance.*** An effective coordinating organization would be characterized as follows: it is a formal organization that is independently governed and managed as defined by its bylaws. Its effectiveness, legitimacy, relevance and confidence as a coordinating organization depends on how effectively it reaches out to stakeholders from diverse areas of the economy, that is reflected in the diversity of the composition of its stakeholders. The range of stakeholders in matters of agricultural policy such as innovation is likely to be very wide, including farmers and other actors associated with agricultural innovation (research, education, extension, and farmer organizations; private firms; and NGOs), rural territories, and consumers. Representatives from outside the agricultural sector can add diversity and value to discussions. All should have a voice and be included in decision-making concerning agricultural innovation strategies and programs.

The presence of a skilled management team who would execute the activities identified by the organization's board is another important characteristic. The activities would normally include (a) coordinating the development of a strategic vision for agricultural innovation, coordination, and formulation of agricultural innovation policy, which will be increasingly integrated into general science-innovation policy; (b) linking agricultural innovation to broader agricultural policy and science-innovation discussions; (c) continuing contribution to the development of a strategic vision of the agricultural sector; (d) coordination and designing of agricultural innovation priorities and agendas; (e) coordination of the division of labor and channeling of funds to priority innovation areas; (f) monitoring and evaluation of innovation programs and their impact; and promoting collaboration and exchanges among the various parts of the innovation system, including external linkages.

2. ***Building innovation networks***. An innovation network is defined as "a diverse group of agents who voluntarily contribute knowledge and other resources (money, equipment, and land, for example) to jointly develop or improve a social or economic process or product. It is characterized by a nonhierarchical structure with no legal personality and often with fuzzy objectives. Decisions are consensus-based and activities spurred by collaboration with different actors participating, depending on market opportunities and the technologies they develop. In fact, membership of these networks changes in response to emerging problems and opportunities or the development and diffusion of innovations.

   A major reason why innovation networks emerge (and are becoming more prevalent) is because no single actor has all the resources required to be able to innovate as required by the market. Thus, to be able to access the required resources, they would set up informal collaborations. Actors would also tend to form these informal collaborations when problems or opportunities affecting actors in the innovation system are not clearly defined. For example, network goals can differ with some developing technical solutions to specific problems such as creating new business models and new products, or reduce poverty. Network membership can include farmers and farmer organizations. This uncertainty would force partners to use flexible approaches to explore potential solutions instead of getting into contracting and structured partnerships. This flexibility does not fit easily into the usual requirements of publicly funded projects, especially because it is difficult at first to define clear objectives and the steps that will deliver the innovation.

3. ***Facilitating smallholder access to modern marketing chains*.** Modern marketing chains can foster economic growth and alleviate poverty directly and indirectly. The benefits from modern marketing chains are the higher incomes for farmers who participate in the marketing chain, the development of innovation capabilities (through interactions with other actors in the chain); the diffusion of technical, organizational, and institutional innovations; and the creation of employment in rural areas. There are also indirect benefits such as expansion of local economies, exposure of local entrepreneurs outside the chain to the operation of modern markets, the development of links with new actors in the AIS, and the modernization of traditional wet and wholesale markets.

   Modern marketing chains have many features of buyer-driven value chains. The market intermediary close to consumers, usually a supermarket or a broker, organizes many producers and intermediaries and decides who will participate in the chain, oversees all the links from the farm to the shelf, defines the nature of the interactions and commercial conditions, and sets quality and safety standards. Other important features of modern marketing chains are that these are focused on marketing specific products (vegetables, fruits, meat, and so on) where access to the value chain is highly restricted. While informal transactions are rare, verbal agreements based on trust are common.

Modern marketing chains are of four types. *The first type* includes traditional export crops produced on plantations, such as coffee, tea, and bananas, and marketed mainly by large companies and traditional agri-processors. *The second type focuses on* supplying developed countries with fresh and processed fruits and vegetables, fish and fish products, meats, nuts, spices, and flowers. This started in the early 1980s following trade liberalization and improvements in logistics. *The third type of modern marketing chain* was triggered by the expansion of fast-food chains and supermarkets that supply mostly domestic markets, although increasingly they reach foreign markets. The *fourth type* are niche markets in their many forms.

4. ***Building innovation capabilities in farmer organizations.*** This would refer to building innovation capabilities in farmer organizations toward addressing technical or commercial issues such as crop management, good governance, creating structures and incentives for innovation, and developing external links, and building strong leadership. The capacity-building activities could include traditional training in purpose-built facilities, on-the-spot training, consulting services, extension, seminars and workshops on the dynamics of organizational innovation, exchange programs so that managers can see the capabilities of innovative farmer organizations, tutoring, and mentoring.

Agricultural Education and Training

Agricultural innovation is a product of the capacity, resources, and interactions by actors from the wide range of fields related to food and agriculture. Thus, it is important to build up the capacity to generate new ideas, knowledge, technologies, processes, and forms of collaboration that depend on different skills—technical, fiscal, and managerial competencies, entrepreneurship, facilitation, conflict resolution, communication, contractual arrangements, and intellectual property rights. Also, it is important for universities, research institutes, and other learning institutions to reposition themselves to acquire and infuse these skills onto their students. This would involve the close integration of the critical functions of research, teaching, extension, and commercialization.

Transforming agricultural education and training may involve **reforming public agricultural education at the tertiary level**, curriculum change in higher agricultural education, education and training of agricultural technicians, and making the necessary reforms in managing in-service training/learning.

Investments in Extension and Advisory Services

Extension has been considered as an agency whose focus is very much on increasing production, improving yields, training farmers, and transferring technology. However now, it should no longer be viewed as an *agency* but as *a system* that is integral and central to innovation systems that focuses on facilitating interaction and learning rather than solely on training farmers. As such, **it should focus on better knowledge sharing and better use of available information and knowledge** for desired changes which are at the center of innovation processes. They then become well positioned to facilitate and support multi-stakeholder processes. A **knowledge management system** is therefore essential to agricultural extension and the whole AIS. Integral to the AIS, EAS more than ever play a brokering role in linking key actors such as producer organizations, research services, and higher education, hence need stronger coordination and linkages within the pluralistic, multi-stakeholder AIS.

The broadest challenge is the tremendous need for new capacities within extension. Demands and new roles for advisory services are evolving in the wider innovation system that requires

investments in the capacity of individual extension workers and organizations for value chain approaches, in market-oriented extension, in group and organizational development, in agribusiness, and in knowledge management focused on mechanisms to share information (networks, platforms, and the like). Given the rapid changes in the agricultural landscape, advisory services should also now focus on climate change, food security, and equipping rural people to deal with risk in general.

Thus, the approaches for developing effective EAS would include (a) decentralizing its planning, financing, and administration; (b) providing different options for pluralistic agricultural EAS and financing this; (c) involving farmer organizations in providing EAS, from participatory planning to procurement to farmer-to-farmer extension and paying for services, and privatization and PPPs partially paid by farmers themselves, directly or indirectly.

Agricultural Research

Investing in agricultural research within an AIS framework complements the traditional internal focus on capacity and research priorities with an external emphasis on better articulation of client demand and effective institutional partnerships. Agricultural research as a producer of new knowledge requires enabling institutional arrangements to apply that knowledge.

With increasing constraints on land, water, and nutrient supplies and the difficulty of meeting the food requirements of a growing population as well as the adverse impacts of climate change, new knowledge from agricultural research systems will become more vital in maintaining growth in agricultural productivity and food supplies. Locating agricultural research within an AIS is a means to heighten the performance of research systems through improved articulation with demand; more effective, better-differentiated institutional partnerships; and better market integration.

To do this, it will be necessary to design agricultural research linkages within an AIS framework. This would involve the following:

1. **Strengthening information sharing and demand articulation in research systems** through formal coordination organizations, enhanced communication, and ICTs
2. **Promoting greater participation of farmers and other clients** in technology development processes
3. **Building and strengthening public-private partnerships in agricultural research** – In general, a precondition for investment in PPPs in agricultural research is that they should be able to count on financial support from the government and development agencies. They should also address problems of public concern that require collective action and pool capacities for innovation.
4. **Regional research in an AIS framework** – Collective regional (international) activity is needed because more problems and opportunities are transnational.
5. **Co-designing innovations with multiple stakeholders** – Innovations usually result from a process of networking and interactive learning among farmers, input suppliers, traders, processors, researchers, NGOs, and government officials. Given changing socioeconomic or biophysical environments, concerned stakeholders cannot address problems alone because of the complexity and/or scale involved.
6. **Organizational change for learning and innovation** – Agricultural research organizations should adopt a *learning organization* mindset and in so doing respond and innovate in an agile way to changes in their environment with transformative policies, management practices, and structures. Transforming an agricultural research organization into a learning organization complementing bottom-up initiatives with strong leadership from the top, ensuring that organizational learning takes place and

that useful organizational innovations are proactively mainstreamed. Another priority for investment projects is to ensure that researchers have adequate incentives to communicate and work well in collaborative teams.

To design research in an AIS framework;

1. Participants must develop and share a vision of mutual benefit and make a formal commitment prior to concrete investments.
2. The arrangement should lead to greater efficiency in research for development, especially through economies of scope and scale.
3. The research design and approval process must ensure research quality and relevance. Investment in strong M&E is necessary to gain political support.
4. Such arrangements must redound to improving national capacity.
5. The AIS should foster collective action on shared challenges that cannot be addressed by a single area or institution, especially transboundary problems of a public nature.
6. Finally, sustainable cross-country/regional organizations will require higher-order political and financial mechanisms committed to a regional strategy.

What this implies is that on the demand side, investment is needed to be able to exploit market-driven agricultural opportunities and negotiate rules and standards for better competition. On the supply side is knowledge for addressing emerging challenges, such as transboundary diseases, climate risks, water scarcity, and increased price volatility in global markets. All of these challenges have significant implications for the knowledge system that do not recognize regional borders.

Incentives and Resources for Innovation Partnerships and Business Development

The power of the private sector to innovate and foster economic growth is a critical driver of long-term, sustainable development in agriculture. Development programs apply two major instruments to engage with the private sector for this purpose: *agricultural business development,* which aims to stimulate general economic growth, and *public-private partnerships* (PPPs), which aim to address development issues in conjunction with the private sector. Public sector support for and cooperation with the private sector are generally considered justified, valuable, or even necessary to: (1) compensate for market failures that prevent or hinder necessary private investments, (2) stimulate growth and help businesses become established; (3) generate and/or direct innovation in areas considered important for society; or (4) reduce some of the risks inherent in commercializing new technologies.

The following are some incentives and resources for innovation partnerships and business development:

1. ***Public-private partnerships*** (PPPs) bring the complementary skills of the public and private sectors to a program or project where each partner has a different level of involvement and responsibility, with the objective of providing public goods or services. PPPs in agriculture mainly target opportunities for environmental, social, or equitable growth. They range in scope from cooperating on an individual project, to generating ideas and innovations in a specific field or for a specific purpose, to major strategic alliances that address major concerns in the development of the agricultural sector.
2. ***Public investments in business development*** can direct private investments toward areas of significant public interest and areas where the private sector alone would generally underinvest. Public investments for business development can also

complement private investments (for example, by providing funding for services or basic research).

3. ***Innovation funds*.** The appropriate funding mechanisms to support innovation by collaborating public institutions, private entrepreneurs, and other actors depend on the public good to be produced and the role of the public sector. Useful alternatives include specialized innovation funds and matching grants to provide incentives for collaboration and risk taking.
4. ***Accelerating development of agribusiness enterprises by using business incubators*.** Support for *business incubation* helps to scale up small and often newly formed enterprises that bring innovative technologies and services to market. Developing countries require broader, less intensive, and more diverse incubator services to develop entrepreneurial, innovative cultures and business environments.
5. ***Agricultural clusters*.** Cluster-based approaches have increased agricultural productivity, innovation, and business formation
6. ***Technology transfer offices: facilitating intellectual property protection for agricultural innovation.*** Technology transfer is critical in transforming agricultural research innovations into applications for end users. The vast majority of agricultural innovations arise from publicly sponsored research centers or universities, which typically are unprepared to engage in formal mechanisms of technology transfer. These mechanisms may require intellectual property protection and/or legal arrangements for transferring intangible and tangible property rights to other public, commercial, or international partners.
7. ***Risk capital for agriculture.*** Risk capital refers to investment in a company or project at an early or high-risk stage. Investments in SMEs are developing innovative agricultural technologies to improve the quality of crops, reduce risk and losses, and improve efficiency to increase competitiveness. The level of innovative technology used in agriculture in developing countries is expected to significantly increase with new applications of biological and information technologies.

Creating an Enabling Environment

The enabling environment for agricultural innovation includes factors that influence agricultural innovation positively but are controlled by policies other than those concerned with agricultural innovation. Agricultural innovation policy has to be synchronized with other policies to ensure that together they enable innovation. Cross-cutting policy issues affecting agricultural innovation include policies to reduce poverty and sustain the environment, to foster collaboration between the public and private sectors, and to build social capital more generally.

Three clusters of enabling factors for agricultural innovation require attention and investment:

1. ***Innovation policy and corresponding governance structures*** to strengthen the broader framework for agricultural innovation policies – A national innovation policy defines the roles and functions of actors and stakeholders within the national innovation system (NIS), provides an overall framework for innovation policies specific to particular sectors, and sets priorities across sectors and technologies. A particular challenge is where to assign responsibility for innovation policy within the government structure.
2. ***Regulatory frameworks*** that stimulate innovation directly (such as IPRs) or indirectly (standards that stimulate trade) or steer innovation toward certain preferred outcomes (safer food). Regulatory frameworks that are important for agricultural innovation include those for biosafety standards and technical regulations related to agricultural health, food safety and quality aspects.

3. ***Accompanying agricultural investments*** **in rural credit, infrastructure, and markets.** Better coordination of agricultural innovation investments with accompanying rural investments should lead to greater synergy and impact.

Assessing, Prioritizing, Monitoring, and Evaluating Agricultural Innovation Systems

Practitioners require information and knowledge for short- and long-term decision making as well as managing limited resources effectively given technical and institutional changes. Four generally defined AIS levels for making informed decisions and managing innovation include the following: (1) policy, which emphasizes coherence in decision making and management across sectors, scenario development, and benchmarking innovation capacities; (2) investment, where the actors are responsible for designing and prioritizing interventions that support innovation; (3) organization, where the actors are responsible for ensuring relevance to the wider innovation system; and (4) intervention, where the actors are responsible for managing and implementing innovation processes and resources to achieve desired societal and economic goals.

Assessing, prioritizing, monitoring, and evaluation, which will be widely used across the system and by a range of stakeholders, are important for (1) assessing and prioritizing investments for AIS; (2) improving the coordination between organizations and creating an enabling environment for them to innovate using diagnostic tools for planning, managing, and evaluating investment projects to support agricultural innovation; (3) gathering and analyzing information that would be important for designing future plans based on foreseeable opportunities and longer-term issues (including difficult institutional and political issues) as well as securing a sufficient level of commitment from stakeholders to enable the necessary processes of reform, restructuring, transformation, and change; and (4) monitoring and evaluating AIS interventions.

In summary, the focus of reforms for the AIS should consider:

1. The current system of coordination and governance of agricultural research, extension, and training for agricultural innovation for building innovation networks, facilitating farmers' access to modern marketing chains, and building innovation capabilities in farmer organizations;
2. The investments to be made in EAS for promoting pluralistic extension systems and farming as a business, promotion of local agri-business development services, as well as performing the new roles of EAS and innovation brokers;
3. The incentives and resources that should be provided to promote innovation partnerships and business development;
4. The mechanisms that should be instituted to create a more efficient system of assessing, prioritizing, monitoring, and evaluating agricultural development programs and projects that is linked to the overall NAFMIP RBME System (to be detailed in the RBME Roadmap) as discussed in Chapter 9;
5. The changes in public agricultural education, curricular reforms in higher agriculture education and training for technician development, and in-service training and learning;
6. Designing agricultural research linkages within an AIS framework that would consider building and strengthening PPPs in agricultural and regional research as well as the co-designing innovations and organizational change for learning and innovation; and
7. Creating an enabling environment for agricultural innovation.

Research, Extension, and Training Functions of LGUs

Republic Act No. 7160, otherwise known as the Local Government Code (LGC) of 1991, provides for the devolution or transfer of the responsibility for the delivery of various aspects of basic services as well as certain regulatory and licensing powers to local governments. Devolution refers to the act by which the national government confers power and authority upon various local government units to perform specific functions and responsibilities (DA-PAFES).

However, devolving agriculture and fishery extension services from DA to the provincial, city and municipal governments has posed serious challenges especially to low income municipalities given their lack of resources, manpower and funding. Moreover, they lack control over managing agriculture by municipal and city LGUs. With this set up, coordination is limited, if existing at all, among the different players—DA and its attached agencies, SUCs, and the private sector at the grassroots level. This has resulted to a weak agriculture and fishery extension system. With limited financial and manpower resources, the small municipalities lack sufficient economies of scale to effectively plan and implement agricultural development programs. On the other hand, provincial LGUs, because of their size, are better positioned to plan and implement agricultural development programs. This is the rationale for establishing the province-led agricultural and fisheries extension system (DA-PAFES).

Province-Led Agriculture and Fisheries Extension System

The PAFES (Province-led Agriculture and Fisheries Extension System) is one of the 18 key strategies of the Department of Agriculture in its OneDA Reform Agenda (see https://www.da.gov.ph/the-one-da-reform-agenda-eighteen-18-key-strategies). It aligns with devolving the extension function to local governments by virtue of the LGC of 1991, eliminating a centralized system of extension research, extension, and training as an option. The main objective of PAFES is agricultural and rural development led by the local government units, specifically the provinces.

Given this devolution, PAFES is intended to strengthen the collaboration between the national government, local government, academe, and the private sectors in bringing extension services to the grassroots amid the challenges of devolution. It shall serve as the “institutional arrangement in pursuing the full devolution of AFE services to LGUs, integrating the implementation of agriculture and fisheries programs and related support services at the provincial level. It further aims to strengthen the capability of LGUs to plan and implement multiple agriculture and fisheries programs with the province as the center for operations given the full devolution of AFE services to LGUs as mandated by EO138” (DA PAFES Manual). With PAFES, the province serves as the hub for synchronizing agricultural extension plans and programs as well as orchestrating the activities of the various stakeholders. DA aims to co-plan, co-invest, co-implement, and co-monitor priority projects in the provinces with their local governments, particularly as they launch together the commodity systems program to enhance its comparative advantage (DA PAFES Manual).

The Agriculture and Fisheries Modernization Act of 1997, section 86, provides for giving priority to utilization of research results through formal and informal education, extension, and training services. The extension services covered include training services, farm or business advisory services, demonstration services, and information and communication support services through tri-media. It also provides for delivering agriculture and fishery extension services to be multidisciplinary involving farmers, fisherfolk, their organizations, and food and non-food producers and processors in both the private and public sectors (AFMA RA 8435).

In operationalizing PAFES, the first step to be taken is the selection of pilot provinces with at least one pilot area in each province. This shall eventually cover all provinces in the country. The criteria for selecting these provinces are: (1) the expressed interest of the province, (2) capacity and quality of governance, (c) presence of an SUC with a strong RDE program, and (d) potential for success (DA-PAFES Manual).

The next step is replication of PAFES given the recommendations from the experiences in the pilot provinces. This will be the responsibility of the RFO to coordinate with all the provinces in the region for inclusion in the implementation of PAFES in the succeeding years. The last step is the implementation arrangements. A number of offices, agencies and institutions will be involved in establishing the PAFES.

The Rowing Functions of LGUs in Research, Extension, and Training

Section 17 of the LGC of 1991 or Republic Act (R.A.) No. 7160 specifically lists the agri-fishery functions to be devolved to the LGUs. The national government guide with its "steering" functions while the LGUs will implement with "rowing" functions. Specifically, certain agricultural and fisheries research, extension, and training services will now be the responsibility of the LGUs. Meanwhile, the Department of Agriculture, is authorized to commission and provide funding for training and extension services to be undertaken by the private sector (RA 7160).

The following are the rowing functions of the respective LGU units and their private partners related to research, extension, and training:

Roles of LGUs

The LGUs will deliver agriculture and fisheries extension services directly to their constituents. The provincial governments shall integrate the operations for the agriculture extension services and shall evaluate all municipal extension programs annually. It will be responsible for project management, providing additional complementary funding and specialists if necessary, as well as mobilizing support from municipal and city LGUs in implementing programs (DA-PAFES).

The provincial agricultural extension and on-site research services and facilities to be provided can include the prevention and control of plant and animal pests and diseases; dairy farms, livestock markets, animal breeding stations, and artificial insemination centers; and assistance in organizing farmers' and fisherfolk's cooperatives and other collective organizations, as well as the transfer of appropriate technology; industrial research and development services, as well as the transfer of appropriate technology; and investment support services, including access to credit financing.

The municipal or city LGU is responsible for providing technical and related extension services to farmers and fisherfolk, providing annual co-financing for agri-fishery core programs and budget, collaborating with the Provincial Agriculture Office in training farmers and fisherfolk in conducting field days and setting techno-demo farms and developing the agri-fisheries extension programs. Among others, it is responsible for dispersal of livestock and poultry, fingerlings, and other seeding materials for aquaculture; *palay*, corn, and vegetable seed farms; medicinal plant gardens; fruit tree, coconut, and other kinds of seedling nurseries; demonstration farms; quality control of copra and improvement and development of local distribution channels, preferably through cooperatives; inter-barangay irrigation systems; water and soil resource utilization and conservation projects; and enforcement of fishery laws in municipal waters including conservation of mangroves.

Many LGUs, however, are not able to provide the basic services and facilities identified in said Section 17 of the LGC due to lack of resources. Also, out of the 33 agri-fishery functions under the said LGC, three functions will not be devolved, namely: water resources utilization, credit financing, and quality control of copra. One function was identified as belonging solely to the LGUs, that is, the planting materials distribution system, while 29 functions are common or shared between the DA and the LGUs, among which are (1)seed farms and seedling nurseries; (2) prevention and control of plant diseases; (3) soil conservation projects and utilization; (4) municipal roads and bridges; (5) animal breeding station and dairy farms; (6) artificial insemination prevention and control of animal diseases; (7) slaughterhouses; (8) fingerling dispersal and other seeding materials (seaweed propagules); (9) fish port/community fish landing centers; (10) conservation of mangroves; enforcement of fishery laws; (11) development and improvement of local distribution channels; (12) operation of farm produce collection and buying stations and livestock markets; (13) market information system; (14) agricultural extension (demo farm and transfer of technologies); and (15) on-site research service and facility (DA-RFU-4A).

The primary focus of state universities and colleges (SUCs) is on improving the capability of the LGU extension service in their extension programs through the offering of degree and non-degree training programs, technical assistance; extension *cum* research activities, monitoring and evaluation of LGU extension projects; and information support services through the tri-media and electronics.

SUCs can also organize and detail a dedicated core of university agri-fishery extension staff to the PAFES Center and perform the following functions: (1) package participatory research proposals for submission to the PAFES; (2) participate and provide technical services in crafting the PAFES program; (3) design extension interventions along skills training and provide technical assistance; (4) test, adapt, and package site-specific and climate-resilient technologies in collaboration with other agencies, farmers, and fisherfolk; (5) exhibit matured and commercially-viable technologies; (6) train farmers and fisherfolk; and (7) help set up techno-demo farms and conduct field days.

Private Sector and Private Voluntary Organizations

Private groups such as the farmer and fisher cooperatives and associations and others will be encouraged to participate in training and other complementary extension services especially in community organizing, use of participatory approaches, popularization of training materials, regenerative agricultural technologies, and agribusiness and management skills. Among the functions it can perform are capacity building on agri-entrepreneurship and farm management together with DA-ATI and SUCs; linking farmers and fisherfolk with markets and providing custom services in the whole agriculture and fisheries value chain; assigning representatives to provide technical assistance in technology demonstration and training of farmers; participating in input distribution, information and education, and community mobilization; and collaborating with partner agencies in conducting field days (DA-PAFES).

Major Challenges and Issues in Performing Devolved Functions

Table 6.7 provides a list of some of the challenges faced by the LGUs in performing their functions based on the experiences of Laguna and Quezon provinces (DA-RFU 4A).

Table 6.7: Devolved LGU Functions and Challenges in Implementation, Laguna and Quezon Provinces, 2021

	DEVOLVED FUNCTIONS	LAGUNA (MP)[2]	LAGUNA (CHALLENGES)[3]	QUEZON (MP)	QUEZON (CHALLENGES)
Crops	1. Prevention and control of plant pests and diseases, 2. seed farms, 3. seedling nurseries, 4. planting material distribution, 5. quality control of copra	1, 3, 4	1. limited manpower, 2. insufficient budget 3. limited supply of farm inputs	1, 4	1. Insufficient skilled manpower (AEW and farm worker) and permanent person assigned in the field 2. Limited budget granted and allocated to LGUs 3. Lack of farmers' training and knowledge especially on crop protection and pest management 4. Low adoption of technology and hesitant farmers on shifting from old practices to new practices 5. Untimely reporting resulting to late monitoring (farm visits)
Livestock	1. Prevention and control of animal diseases 2. Animal breeding stations 3. Artificial insemination centers 4. Dairy farms	none	N.A.	1	1. Lack of Municipal Veterinarian and Livestock Technician/AEWs, Inspector in the municipality 2. Limited budget granted and allocated to LGUs 3. Unavailable, inaccessible and unsustainable facilities, inputs and equipment for livestock raising 4. Lack of raisers' training and knowledge on diseases prevention and treatment 5. Unsecured biosecurity measures / Threat of animal diseases

[2] Most performed devolved functions
[3] Challenges arranged by importance

	DEVOLVED FUNCTIONS	LAGUNA (MP)[2]	LAGUNA (CHALLENGES)[3]	QUEZON (MP)	QUEZON (CHALLENGES)
					6. Untimely reporting resulting to late monitoring (farm visits, death of animals) resulting to unreliable data and reports from the field 7. Limited access to credit and other financing services to support livestock raising 8. Presence of environmental calamities or human-made hazards affecting the livestock sector
Fisheries	1. Fingerling Distribution 2. Other seeding materials for aquaculture 3. Fish ports 4. Enforcement of fishery laws 5. Conservation of Mangroves	1, 4	1. Inadequate number of technical staff or experts 2. Lack of good quality water pump, 3. Lack of new equipment to produce more fingerlings, 4. Insufficient budget allocation, 5. Lack of capacity building activities 6. No declared area to plant more mangrove, among others	4, 5	1. Unavailable, inaccessible and unsustainable facilities, inputs and equipment for fisheries 2. Lack of skilled and knowledgeable fishery staff 3. Lack of logistics support 4. Presence of environmental calamities or human-made hazards affecting the fishery sector 5. Limited budget granted and allocated to LGUs 6. Illegal Fishing / Enforcement Issues
Credit and Marketing	1. Livestock markets 2. Slaughterhouses 3. Development and improvement of local distribution channels 4. Operation of farm produce	5	7. Limited manpower or lack of technical staff 8. Insufficient logistics support	2	1. Unavailable, inaccessible and unsustainable facilities, inputs and equipment for credit services, marketing and slaughtering 2. Insufficient skilled manpower (credit) and permanent person assigned in the field to reach the farmers

	DEVOLVED FUNCTIONS	LAGUNA (MP)[2]	LAGUNA (CHALLENGES)[3]	QUEZON (MP)	QUEZON (CHALLENGES)
	5. Collection and buying stations 6. Market information system 7. Credit financing				3. Limited budget granted and allocated to LGUs 4. Inoperative Market Information System 5. Limited capacity building and farmers' enhancement activities 6. No market / trader / hauler available in the area
Research and development	1. On-site research 2. Demonstration farms 3. Transfer of technologies 4. Agricultural extension	1, 2, 3, 4	1. Limited manpower/ staff 2. Limited budget 3. Limited logistics support issues.	3, 4	1. Limited budget granted and allocated to LGUs 2. Insufficient skilled manpower (research) and permanent person assigned in the field to reach the needs of the farmers 3. Presence of environmental calamities or human-made hazards hindering research and extension activities in the field 4. Unavailable, inaccessible and unsustainable facilities and equipment for research activities 5. Limited training opportunities for the farmers and declining farmers' interest resulting to a lower adoption rate of technologies 6. Limited access to internet
Other functions	1. Soil resource utilization 2. Water resource utilization 3. Soil conservation projects	1, 2, 3, 4	1. Lack of technical staff 2. Lack of capacity building activities 3. Lack of allocation for laboratory reagents.	4	1. Adoption rate of farmers to technologies is low and "*ningas cogon*" mentality of farmers 2. Lack of coordination activities resulting to inactive members

	DEVOLVED FUNCTIONS	LAGUNA (MP)[2]	LAGUNA (CHALLENGES)[3]	QUEZON (MP)	QUEZON (CHALLENGES)
	4. Organization of farmers and fisherfolk organizations				3. Limited budget granted and allocated to LGUs 4. Political affiliation 5. Insufficient skilled manpower (operations and maintenance) and permanent person assigned in the field to reach the needs of the farmers

Sources:

1. DA RFU 4-A. Analysis on LGUs Devolution Transition Plan (DTP) MATRICES, Province of Laguna. Oct. 2021. Department of Agriculture, Regional Field Unit No. 4-A (CALABARZON) Lipa Agricultural Research and Experiment Station, Pres. Jose P. Laurel Highway, Brgy. Marauoy, Lipa City, Batangas 4217
2. Provincial Analysis Devolution Transition Plan Province of Quezon. Report Prepared by: **Planning and Programming Section** Planning, Monitoring and Evaluation Division as of November 10, 2021

Crops Sector

In performing their devolved functions, LGUs primarily focus on preventing and controlling plant pests and diseases and distributing planting materials. Their major challenges in performing these functions include insufficient skilled manpower (AEW and farm worker) and permanent person assigned in the field, limited budget granted and allocated to LGUs, and the lack of farmers' training and knowledge especially on crop protection and pest management.

Livestock Sector

There is no mention of any activity for the livestock sector in Laguna. However, in Quezon Province, the focus is on preventing and controlling animal diseases. The major challenges faced are the lack of municipal veterinarian, livestock technician/AEWs, and inspector; limited budget granted and allocated to LGUs; and unavailable, inaccessible, and unsustainable facilities, inputs and equipment for livestock raising.

Fisheries Sector

The major focus for Laguna Province is on fingerling distribution and enforcement of fishery laws while Quezon Province focuses on enforcement of fishery laws and conservation of mangroves. The major challenges are unavailable, inaccessible, and unsustainable facilities, inputs, and equipment for fisheries; lack of skilled and knowledgeable fishery staff; and lack of logistics support.

Credit and Marketing

The activities in Laguna focus on operating collection and buying stations while Quezon Province focuses on operating slaughterhouses. The major challenges in the performing their devolved functions include the limited manpower or technical staff; insufficient logistics support; unavailable, inaccessible, and unsustainable facilities, inputs, and equipment for credit services; marketing; and slaughtering.

Research and Development

Laguna and Quezon Provinces both focus on agricultural extension especially on transfer of technologies. However, in addition, Laguna also involves itself with on-site research and demonstration farms. Both provinces face three major challenges, namely, limited manpower/ staff, limited budget, and limited logistics support.

Other Devolved Functions

Laguna performs four additional devolved functions, namely, soil resource utilization, water resource utilization, soil conservation projects, and organization of farmer and fisher associations. The province of Quezon, however, limits itself to organizing farmer and fisher organizations. The major challenges faced in the implementation of these functions are the lack of technical staff, lack of capacity building activities and Lack of coordination activities of farmers and fisherfolk organizations.

Agricultural Research, Extension, and Training within the AIS Framework

Agricultural research, extension, education, and training are key components of an AIS that are central to unlocking the potential of agricultural innovation and achieve the Sustainable Development Goals. Public agricultural research and extension and advisory services (EAS)

are essential for increasing productivity and promoting sustainable agricultural growth and alleviating poverty (FAO, 2020). However, the public services that dominate extension services are plagued by lack of sustained funding, insufficient technology, poorly trained staff, high dependency on donor funding, weak links to research and advisory services, limited farmer participation, and a focus on research priorities that do not directly address the needs of the farmers. Because previous approaches have been ineffective, most extension programs are moving away from centralized systems and trying to improve links with research and farmers.

Another primary constraint (among many) is that institutions have not kept pace with the labor market's demand for knowledge and practical competencies, especially in agribusiness, business and program management, and the problem-solving and interpersonal (21st century) skills crucial for actors to function in AIS EAS. Also, aside from aforementioned budgetary constraints, many public research organizations face serious institutional constraints that inhibit their effectiveness, constrain their ability to attract funds, and ultimately prevent them from functioning as a major contributor to the innovation system. The main constraints result from slow institutional and policy change, such as the lack of consensus on a strategic vision, ineffective leadership and management, a continued emphasis on building centralized national agricultural research structures rather than on creating partnerships, the loss of highly qualified scientific staff, and weak links with and accountability to other actors involved in innovation processes (World Bank, 2012).

Innovation needs to be more dynamic. Research, education, and extension are usually not sufficient to bring knowledge, technologies, and services to farmers and entrepreneurs and to get them to innovate. Innovation requires a much more interactive, dynamic, and ultimately flexible process in which the major players deal simultaneously with many conditions and complementary activities that go beyond the traditional domains of R&D and extension. To date, these conditions and complementary interventions have not been consistently addressed. Additional new ways and means of doing things are needed (World Bank, 2012).

The devolved functions of research, extension, and training of the LGUs in PAFES within the context of the AIS should thus consider to:

1. ***Integrate traditional interventions with complementary interventions.*** The more traditional interventions of support for research, extension, and education and the links among them should be integrated with other complementary interventions needed for innovation to take place, such as providing the professional skills, incentives, and resources to develop partnerships and businesses; improving knowledge flows; and ensuring that the conditions that enable actors to innovate are in place (World Bank, 2012).
2. ***Nurture strong science and technology to contribute to innovation.*** This encompasses the basic, strategic, and adaptive agricultural science as well as sciences outside agriculture that are widely regarded as contributing to innovation and sustainable, equitable agricultural development. Development cannot occur without knowledge. Thus, sustaining food production and rural livelihoods and reducing poverty would depend on the successful generation of new knowledge that can be applied in agriculture, as well as the capacity to produce such knowledge (World Bank, 2012).
3. ***Improve management of public research policy.*** This calls for better planning, improved financial management, greater accountability, and more relevant programs for clients, developed with oversight from multi-stakeholder boards or through better research-extension linkages (World Bank, 2012).
4. ***Increase the participation of farmers, the private sector, and other stakeholders*** in research governing boards and advisory panels to attain real influence over research decisions and priorities (World Bank, 2012).

5. ***Decentralize research and extension services*** to bring scientists closer to clients to better focus research on local problems and opportunities, improve accountability to local users, and facilitate clients' access to research services and products that respond better to their needs (World Bank, 2012).
6. ***Establish competitive funding mechanisms*** that involve key stakeholders, especially users, in promoting demand-driven research, setting priorities, formulating projects, and screening proposals (World Bank, 2012)
7. ***Promote producer organizations*** to reach economies of scale in services and market activities, increase farmers' ability to demand better services, and help producers to hold service providers accountable (World Bank, 2012)
8. ***Utilize ICTs*** to change how agricultural science, innovation, and development occur by enabling a variety of stakeholders to interact and collaborate in new ways to enhance the innovation process (World Bank, 2012)
9. Provide ***greater support for education and training institutions*** since they are important in developing human resources and at the same time serve as a source of knowledge and technology. The absence or decline of these institutions leaves a large gap in a country's innovation capacity (World Bank, 2012).
10. ***Invest in science and technology*** as this plays a critical role in improving and maintaining agricultural productivity (World Bank, 2012).
11. ***Invest in public agricultural research, advisory services, and education*** as these would enhance responding to clients' needs, work with farmer groups, communicate better with partners, and collaborate with the private sector (World Bank, 2012).
12. ***Invest in building the capacity to innovate*** across the spectrum of actors in the AIS and ***develop an enabling environment for innovation*** to occur. Efforts to strengthen research systems and increase the availability of knowledge have not necessarily increased innovation or the use of knowledge in agriculture (Rajalahti, et.al. 2005).
13. ***Develop new agricultural extension models*** to be responsive to specific farming systems and social conditions especially because extension services are shifting their focus and changing their roles to improve service provision and act as brokers to the more diverse set of clients seen in an AIS (World Bank, 2012). No single extension model is universally relevant.
14. The ***agricultural research system needs to evolve***, become more efficient and effective to be responsive to farmers' demands and consider both the immediate and long-term needs of family farmers (FAO, 2020).
15. ***Shift the research agenda away from productivity gains only***, toward environmental concerns and efficient resource use (FAO 2020).
16. ***Agricultural research institutions and EAS should not operate in isolation but interact with each other*** and many stakeholders (governments, agricultural input suppliers, market intermediaries, farmer organizations, and private sector entities) in an 'agricultural innovation system' (FAO, 2020).
17. ***Decentralize decision making*** in providing EAS.
18. Shift from a system where EAS are entirely publicly funded to ones in which an ***increasing amount of the financial support comes from other sources and specific advisory services have been privatized.*** In addition, digital technologies are now increasingly accessible and are being used by EAS providers to reach smallholders and family farmers (FAO, 2020).
19. ***Agricultural research systems and (EAS) should shift from a research-driven process relying on technology transfer to one that enables and rewards***

innovation. In many low- and middle-income countries, weak capacity to innovate is a real obstacle to this transformation. It is essential to establish an environment where the needs and demands of resource-poor farmers and consumers are heard and their voices influence the research and EAS agenda. (FAO, 2020)

20. ***Provide platforms for the exchange and sharing of knowledge*** relevant to agricultural innovation (FAO, 2020).
21. ***Advisory systems and staff need to assume the convening, brokering and coordinating roles*** and not just the role of passing on information, since agriculture is increasingly knowledge intensive and involves many different actors (Ojijo et. al. 2016).
22. ***Undertake and document capacity development impact assessments*** that will help highlight the key role of capacity development in agricultural research for development and evidence-based advocacy for capacity development by multiple organizations (Ojijo et. al. 2016).
23. ***Undertake more evaluations of advisory system approaches***, such as ICTs and farmer-to-farmer extension, to assess what types of approaches work well for particular types of agricultural technologies, for particular AF groups (e.g., women), at what cost, and how approaches may be combined and improved (Ojijo et. al. 2016).

Although not widely adopted at scale, generating and applying new knowledge is important because it can enhance productivity, competitiveness, and sustainability in farming. Governments, however, can play an important role in creating enabling conditions for agricultural innovation through coordination, promoting horizontal and interactive working approaches, strengthening knowledge management, and creating networks for managing partnerships.

Production Support Services

Strategic Objectives

1. Maintain if not enhance undisrupted delivery of the necessary support facilities and services to smallholder farmers and fisherfolk;
2. Update production support policy and field operations based on an objective assessment of the differentiated planned and unplanned impacts of production support on agri-fishery sub-sectors, consumers, and other stakeholders; and
3. Update institutional capacity assessment and develop LGU capacities to take over leadership in planning and delivery of the corresponding facilities and services.

Basic Interventions

1. DA, other NGAs, LGU, smallholder farmers, and fisherfolk jointly formulating and implementing a transition plan (including financing arrangements) for LGUs to systematically assume greater responsibility for this function;
2. Assess and develop capacities of all LGU levels to progressively take over with support from DA and central agencies;
3. Fill up vacant LGU agri-fishery positions;
4. Continue refining service delivery protocols and mechanisms vis-à-vis criteria such as efficiency, cost-effectiveness, and dependability in times of emergency or crisis; and
5. Multi-media packaging and nationwide replication of LGU successes such as in Alabat, Quezon.

DA Cluster

FOS with ATI, PRS, AFID and FMRDP, others as needed

Partners

Including but not limited to Leagues of LGUs, AFCs, NAPC, DILG, and other concerned national government agencies; extension units of public and private colleges and universities

Transitory Central Steering Role

DA, in consultation with other concerned national government agencies, will steer the planning and delivery of production support facilities and services toward the decentralized regime envisioned in the Local Government Code of 1991.

The transition plan for DA to phase out and LGUs to phase in will cover not only confirming what types of facilities and services are to be provided and up to when, but also: (1) criteria for phasing out of production support; and (2) shift toward more environment-friendly farm inputs and machinery, equipment, and tools, such as organic fertilizer and electric-powered machinery.

The transition management role will include promoting a change in LGU mindset. While all LGUs have a stake in transforming the food system, not all local officials recognize the importance of this transformation and their role. A typical LGU still looks up to the national government for initiative and support. This is partly because financial resources downloaded to the LGUs are inadequate and LGUs have insufficient staff. These constraints are now being addressed by the Mandanas Ruling.

Local Rowing—and Eventually Steering—Functions

LGUs are responsible for production support services including but not limited to the following:

Barangay

1. Agricultural support services which include a system for distributing planting materials and operating stations for collecting and buying farm produce;
2. Maintaining barangay roads and bridges and water supply systems;
3. Providing infrastructure facilities such as multi-purpose halls, multi-purpose pavements, and similar facilities; and
4. Providing satellite or public markets where viable.

Municipality

1. Extension services and facilities related to agriculture and fishery activities including dispersal of livestock and poultry, fingerlings, and other seeding materials for aquaculture; palay, corn, and vegetable seed farms
2. Establishing fruit tree, coconut, and other kinds of seedling nurseries and demonstration farms

Province

1. Organizing fisherfolk's cooperatives and other collectives/organizations, as well transferring to them appropriate technology
2. Investment support services, including access to credit financing

City

All the services and facilities of the municipality and province

Operation and Maintenance of Production Support Facilities

An important LGU rowing function, particularly their operation and maintenance (O&M) of production as well as postharvest infrastructure, facilities, machinery, and equipment. It is also an opportunity to trigger the LGU steering role.

LGU-Funded Facilities

LGUs will naturally be responsible for operating and maintaining LGU-funded infrastructure, facilities, machinery, and equipment, including but not limited to:

Barangay

1. Farm produce collection and buying stations;
2. Barangay roads and bridges;
3. Infrastructure facilities such as multi-purpose pavements, and the like; and
4. Satellite or public markets where viable.

Municipality

1. Fruit tree, coconut, and other kinds of seedling nurseries;
2. Demonstration farms;
3. Local copra distribution channels;
4. Irrigation systems; and
5. Infrastructure facilities intended primarily to service the needs of the residents of the municipality and which are funded out of municipal funds including, but not limited to:
   a. Municipal roads and bridges;
   b. Communal irrigation, small water impounding projects, and other similar projects; and
   c. Fish ports, seawalls, dikes, flood control, and similar facilities.

Province

1. Dairy farms, livestock markets, animal breeding stations, and artificial insemination centers;
2. Infrastructure facilities intended to service the needs of the residents of the province and which are funded out of provincial funds including, but not limited to:
   a. Provincial roads and bridges,
   b. Flood control, and
   c. Irrigation systems.

City

All the services and facilities of the municipality and province

Privately Funded Facilities

LGUs will play a facilitative and increasingly steering role in supporting operation and maintenance of production and postharvest infrastructure, machinery and equipment, and production support facilities funded by the private sector.

Big ticket infrastructure that can be handled by the private sector is best handled by the private sector. Among these are food terminals, cold storage, farmers' markets, manufacturing hubs, and cloud kitchens. These can be operated like tollways, where users pay according to use. What the government needs to do is make these projects attractive for investors to participate in them. If the private sector is reluctant, it may be necessary for the government to build these infrastructure as "catalytic investment," but develop a program for transferring operations and maintenance to farmers' cooperatives. Similarly, for farm machinery, big cooperatives can establish their own machinery pool serving their members as well as other farmers for a fee.

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CHAPTER 7

NAFMIP Agenda for Transformative Investment and Co-financing

This investment program is a product of a series of consultations that transpired at the regional and national levels. All estimates presented in this Plan narrative are based on information processed from these consultations, inputs from the different national level technical discussions, and technical analyses and adjustments made by the consultants. Consistent with NAFMIP serving as Directional Plan, the purpose of the investment program is to guide the types, mixes, magnitudes, and even locations of investments that will be made in pursuit of agri-fishery industrialization and modernization. These figures represent the best available estimates at the time of NAFMIP formulation and are not cast in stone. They are subject to review and revision as the different operational plans are formulated.

Considerations for Shaping NAFMIP Investment Program

The innovation and transformation espoused in NAFMIP can be best translated in the form, type, and scale of investments that will be prioritized, funded, and implemented over the next ten years. NAFMIP investments will veer away from the business-as-usual route that emphasizes government distribution of predominantly private goods, prioritizes single crops and production interventions, and allocates resources in several small projects loosely linked to results and outcomes.

Instead, identifying and programming investments will need to match the steering role of the DA and the critical roles of its partner NGAs in implementing NAFMIP. For DA, this institutional leadership is already embodied in past agricultural and fisheries modernization strategies, and amplified further by the paradigm shift for agri-fisheries development, modernization, and industrialization. In addition to the Department's New Thinking approach, the following concerns have been considered in drafting the NAFMIP investment program:

1. ***The lingering COVID 2019 pandemic*** which caused severe fiscal constraint both at the national and local levels. With vaccination and other health measures, the pandemic is expected to be gradually managed. Hence, the sectoral investment must promote recovery from this global pandemic, and at the same time, usher in the new normal in a post-COVID context.
2. ***The Supreme Court ruling on the Mandanas-Garcia appeal*** which attempts to further deepen decentralization in the country. In line with this ruling, the Devolution Transition Plan (DTP) attempts to rationalize the types of investments that DA will pursue vis-à-vis the local government mandates moving forward. DA will focus on the large, more strategic infrastructure, facilities, and services in line with the NAFMIP priority areas. However, DA will continue to support to fifth- and sixth-income class LGUs, while the rest of the LGUs will be expected to bolster investments in the agri-fisheries sector as a fundamental pillar for inclusive development. The past cost-sharing arrangement between the national and local governments will be revised upwards to emphasize the bigger fiscal role of LGUs expected under the Mandanas-Garcia Ruling. DA will build on related experience from its portfolio.

3. ***Complementary reforms and investments*** arising from commodity system road maps and other operational plans. Alongside the formulation of the NAFMIP, the various units of DA will also prepare commodity system roadmaps and complementary operational plans. These plans will mutually reinforce each other, with NAFMIP providing the broad directions and parameters to inform the detailed strategies and initiatives to be contained in these roadmaps. DA will encourage the private sector to match these plans with their investments. The DA-PPP unit will play a prominent role in advocating identified DA-PPP programs and projects, facilitating project identification up to development, undertaking contract management, and administering a data-based system for more effective PPP management. To effectively engage the private sector, the Department will further strengthen its capacities for public-private partnerships.

Investments by Three NAFMIP Phases

These considerations underlie the manner by which the corresponding investment program has been laid out, i.e., 2021 to 2023 have been tagged as Recovery years, while the subsequent years, i.e., 2022 to 2030, as Growth-inducing; and 2023-2030 as Resilience-building (See Chapter 2, Figure 2.2).

Recovery years (2021 – 2023). The first three years will emphasize the recovery of the sector from the lingering public health emergency. It is recognized that this period will be particularly challenging considering the fiscal position of both the national and local governments. To facilitate the recovery of those affected by the pandemic, DA will help restore the disruptions in value chains and recover lost incomes among farmers and fisherfolks.

The first three years of the NAFMIP will also wind down programs and projects from past commitments especially if these contribute to addressing the long-standing gaps in infrastructure and services in the regions. DA will also concentrate on establishing the enabling environment and government systems for full-blown NAFMIP implementation. DA will sort out the governance and institutional arrangements that nurture multipartite partnerships and collaboration.

The plan introduces several reforms and innovative ideas yet to be translated into concrete actions and operations. DA will therefore identify and package new investments and undertake necessary project preparatory activities to establish the social, environmental, and economic viability of the planned investments.

Growth inducing years (2022-2030). Full-blown implementation of the NAFMIP targets will take place within this period, following the preparatory actions undertaken in the previous years. The Department will intensify its engagement and communication strategies toward building a broad-based community of partners and stakeholders that have heightened understanding and appreciation of and commitment to NAFMIP targets. This period will also be particularly critical in addressing new challenges which will become the bases for continued upgrading of policies, capacities, and systems for a modern agri-fisheries sector. DA will be attentive to opportunities for new partnerships and funding, underpinned by transparent and constant communication and M&E schemes. High impact and strategic investments in the different agri-fisheries industrial business corridors (AFIBCs), scaled up mechanization and other technologies, and promotion and development of new businesses are among some of the investments that will be supported.

Resilience building years (2023-2030). The growth-inducing and resilience-building efforts practically overlap in time, with the former ahead by only one year. Over the last few years, the Department has managed to integrate resilience into operations. This approach will thus be continued and will continue to permeate the NAFMIP approaches, strategies, and priorities

throughout its implementation, and even beyond. Resilience will be enhanced and not just be limited to building resilience to natural hazards and climate change, but will also integrate the lessons from other crises and emergencies, such as the COVID 19. Scaling up of climate smart and climate resilient agriculture will remain a priority, but will also strengthen continuity in production and distribution despite complex emergencies. This will also serve as the period to consolidate knowledge and sustain the gains from NAFMIP implementation towards a more sustainable and resilient agriculture and fisheries. Table 7.1 below illustrates the types of investments under the phases above.

Table 7.1: Potential Investments under NAFMIP Implementation Phases

PHASES	ILLUSTRATIVE INVESTMENTS AND INTERVENTIONS
Pandemic recovery	• Nationwide replication of scaled-up KADIWA outlets • Follow-on consultations to enhance stakeholder awareness and interest to participate in sector transformation programs, projects and activities • Exploratory meetings with potential large investors (Filipino and international) in AFIBCs • NAFMIP innovations-oriented capacity development • Public information campaign on integrative food and nutrition security • Enhancements of logistical infrastructures and facilities
Growth-inducing	• Legislative and policy enhancements to incentivize large private investments • NAFMIP marketing and development of transformative financing opportunities • Launch of large-scale agriculture and fishery mechanization program • Construction of FTI-type facilities linked to integrated transport networks • Integration of NAFMIP concepts and strategies into LGU agri-fishery plans • Development of large-scale urban agri-fishery programs, projects and activities • Support to innovative business incubation initiatives
Resilience-building	• Full assumption by LGUs of technical and financial responsibilities for devolved agri-fishery services and facilities • Issuance of blue and green bonds to finance large-scale investments • Mainstreaming of climate action plans including investments requirements into LGU agri-fishery plans • Agri-fishery industrial business Corridors operating under PPP-type arrangements • Sustainable and expanded urban agricultural practices • Promotion of safe waste management practices and establishment of facilities for the same

Initial Estimates of NAFMIP Investment Requirements

The required investment is estimated from the combined inputs of the regional consultations, historical and forecast data, and other related variables. Budgetary data from the last ten years and other related data (e.g., performance from projects, international benchmarks, etc.) were consolidated and analyzed to come up with the forecasts and the different assumptions presented.

The forecast data provided the basis for the three scenarios, to wit: (1) low investment scenario; (2) mid-level of investment scenario; and (3) full level of investments scenario. A low investment scenario corresponds to the current level or status quo of funding, characterized by a level of funding that averages only 2.7%[1] of the national budget. A mid-level investment scenario represents a modest increment from the current level of spending (around 3-4%). The full investment scenario calls for a significant increase in spending for the agri-fisheries sector, restoring its previous share of six percent of the total national government budget.

These levels of spending correspond to the extent of how much of the NAFMIP targets can be achieved. A low investment scenario will involve incipient transformation in the basic foundations necessary for modernization and industrialization, without necessarily achieving them as envisaged. A mid-level spending, which will result in partial transformation, will achieve many of the identified targets, although modernization and industrialization will require a much longer planning horizon to achieve. A full funding scenario corresponds to substantial transformation of the sector, with most of the indicators expected to be achieved alongside serious actions on governance and implementation reforms.

DA targets to mobilize up to around **PHP8.0 trillion from both the public and private sources**. This figure is an aspirational value, considering very modest investments for the sector in the previous years. The different scenarios above will determine the extent of achievement, not just of the capital and technical investments, but also the of the development results and outcomes to which they are linked. Based on the NAFMIP results framework, 11% are indicators associated with carried over programs from the past national and sectoral plans; 32% are new targets which arose from related assessments and cross-cutting targets; and the rest pertain to the transformative results that represent the NAFMIP reform areas (Annex 1). Table 7.2 below summarizes the investment levels targeted within the NAFMIP implementation timeframe.

Table 7.2: Investment Scenarios for NAFMIP Implementation, in PHP Billion[2]

SOURCE OF FUNDING	LOW	MEDIUM	HIGH
DA	1,167.70 – 1,392.57	1,729.92 - 2,063.07	2,594.88 - 3,094.61
LGUs	233.54 - 278.51	345.98 - 412.61	518.98 - 618.92
NGAs	116.77 – 139.26	172.99 – 206.31	259.49 – 309.46
Private Sector	1,518.00 – 1,810.34	2,248.89 – 2,681.99	3,373.34 – 4,022.99
Total	**3,036,01 – 3,620.69**	**4,497.79 – 5,663.92**	**6,746.68 – 8,045.97**

Transformative Investments

The lingering necessity for capital build-up in the agri-fisheries sector warrants the inclusion of basic infrastructure that DA has been providing, e.g., post-harvest facilities. At the same time, the three strategies of NAFMIP—modernization, industrialization, and consolidation—calls for new investments and approaches that will create a strong and durable foundation for the long-term transformation of the sector.

[1] This figure refers to combined DA and NIA budgets. Net of NIA, the DA budget averaged 1.9% within the same period.

[2] Calculated based on a modest average growth of 3% (low case) and 5% (medium case) in national government budget over the next eight years, accounting for lingering economic and fiscal impact of COVID and lingering tensions in Europe. The scenarios above pertain to share of DA budget to total national budget, to wit: 2.7% (prevailing average, computed with NIA portfolio), 4%, and 6%, respectively.

This entails that the Department gradually shifts its attention away from various small and piecemeal projects that spread DA resources thinly across commodities and services. Instead, the Department's budget will be devoted to more strategic and catalytic investments. These are mostly large-ticket and high-impact programs that will address the infrastructure gaps in the regions and induce investments among LGUs, non-government organizations (NGOs), and the private sector. DA will likewise adopt a more programmatic approach that will promote convergence of efforts among institutional partners and DA units. This will allow the Department to concentrate on fewer, more targeted programs that can be managed and absorbed by the existing institutional structure and implementation mechanisms. DA will focus its energy and resources on planning, implementing, and facilitating high-impact and strategic programs and projects, in the scale of around PHP100 million (Table 7.3).

Table 7.3: Large-scale Investments Identified under NAFMIP

TYPE OF INTERVENTION	ESTIMATED COST (in PHP Million)
1. Consolidated **p**roduction and post-harvest facilities (commodity systems-oriented)	1,449,107.17
2. Construction of critical infrastructures spatially integrated within agri-fisheries industrial business corridors (AFIBCs)	709,052.54
3. Modernized food terminal facilities and similar facilities linked to transport nodes in urban and peri-urban areas	
4. Smart irrigation and water impoundment or retention systems serving two or more commodities	105,804.89
5. Other large-scale infrastructure (waste management facilities, fish ports, ICT including high-speed connectivity)	36,250.55
6. Scaled up mechanization and adoption of other commercial scale-oriented technologies	21,137.14
7. Large-scale production and distribution of **b**iologically safe technologies including biopackaging	9,341.56
8. State-of-the-art R&D facilities linked to PAFES networks	6,436.48
9. Development of agri-fishery enterprises and business incubation initiatives linked to large investors	3,922.00

Note: Estimates aggregated from the regional consultations, subject to updating and confirmation during NAFMIP preparation

The projects include (1) construction of critical infrastructures to set up the different agri-fisheries industrial business corridors (AFIBCs); (2) integrated food terminal facilities and similar facilities; (3) biologically safe technologies; (4) waste management facilities; (5) scaled up mechanization and adoption of other technologies; (6) promotion and development of business incubation ideas; (7) introduction of digital technology across processes, including unified databases and information systems; (8) smart irrigation and water impoundment or retention systems; (9) fishports/fish landing facilities; and (10) expanded R&D work on innovative and breakthrough practices.

Strategic priorities from regional and commodity system plans and roadmaps yet to be developed will provide, in more detail, the type, nature, and scope of these interventions. Successful models, like the New Clark City Agri-industrial Hub and Taguig Agri-industrial Hub, will be explored and adapted in different areas nationwide. Notwithstanding the priority for

these types of investments, DA and its partners will continue to adhere to robust social, economic, and environmental safeguards in the preparation of these interventions.

Further, a modern agri-fisheries sector will not be feasible without drawing on innovations that will make the sector dynamic and responsive to the changes in market demands. The use of innovations and knowledge is crucial in promoting efficiency in both institutional and market-based operations and in upgrading the capacities along the value chain. Investments on R&D, ICT, standards development and regulation, and mechanization are thus fundamental. DA will promote sustainable technology that does not result in excessive operations and maintenance cost for the users (especially fuel whose prices are very volatile) or negative externalities to the ecosystem. The knowledge referred herein is not purely external or modern, but also includes indigenous know-how and practices that have progressively matured over the centuries. DA will share with LGUs the responsibility of creating access to these innovations, technology, and knowledge among farmers and fishers. Moreover, DA will explore and invest on new areas and form of extension services, as well as alternative service delivery schemes that will cater to the needs of a modernizing agriculture.

Related to above, DA will frontload investments on building institutional and organizational capacities for NAFMIP implementation. In performing its steering functions, DA will invest in strengthening its institutional and organizational capacities for policy-making and planning, regulation, standard-setting, R&D and knowledge building, and partnership building. DA will develop the discipline of organizing, coordinating, and directing LGU, NGO, and private sector investments, instead of delivering retail services.

LGUs, on the other hand, will also require capacities to proactively and effectively perform their enhanced roles under the NAFMIP and the Mandanas-Garcia Ruling and incentivize them to prioritize investments for agri-fisheries. Planning and implementation of spatially-oriented transformative schemes and investments will be carried out in strong partnerships with the LGUs to build ownership and commitment to these targets, especially in the form of increased spending for identified priorities.

Complementing the targeted innovations, DA will also draw on successful practices already institutionalized by the Department. Since the establishment of national legislations on climate change and natural hazards, the Department has built considerable knowledge and expertise on integrating science in policy-making and planning. This will be sustained, especially in the context of building the resilience of the sector. Integrated into this resilience agenda, due attention will be given to the agri-fisheries ecosystem, through inter-connected spatial strategies (e.g., SAFDZ, AFIBCs, etc.). DA will likewise give a premium to restorative practices in both land and water resource use.

This NAFMIP investment program is not a static document. It will be revisited periodically with partners and stakeholders to reflect emerging demands from the ground. Among the areas that need to be strengthened are the: (1) selection of the corridor and evaluation of the feasibility of the AFIBC networks and their component agri-industrial hubs for which critical infrastructure and facilities must be established along the value chains; (2) mobilization of adequate public sector, third party, donor, or IFI capital for agri-corridor development; (3) support to commodity system development and diversification strategies that have yet to be further fleshed out; (4) support to the farm consolidation and clustering schemes that will be developed and nurtured in the different regions as an approach to supporting industrialization; (5) service delivery plans and strategies with spatial dimension criteria; (6) priorities arising from multi-commodity/inter-banner assessments; (7) incentives and assistance for agribusiness incubation/start-ups and innovation center(s) that will fill the needs of agri-industries and enterprises; (8) strategic marketing and branding to upgrade and promote domestic products; (9) investments to develop products that have high value additionality through use of specialized technology; (10) investments toward the maturation of

newly identified innovation areas, such as biopackaging, food safety, etc.; (11) infrastructure and facilities in SAFDZ and other spatial-oriented developments, which have not yet been fully implemented in the past; (12) technical support to LGUs in drawing up their strategic development plans for agriculture; (13) review of overlapping functions of government agencies to ensure that they more efficiently deliver government services and allocate government resources; (14) incentives and resources for innovation partnerships and business development; (15) support for the legislation of the National Land Use Act; and (16) technical assistance in capacitating research and extension personnel of LGUs.

Transformative Resource Mobilization

Realizing a modern and industrialized agri-fisheries sector entails massive investments in the next ten years**. The responsibility for transforming and funding the agri-fisheries sector does not rest alone with the Department, but is shared with other actors, including the LGUs, private sector, and other government agencies.** For the NAFMIP implementation, the DA envisions to mobilize up to around **PHP8.0 trillion in combined resources** from the public and private sectors, broken down as follows. The huge investment target is what the sector aspires to propel it from its current state to what is envisaged.

Department of Agriculture

To hasten achieving the NAFMIP targets, the DA will require an increase its share in the national budget to around **six percent**, from the prevailing average of around 2.7% in the last six years. The six percent share simply restores the budget level that DA used to enjoy in the previous years (i.e., 2010 to 2015). The significant funding volume would be necessary for the DA to leverage resources from the private sector and other government partners, among others. Granted a six percent share of the budget, the Department can potentially receive somewhere between PHP2.5 to 3.1 trillion, a volume substantial to support the physical and technical targets set in the NAFMIP.

Local Government Units

The Mandanas-Garcia Ruling will transfer significant resources to the LGUs. DA will advocate increased spending for the sector, in line with its DTP, to achieve the target contribution of around 20-30% of the investment requirement above. Many of the current expenditures of the DA are best assumed by the LGUs, as also confirmed during the regional consultations. The large proportion of this target will come mainly in the form of counterpart of LGUs participating in the transformative investments in the coming years as well as complementary programs, projects, and initiatives that enhance the transformative investments in these localities. Experience from the Philippine Rural Development Project shows that DA mobilized around 17% in LGU contribution equivalent to around PHP18 billion under the PHP108[3] billion program.

With bigger fiscal space, LGUs are encouraged to revisit their overall local development and specific agri-fisheries plans and their corresponding investments. This is to enable the LGUs to determine their potential roles and contribution to achieving the NAFMIP targets, promoting vertical alignment among these plans in the process. NAFMIP will build on the improved national-local planning and budgeting practices and guidelines already institutionalized by the Department.

[3] Working figure for validation

Under the DA DTP, the LGUs will continue to be responsible for the locally-mandated infrastructures and services, as prescribed in the Local Government Code (LGC) and other existing legislations. LGUs will remain responsible for on-site research services, establishment of nurseries, provision of biologics for endemic diseases, maintenance of rural infrastructure, and training for farmer/fisher beneficiaries, among others. In addition to these usual investments which can be undertaken by the LGUs on their own, the DA anticipates their participation and contribution in planning, implementing, operating, and maintaining the transformative investments in their jurisdictions. The spatial focus of the NAFMIP further underscores the critical role of the LGUs in delivering the NAFMIP targets.

Private Sector

The agri-fisheries sector is largely driven by decisions and actions of the private sector (i.e., from small producers to large institutional players). As such, DA envisions that the private sector will be able to match, or even exceed, the public sector investments. With the establishment of critical public infrastructure and facilities, as well as revitalized support to R&D, DA will urge the private sector to expand their entrepreneurial activities across the value chain and create new markets leading to healthier and better food options for Filipinos.

To effectively engage the private sector, the Department will strengthen its capacities for public-private partnerships (PPPs). It will revisit its policies and strategies to consolidate and build up the incentive framework to stimulate private sector investments. DA will strengthen its PPP Unit as the lead and accountable entity that will deal with private sector concerns and investment facilitation. Capacities will be built toward packaging and developing a portfolio of PPP projects to be actively solicited from the private sector. A roster of potential PPP projects from the different commodity system plans and roadmaps will be consolidated, screened, and packaged to determine prospects for PPP. The DA will likewise coordinate and build partnerships with the PPP Center to bolster the prospects of generating private sector investments and to capacitate DA on project development and contract negotiation and management. Different tools, including IT platforms, will be developed to better manage and monitor the progress of the ensuing PPP portfolio.

The Department will also engage with the private sector, especially the commercial banks, to ensure the implementation of the Agri-Agra Reform Credit Act of 2009 (Republic Act No. 10000), which mandates all government and private banking institutions to allocate at least 25% of their total loanable funds for agriculture and agrarian reform beneficiaries (i.e., 15% of the loanable funds to be allocated to the agriculture sector and the remaining 10% to the ARBs). The Rural Bankers Association of the Philippines and other related institutions will likewise be tapped to improve and expand the design of more financially inclusive instruments that will be more accessible and responsive to the needs of farmers, fisherfolk, and other actors in the food value chain.

Non-government Organizations

NGOs include a wide-range of national and local institutions, from small producers' associations to large national-level associations. As such, they will play a critical role in the NAFMIP, not just from the perspective of financing. More importantly, NGOs will be important providers of knowledge, facilitators of social and community processes, and coordinators of multi-sectoral partners, among many others. They are in the best position to conduct extensive and iterative processes to bring different actors into more cohesive force supportive of NAFMIP.

Government Partners

DA will also engage with national agencies to leverage resources and expertise toward the attainment of NAFMIP targets. In its multi-level, multisectoral consultation, it has reached out to different agencies which have related mandates and share the ownership of the NAFMIP agenda. These include the Departments of Agrarian Reform, Energy, Environment and Natural Resources, Information and Communications Technology, Interior and Local Government, Public Works and Highways, and Trade and Industry, as well as with National Irrigation Administration, State Universities and Colleges, and Technical Education and Skills Development Authority, among others that are listed in Table 8.2 in Chapter 8. To further rationalize the institutional arrangement in the agriculture sector, the National Irrigation Administration (NIA) has been transferred from the Office of the President to DA.[4]

DA will continue to employ the Agricultural Development Plan as a tool for monitoring the commitment of other government agencies to NAFMIP. It will enhance its engagement strategy among government agencies and negotiate with them to commit an aggregate spending equivalent to at least 10% of the DA budget for complementary infrastructure and services in the rural areas. This is particularly critical as investments in transport infrastructure, rural electrification, and digital technology facilitation, among others, can significantly advance the modernization and industrialization of the agri-fisheries sector. As all agencies are expected to operate within their respective DTPs, the contribution from the NGAs is conservative.[5]

In addition, the DA will proactively explore with the government oversight agencies the possibility of tapping both tax and non-tax sources for the sector, and other non-traditional sources of funding. Land conversion of fertile agricultural lands especially those that benefited from government interventions will have to be meted with fiscal disincentives, if not outright sanctions. Non-tax resources include the use of still pending proceeds being pursued by the Presidential Commission on Good Government, the Coco Levy Funds, and the RCEF, among others.

These funds, along with other potential **transformative funding sources** such as global capital markets, can be pooled into a **Philippine Agri-Fishery Sector Pandemic Recovery and Transformation Program**, akin to the Marshall Plan implemented by the US to aid European recovery after World War II.[6] The poverty that remains pervasive among Filipino farmers and fisherfolk requires such a comprehensive infusion of funds to lift them out of their current condition and transform the sector into a potent and inclusive economic driver. Consolidating these resources and earmarking them for agreed priority programs and projects will increase the chances of mobilizing the desired volume of investments for the sector.

[4] Executive Order No. 168 issued on 25 April 2022 (https://www.officialgazette.gov.ph/downloads/2022/04apr/20220425-EO-168-RRD.pdf).

[5] For example, the DTP of DPWH states that the Department will cease to fund or implement subprojects such as local roads and bridges, water and sanitation facilities, and other local infrastructures that are already devolved. Only limited support will be considered for fifth and sixth income-class LGUs.

[6] The Marshall Plan, laid out by U.S. Secretary of State George Marshall in 1947 and authorized by the then US Congress, was the European Recovery Program (ERP) that gave more than $13 billion in aid to European nations—including its World War II enemies, Germany and Italy. It was crucial in revitalizing their post-war economies. By the time U.S. funding ended in 1951, the economies of all the European recipients had surpassed prewar levels. For this reason, the Marshall Plan was considered a success. (https://www.investopedia.com/terms/m/marshall-plan.asp)

Development Partners

The role of development partners is also critical in implementing the NAFMIP. As DA envisions large-scale investments, concessional funding that will guarantee the steady inflow of funds throughout the implementation period is fundamental. In addition, development partners can provide access to relevant experience, knowledge, and expertise to enrich the policy making, planning, and implementation associated with NAFMIP. One particular area of interest that DA will present to the partners, under the leadership of the DOF, is the possibility of exploring and developing innovative funding instruments (*e.g.,* agri-green bonds). The Asian Development Bank, the Food and Agriculture Organization of the United Nations, the International Fund for Agricultural Development, the World Bank, and a roster of bilateral institutions are eyed as key partners in this effort.[7]

As part of the NAFMIP implementation strategy, DA will continuously and aggressively conduct nationwide investment promotion activities to secure support for NAFMIP. DA targets to reach out to all possible partners on the ground, from small farmers associations to large businesses, NGOs, as well as LGUs and national agencies. DA will promote more robust partnership schemes between small and big players that will underpin not just a modern, but also a more inclusive agriculture program. DA will link partners together to foster more efficient and results-oriented resource-sharing arrangements for NAFMIP implementation.

With proposed increased spending and investments for the sector, it is also pivotal that the governance mechanisms associated with managing these resources are equally improved. Measures that will strengthen transparency and accountability in the use of the funds will be put in place to build the credibility of and trust on the Department as the lead implementor of agri-fishery programs. The critical role of civil society oversight will be harnessed through their participation in the NAF Council. Communication and dissemination of financial and physical progress of NAFMIP implementation will likewise be shared with the general public through the use of social and mass media.

Emerging Priorities in the NAFMIP Investment Program

Preparing the investment program for NAFMIP entailed developing a digital application (http://nafmip.da.gov.ph/login) that allows the operating units at both the national and local levels to plug in their inputs. The system was designed to reflect the new way of thinking espoused in the NAFMIP—from outputs to result areas. The emerging priorities for NAFMIP are reflected below.

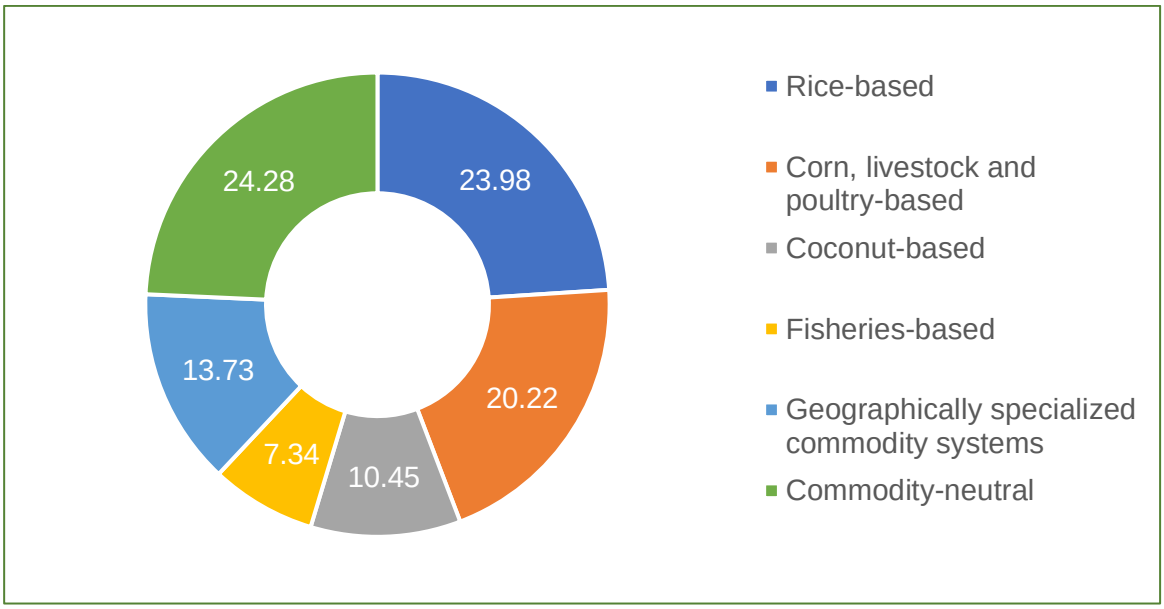
Investment Requirements by Commodity System

Veering away from single commodity, the NAFMIP promotes a commodity-system approach that encourages a more integrated planning of investments and other interventions to linked commodities. Six systems have been identified under NAFMIP. Programming of investments is more balanced among them: commodity neutral[8] (24.28%), rice-based (23.98%), and corn, livestock, and poultry-based (20.22%) topping the list (Figure 7.1). With enhanced spatial planning, higher priority may be accorded to geographically specialized and competitive commodities.

[7] In recent developments, the International Finance Corporation subscribed to around USD100 million of "blue bonds" issued by the BDO Unibank, Inc. The first of its kind in the Philippines, the blue bond will support investments that aim to protect and conserve marine resources in the country. Eligible projects will include water conservation, wastewater treatment, plastic recycling, sustainable tourism, fisheries, and sustainable seafood processing.

[8] i.e., crosscutting or benefiting several commodities

Figure 7.1: Investment Requirements by Commodity System, 2021-2030



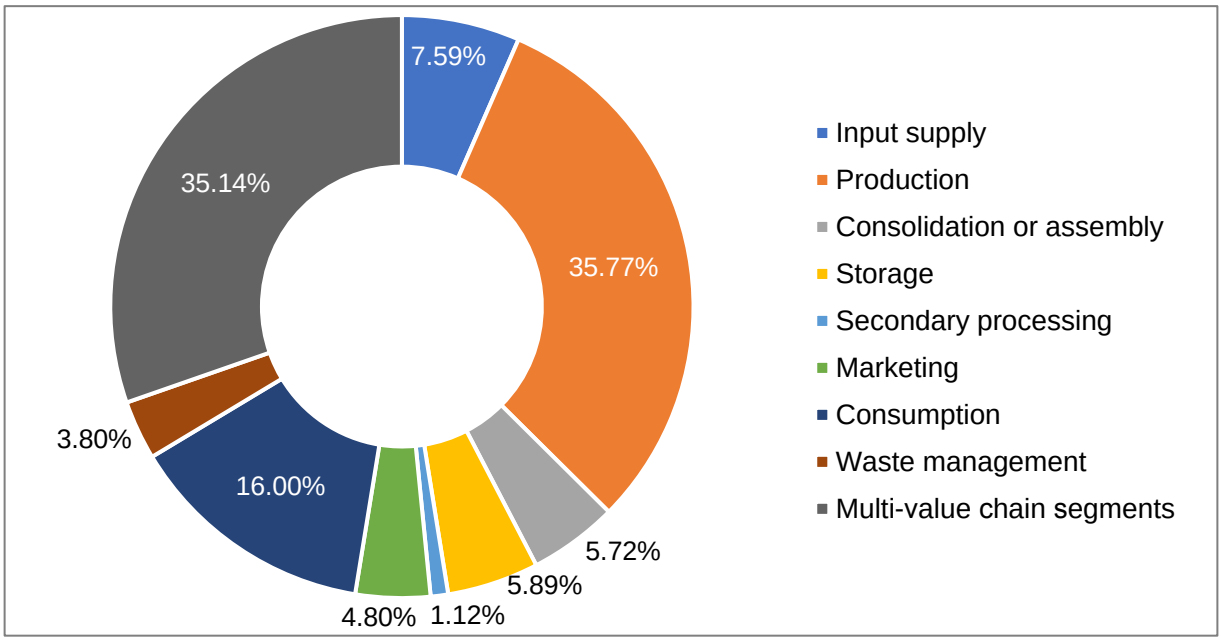
Investment Requirements by Value Chain

Investments related to production and multi-value chain segments account for around 70% of the investment requirements for the next decade (Figure 7.2). This category includes providing basic rural infrastructure, facilities, and services, which currently dominate the investments that DA has been programming. Addressing the gaps in physical capital across the regions is pivotal to modernization, thus the current focus on production support. Focusing on production signals a huge invitation for the private sector, NGOs, and LGUs to shoulder the responsibility for the higher segments of the value chain.

The multi-value chain links coincide with the support of DA to farmers and fisherfolk on one side and to consumers, on the other, as well as in bringing small producers and large institutional players together. Whereas the domain of DA support has focused on production and logistics in the past, DA will also cover nutritional quality and food safety as critical links in the value chain.

Lastly, including waste management in the value chains indicates the growing recognition of the value of protecting the integrity of the ecosystem in modern agriculture. It attests to the increasing responsibility of the sector to contribute to mitigating climate change impacts and complements the strong CRA strategies already mainstreamed into DA operations and investments. Thus, investments related to waste management, along with the CRA-related programs of DA, will result in a much desired and more robust adaptation and mitigation investment portfolio.

Figure 7.2: Investment Requirements by Value Chain, 2021-2030



Investment Requirements by Region

All regions expressed significant investment requirements in order to contribute to the NAFMIP targets. For NAFMIP implementation, several regions are estimated to require over PHP100 billion to achieve the targets identified by the regional partners and stakeholders. CAR, Region II, and Region IVA submitted the highest estimated requirements. Luzon accounts for 36.98% of the total requirements, followed by Mindanao and Visayas, with estimated requirements of 13.00% and 10.34%, respectively. Meanwhile, national programs account for the remaining 40% of the estimated investment requirements. A more balanced distribution will be targeted through enhanced spatial planning that will surface the true competitive potentials of the regions. The investments for the Bangsamoro Autonomous Region of Muslim Mindanao are not included in the current estimates though, which are programmed as a separate budget of its Ministry of Agriculture, Fisheries. Table 7.3 presents the estimated annual breakdown of investments for the regions.

Figure 7.3: Investment Requirements by Regional Distribution, 2023-2030

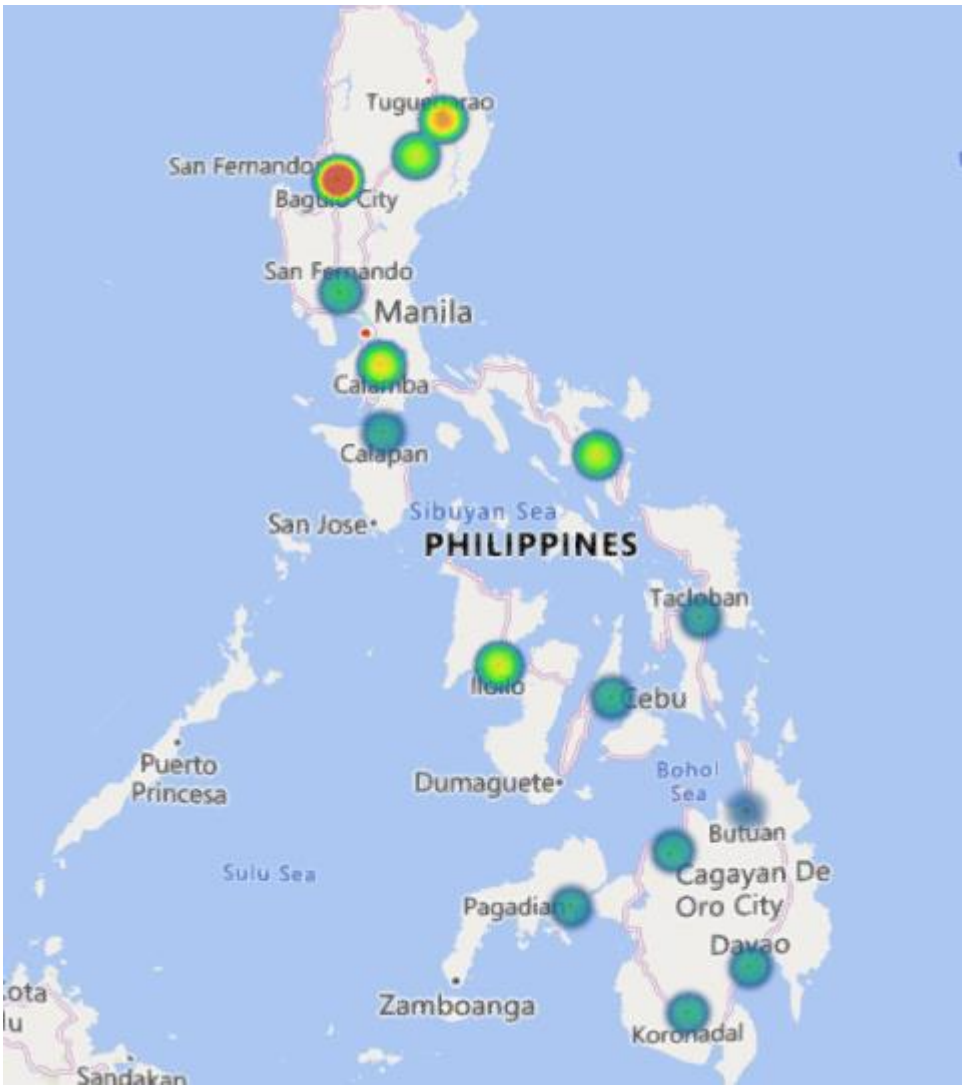


Table 7.4 breaks down the target investments by year within the course of the NAFMIP implementation starting 2023.

Table 7.4: Regional Breakdown of Estimated Investments under NAFMIP, in PHP B

REGION	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL
I	11,784.26	12,785.92	14,448.09	16,398.58	8,612.39	21,125.06	23,237.57	25,561.33	143,953.19
II	15,720.60	17,056.85	19,274.24	21,876.26	24,829.55	28,181.54	30,999.70	34,099.67	192,038.40
III	7,847.92	8,514.99	9,621.94	10,920.90	12,395.23	14,068.58	15,475.44	17,022.98	95,867.99
IV-A	13,046.86	14,155.84	15,996.10	18,155.57	20,606.57	23,388.46	25,727.31	28,300.04	159,376.75
IV-B	6,733.86	7,306.24	8,256.05	9,370.62	10,635.65	12,071.46	13,278.61	14,606.47	82,258.97
V	12,007.07	13,027.67	14,721.27	16,708.64	18,964.30	21,524.49	23,676.93	26,044.63	146,675.00
VI	12,254.64	13,296.28	15,024.80	17,053.15	19,355.32	21,968.29	24,165.12	26,581.63	149,699.22
VII	6,931.92	7,521.13	8,498.88	9,646.22	10,948.46	12,426.51	13,669.16	15,036.07	84,678.35
VIII	6,412.02	6,957.04	7,861.46	8,922.76	10,127.33	11,494.52	12,643.97	13,908.37	78,327.47
IX	6,461.54	7,010.77	7,922.17	8,991.66	10,205.53	11,583.28	12,741.61	14,015.77	78,932.32
X	6,981.43	7,574.85	8,559.58	9,715.13	11,026.67	12,515.27	13,766.79	15,143.47	85,283.19
XI	6,931.92	7,521.13	8,498.88	9,646.22	10,948.46	12,426.51	13,669.16	15,036.07	84,678.35
XII	6,981.43	7,574.85	8,559.58	9,715.13	11,026.67	12,515.27	13,766.79	15,143.47	85,283.19
XIII	4,827.58	5,237.93	5,918.86	6,717.91	7,624.82	8,654.17	9,519.59	10,471.55	58,972.42
CAR	24,410.25	26,485.12	29,928.18	33,968.49	38,554.24	43,759.06	48,134.96	52,948.46	298,188.75
National	98,235.16	106,585.14	120,441.21	136,700.78	155,155.38	176,101.36	193,711.49	213,082.64	1,200,013.16
Total	**249,591.44**	**270,806.71**	**306,011.58**	**347,323.14**	**394,211.77**	**447,430.36**	**492,173.39**	**541,390.73**	**3,024,226.72**

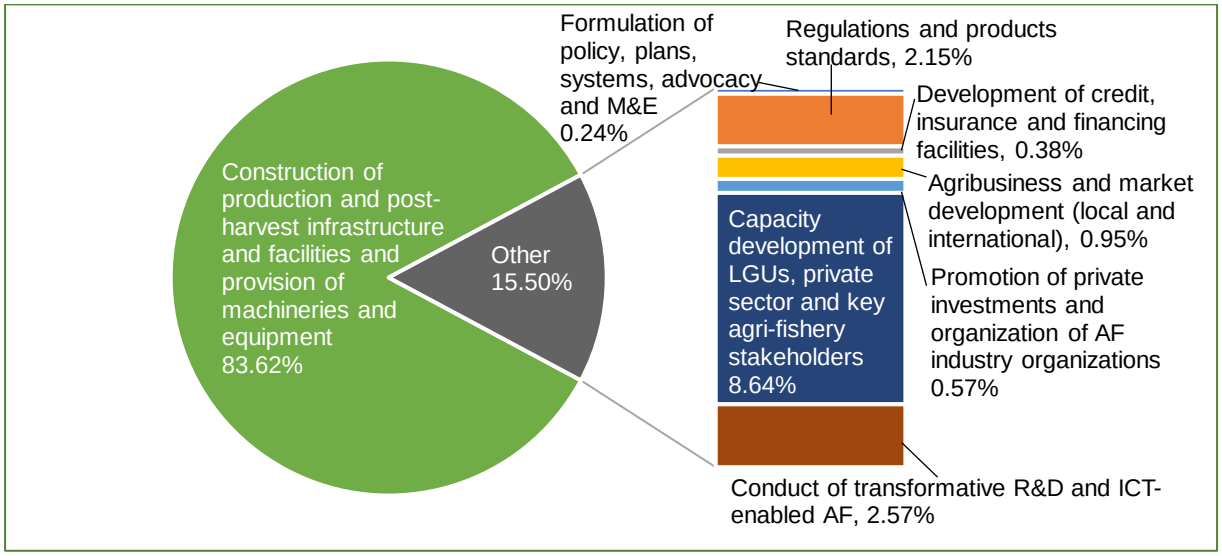
Note: Preliminary estimates based on a six percent share in forecast national budget and regional inputs

Investment Requirements by Centralized Function

The different OUs of DA believe that construction of production and post-harvest infrastructure and facilities, as well as the scaled-up mechanization, will be the focus under NAFMIP. Increased attention will also be given to R&D as a major foundation of a modern and industrial AF sector. Capacity of farmers and fishers to absorb and adopt innovations and of LGUs to adhere to increased responsibilities under the Mandanas-Garcia regime will likewise be prioritized.

Other tasks such as policy-making, planning, communication, and M&E will be provided with adequate resources. The Department of Agriculture with the Department of Finance will collaborate with partners in the private sector and development community to explore and develop new financial instruments for farmers, especially toward concessional financing and reliable insurance protection for farmers. DA will not itself implement any of these facilities, but will be a major policy-maker and enabler. DA will instead partner with LGUs to ensure that the intended stakeholder-beneficiaries will have the required capacities to participate in these instruments.

Figure 7.4: Investment Requirements by Centralized Function, 2021-2030



Investment Requirements by OneDA Pillar

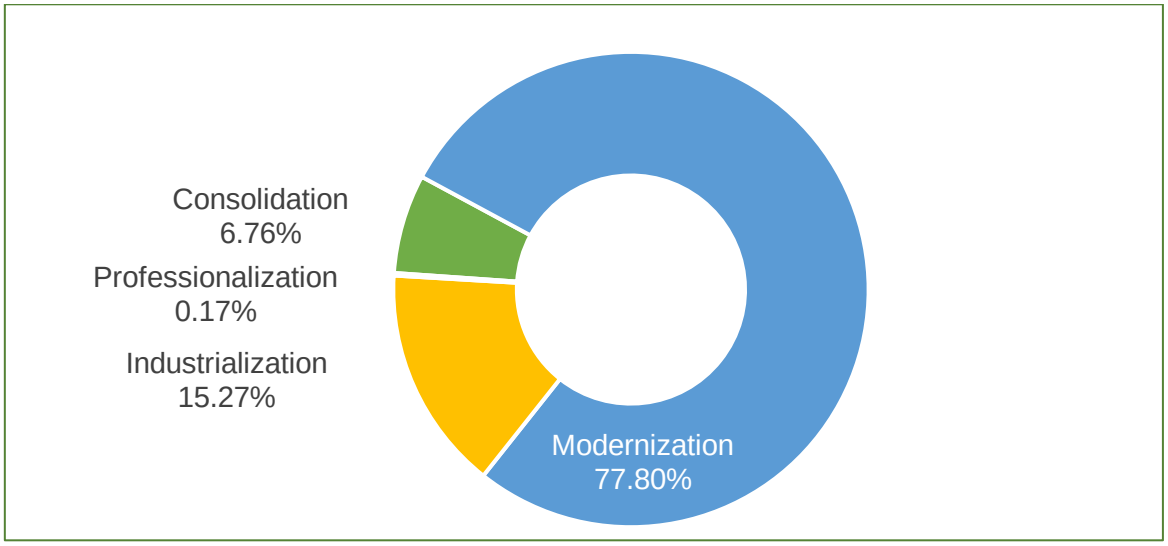
Over 90% of the planned investments will be allocated for modernization and industrialization of the sector, considering that one of its major components is the construction of infrastructure and facilities. However, a major bulk of this investment (around 80%) is intended for modernization that is reflective of the strategic demarcation of roles between the public and private sectors. The enabling policies and capital investments of the government should guide the private sector to make better business decisions and agri-industrial investments that are ecologically sound and integrate the corporate social responsibility (CSA) tenets that it strongly adheres to. In particular, DA may support the private sector in seizing the opportunities that may be gained from the current global economic crises.

Meanwhile, it is noticeable that modest investments are programmed for consolidation. DA plans to develop and expand more culturally-fit models to promote consolidation among farmers. Local experience is spotty, hence the need to learn from other countries, indigenous

populations, and regions to come up with a corresponding policy and institutional framework underlying consolidation of farmers. It is not expected that a one-size fits all model will arise, but NAFMIP will instead look out for varied models that fit the local and regional context. These different models and approaches will then become the bases for identifying and programming investments.

NAFMIP implementation will foster a gradual evolution and shift in skills and competencies of the DA staff across the board. Consistent with its steering role, regular funding will be provided to DA toward strengthening its institutional and organizational capacities in performing its core functions, as already espoused under previous AFMAs.

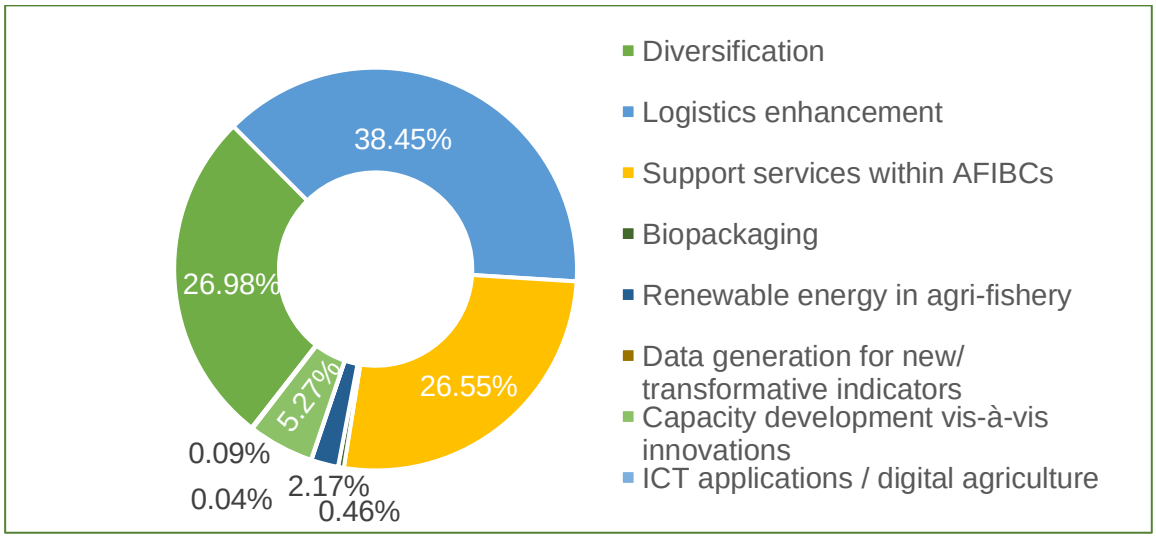
Figure 7.5: Investment Requirements by OneDA Pillar, 2021-2030



Investment Requirements by Area of Innovation

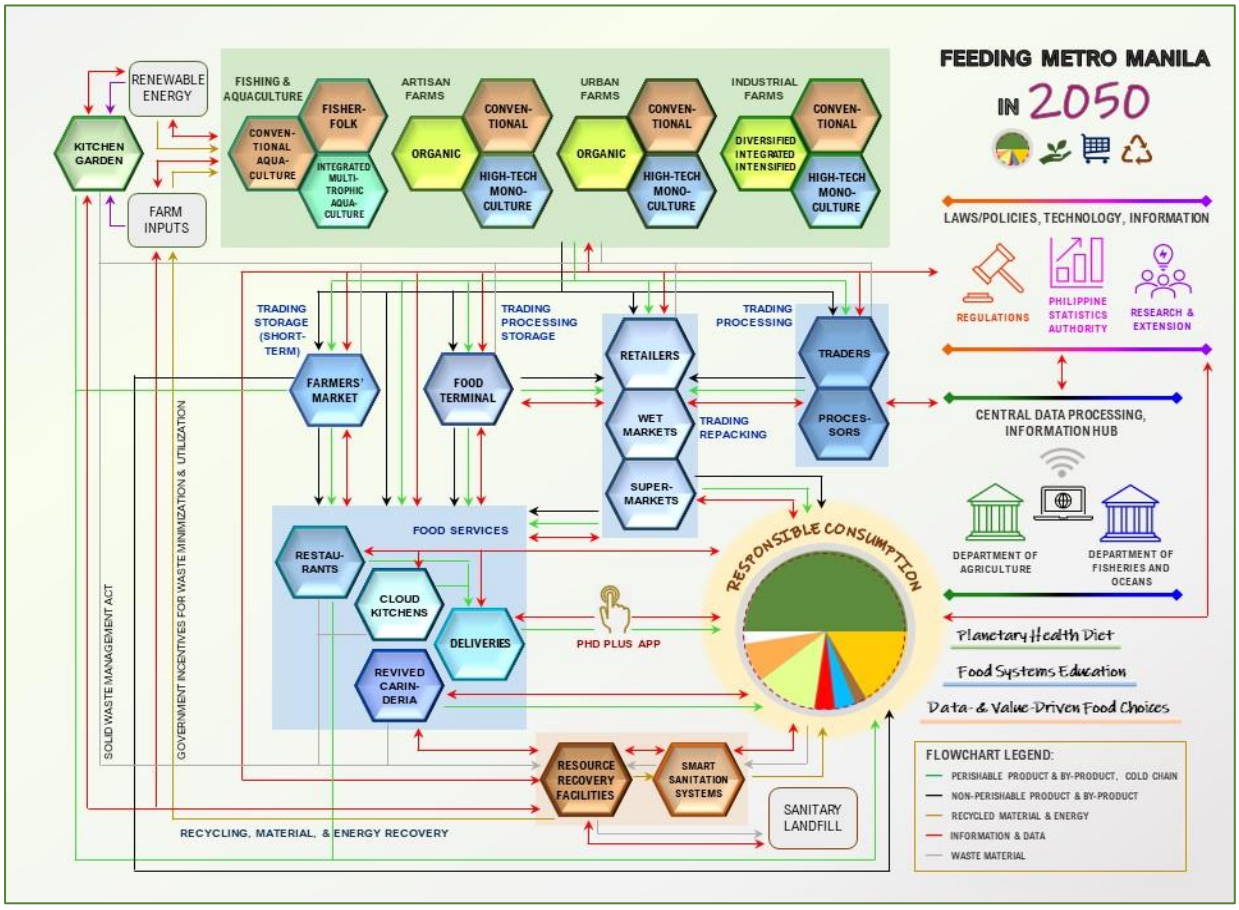
Over 90% of the DA budget will be allocated for programs that promote diversification, logistics enhancement, and support services within the AFIBCs (Figure 7.6). While these types of interventions may be considered traditional, additional efforts will be exerted to modernize the design, delivery, methodology, and approaches guiding the design of these investments.

Figure 7.6: Investment Requirements by Area of Innovation, 2021-2030



DA will also consolidate the different ICT systems within the Department to enhance its credibility among partners and stakeholders. Over the years, a seamless ICT system will vertically connect the central office and regional levels. ICT solutions for farmers and fishers will be further explored and disseminated toward closing the digital divide (Figure 7.7).

Figure 7.7: Food System Vision (Rasco, 2021)



From Rasco, Eufemio T. 2021. Food System Vision in Diagram (https://nast.ph/index.php/nast-related-links/food-system-vision)

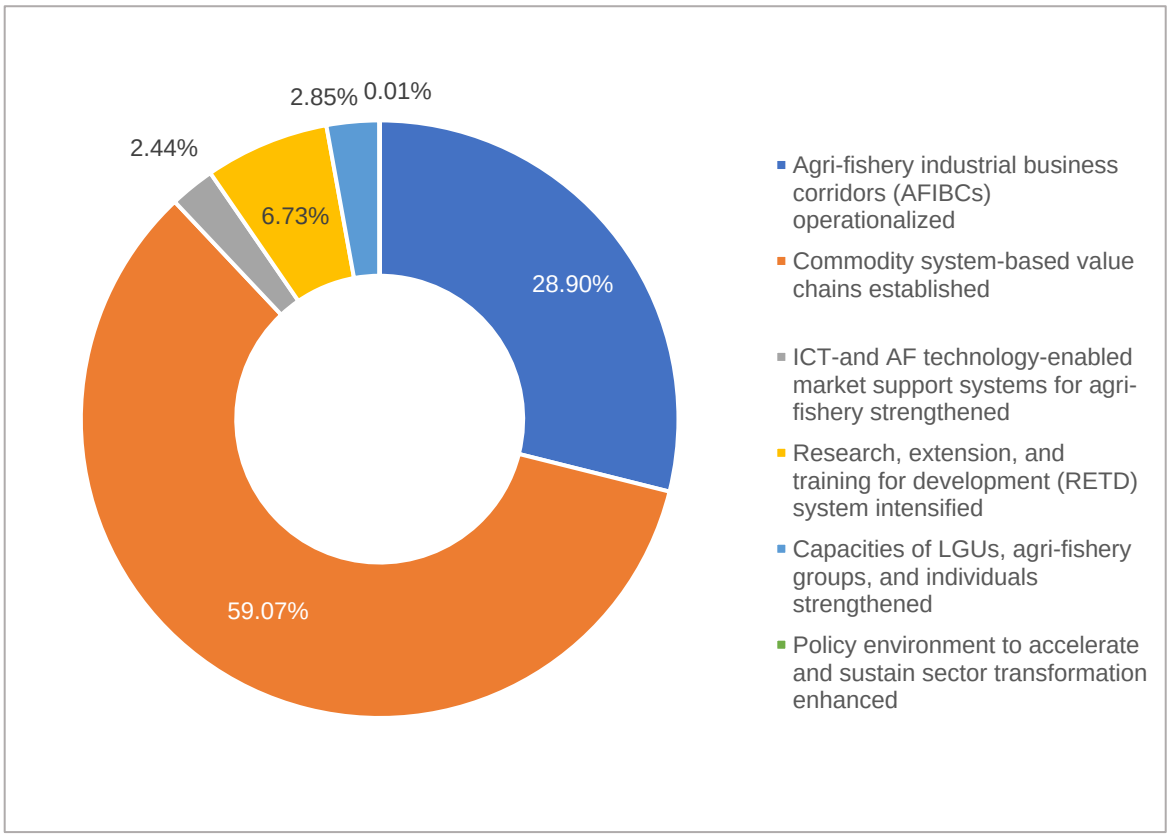
The two areas of innovation that will also receive stable funding in the coming years are biopackaging and electrification in the countryside. As regards the former, the DA has the potential to make dramatic contributions to shift the current use of non-biodegradable packaging particularly of food products, and create an industry for biopackaging. The success of this effort will rely not just on DA, but also on the manner that it will be able to mobilize the different centers of knowledge and innovations in public and private institutions.

Legally speaking, it is not really the responsibility of the DA to engage in the development and delivery of renewable energy in the countryside. However, it can partner with the Department of Energy, which has the mandate for this, to establish these technologies in the countryside to address the gaps in production, processing, and other links in the value chain.

Investment Requirements by Sector Output

It is not surprising that investments for establishing commodity system value-chains—ranging from production to distribution—comprise nearly 60% of the total requirements for NAFMIP implementation. Significant resources, close to 30%, are also required to develop and operationalize the different AFIBCs, which are linked to spatial strategies to be formulated at the regional level. Estimated investment requirements further indicate renewed attention to research, extension, and training for development (RETD) as a pivotal element of modernization. This is complemented by capacity development of farmer/fisher groups, which accounts for the smallest fraction of the requirement (Figure 7.8).

Figure 7.8: Investment Requirements by Sector Output



CHAPTER 8

NAFMIP Agenda for Transformative Governance and Institutional Arrangements

Institutional challenges limited the development of the agri-fishery sector as these binding constraints resulted to decreasing performance in terms of its contribution to the Gross Domestic Product (GDP). The institutional and governance weaknesses in the sector were due was to several factors as explained by Habito and Briones (2005) when they reported that "analysts have constantly pointed to over centralization, politicization of the bureaucracy, lack of clear organizational framework, fragmentation, weak coordination, weak technical and managerial capability, unclear communication lines, unstable budget, and corruption."

The transformative strategies adopted in the NAFMIP as a whole-of-nation plan require institutional adjustments and long-term organizational development for the Department of Agriculture as core organization—as well as all other public and non-government organizations concerned with agri-fishery development at the central, regional, and local levels. This is referred to in this chapter as internal and external institutional environments. The transformation of the agri-fishery sector will also entail significant interventions to address persistent governance issues.

Framework for Institutional Roles and Relationships

The Internal Institutional Environment

Role of the Department of Agriculture. Synergy and coordination among member-agencies of the whole DA family are at the core of institutional capacity building interventions even as they endeavor to do commodity system planning, regional and spatial planning, as well as functional planning for service delivery.

These are best strengthened in the context of the horizontal and vertical integration of the efforts of all concerned offices. At the horizontal front, interventions should enable member agencies—such as the staff or service units of the department as well as the bureaus, attached agencies and corporations—to work as teams rather than as independent organisms. Thematic and functional areas and mechanisms of convergence, coordination and collaboration should be reviewed/identified and enhanced/established, respectively, to promote operational efficiency and cost effectiveness. The agriculture and fisheries sector has about 30 coordinating bodies.

Toward vertical coordination, lines of communication will be instituted to ascertain responsibility and accountability at various levels of governance. Operational arrangements will also be strengthened between central level units and regional field offices.

The current structure of the DA with several attached agencies, corporations, and bureaus are currently configured for a single commodity approach. It is also not fully equipped to perform the functions pertaining to implementing the NAFMIP transformative strategies. One concern is the inadequate focus on the fisheries sector in spite of coastal and marine environments

comprising 80% of the country's territory. The Transition Plan addresses these issues with appropriate recommendations in this chapter.

Table 8.1 identifies thematic and functional areas of convergence, synergy, and collaboration of the various operating units of the department. It also presents how such functions or themes could strengthen institutional linkages of the department as one family.

Table 8.1: Strengthening Internal Linkages through Thematic and Functional Areas

THEMATIC OR FUNCTIONAL AREAS OF CONVERGENCE OR COLLABORATION	SPECIFICS OF CONVERGENCE AND COLLABORATION	STRATEGIC FOCUS OF INTEGRATION	SPECIFICS OF INTEGRATION
Direction-setting for the whole sector and respective operating units	How the different operating units align with overall development directions and translate such into specific actions	Horizontal integration	Make development direction and actions of operating units supportive of and consistent with the overall direction set for the whole sector
		Vertical integration	Adopt overall development directions and translate into action plans at lower-level offices
Work/ strategic planning for the whole sector and respective operating units	How overarching vision, development thrusts and priorities are translated across the: (a) different operating units of the department; and (b) various levels of governance	Horizontal integration	Strongly align specific work and strategic plans of operating units consistent with overarching vision, development thrusts and priorities
		Vertical integration	Integrate work and strategic plans of lower levels in higher level plans
Investment programming	Selection, prioritization, and programming of high impact, responsive PPAs	Horizontal integration	Integrate and package similar and related projects or projects from various operating units with common features to promote cost efficiency and eliminate duplication of activities
		Vertical integration	Identify PPAs from below and properly integrate with similar PPAs at higher levels of governance
Project development	Generation and packaging of project proposals based on: (a) responsiveness to sector-wide needs and service gaps; (b) impact in	Horizontal integration	● Develop large scale, high impact sector-wide projects ● Ascertain collaboration among concerned service units and offices

THEMATIC OR FUNCTIONAL AREAS OF CONVERGENCE OR COLLABORATION	SPECIFICS OF CONVERGENCE AND COLLABORATION	STRATEGIC FOCUS OF INTEGRATION	SPECIFICS OF INTEGRATION
	bringing about overall intended results for the sector; and (c) effectiveness on the use of resources.	Vertical integration	● Develop nationwide, multi-level responsive projects ● Support these at various levels of governance
Monitoring and evaluation (M&E)	Design and implementation of various evaluation studies (e.g., outcome mapping, impact evaluation, benefit-cost effectiveness review, among others) of PPAs for more rational investment programming and budgeting	Horizontal integration	Align all M&E initiatives of various operating units and subsectors with the NAFMIP RBME Roadmap and integrate these with the NAFMIP Management Information System
Budgeting	Effective determination and allocation of funding requirements for the implementation of PPAs and operation of offices	Horizontal integration	Determine budget and allocation among member-agencies of the DA family based on implementation needs and requirements of identified PPAs
		Vertical integration	Determine budget and allocation employing a mix of acceptable top-down and bottom-up approaches
Fund sourcing for high impact projects	A proactive strategy of funds mobilization for identified high impact and sector wide PPAs	Horizontal integration	Ensure coordination among offices responsible for project development, investment programming and budgeting as well as concerned program offices.
Policy review and development	Ensuring responsiveness of regulatory regime given the challenges of the time and the need to provide for enabling environment for the implementation of the NAFMIP	Horizontal integration	Ensure coordination with concerned and relevant operating units and program offices, as well as other sector stakeholders
Delivery of extension services at the sub-national level	Providing a common ground for extension service delivery and capacity development at the local level.	Horizontal integration	Ensure coordination with concerned and relevant operating units and program offices, as well as other sector stakeholders.

THEMATIC OR FUNCTIONAL AREAS OF CONVERGENCE OR COLLABORATION	SPECIFICS OF CONVERGENCE AND COLLABORATION	STRATEGIC FOCUS OF INTEGRATION	SPECIFICS OF INTEGRATION
Farm Clustering	Development of scale economies in agriculture and fisheries sector	Horizontal integration	Ascertain that different programs, offices and services units collaborate in providing assistance to identified focus areas or activities.

The External Institutional Environment

Role of other stakeholders. The external environment includes offices from the executive and legislative branches of the national government; relevant civil society and business sector organizations; national, regional, and local coordinating bodies; the local governments; small farmer and fisher formal and informal organizations; and the academe. Areas for strengthening could include points of agency integration, definition of roles and responsibilities, designation of growth hubs and farm or program clustering, and supply chain management.

Table 8.2 summarizes the roles of other stakeholders and how they could be mobilized in effecting development and transformation to the agriculture and fisheries sectors.

Table 8.2: Strengthening Institutional Linkages with other Stakeholders

AGENCY/ ENTITY/ COORDINATIVE BODY	MANDATE	POSSIBLE ROLES IN AGRI-FISHERIES TRANSFORMATION
Department of Finance (DOF)	Formulates revenue policies that will ensure funding of critical government programs that promote welfare among our people and accelerate economic growth and stability	Support NAFMIP implementation through fiscal policies that create a favorable investment climate for agri-fishery
National Nutrition Council (NNC)	Formulates national food and nutrition policies and strategies; coordinates planning, monitoring, and evaluation of the national nutrition program; coordinates the release of funds, loans, and grants from government and non-government organizations; and calls on any department, bureau, office, agency, and other instrumentalities of the government for assistance in the form of personnel, facilities and resources as the need arises. organizations	Ensure integration of nutrition-sensitive agriculture toward achieving nutritional outcomes in the Philippine Plan of Action for Nutrition (PPAN 2023-2028) Uphold the integrated food and nutrition planning Advocate this to local government units in crafting their local nutrition action plans
Department of Trade and Industry (DTI)	Realizes the country's goal of a globally competitive and innovative industry and services sector that	Manage: ● Supply chain ● Exports and investment development program

AGENCY/ ENTITY/ COORDINATIVE BODY	MANDATE	POSSIBLE ROLES IN AGRI-FISHERIES TRANSFORMATION
	contributes to inclusive growth and employment generation Expands economic opportunities in industry and services and increases the access to these particularly of micro, small, and medium enterprises (MSMEs) and relevant cooperatives, especially in the AF sector	● Industry development program SME development program SME development program Improves access to finance, to production networks, and to markets
Philippine Economic Zone Authority (PEZA)	Establishes the legal framework and mechanisms for the integration, coordination, planning, and monitoring of special economic zones, industrial estates / parks, export processing zones, and other economic zones Transforms selected areas in the country into highly developed agri-industrial, industrial, commercial, tourist, banking, investment, and financial centers, where highly trained workers and efficient services will be available to commercial enterprises Promotes the flow of investors, both foreign and local, into special economic zones which would generate employment opportunities and establish backward and forward linkages among industries in and around the economic zones Stimulates the repatriation of Filipino capital by providing attractive climate and incentives for business activity Promotes financial and industrial cooperation between the Philippines and industrialized countries through technology-intensive industries that will modernize the country's industrial sector and improve productivity levels by utilizing new technological and managerial know-how Vests the special economic zones on certain areas thereof with the status of a separate customs territory within the framework of the Constitution and the national sovereignty and territorial integrity of the Philippines	Support NAFMIP in establishing AFIBCs

AGENCY/ ENTITY/ COORDINATIVE BODY	MANDATE	POSSIBLE ROLES IN AGRI-FISHERIES TRANSFORMATION
Department of Transportation (DOTr)	Develops policy, plans, programs, coordinates, implements and administers promotion, development, and regulation of a dependable and coordinated network of transportation systems, as well as in providing fast, safe, efficient, and reliable transportation services	Develop a National Logistics Master Plan toward successfully bringing the commodities to the paying consumers and make the whole operation viable, profitable and sustainable, including: • Trade corridors and routes development • Logistics infrastructure development plan • Storage facilities and food terminal development • Local market and industry support • Digital infrastructure development for logistics • Climate-proofing infrastructure and related development
National Anti-Poverty Commission (NAPC)	Acts as the "coordinating and advisory body" that exercises oversight functions in implementing the government's social reform agenda (SRA) and ensures that it is incorporated into the formulation of national, regional, sub-regional, and local development plans Institutionalizes basic sector and NGO participation in managing the SRA cycle Develops microfinance by establishing the People's Development Trust Fund (PDTF) and strengthening the People's Credit and Finance Corporation as the forerunners for microfinance services Strengthens LGUs so they can incorporate the SRA in their local development efforts	Provide support in alleviating poverty among farmers and fisherfolks Assist LGUs in enhancing poverty alleviation interventions in their local plans to benefit farmers and fisherfolk
Department of the Interior and Local Government (DILG)	Establishes and prescribes plans, policies, programs, and projects to promote peace and order, ensure public safety and further strengthen the administrative, technical, and fiscal capabilities of local government offices and personnel	Under its oversight function over LGUs, provide support for institutional development and supports the integration of NAFMIP strategies in LGU plans

AGENCY/ ENTITY/ COORDINATIVE BODY	MANDATE	POSSIBLE ROLES IN AGRI-FISHERIES TRANSFORMATION
Department of Agrarian Reform (DAR)	Leads in implementing the CARP through LTI, agrarian justice, and coordinated delivery of essential support services to client beneficiaries Actualizes equitable land distribution, ownership, agricultural productivity, and tenurial security for, of, and with the tillers of the land toward improving their quality of life	Deliver extension service at the local level Manage assets Deliver capacity building at the community level (for farmers), e.g., farm productivity
Department of Environment and Natural Resources (DENR)	Oversees conservation, management, development, and proper use of the country's environment and natural resources, specifically forest and grazing lands, mineral resources, including those in reservation and watershed areas, and lands of the public domain; as well as the licensing and regulation of all natural resources as may be provided by law in order to ensure equitable sharing of the benefits derived therefrom for the welfare of the present and future generations of Filipinos	Deliver extension service at the local level Asset management and use Deliver capacity building at the community level (for farmers), e.g., farm productivity Enforce environmental laws for watersheds and protected areas
Department of Science and Technology (DOST)	Provides central direction, leadership and coordination of scientific and technological efforts and ensures that the results therefrom are geared and utilized in areas of maximum economic and social benefits for the people	Develop and apply food processing technology Product packaging, labeling, branding Coordinate product certification/ accreditation
DOST Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (PCARRD)	Formulates policies, plans, and programs for science and technology-based R&D in the different sectors under its concern; coordinates, evaluates, and monitors the national R&D efforts in the agriculture, aquatic, and natural resources (AANR) sector; allocates government and external funds for R&D and generates resources to support its program	Contribute to materializing and complementing the NAFMIP by funding and formulating programs/ projects related to consolidation, modernization, and industrialization of the agriculture and fisheries sectors
Department of Information and Communications Technology (DICT)	Develops policy related to the national ICT development agenda; and plans, coordinates, implements, and administers related programs	Support establishing the National Information Network Support, guide, and monitor digitalization and digital

AGENCY/ ENTITY/ COORDINATIVE BODY	MANDATE	POSSIBLE ROLES IN AGRI-FISHERIES TRANSFORMATION
		transformation in the AF sector[1]
Technical Education and Skills Development Authority (TESDA)	Provides direction, policies, programs and standards toward quality technical education and skills development	Provide capacity development programs in food processing
Department of Tourism (DOT)	Encourages, promotes, and develops tourism as a major socio-economic activity to generate foreign currency and local employment and to spread the benefits of tourism to a wider segment of the population with the support, assistance, and cooperation of both the private and public sectors	Promote agri-tourism to provide additional income for farmers and fisherfolk Provide capacity development programs on agri-tourism Link farmers and fisherfolk to tourism establishments to supply agri-fishery products
National Irrigation Administration (NIA) (now as part of DA as of April 25, 2022)	Investigates, studies, and develops all available water resources in the country, primarily for irrigation purposes Plans, designs, constructs, and/or improves all types of irrigation projects and appurtenant structures Operates, maintains, and administers all national irrigation systems (NIS)	Support NAFMIP strategies to increase agri-fishery production
Department of Education (DepEd)	Formulates, implements, and coordinates policies, plans, programs, and projects in the areas of formal and non-formal basic and secondary education	Include modernized agri-fishery in primary and secondary education curricula Promote and use the traditional Filipino diet in feeding programs for students Encourage K-12 learners to pursue careers in modernized agri-fishery
Department of Social Welfare and Development (DSWD)	Develops, implements, and coordinates social protection and poverty-reduction solutions for and with the poor, vulnerable, and disadvantaged	Promote and use the traditional Filipino diet in feeding programs for malnourished children and other groups

[1] **Digitalization** refers to enabling or improving processes by leveraging digital technologies and digitized data, while **digital transformation** is really business transformation enabled by digitalization (From https://www.arcweb.com/blog/what-digitization-digitalization-digital-transformation).

AGENCY/ ENTITY/ COORDINATIVE BODY	MANDATE	POSSIBLE ROLES IN AGRI-FISHERIES TRANSFORMATION
Department of Human Settlements and Urban Development (DHSUD)	Manages housing, human settlement, and urban development	Support the NAFMIP integrated spatial strategy Ensure integration of sustainable land management principles in the PDPFP and CLUP
Bureau of Customs (BOC)	Assesses and collects customs revenues; curbs illicit trade and all forms of customs fraud; and facilitates trade through an efficient and effective customs management system	Prevent smuggling of agricultural and fishery products and other related forms of illicit trade detrimental to the agri-fishery sector
National Commission on Indigenous Peoples (NCIP)	Protects and promotes the interest and wellbeing of the ICCs/IPs with due regard to their beliefs, customs, traditions, and institutions	Strengthen inter-agency convergence in IP areas (ancestral domains) as spatial context for agri-fishery investments, including for geographically specialized commodity systems planning and implementation Input to NAFMIP implementation and assessment
State universities and colleges and private colleges and universities (SUCs)	Provide advanced education, and higher technological, professional, and vocational instruction and training Promote and undertake research and extension services in support of sector development	Technical and knowledge-based support to farmers and fisherfolk Develop disruptive technologies in AF modernization Provide capacity development programs
Local chambers of commerce and industry	Promote interest in local business possibilities Promote economic welfare of the community Professional development	Industrial and business development Provide assistance to businesses with the latest marketing and promotional techniques Provide a variety of services that could help transform the agriculture and fisheries sectors
Business organizations, associations and federations	Enforce industry standards among members	Advise on attracting investors and mobilizing resources in the magnitude required for agri-fishery industrialization

AGENCY/ ENTITY/ COORDINATIVE BODY	MANDATE	POSSIBLE ROLES IN AGRI-FISHERIES TRANSFORMATION
	Foster cooperation and coordination among members in addressing industry concerns	Provide inputs to agri-fishery policies and regulation
Federations/ associations of local farmers and fisherfolk	Provide assistance to farmers and fisherfolk in terms of extension services, access to funding and credit facilities, and marketing of products	Assist government to work out agri-fisheries development plans Facilitate agri-fisheries extension Provide supply and marketing services Supply farm credit Develop capacities of farm/fisher leaders
Development partners	Promote social and economic development	Provide technical assistance to help boost investments Convene inter-government and intersectoral dialogues Promote global best practices in agri-fishery sector transformation
Local government units	Extension and on-site research services and facilities related to agriculture and fishery activities Assist in organizing farmers' and fisherfolk's cooperatives and other collectives/organizations Facilitate transfer of appropriate technology Facilitate industrial research and administer development services	Direct policy for the AF sector at the local level Provide extension services Farm cluster management Establish coordinative mechanisms at the local level (e.g., the PAFES) Integrate the NAFMIP strategies (SAFDZ, Integrated Spatial Planning Framework, AFIBCs) to local plans (PDPFP, CLUP)
Relevant coordinating committees at the sub-national levels	Collaborative decision making and policy direction setting Build consensus building and facilitate working together to get things done	Set policy directions Formulate plans Develop projects and program investments
Financial institutions	Provide funding assistance and support to agri-fisheries transformation	Provide credit facility for start-up agribusiness endeavors

AGENCY/ ENTITY/ COORDINATIVE BODY	MANDATE	POSSIBLE ROLES IN AGRI-FISHERIES TRANSFORMATION
	Assist farm/fishery and asset management and development	
Insurance companies	Provide crop insurance Manage farm/fishery risks	Risk management and resiliency
Logistics and transport service providers	Product distribution and channeling	Transport goods Establish crisis-proof trade and transport facilities Product marketing and distribution
Legislators (at all levels)	Formulate laws, policies, and regulatory measures Authorize spending Review policy enabling environment	Formulate and develop relevant rules and policies to support transforming the sector and in implementing the NAFMIP
Law enforcement and intelligence agencies		Provide assistance to DA and BOC in implementing RA 10845 (Anti-Agricultural Smuggling Act of 2016)
Philippine National Police Criminal Investigation Detection Group (PNP-CIDG)	Monitors, investigates, and prosecutes all crimes involving economic sabotage and other crimes of such magnitude and extent as to indicate their commission by highly placed or professional criminal syndicate/s or organization/s Investigates all major cases involving violation of the Revised Penal Code (RPC) Operates against organized crime groups	
National Intelligence Coordinating Agency (NICA)	Directs, coordinates, and integrates national intelligence activities Takes lead as intelligence collector of the national government, focusing on the country's strategic intelligence (IS) requirements; Prepares intelligence estimate on local and foreign situation for the formulation of national security policies by the President and the National Security Council	

AGENCY/ ENTITY/ COORDINATIVE BODY	MANDATE	POSSIBLE ROLES IN AGRI-FISHERIES TRANSFORMATION
	Serves as the focal point for the government's counterintelligence activities and operation Acts as Secretariat to the Anti-Terrorism Council Serves as head of the NTF-ELCAC's SAKM Cluster.	

Agenda for Transformative Governance

NAFMIP Implementation Coordinating Body

The crisis management approach to addressing the pandemic brought about by Covid-19 provided a template on how a national-level coordinating body bestowed with adequate authority can execute strategies and policies at all levels of government. Despite the challenges, the inter-Agency Task Force (IATF) enabled the national government to ensure coordination of interventions from the national to the regional down to the local government levels.

The urgency of achieving food security will require efficient and effective implementation of the NAFMIP's transformative strategies and interventions. A coordinating body similar to the IATF should oversee and monitor NAFMIP implementation. Considering the numerous agri-fishery coordinating bodies already in place, however, a new task force need not be created. The incoming administration may instead designate and elevate an existing body to serve the purpose, such the National Agricultural and Fishery Council (NAFC). NAFC fits the requirement for the coordinating body to have multi-stakeholder representation including government line agencies, legislators, the private sector, civil society, and local governments. The NAFMIP coordinating body will mainly review/assess multisector commitments, identify factors facilitating or hindering plan implementation, and formulate policies to address or enhance those factors. During NAFMIP implementation, this coordinating body will regularly convene multisector/multi-stakeholder dialogues to generate feedback, inputs, and engagement that can inform decision making and Plan execution. This will facilitate calibrating interventions or making timely adjustments as appropriate. It will also identify and propose enabling legislation needed to ensure effective Plan implementation.

Improving International Trade Governance

As NAFMIP promotes international trade, particularly exports of high-value manufactured agri-fishery-based products, a corresponding enhancement of governance arrangements will be required to ensure fair trade practices. Programs, projects, and activities to be funded during the Plan period will support, among others, interventions to (1) continually raise transparency in all transactions; (2) improve productivity and competitiveness; (3) ensure payment of correct import duties; (3) curb smuggling (see section on smuggling below); (4) raise food safety and quality standards; (5) build capacities to enforce quarantine regulations; and (6) provide safety nets for stakeholder groups to be negatively affected by imports. The Plan calls for reviewing and aligning international trade policies and regulations vis-à-vis NAFMIP innovations; and developing and adopting ICT applications to reduce the transaction cost of exporting high-value products.

Protecting Against Corruption

One issue impacting the AF economy that many times needs just-in-time executory decision-making from top leaders is the continuous smuggling of food products. A study conducted in 2014 revealed that the most common commodities smuggled into the country are milled rice, sugar, onion, ginger, carrot, and turnips (Gordoncillo, et al.). The study also estimated that in terms of value, milled rice is the top smuggled commodity with a total value of USD1.2 billion from 1986 to 2009. Refined sugar (USD448M), beef meat (USD428M), onion (USD259M), and pork (USD117M) follow. The estimates also revealed that by mid-1990s, the value of technical smuggling[2] of most commodities such as milled rice, beef meat, onion, pork, ginger, and carrots increased for most of the years from 1995 to 2009. A more recent study using UN trade statistics revealed that the estimated government revenue lost increased from USD26.6 billion in 2004 to USD143.3 billion in 2016 (Lantican and Ani, 2020). Study results showed that overall, the trend in the volume of technical smuggling has increased, and that the policies and accession to the World Trade Organization (WTO) had no influence on the extent of technical smuggling.

Republic Act 10845, otherwise known as the Anti-Agricultural Smuggling Act of 2016, was signed into law on May 23, 2016. The law declared smuggling as economic sabotage. In the same year, Republic Act 10863, otherwise known as the Customs Modernization and Tariff Act, was signed into law and amended the Tariff and Customs Code of the Philippines. The two laws are the major policies against agricultural smuggling.

Among the key initiatives to enforce the law were the creation of task forces. The Bureau of Customs created the Anti-Smuggling Task Force in 2018 purposely to intensify the agency's efforts against illegal importation of goods into the country. As the agency's prosecution arm, it coordinates with other law enforcement agencies in the bureau such as the Intelligence Group (IG) and the Enforcement and Security Services (ESS). The DA created the Compliance and Regulatory Enforcement for Security and Trade (CREST) Office while the Federation of Philippine Industries created the Anti-Smuggling Committee.

Initial impacts of the policies and initiatives resulted in improvements of BOC's performance in achieving its revenue targets. In 2018, BOC achieved its target revenue for the year posted at PHP585.54 million (US$11.54 million) of collections (Lantican and Ani, 2020). The value of misdeclared goods seized at the Port of Manila in 2019 also significantly improved. The DA reported increased apprehensions and confiscations of smuggled AF products in 2021.

However, despite these initial gains, the problem persisted, highlighted recently (as of this NAFMIP finalization period) by a series of news items that featured the negative effects of smuggling on local producers and the overall economy. It is imperative that measures to curb smuggling be established. Beyond reactive executive actions, continuous operational policy reforms through legislative actions and appropriate mechanisms established in concerned agencies are essential and urgent to improve monitoring, detection, and enforcement.

The smuggling problem is also a corruption issue directly connected with each other. Technical smuggling as defined are those activities that involve bringing in imported goods using the ports of entry by misdeclaration. Unlike direct smuggling, the imported goods pass through the regulatory systems but have escaped detection. However, large shipments

[2] Technical smuggling refers to the act of importing goods into the country by means of fraudulent, falsified, or erroneous declaration of the goods to its nature, kind, quality, quantity, or weight, for the purpose of reducing or avoiding payment of prescribed taxes, duties, and other charges (RA 10863, 2016).

involving accredited importers are too big to miss, which indicates system failure or possible human intervention.

To effectively curb smuggling, operational reforms can improve efficiency and effectiveness of systems, which have legal and operational implications. SEARCA (2013) recommended legislative actions and operational reforms to address smuggling. The study revealed "existing processes that are unique in the Philippines compared to other countries which do things differently" (SEARCA). It is therefore necessary that measures specific to the Philippine context be strengthened.

The recommended legislative actions and policy reforms include the following:

- Harmonize tariff rates;
- Impose stiff penalties for the crime of smuggling;
- Establish a food safety, revenue, and trade coordinating council;
- Facilitate real-time access to cargo manifest by other regulatory agencies;
- Operationalize and fully implement the single window system (SWS);
- Modify the boarding protocol;
- Create an oversight function in the risk management system;
- Track rules of origin and international transshipment;
- Share responsibility and accountability in post-border inspection; and
- Strengthen monitoring at customs-bonded manufacturing warehouses.

Operational efficiency also needs to be improved in the fight against smuggling of agricultural products through more effective inter-agency collaboration between the DA, BOC, DTI, and intelligence and law enforcement agencies such as the National Intelligence Coordinating Agency (NICA) and Philippine National Police-Criminal Investigation and Detection Group (PNP-CIDG). The BOC's Strategic Transformation Plan should be revisited and regularly updated to ensure responsiveness to current and future challenges.

Another aspect that needs to be given attention is on ethics and moral values formation among the bureaus' personnel and management. An ethics program needs to be crafted to include compliance and values orientation. This can be integrated into the updated BOC Strategic Transformation Plan.

Moreover, reforming procurement and contracts management would require instituting mechanisms at DA toward improving transparency and accountability based on the provisions of the Government Procurement Reform Act. It is further crucial to improve internal control and audit by fully operationalizing the Internal Audit Services based on the international standards for professional internal auditing.

Improving the Transport System for Agri-fishery Products

Transport is one key component of the logistics system that utilizes infrastructure in bringing goods from production to processing or consolidation areas and finally to the markets and consumers. Being archipelagic, transport systems in the Philippines are inter-modal with travel time being dependent on efficiency of roads, rails, seaports, and airports. Agricultural products are usually transported using the roll on-roll-off (RORO) vessels that ply routes between islands. The current situation is not favorable as issues arising from port efficiency result to costly delays on the part of commuters and cargoes. Port operations are hampered by inefficient systems and procedures resulting to losses in agri-fishery products being

transported. As a governance issue, such inefficiencies need appropriate policies and interventions to improve transport operations.

Digitalizing Government Systems

The nature of the reforms recommended highlights the need to upgrade the information technology (IT) system and to digitalize and automate processes and data management. This is consistent with the public management paradigm on digital era governance[3] (DEG). Digitalization will establish mechanisms to improve transparency and accountability which can serve as deterrents to corruption.

Current efforts in digitalizing government systems need to be intensified through decisive actions in upgrading the IT infrastructure and services. This will also support the National Information Network (NIN) that was mandated under the AFMA but not yet realized. The NIN is supposed to be set up from the DA national to regional, provincial, and municipal offices. As shown in Table 8.2, digitalization falls under the mandate of DICT. In the agri-fishery sector, it will initially be jointly led by DA's Planning and Monitoring Service (PMS), Policy Research Service (PRS), and Information and Communication Technology Service (ICTS)—in collaboration with DICT.

Transition Plan

Overarching Strategy for Governance and Institutional Development

The transformation of the whole agriculture and fisheries sector shall focus on two interrelated and interdependent levels, i.e., internal and external.

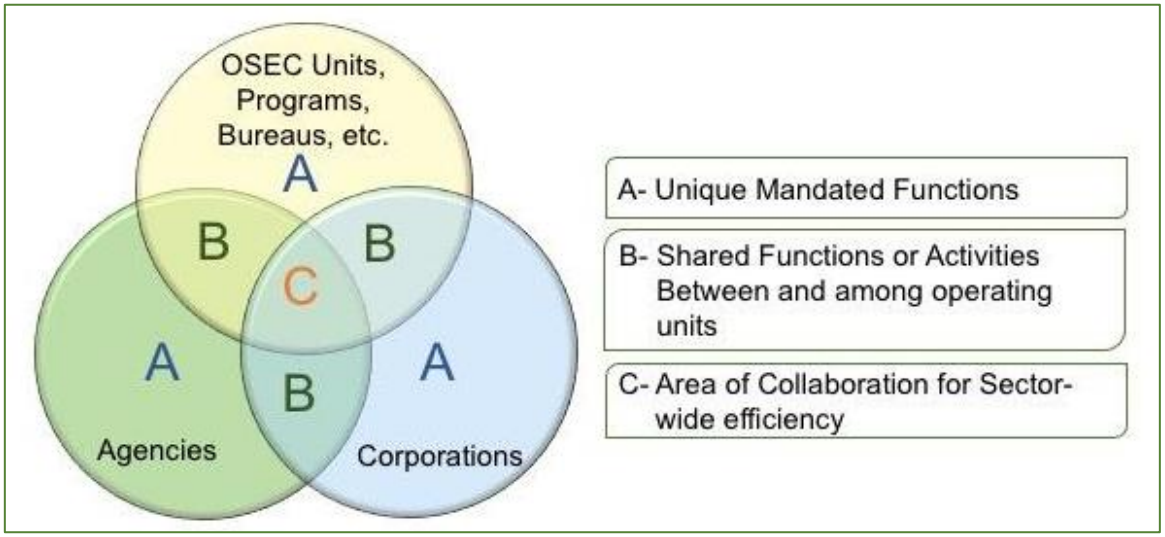
Internal level transformation. This strategy reinforces the OneDA Approach. This implies that the operating units of the DA at various levels have similar development directions and their mandated functions are performed in sync with each other. The overall intention is to promote sector-wide efficiency and effectiveness.

The DA operating units have their own unique mandated functions. They also share selected functions or activities that are performed for inter-unit services. The areas of convergence or collaboration is the most important aspect in implementing the transformative strategies.

Looking at the functions of the operating units (Figure 8.1), the areas of convergence include the following: (1) plan formulation and policy and regulation development; (2) delivery of extension services (e.g., PAFES); (3) selection and prioritization of key programs, projects and activities; (4) monitoring and evaluation (of plan implementation, policy enforcement, PPA implementation); (5) information, advocacy, promotion and knowledge management; (6) risk management and climate resiliency; (7) partnership and stakeholder management; and (8) farm and asset management.

[3] Digital era governance emerged as the public management model largely because of the central role of the digital technologies shaping the organizational structure of public organizations (Dunleavy et al., 2005).

Figure 8.1: Alignment of Functions and Areas of Convergence and Collaboration among DA Operating Units



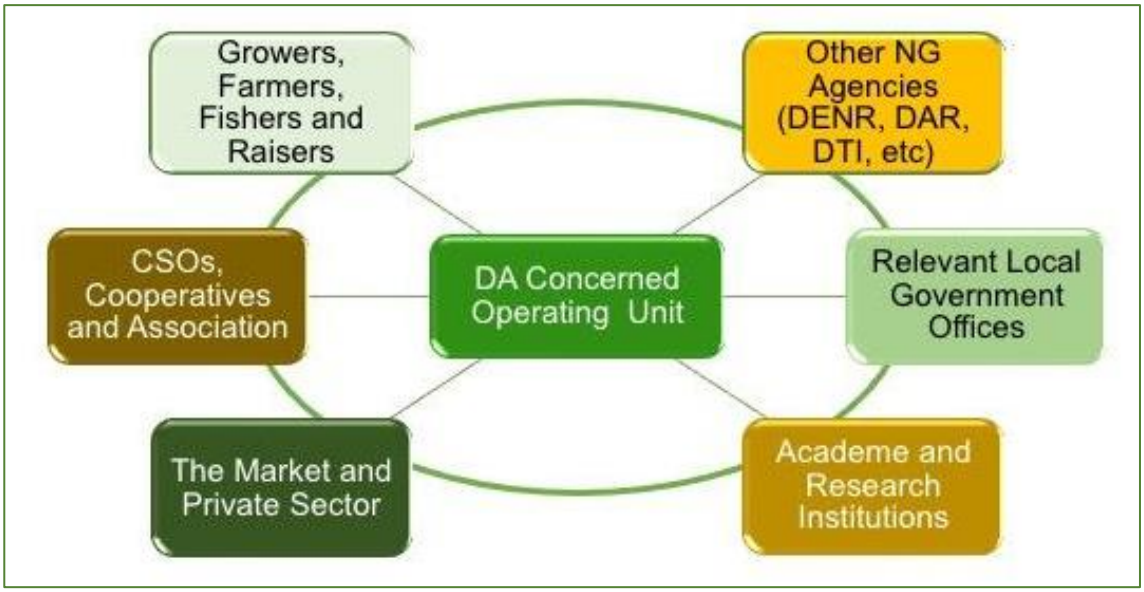
Adequate support will be provided to ensure strengthened presence at the local level. Technical assistance will be aimed at upgrading the capacities of provincial and municipal agriculture offices as well as departments that facilitate investment promotion and cooperatives development. The creation of Local Economic Development and Investment Promotion (LEDIP) Office should be mandated and strengthened. At present, its creation is optional and not all LGUs have established the office. There should also be corresponding interventions to improve the LGU functions on cooperatives development. Coordination of project implementation will further be strengthened by enhancing the functions of the Agricultural Program Coordinating Office (APCO) at the regional level. This will be done by linking the APCO to the Provincial and Municipal Planning and Development Offices, the LGU department that provide technical and secretariat support to the Local Development Councils.

Partnerships with the academe primarily with state universities and colleges will be pursued to facilitate collaborative activities on RETD and curriculum development. Moreover, the academe will play an important role in providing opportunities for LGU agri-fishery personnel to pursue graduate studies and earn degrees.

The contribution of the private sector will be facilitated, and partnerships will be nurtured in providing extension services that can improve production, value-adding, and marketing

External level of transformation. The strategy is to actively engage all stakeholders in agri-fisheries sector modernization and industrialization. This requires aligning the OneDA thrusts and those of the development aspirations and priorities of partners and stakeholders; and putting collaborative mechanisms in place. Partners and collaborators include people and other institutions acting as service providers and process facilitators. As can be seen in Figure 8.2, these may include other national government agencies, relevant offices at the local governments, the market and the private sector, the academe and research institutions as well as the civil society groups and associations in the agri-fisheries sector. Most important among these stakeholders as well as beneficiaries are the farmers, fisherfolk, livestock raisers (individuals and groups), and the Filipino people.

Figure 8.2: DA and its Partners and Collaborators



Areas for collaboration among partners could include: (1) capacity building for beneficiaries; (2) extension service delivery; (3) asset development management; (4) program development and implementation; and (5) production, distribution and marketing efficiency.

Institutional Adjustments

Over a 10-year period, the institutional reform, transformation, and development of the whole sector require the following:

a. Functional adjustment of DA offices and units;
b. Strengthening of coordinative and integrative mechanisms in the whole sector; and
c. Continuous capacity development.

Functional Adjustment of DA Offices and Units

For internal level or institutional transformation, the proposed adjustments would require: (a) realigning functions and levelling up capacities of existing units and offices of the DA Central Office to ensure and strengthen the thematic and functional focus of proposed designated focal unit (whether existing or proposed); and (b) the engaging all operating units.

A key process to be undertaken under the transition plan is the Organizational Diagnosis, which will inform the functional adjustments that can be undertaken to improve efficiency and effectiveness in carrying out mandated functions to execute the transformative strategies of the NAFMIP. Details of the transition plan will be firmed up based on the results of the OD through a consultative and participatory process at various levels.

Integration of Irrigation Services to Support the NAFMIP

The National Irrigation Administration (NIA) was created by virtue of Republic Act No 3601 (1963) and originally placed under the Office of the President. Later it was attached to the Department of Public Works, Transportation, and Communication under PD No.1, dated 23 September 1972. The Administrative Code of 1987, dated 25 July 1987, attached NIA to both

the Department of Public Works and Highways (DPWH) and Department of Agriculture (DA). It was transferred to the Office of the President pursuant to Executive Order No. 22, dated 14 September 1992. Administrative Order No. 17, dated 14 October 1992 attached it again to DA. However, Executive Order No. 165 in 2014 placed it again under the Office of the President together with the National Food Authority, Philippine Coconut Authority, and Fertilizer and Pesticide Authority.

This setup resulted in challenges to effectively complementing the delivery of services. Consequently, Secretary William Dar proposed on April 19, 2021 to transfer the NIA to the DA as an attached agency to facilitate better integration and enhance coordination to maximize available resources in improving the productivity of Philippine agriculture. The Department of Finance (DOF) and the National Economic and Development Authority (NEDA) supported this proposal. Consistent with the OneDA principle, the NAFMIP includes returning the NIA to the DA.

On April 25, 2022, Executive Order No. 168 was issued by the President of the Philippines and transferred the NIA from the Office of the President to the DA. The order stipulated that the Governance Commission for GOCCs should study the reorganization of the NIA Board of Directors and submit their recommendations to the Office of the President through the Executive Secretary.

This development will pave the way for better complementation in the provision of irrigation services. Adequate support to the SAFDZ and other key agri-fishery areas can be facilitated by the alignment of NIA's priority projects with the commodity systems-based approach of NAFMIP. In line with this, the transition plan will include the full integration of NIA to the DA system in line with the OneDA principle.

Explore Creating a Department of Fisheries and Aquatic Resources

Recognizing the vast potential and wealth of the country in marine and coastal resources, the NAFMIP urges the government to focus and invest more in managing fisheries, aquatic resources, and developing of the Blue Economy.[4]

The Bureau of Fisheries and Aquatic Resources (BFAR) is currently one of the bureaus under the DA. Being an archipelagic and maritime state, the Philippines' vast coastal and marine resources are seven (7) times wider than its land area. It has approximately 26.6 million hectares of coastal waters and 193.4 million hectares of oceanic waters. At least two million fisherfolk and their families depend on fishing for their livelihood. Data have also shown fisherfolk, together with coconut farmers, as the poorest in the agri-fishery sector.

Owing to the challenge of effectively delivering services in managing the fisheries and oceans, proposals to create a separate department of fisheries exist and are worth pursuing. Senate Bill No. 242 titled "An Act Creating the Department of Fisheries, Providing for its Powers and Functions and for Other Purposes" was filed by former Senator Loren Legarda. According to Legarda, the bill seeks to protect and conserve the country's fishery and aquatic resources within sustainable limits for the exclusive use and enjoyment of Filipino citizens, to accelerate the integrated development of the fishery industry, and to protect the rights of small and subsistence fisherfolk and fish workers for the preferential use of such resources. Similarly, Senate Bill No. 1437 was filed by former Senator Alan Peter Cayetano seeking to create a Department of Fisheries and Aquatic Resources, which would give the nation's fishery sector a more focused attention.

[4] The "blue economy" concept seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while ensuring environmental sustainability of the oceans and coastal areas (World Bank Group, 2017).

The National Academy of Science and Technology (NAST) on its 39th Annual Scientific Meeting on July 12-13, 2017 had also passed a resolution recommending the creation of a new department that will deal with fisheries, the oceans, and other aquatic resources. If instituted, the proposed department would spearhead developing the blue economy in the Philippines. The primary function of the new department is to develop and manage resources in the oceans and other aquatic ecosystems. The Academy reiterated this recommendation in another resolution passed during the 40th Annual Scientific Meeting on July 11-12, 2018.

Support for Cooperatives

A highly influential contemporary historian, Yuval Noah Harari,[5] famously argued that the main advantage of Homo sapiens over other creatures is his ability to work cooperatively in large numbers. This is made possible by his capacity for abstract thinking and ability to imagine.

Regrettably, Filipinos have not learned the basic lesson of mass cooperation. While Filipinos have a *bayanihan* tradition, which is essentially sharing labor, this is limited to a few families in a village, and it is limited to labor. Cooperation is needed in large numbers and in a broader range of activities of Filipinos.

The consolidation strategy as OneDA pillar calls for mass cooperation among all who engage in primary food production. The NAFMIP recognizes this strategy as an essential ingredient without which the plan would not work. The experience of other countries in recent history, notably Taiwan and Thailand, demonstrated the merits of cooperatives as a system of cooperation. In Thailand specifically, the top-level government organization responsible for agricultural development is the Ministry of Agriculture and Cooperatives. This organization is credited for the recent success of Thailand in developing its agriculture sector.

Aligned with the OneDA consolidation pillar, NAFMIP recommends forming the Bureau of Agricultural Cooperatives within the DA. This unit will nurture cooperativism among primary producers, taking into account the anticipated expansion of their work to value adding and marketing.

Strengthening Coordinative and Integrative Mechanisms for the Whole Sector

For external level transformation, the institutional adjustments would require that the major stakeholders (a) recognize and agree with the desired and ideal state of agri-fisheries in the future (2030); (b) accept and own that vision of the desired future; and (c) commit and resolve to achieve such desired vision.

The Role of LGUs

While all LGUs have a stake in transforming the food system, not all recognize their importance. A typical LGU still looks up to the national government for initiative and support for a food system project, even as this responsibility has been transferred to them with the enactment of the LGC. This is partly because the financial resources needed to carry out meaningful projects have not been provided to the LGUs. On the other hand, the DA's manpower presence has been limited to regional offices. The result is that very few LGUs have sufficient staff who are dedicated to food systems improvement. The absence of incentives for agri-fishery workers at the local level is a reason for sub-par performance.

[5] Yuval Noah Harari is an Israeli public intellectual, historian and a professor in the Department of History at the Hebrew University of Jerusalem. He is the author of Sapiens: A Brief History of Humankind

The expected implementation of the Mandanas-Garcia Ruling in 2022 creates new possibilities for the LGUs that should be maximized. With increased budgets come greater opportunities for upgrading the organizational structure of provincial, city, and municipal agriculture offices. Hiring additional staff and providing capacity development interventions will enable the LGUs to better perform its rowing functions through the PAFES.

Good practices by several LGUs serve as benchmarks and models for advancing agri-fishery and alleviating poverty.

The experience of Alabat, Quezon, which has served as a poster case of LGU success in dramatically improving incomes of farmers and fisherfolk, suggests that the municipal level government can take on a comprehensive role of visioning, planning, fundraising, and implementing a food systems transformation project. The key element is a visionary, creative, competent, and dedicated leadership in the person of the municipal mayor, Hon. Fernando Mesa. In the current lexicon of DA, Mayor Mesa has performed both the steering and rowing functions.

The Alabat experience can be summarized in the following metrics:

1. Three terms (nine years) of continuing leadership of Mayor Mesa
2. Alabat was transformed from fifth to third class municipality.
3. Incomes of farmers increased from five to 20-fold through diversification and value adding.
4. Near zero malnutrition, crime, and insurgency

The impact of doubling the income of farmers and fisherfolk was beyond economics. It improved health, peace and order, and the behavior of citizens. Truancy in school reportedly went down as well.

The Alabat experience demonstrated a range of possible roles of the LGUs in food system transformation. At the extreme is the municipal government performing both the steering and rowing functions, with the provincial and national governments only performing enabling roles by providing appropriate policies, big ticket infrastructure, and funding. At the other extreme is the current situation wherein the DA, through its many agencies, works directly with farmers and other stakeholders, performing the steering, rowing, and enabling functions. Many intermediate measures are possible, depending on the respective roles of municipal, provincial, and national governments.

To stimulate LGU activity in food systems transformation, NAFMIP will provide for training mayors and governors toward involving them more deeply in visioning, planning, and implementing food system transformation in their respective provinces. The DILG will perform oversight functions over this training, with active support from the Food System Task Force.

The Provincial Agri-fishery Extension System (PAFES) will be the main support mechanism for the food system transformation programs (Figure 8.3).

Figure 8.3: Vertical and Horizontal Integration through Critical Functions and Themes

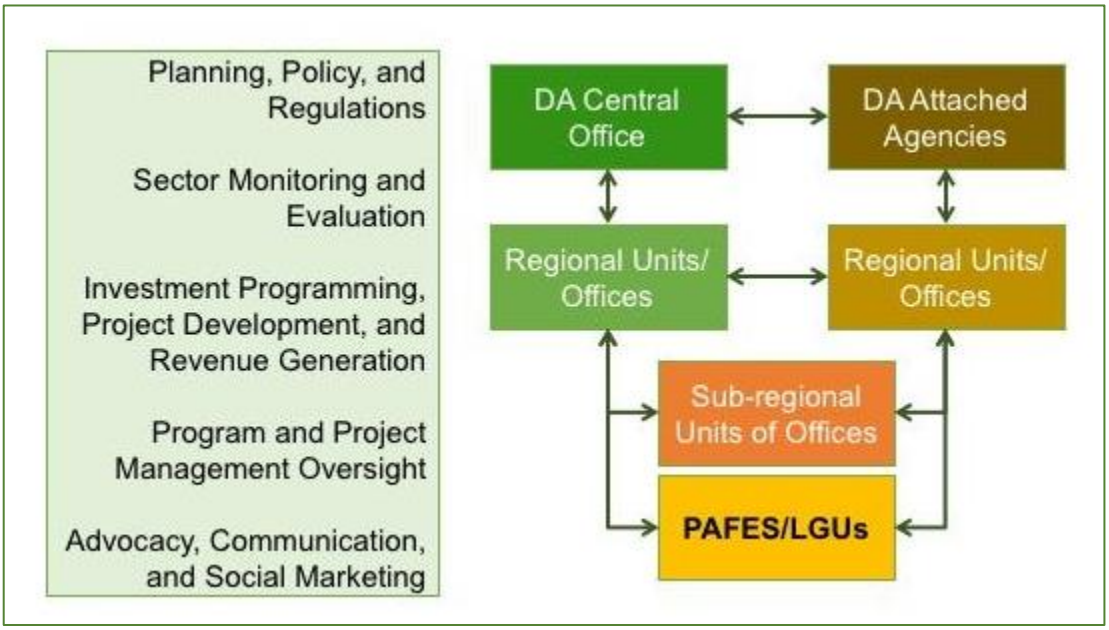


Table 8.3 presents the major thematic and functional services under DA that need to be realigned, briefly describing functions for such services.

While these functions are best seen at the DA Central Office, the structure of Regional Field Offices should likewise align and adjust accordingly (Figure 8.3). The OUs would also create service units that correspond to these functional areas to ensure better coordination of the DA Central Office.

To ascertain better efficiency in discharging these functions and services, the DA will endeavor to continuously enhance its institutional capacities and competencies on the use of ICTs.

Table 8.3: Alignment of Functions of the Department of Agriculture

THEMATIC AND FUNCTIONAL SERVICES	DESCRIPTION OF PROPOSED FUNCTION/S
1. Planning, Policy and Regulations	• Formulate plans, strategies, and policies • Formulate regulations • Overall sector planning • Coordinate sub-national planning and policy formulation • Integrate OU plans and policies • Coordinate planning and policy formulation efforts of DA partner agencies and entities

THEMATIC AND FUNCTIONAL SERVICES	DESCRIPTION OF PROPOSED FUNCTION/S
2. Sector Monitoring and Evaluation	• Sector surveillance and intelligence (global, national and sub-national levels) • Sector environmental scanning • Sector performance monitoring and evaluation (DA and DA partner institutions) in accordance with the NAFMIP RBME System to be expounded in the NAFMIP RBME Roadmap (see Chapter 9) • Monitoring and evaluation of plan implementation and policy enforcement
3. Investment Programming, Project Development, and Revenue Generation	• Sector-wide investment programming (public and private) – DA and DA partner institutions • Develop and evaluate proposed sector-wide and DA-wide programs and projects • Proactively source and generate funds (public and private) for sector-wide proposed programs and projects
4. Program and Project Management Oversight	• Supervise to ensure complementation of programs and projects of DA, DA-OUs, and DA partner agencies • Oversee performance of sector-wide and DA-wide programs and projects • Monitor and evaluate sector-wide and DA-wide programs and projects
5. Advocacy, Communication and Social Marketing	• **Coordinate marketing and promotion of agri-fisheries sector** • Communicate to various audiences plans, policies, strategies and regulations related to agricultural development • Communicate to various audiences the efforts, performance, and achievements of the agri-fisheries sector (DA and its partner institutions)

Strengthening coordinative and integrative mechanisms for the whole sector. For external level transformation, the institutional adjustments would require NAFMIP's major stakeholders to: (1) recognize and agree on the desired and ideal state of agri-fisheries in the future (2030); (2) accept and own that vision of the desired future; and (3) commit and resolve to achieve such desired vision (Figure 8.4).

Figure 8.4: The Vision and Active Engagement of Stakeholders

NAFMIP as a directional plan. For the transformative strategies to be effectively implemented, NAFMIP as a directional plan will guide other sector plans from the national and regional levels to local government plans (Figures 8.5 and 8.6).

Figure 8.5: Institutional Adjustments, Policy Support, and Capacity Development for Integrating NAFMIP in National, Regional, and Local Plans

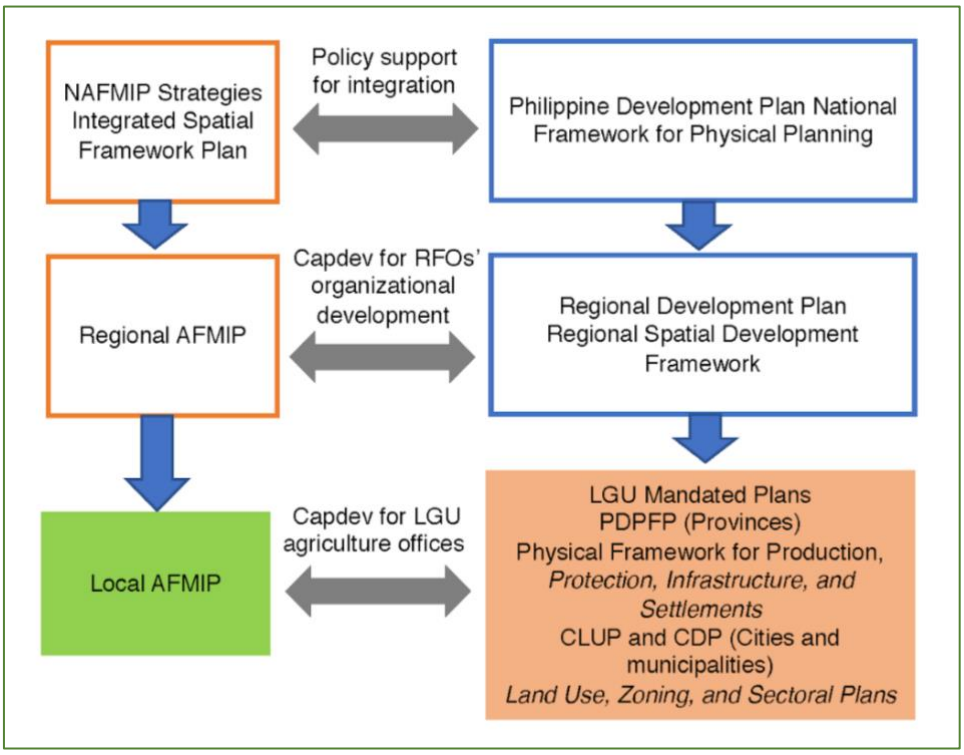
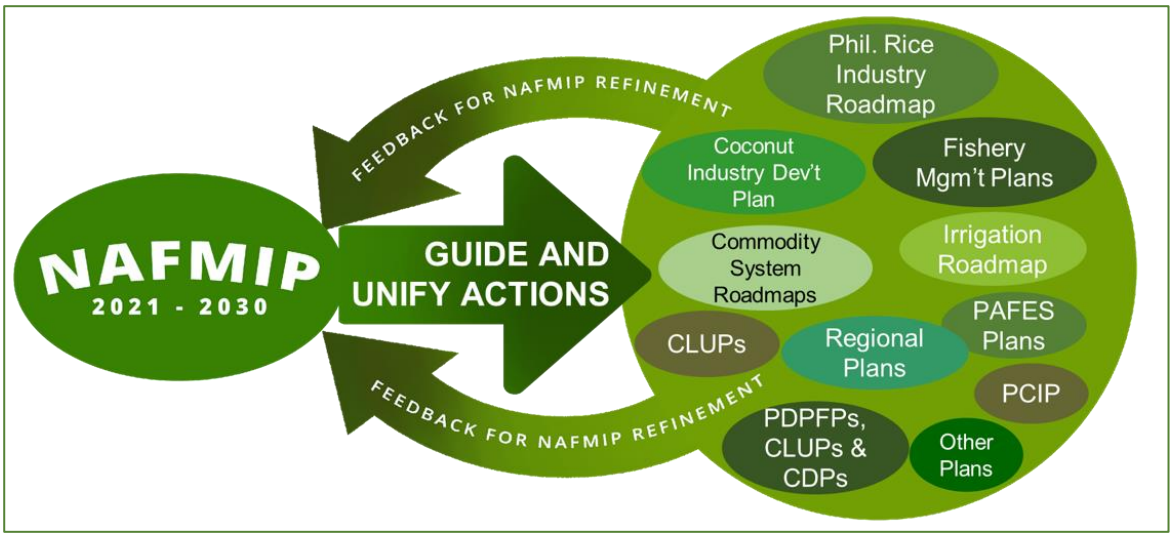


Figure 8.6: NAFMIP as Directional Plan to Guide Other Sector Plans



In line with the shift to commodity systems approach, the existing commodity directorates will now function as commodity *system* directorates and will coordinate with other operating units both for planning and implementation. Corresponding improvements in capacity will also be pursued during the transition period.

At the regional level, RFOs should likewise be strengthened by creating units or designating personnel to handle spatial planning functions. Considering the fast turnover of highly technical GIS personnel, succession should be provided for in case trained personnel leave or transfer to other employment.

Capacity development also applies to stakeholder-beneficiaries—the farmers, growers, producers, fisherfolk, and food manufacturers, among others, as well as to direct service providers, such as agriculture and fisheries extension workers, credit and insurance companies for farmers and other financial institutions, and related technology service providers. Table 8.4 presents the areas for capacity development by group.

Table 8.4: Areas for Capacity Development

INSTITUTIONS AND BENEFICIARIES	AREAS OF CAPACITY DEVELOPMENT
DA OUs and DA partners and collaborators (various levels)	• Sector planning • Spatial planning using GIS • Priority commodity planning and analysis (local) • Strategic and operational planning • Project development and planning • Investment programming (across OUs and across concerned partner national government agencies) • Monitoring and evaluation (of plan implementation, policy enforcement and PPA implementation) • Project and program management

INSTITUTIONS AND BENEFICIARIES	AREAS OF CAPACITY DEVELOPMENT
	• Marketing and promotion (sector-wide, OU-specific, area-focused) • Extension service delivery efficiency • Resource sharing for sector-wide efficiency • Program and project appraisal and assessment • Climate resiliency (in production, distribution and marketing) • Digital marketing
Stakeholder-beneficiaries	• Farm and asset management for productivity • Farm clustering and integration for resource use efficiency and effectiveness • Farm mechanization technologies • Application of digital technology in production, distribution and marketing • Practices in increasing productivity • Sustainable agriculture and fisheries activities at the household and small community levels (i.e., non-reliance on loans and credits; low external input/ sustainable production, processing, and waste management systems, entrepreneurship; and risk and financial management)

The estimated capacity development budget for 2021-2030 is presented in Table 8.5. For LGUs, an estimated budget of PHP62 billion throughout the period is needed for various capacity development interventions.

Institutional development support as discussed in the previous section of this chapter is essential in implementing NAFMIP, requiring a total estimated budget of PHP186 billion. The breakdown per year is presented in Table 8.6.

Table 8.5: Investment Requirements for Capacity Development and Institutions (in Million Pesos)

INTERVENTION TYPE	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL
Capacity development (cap dev) of LGUs, private sector, and key agri-fishery stakeholders	463.1	4,603.6	10,228.58	3,098.94	3,215.01	3,202.73	9,011.53	9,179.49	9,624.04	9,493.54	**62,120.56**
Cap dev of farmers, livestock raisers, and fisherfolk	65.07	990.12	173,728.94	2,128.34	3,042.72	2,523.44	2,587	1,862.44	1,756.33	1,752.32	**190,436.72**
Cap dev vis-à-vis innovations	996.3	6,327.92	185,931.89	6,977.39	6,267.83	6,278.02	11,616.94	11,847.95	12,301.4	12,213.56	**260,759.2**

Table 8.6: Estimated Budget for Institutional Strengthening (in million pesos)

YEAR	BUDGETARY REQUIREMENT
2021	9.53
2022	89,872.64
2023	95,113.04
2024	135.31
2025	129.78
2026	136.89
2027	106.59
2028	101.17
2029	109.97
2030	100.77
Total	**185,815.69**

Transition Plan Roll-out

The transition plan is an implementation mechanism for the NAFMIP and a plan in itself that needs to be implemented to establish an enabling environment for a transformed agri-fisheries sector.

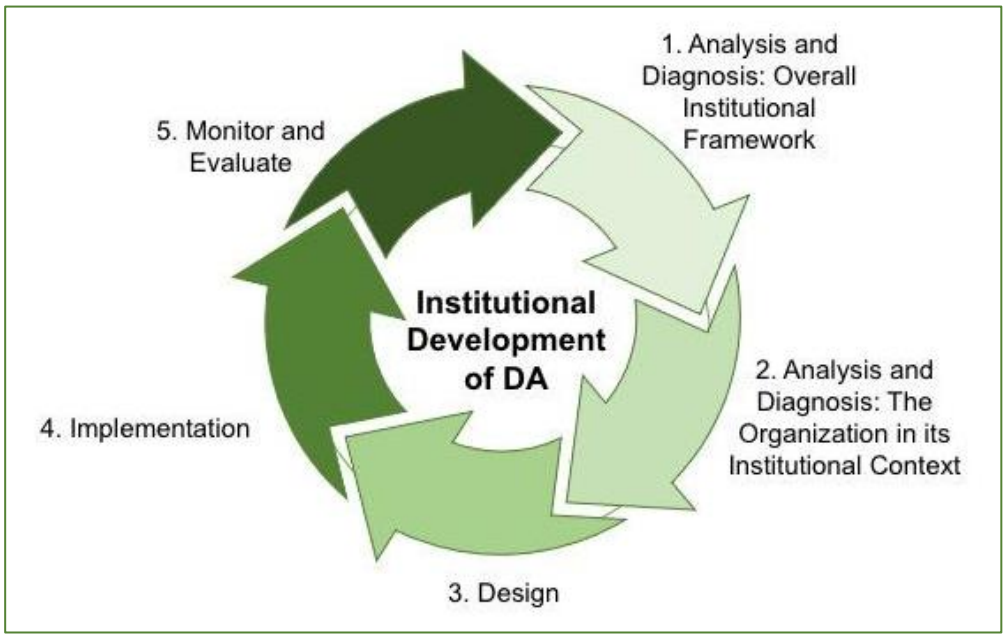
The strategies for its implementation are presented in Table 8.7.

Table 8.7: Strategies for Implementing Governance and Institutional Development

STRATEGIES	DESCRIPTION
Phased implementation of activities	• Three phases: short-, medium-, and long-term periods • Well-planned set of reinforcing activities per phase
Tangible and high impact deliverables and milestones	• Focus on organizational development based on comprehensive assessment and diagnosis • Well-established processes and structures • Need-based and transformation-responsive interventions
Well-identified change movers and change owners	• Who will do what? • Clear delineation of responsibilities within DA – to avoid mediocrity and promote proactivity • Enable responsibility and accountability • Issuance of mandate to act (for all possible areas of intervention)

The process of implementing institutional development at the Department of Agriculture follows a cyclical process, as shown in Figure 8.7.

Figure 8.7: Institutional Development Process



Given the implementation strategies and the institutional development process as presented above, Table 8.8 summarizes the major activities that DA should implement.

Table 8.8: Phases of DA Activities for Implementing Institutional Development

SHORT-TERM (1-3 Years)	MEDIUM-TERM (4-6 Years)	LONG-TERM (Beyond Six Years)
• Analysis and diagnosis (multi-level) • Redefinition of coordinative mechanisms at the national and sub-national levels • Detailed change planning • Issuance of mandates (change owners and coordinative mechanisms) • Mainstreaming of structure and process strengthening • Capacity development (CD) needs assessment (internal and external) • Design, Prioritization and Conduct of CD Program	• Continuous practice of internal strengthening interventions • Continuous practice of external strengthening interventions • Monitoring and evaluation of institutional development activities (internal and external) • Continuous institutional development • Continuous conduct of CD Program	• Continuous practice of internal strengthening interventions • Continuous practice of external strengthening interventions • Monitoring and evaluation of institutional development activities (internal and external) • Continuous institutional development • Continuous conduct of CD Program

Table 8.9 presents a more detailed schedule of implementation of institutional development interventions.

Table 8.9: Indicative Schedule of Institutional Development Intervention

MAJOR ACTIVITIES	TIMEFRAME		ESTIMATED BUDGET	RESPONSIBLE UNIT/S
	Start	End		
1. Conduct organizational diagnosis and analysis (multi-level) for the DA	April/May 2022	End of 3rd quarter of 2022	20,000.00	PMS, FMS, and HRD Division (outsource to service provider)
	(even while the NAFMIP is yet being formulated)			
2. Issue office order/mandate for the preparation of detailed Transition Plan based on the requirements of the approved and adopted NAFMIP	August 2022	EO August 2022		PMS/ OSec
3. Detail the Transition Plan based on the results of the organizational diagnosis	September 2022	December 2022	200,000.00	PMS, FMS Administrative Service, FOs and OUs

MAJOR ACTIVITIES	TIMEFRAME		ESTIMATED BUDGET	RESPONSIBLE UNIT/S
	Start	End		
through a consultative/ participatory process at various levels				
4. Redefine coordinative mechanisms at the national and sub-national levels	September 2022	December 2022		PMS
5. Issue office order for the adoption and approval of the Transition Plan	January 2023	EO January 2023		PMS/ OSec
6. Detail change planning (all units/ offices at various levels)	February 2023	EO March 2023	1,000,000	Concerned units/ offices
7. Mainstream structure and process strengthening	April 2023	EO June 2023	500,000.00	Concerned offices and units at various levels
8. Conduct CNA (internal and external – multi-level)	April 2023	EO June 2023	2,000,000.00	Concerned HR department/ office/unit of OUs
9. Design, prioritize, and conduct CD Program	July 2023	EO December 2023	10,000,000.00	Concerned HR department/ office/unit of OUs
10. Continuously practice internal and external strengthening interventions	July 2023	EO 2030	20,000,000.00	Concerned department/ office/unit of

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CHAPTER 9

NAFMIP Agenda for Transformative, Results-based Monitoring and Evaluation and Knowledge Management

NAFMIP RBME: An Introduction

Monitoring and Evaluation (M&E) is a function inherent in all management areas—strategic, organizational, financial, program, project, others—particularly in public sector management (PSM). Public servants who consider themselves managers within the agri-fishery (AF) sector, whether middle or senior managers, must undertake some aspects of M&E. This ubiquitous characteristic of M&E may be one of the explanatory reasons for the high fragmentation and uneven nature of M&E systems in the AF sector. On one hand, information systems are many in the sector, designed to store monitoring data. Yet these information systems are mostly stand-alone systems incurring higher costs in data storage and bringing about unnecessary data redundancy. Moreover, M&E capacity is uneven between and among the DA operating units (OUs) and among individual staff members in each OU. These and other such key issues challenge operationalizing effective **results-based monitoring and evaluation** (RBME) in the AF sector, which the RBME situationer describes (see Section 1 of Chapter 2).

Many PSM capacity development initiatives have been short-term and unsustainable. Moreover, countries often see such capacity initiatives as supply-driven, imposing "international good practice" rather than building on the country's own systems.

Thus this chapter presents the RBME system and knowledge management (KM) practices required to track the overall progress of the implementation of NAFMIP as well as to acquire evidence to support achievement of outcomes and impact. It primarily responds to the challenges identified and opportunities presented in the RBME situationer and secondly, aligns and supports the transformative elements of the Plan.

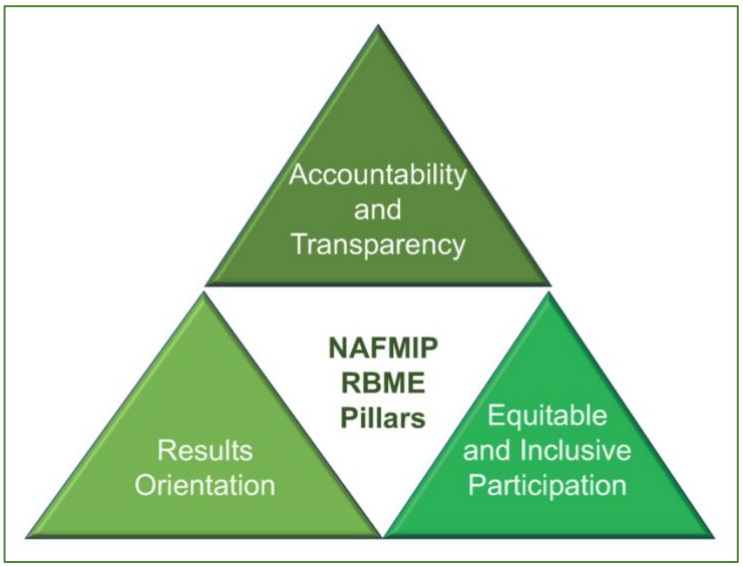
The NAFMIP RBME Principles

Results-based monitoring and evaluation (RBME) is anchored on **results-based management** (RBM), which is a management strategy adopted by organizations to ensure that their processes, products, and services directly contribute to achieving their desired results. An RBME system operationalizes the performance measurement goals of RBM. Several key principles govern RBME in the public sector (see for instance, DBM's RBMER Policy[1] and NEDA-DBM National Evaluation Policy Framework[2]). The NAFMIP RBME is premised on three core principles of **accountability and transparency**; **results-based**; and **equitable and inclusive participation** (Figure 9.1). These core principles will guide the design and implementation of the NAFMIP RBME System.

[1] Section 6 of the DBM's National Budget Circular No. 565 s. 2016 on the Adoption of a Results-Based Monitoring, Evaluation and Reporting Policy lists five guiding principles namely: accountability and sound decision making; cost effectiveness; participatory and ownership; learning; and professionalism, ethics and integrity.

[2] NEDA-DBM Joint Memorandum Circular 2015-01 on the National Evaluation Policy Framework of the Philippines includes among others as its guiding principles: standard of ethics; regard for impartiality; and use of evaluation results.

Figure 9.1: NAFMIP RBME Principles



***Accountability and transparency*.** A commitment to results-based monitoring and evaluation means that the DA—its top executives, middle management and staff—are held accountable for appropriate levels of results and each level maintains both upward and downward accountabilities. Strict adherence to the core principle of accountability and transparency overcomes the traditional bias for organizational mediocrity and inertia. Paraphrasing Osborne and Gaebler (1992), if results are not measured, success is not distinguished from failure. If success is not identified, it cannot be rewarded. If success is not aptly rewarded, essentially failure (or non-performance) is probably being encouraged.

***Results-based culture*.** A commitment to results-based monitoring and evaluation means that all other management systems—strategic, operational and tactical—support implementing RBME. This includes, among others, a budget system that supports a results-oriented approach; a planning system that elucidates how objectives are cascaded and interlinked among operating units; and a system that provides significant incentives for attaining results and corresponding sanctions for poor results. Fidelity to the core principle of results-orientation overcomes the bias for the **input-output approach**, which bases performance primarily on inputs (such as disbursement rate) and outputs (such as number of goods distributed) at the expense of results (such as percent of smallholder farmers lifted from poverty).

Equitable and inclusive participation. A commitment to results-based monitoring and evaluation means that all segments of the sector stakeholders and beneficiaries at every level of governance are provided with equal opportunities to participate in: planning and designing interventions that affect them; M&E activities actively (and not simply a passive source of data); accessing performance information of concern to them; among others. Observance of the core principle of equitable and inclusive participation weakens the traditional practice of top-down approaches or one-way participation tactics (or simply information sharing).

The NAFMIP RBME system aims to generate information, supported by science-based data, that reliably informs on the performance of NAFMIP-anchored[3] programs and projects.

[3] NAFMIP-anchored programs and projects are programs and projects in the AF sector that directly contribute to attaining the NAFMIP goals and objectives. Such can be validated by determining how the logframes of these programs and projects are linked to the NAFMIP Logframe.

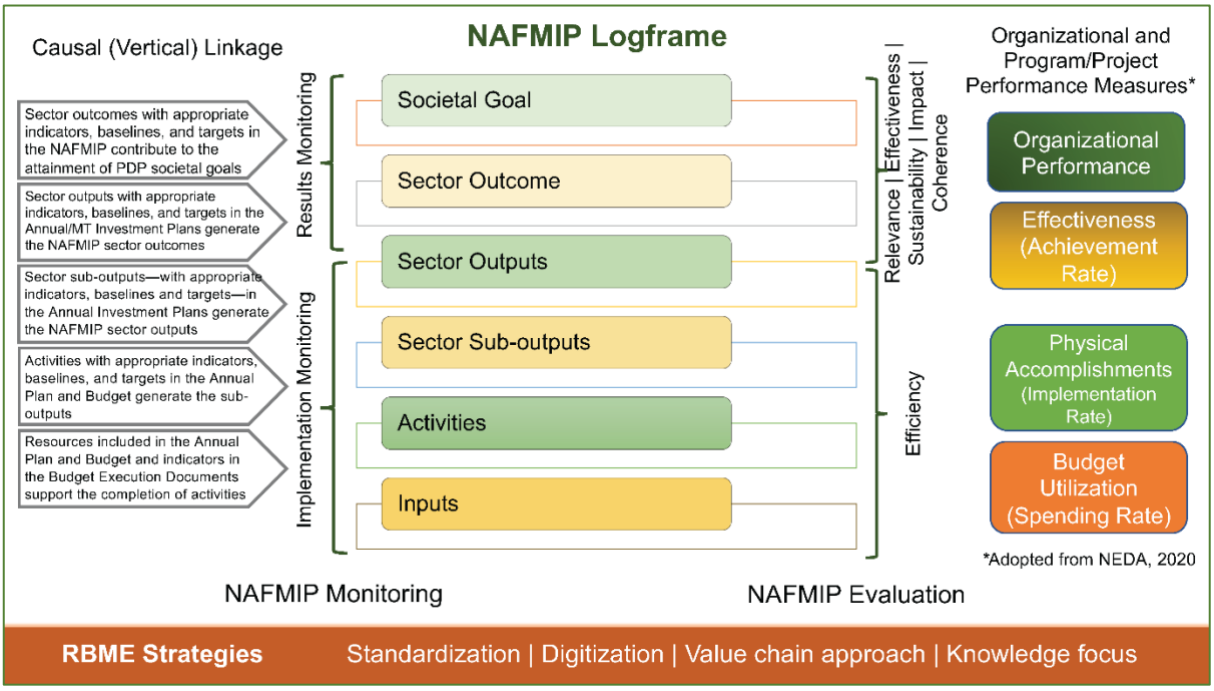
It likewise aims to enable more effective and efficient management of such AF programs and projects and improve organizational knowledge and learning.

NAFMIP RBME Framework

The RBME Framework (Figure 9.2) provides the overarching foundation for the development of a comprehensive RBME system to track the progress of implementation of NAFMIP within its ten-year prescription period and beyond. The RBME Framework is fully aligned with the basic components of management in the public sector: planning; budgeting; implementation; and M&E. It is not presented as a full prescription but as a harmonizing platform on which DA, its OUs, and other stakeholders within the agri-fishery sector can anchor their respective M&E systems—at the organizational level (e.g., DA OUs, RFOs, LGUs, FCAs), at the program level (i.e., both locally and official development assistance or ODA-funded), and at the project level (e.g., congressional projects or ODA-funded).

Central to the RBME framework is the NAFMIP **theory of transformative change** (see Chapter 2 and Annex 1 on the Plan Logframe), which explicates the positive transformations that the AF sector will experience as the Plan is fully executed within and even beyond its 10-year time horizon. The Plan Results Chain provides the anchor to which all other AF Plans (such as commodity-system plans, regional AFMIPs, OU plans, local AF development plans, among others) should link to. Basically, all other Plans in the sector must illustrate causal linkages to the NAFMIP Results Chain, i.e., to which sector outputs, outcomes, and impacts they contribute to and what activities and sub-outputs will be completed to lead to the desired results. Moreover, the performance indicators included in other AF plans must clearly illustrate connections to the NAFMIP Logframe performance indicators. The causal linkages are shown on the left side of Figure 9.2.

Figure 9.2: NAFMIP RBME Framework



NAFMIP implementation monitoring in a sense then focuses on tracking the linkages among budget allocation-activity implementation-production of sub-outputs-generation of sector outputs. **Results monitoring of NAFMIP**, on the other hand, spotlights attention on the likelihood that outcomes and impact will be achieved based on the findings from

implementation monitoring. **NAFMIP evaluation** further looks at several criteria, one of which is **efficiency**, undertaken by looking at budget utilization vis-à-vis budget plans and physical accomplishments vis-à-vis targets. Other evaluation criteria are lifted from international recognized evaluation criteria of: relevance, effectiveness, sustainability, impact, and coherence. Guidance on **measuring performance of public sector programs and projects** are derived from NEDA guidelines on evaluating public sector programs such as but not limited to: budget utilization/spending rate; implementation rate; achievement rate; and organizational performance.[4]

NAFMIP RBME Strategies. In alignment with the OneDA strategies, four strategies for RBME are emphasized. **Standardization** aims to harmonize and align all the different monitoring and evaluation (M&E) systems of the various DA operating units to optimize M&E activities, decrease duplication and reduce wastage of public resources. **Digitalization** refers to the application of ICT to various M&E activities particularly in data collection, storage, processing, and management. Applying a **value chain approach** to RBME recognizes that M&E at lower governance levels contributes to completing the M&E landscape at the highest governance level. A **knowledge-focused RBME** accentuates the role of M&E in building organizational knowledge and learning and eliminates the mistaken notion of M&E as a fault-finding exercise.

Operationalizing the NAFMIP RBME Framework

Four milestones signal the full installation of the NAFMIP RBME System, namely: the formal mobilization of the NAFMIP RBME **Institutional Arrangements** through the issuance of an official DA instrument and implementing guidelines; the **development and institutionalization** of the NAFMIP RBME Roadmap; the **conduct of the National Census of Agriculture and Fishery** (AF); and the **digitalization** of the NAFMIP RBME System. Thus, this Plan enjoins the DA, through the Planning and Monitoring Service (PMS), to immediately initiate the completion of these four milestones.

NAFMIP RBME Milestone 1: The NAFMIP RBME Institutional Arrangements

In accord with the NAFMIP RBME principle of equitable and inclusive participation, establishing the NAFMIP RBME Institutional Arrangements entails the participation of key concerned stakeholders. The first milestone in operationalizing a functioning NAFMIP RBME System is the creation of an ad hoc NAFMIP RBME Technical Working Group (TWG) to flesh out the NAFMIP RBME Institutional Arrangements.[5] The NAFMIP RBME TWG will design the Plan level RBME structure comprising three interactive groups:

1. The NAFMIP RBME Strategic Unit will be responsible for facilitating achievement of impact and outcome level objectives, and for reporting the same to the Secretary.
2. The NAFMIP RBME Committee will be responsible for harmonizing and synchronizing OU-level RBME.
3. The NAF Council will designate an existing committee, including non-government and private members, to serve as NAFMIP overall RBME oversight. The composition of each group is provided below.

Within the first step six months of Plan implementation, the PMS is expected to draft a Department Order creating the NAFMIP RBME TWG composed of representatives from key DA OUs, namely: PMS; Philippine Council for Agriculture and Fishery (PCAF); Bureau of

[4] NEDA and DBM. 2020. Guidelines on Evaluation in the National Government. Pasig City: NEDA

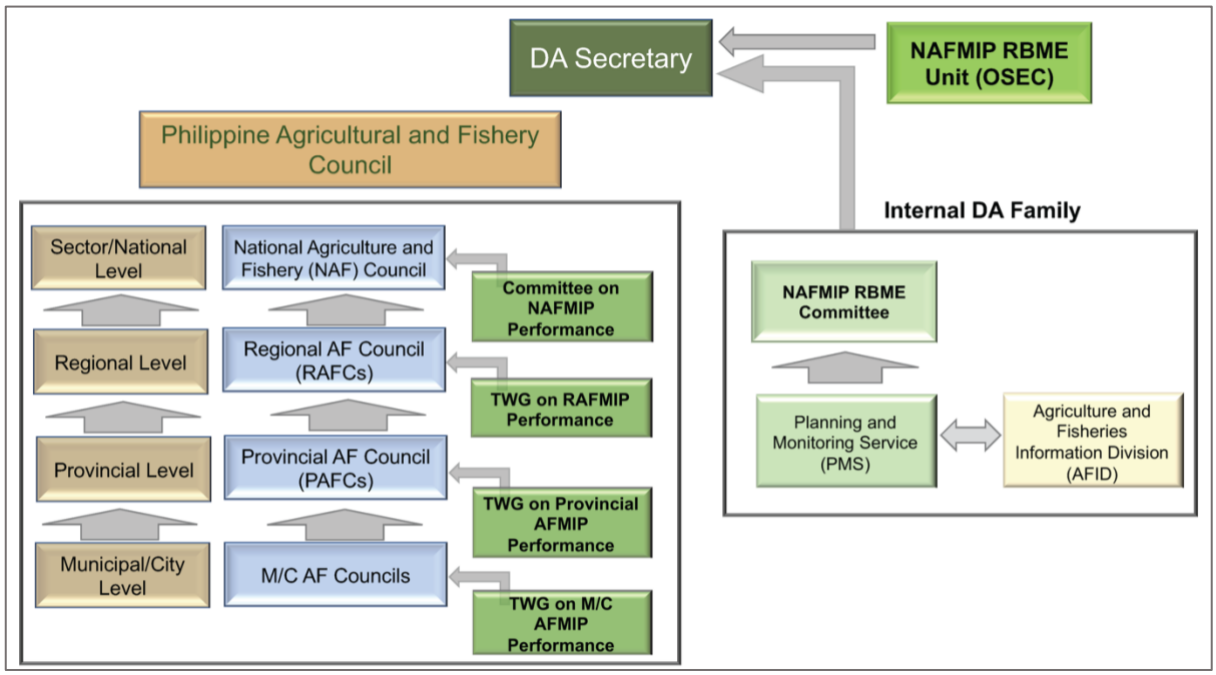
[5] These NAFMIP RBME Institutional Arrangements took off from the output of the participants in a consultation workshop on M&E and was further enhanced by the NPT.

Fisheries and Aquatic Resources (BFAR); Agricultural Training Institute (ATI); Planning Chiefs from three Regional Field Offices (RFOs); a representative from one AF stakeholder association[6]; and other OUs as deemed necessary. The TWG will be chaired by the Assistant Secretary for Planning and Project Development. The TWG's main mandate is to detail the roles and responsibilities of the key NAFMIP RBME institutions that will be charged with the monitoring and evaluation of the progress, outcomes, and impacts of the NAFMIP. The TWG will draft the functions and responsibilities of the NAFMIP RBME Strategic Unit; NAFMIP RBME Committee; and the different RBME Committees under the PCAF arrangements.

Within six months after its creation, the NAFMIP RBME TWG will then submit a draft Department Order for the Secretary's signature, creating the NAFMIP RBME Strategic Unit and the NAFMIP RBME Committee including their compositions, reporting arrangements, Implementing Guidelines, among others. Upon issuing this second Department Order, the TWG will dissolve and the newly-created NAFMIP RBME Committee will take lead in the installing the NAFMIP RBME System. The NAFMIP RBME Institutional Arrangements are composed of three governance entities (Figure 9.3).

NAFMIP RBME Strategic Unit. The NAFMIP RBME Strategic Unit will be created, composed of a small but elite group of full-time individuals[7] focused exclusively on facilitating the attainment of NAFMIP outcomes and impact. The NAFMIP RBME Unit is intended to be an independent unit that is accountable primarily to the Department Secretary, and thus it will be headed by a full-time senior manager (Director level) and ably supported by senior and middle level staff.

Figure 9.3: NAFMIP RBME Institutional Arrangements



[6] Such as the Coalition for Agriculture Modernization of the Philippines (CAMP)

[7] The number of staff of the NAFMIP RBME Strategic Unit will be drafted by the NAFMIP RBME TWG. It will be composed of RBME-competent senior staff can be seconded from different Operating Units, agencies, bureaus and RFOs. Within the first six months of its creation, the Unit will complete the formulation of the Unit's work plan, draft operating guidelines and install the Unit's work systems. Within the same time, the Administrative Service should initiate securing plantilla positions for this Unit so that once qualified individuals are hired, those seconded can return to their original work stations within a year.

This Unit will not implement any programs or projects; rather it will be tasked to have the distinctive role of: (1) demanding real progress (not asking for progress reports) on behalf of the Secretary as laid out in the NAFMIP Logframe; (2) on behalf of the Secretary, have senior officials of OUs account for the generating key deliverables identified in the NAFMIP (and sanction non-delivery); and (3) facilitate inter-OU and inter-agency collaboration and establish a mechanism for problem solving, when needed, in support of the transformative strategies outlined in the NAFMIP. The Unit will consistently challenge performance of all OUs and ask difficult performance questions of other Implementing agencies or units. Tasks include, among others, tracking implementation of NAFMIP; identifying potential risks to NAFMIP implementation; assessing deviations in performance at each level of governance; recommending mitigation measures and performance adjustments based on assessment; and deciding on adjustments.

NAFMIP RBME Committee. A NAFMIP RBME Committee will be created at the national level composed of senior staff representing the key DA Operating Units—central office, bureaus, agencies, RFOs and others. The objective of this internal DA committee is to embed the NAFMIP RBME system within the regular inter-OU collaborations and communication, including financial monitoring. The Committee will be chaired by the Assistant Secretary for Planning and Project Development. The main mandates of this Committee are (1) to synchronize the various RBME activities among the DA OUs (from data collection and data analysis to report generation following the Plan logframe) to harmonize RBME initiatives and reduce duplications; and (2) provide a venue for regular reporting on the progress of NAFMIP achievements. This Committee is differentiated from the ManCom in order to spotlight attention mainly on the monitoring and evaluation of the NAFMIP. The NAFMIP RBME Committee will spearhead formulating the NAFMIP RBME Roadmap through the PMS as its Secretariat. Templates for the progress reports of the NAFMIP as well as reporting flows should be clarified in the NAFMIP RBME Roadmap. Basically, reports will emanate from the OUs as reporting units, through the NAFMIP RBME Committee, for submission to two policy-/direction-setting bodies: (a) the NAFMIP RBME Strategic Unit; and (b) the NAF Council committee serving as NAFMIP RBME oversight. In turn, the policy- /direction-setting bodies will provide feedback to the reporting units, thus completing the reporting loop.

NAFMIP RBME within the NAF Council. The sector level performance management of the NAFMIP will be embedded within the existing organizational arrangements of the National AF Council. Anchoring NAFMIP RBME on the NAFC has at least three advantages. First, the institutional arrangement is already existing. Second, the NAFC already includes representation from the private sector and CSOs partners, which can easily be expanded to further promote equitable and inclusive participation. The NAF Council Meeting conducted during NAFMIP preparation highlighted, among others, the private sector's commitment to participate actively in Plan monitoring and evaluation, including tracking of government budgets and private investments. Third, the DA Secretary chairs the National AF Council, with other undersecretaries as members.

The main disadvantage of lodging the NAFMIP RBME in the AFC, proposed in Chapter 8 to provide the oversight over NAFMIP implementation, is that the Council already tackles so many different AF sector concerns that attention to M&E concerns may be deprioritized. To overcome this constraint, a fourth NAFC Strategic Concerns Committee will be created, called Strategic Concerns Committee on NAFMIP Performance Management, with the main mandate of assessing NAFMIP implementation achievements against its planned targets as outlined in the NAFMIP Logframe. As practice, the Chairpersons of all NAFC Committees also sit in the NAFC. Thus the Strategic Concerns Committee on NAFMIP Performance will also sit as a member of the National AF Council. Moreover, the new committee will be mirrored at different levels of governance—at the regional, provincial, and city/municipal AF Councils—

by creating their respective technical working groups (TWGs) on NAFMIP performance. The compositions of the different committees will be detailed in the NAFMIP RBME Roadmap.

NAFMIP RBME Milestone 2: The NAFMIP 2021-2030 RBME Roadmap

The second RBME milestone—the formulation of NAFMIP RBME Roadmap—will be initiated by the NAFMIP RBME Committee with the PMS as Secretariat. The NAFMIP RBME Roadmap must be completed and promulgated within the second year of Plan implementation. The NAFMIP RBME Roadmap is primarily intended to address the fragmentation of the M&E systems in the sector. Specifically, its objectives are to: (1) establish a common framework for RBME within the AF sector to guide planning-budgeting-implementation linkages; (2) harmonize RBME objectives, systems (including information systems) and activities within the AF sector; (3) reduce redundancies while increasing efficiencies in the RBME system; and (4) optimize existing RBME expertise across the sector, which are available in different degrees at different OUs and governance levels.

The NAFMIP RBME Roadmap, formulated together with the various AF stakeholders at different DA OUs and governance levels (e.g. LGUs), will provide the details for the design and operationalization of the NAFMIP RBME System, which includes, among others, the elements outlined below.

1. NAFMIP RBME Principles and Framework
2. NAFMIP RBME Institutional Arrangements
   - 2.1. Composition of different Committees
   - 2.2. M&E roles and responsibilities of different AF stakeholders including the private sector, NGOs, FCAs, and farmers and fishers
   - 2.3. Roles and responsibilities of each DA OU
3. NAFMIP Monitoring Plan
   - 3.1. Performance Indicator Reference Sheets (Initial draft of PIRS for Logframe indicators were prepared for DA during NAFMIP preparation)
   - 3.2. Baselines[8]
   - 3.3. Targets
4. NAFMIP Data Collection
   - 4.1. NAFMIP Data Capture Forms, to which all DA Operating Units must align with
   - 4.2. Data Collection Methods
5. NAFMIP Data Storage and Management[9]
   - 5.1. Data Sharing Agreements, within DA OUs and with external agencies and organizations
   - 5.2. National Information Network
   - 5.3. NAFMIP Management Information System
6. NAFMIP Data Analysis
   - 6.1. Data Analytical Framework
   - 6.2. Quantitative analysis
   - 6.3. Qualitative analysis
7. NAFMIP Evaluation Plan[10]
   - 7.1. Periodic evaluation studies (e.g. baseline, midterm, end of plan)
   - 7.2. Thematic evaluation studies (e.g. Gender Equity and Inclusiveness, Policy)
   - 7.3. Other studies (e.g. meta-evaluations)

[8]See section on National Census on Agriculture and Fishery Sector
[9]See section on Digitalizing the NAFMIP RBME
[10]See section on Evaluation of NAFMIP Outcomes and Impact

8. Communicating and Using M&E Results, which includes:
   8.1. NAFMIP Report Templates to be used by all DA Operating Units reporting to the NAFMIP RBME Committee
   8.2. Communication and reporting flows (internal and external agencies)
   8.3. Knowledge generation and management
9. NAFMIP Communication Plan, which includes process for dissemination of M&E results to external stakeholders and to media
10. Resources for NAFMIP RBME
    10.1. Human Resources (Personnel and Expertise)
    10.2. Financial Resources
    10.3. Technological Resources
    10.4. Other vital resources

NAFMIP RBME Milestone 3: The National Census of the Agriculture and Fishery Sector

The third milestone in the installation of the NAFMIP RBME System is to ensure that the National Census of the Agriculture and Fishery (CAF) Sector is conducted. This should be the second project to be initiated by the NAFMIP RBME Committee after initiating formulation of the RBME Roadmap. The Committee will work closely with the Philippine Statistics Authority (PSA) to ensure that the CAF is well-aligned with the requirements of the NAFMIP.[11] The PSA has in fact piloted the Census of the Agriculture and Fishery in the last quarter of 2021 in three municipalities and one barangay. The Pilot CAF pretested survey instruments and collected key data based on recommendations of the World Census on Agriculture. However, a substantial portion of the data requirements for the NAFMIP Logframe are transformative indicators.

The NAFMIP RBME Committee should thus make sure that the field required to set baseline values of several of the transformative indicators in the Plan logframe are included in the national census such as the use of online platforms for marketing, among others. The DA can also make sure that the **full-blown National Census of the Agriculture and Fishery Sector** will contribute significantly to the NAFMIP. Moreover, although this national census is programmed to be conducted every 10 years, the NAFMIP RBME Committee should negotiate with PSA to conduct the succeeding national CAF in 2030 to obtain better performance information to assess the Plan's impact on the sector 10 years hence.

NAFMIP RBME Milestone 4: Digitalizing the NAFMIP RBME System

Digitalizing the NAFMIP RBME system involves intensifying the application of ICT in the different phases of RBME—from data collection, data analysis, to reporting and communication—as well as strengthening the integration of data from different management information systems for optimum results—from DA Operating Units, LGUs, SUCs, and other key AF stakeholders. This will primarily be accomplished by enhancing the National Information Network (NIN) and establishing the NAFMIP Management Information System.

***National Information Network*.** The Information and Communications Technology Service (ICTS), in collaboration with the NAFMIP RBME Committee, will lead in creating the National Information Network in support of the NAFMIP. The AFMA Law prescribes establishing the NIN to provide information and marketing support services. The NIN was expected to:

> "… be set-up from the Department of Agriculture level down to regional, provincial, and municipal level …and shall… link various research institutions for easy access to data on

[11] See https://psa.gov.ph/content/psa-clears-conduct-2022-census-agriculture-and-fisheries-caf-pilot-census-0

> agriculture and fisheries research and technology. All departments, agencies, bureaus, research institutions, and local government units shall consolidate and continuously update all relevant information and data on a periodic basis and make such data available on the Internet." (RA 8435, Chapter 5, Section 41)

In a nutshell, the NIN intensifies focus on developing information services for farmers and fisherfolk and all key AF stakeholders, which cuts across DA functions. NAFMIP will pursue further developing the NIN as part of its RBME, as the Network will substantially contribute toward sector transformation by providing an electronic platform for rapid information access, sharing, and broadcast. Moreover, many of the key elements of the NIN are essential to RBME implementation. These include systems and protocols for data privacy and security that ensure high-quality data; the ICT platform; and infrastructure and staffing for digital data collection, analysis, and reporting (e.g., through dashboards). To be able to meet such high expectations, the NIN spelled out four major implementation requirements, namely: information systems/data requirements; connectivity requirements (including strong linkages with various government agencies, academe, and non-government organizations[12]); organizational requirements (including capacity development requirements); and investment requirements (for hardware and software).[13]

NAFMIP Management Information System. The Information and Communications Technology Service (ICTS) in collaboration with the NAFMIP RBME Committee will also lead in establishing the NAFMIP Management Information System (MIS). The NAFMIP MIS should be a unified MIS that will link all the required data and information identified in the Plan logframe. The MIS is not meant to duplicate existing Information Systems being used in the different OUs, but would rather link them to facilitate fluid exchange of data and information. Operationalizing the NAFMIP MIS will require data sharing agreements among the different DA OUs as well as with other national and local government agencies and regulatory agencies. It will also require harmonization and alignment of data capture forms of the different DA OUs with that of the NAFMIP Logframe and/or the alignment of the NAFMIP Logframe to capture data from other national and local government agencies.

It will also require harmonization and alignment of data capture forms of the different DA OUs with that of the NAFMIP Logframe and/or the alignment of the NAFMIP Logframe to capture data from other national and local government agencies.

Jump-starting digitalization of NAFMIP RBME. In collaboration with the NAFMIP RBME Committee, ICTS will take the lead in developing a National Information Network 2021–2030 Roadmap (or the equivalent Chapter within the DA ISSP) to detail the NIN goals, performance management, and requirements, including budgetary requirements. It will also prepare a Work Plan to operationalize the NAFMIP MIS, which would harmonizes the various existing information systems within the AF sector. This work plan should include clear targets and milestones.

Within the first year of NAFMIP implementation, ICTS will submit to the Department Secretary, through the NAFMIP RBME Unit, the two Plans for approval, namely, the National Information Network 2021–2030 Roadmap and the MIS Work Plan. Subsequent performance and accomplishments of ICTS on NAFMIP will be compared against these Plans.

[12]Such as Philippine Council for Agriculture and Aquatic Resources Research and Development (PCAARRD); Department of Trade and Industry (DTI); Department of Environment and Natural Resources (DENR); Department of Science and Technology (DOST); Philippine Statistics Authority (PSA); National Statistical Coordination Board (NSCB); National Economic and Development Authority (NEDA); National Computer Center (NCC); Philippine Institute of Development Studies (PIDS); state universities and colleges (SUCs); among other government and non-government entities outside of DA

[13]See NIN Status/Accomplishment Report as of June 2021 by ICTS.

Evaluation of NAFMIP Outcomes and Impact

Evaluation studies will be used for obtaining credible and science-based evidences on the attainment of the three NAFMIP outcomes as well as to assess the likelihood of achieving the intended NAFMIP goal or impact of "a food-and-nutrition-secure, resilient Philippines with empowered and prosperous farmers and fisherfolk."

Three major outcome-level evaluations will track the performance of the OVIs within the next ten years, namely: baseline studies; mid-Plan evaluation; and end-of-Plan evaluation.

Baseline studies. The baseline evaluation will serve to update the baseline values for indicators as well as fill the gaps where such values do not exist as is currently the case for many OVIs. The baseline evaluation studies open the opportunity to incorporate new indicators not currently measured, but are important to determine contribution of interventions to results at the sectoral outcome and societal impact levels. This will include qualitative indicators, usually to elicit perception of beneficiaries and stakeholders as to their current state or condition along desired outcomes.

***Plan mid-term evaluation*.** The midterm results evaluation is critical to review the extent to which NAFMIP is on course in terms of implementation, emerging results, and contribution to overall goals and objectives halfway through Plan implementation. This evaluation provides a window of opportunity to make any necessary adjustments, if need be, including adjustments of OVI values either upward or downward.

***End-of-plan evaluation*.** The end-term results evaluation will provide lessons during the overall implementation period of the Plan as well as provide a basis for informed decisions with regards to the succeeding agri-fishery sector strategies and what the key focus areas of the future phase would be.

Using and Communicating M&E Results

Very critical to RBME is how the end results of M&E are used, shared widely, and communicated. Using M&E results involves preparing reports that input into policy formulation, operational decision making, program/project designs, and resource allocation, among others. Communicating M&E results is concerned with widely sharing the lessons and insights gained from program and project evaluations, either as internal white papers or knowledge products including policy papers and briefs, case stories and experience notes, blogs, etc. that may be shared outside DA. This is the link between M&E and KM/Communication, which another unit or group would be responsible for, whether existing or to be set up, pending the results of a knowledge audit/KM assessment toward a KM strategy that should be undertaken within the NAFMIP. The NAFMIP RBME Committee should ensure that the NAFMIP RBME Roadmap should include the reporting flow and communication plan.

The **reporting flow** will include the different M&E reports that will be prepared in connection with tracking the implementation performance of NAFMIP, their frequency and timing of preparation, and the primary user of the information contained in the reports. This reporting flow should be agreed upon by all the DA OUs and other national and local government units as well as private sector partners.

The NAFMIP RBME Roadmap should also include a section detailing the **NAFMIP Communication Plan**. The implementing unit/s that will operationalize the communication plan, including the RBME portion, is discussed in Chapter 10. The DA Agriculture and Fisheries Information Division (AFID) will serve as Communication focals in facilitating effective and efficient cascading and delivery of new knowledge and information.

As part of **knowledge management (KM)** and to promote organizational learning, the NAFMIP RBME Unit will maintain an inventory of all AF evaluation studies (including case studies of good practices) of all programs and projects, whether ODA-funded, congressionally-funded, private sector-funded, as well as GAA-funded programs and projects. The inventory database will consist of the study designs and methodologies, data collection tools, and draft and final reports (although raw data may be stored in the respective OU databases). These studies will be accessible to all DA OUs through the NAFMIP MIS. In addition, the NAFMIP RBME Unit will also establish linkages with all SUCs and higher education institutions (HEIs) to gain access to thesis and dissertations related to the agri-fisheries sector. To jumpstart building KM in the sector, a **knowledge audit** will be conducted sector-wide to be spearheaded by Bureau of Agricultural Research (BAR) and Agriculture Training Institute (ATI).[14] The result of the sector-wide knowledge audit will include recommendations to strengthen KM within the sector in alignment with the NAFMIP Agenda.

Resources for NAFMIP RBME Implementation

Full implementation of the NAFMIP RBME system requires a range of resources at each phase of the RBME value chain—M&E planning, data collection, data management, data analysis, knowledge use and communication—to increase the likelihood of success. These RBME resources are categorized into four for brevity, namely: leadership, human resources, technology resources, financial resources, and other key/institutional resources.

RBME Champion. While ensuring the production of results is a vital responsibility of all executive managers within the OneDA Family, **RBME leadership** is critical to ensure that M&E is not relegated as an after-thought but is mainstreamed in all the management functions and processes. Thus, an RBME Champion will be designated to hold the second highest responsibility for promoting RBME in the sector (with the highest RBME Champion conferred on the Department Secretary). The RBME Champion may either be the chairperson of the NAFMIP RBME Committee or the Head of the NAFMIP RBME Strategic Unit.

Human resources for RBME. Designing and building an RBME system that can produce complete, timely, and relevant information on the performance of NAFMIP projects, programs, and policies requires experience, skill, and raising institutional capacity. This capacity for a results-based reporting system has to include, at a minimum, (1) the ability to develop good indicators, (2) the means to collect, aggregate, analyze, and report on the performance data; and (3) managers with the skill and understanding to know what to do with the information once it is collected by the information system.

***Technology for RBME*.** RBME requires a sustained data collection system to better inform the decision-making processes during program and project implementation. The resulting data will provide evidence on performance and flag any changes that may be needed for a given project, program, or policy. A basic data requirement is having a shared dataset of results statements for the sector results framework (SRF) and lower-level results frameworks.

***Information systems*.** Efficient RBME processes rely heavily on a computer-aided MIS accessible to all concerned DA operating units (OUs), program and project implementers, and other agencies within the agri-fisheries sector. The NAFMIP MIS pertains to an online facility where decision makers register interventions, baseline and target data, facilitate reporting, and monitor progress against outcome target indicators. The underlying technologies for this platform include (1) servers to securely share and access data; (2) application services (or apps) for data collection, reporting, analysis, and visualization; (3) a shared data repository

[14] BAR and ATI have trained experts/specialists in KM.

accessible to data collectors; and (4) data collection devices, primarily secured mobile devices (tablets or smartphones) and smart devices or sensors (Internet of Things).

***Financial resources for RBME*.** Similar to the innovative programs under this Plan, building, implementing, and maintaining an efficient and effective RBME system for tracking NAFMIP performance and results will require significant financial resources. Specifically, these would require budget for, among others: (1) conducting a national Census on the Agriculture and Fisheries sector; (2) acquiring ICT infrastructure for data collection, storage, and management; (3) applying technology-aided field data collection; (4) building capacities of internal and external stakeholders on RBME; (5) conducting evaluation studies, particularly third-party evaluation; (6) developing the RBME Roadmap; and (6) all other RBME systems development, management, and maintenance activities.

DBM's National Budget Circular (NBC) 560, s. 2015[15] provided for budget a ceiling specifically for Monitoring and Evaluation-related expenses. In particular, Section 3.1.1. states,

> "Pursuant to Section 43, General Provisions of the FY 2015 GM, and to provide agencies with flexibility in allocating the M and E budget across programs/projects within a project category, such amount shall be derived from, and shall not exceed, three percent (3%) of the total annual program/project cost per project category."

The NBC also states that all programs and projects must have an approved monitoring plan (Section 3.2.1) and evaluation plan (Section 3.2.3). This should be strictly implemented in order to avoid confusion in conducting activities related to program and program implementation (e.g., field visits to distribute benefits) vis-à-vis program and project M&E activities (e.g. field visits to assess changes in beneficiaries as a result of benefits received). Developing implementing guidelines (Implementing Rules and Regulations of NBC 560) will address any uncertainty on the sources of funds for RBME-related activities, the computation of M&E budgets per program and project, the approved uses of the budget, the differentiation between program-related travel expenses and RBME-specific travel expenses, among others. These guidelines may be formulated as part of the RBME Roadmap or as stand-alone supporting policy document/s.

***Institutional resources for RBME*.** Institutional resources critical for an effective NAFMIP RBME system include external partners such as the Philippine Statistics Authority (PSA) and Food and Nutrition Research Institute (FNRI) for installing systems of collecting data on transformative indicators; the National Nutrition Council for studies on the Filipino diet; SUCs and other research organizations, for the various AF studies; and internal arrangements with KM/communication units within DA, among others.

[15]DBM. 2015. Implementing Guidelines on Monitoring and Evaluation (M and E) Expenses pursuant to Section 43, General Provisions, FY 2015 General Appropriations Act (GAA)

CHAPTER 10

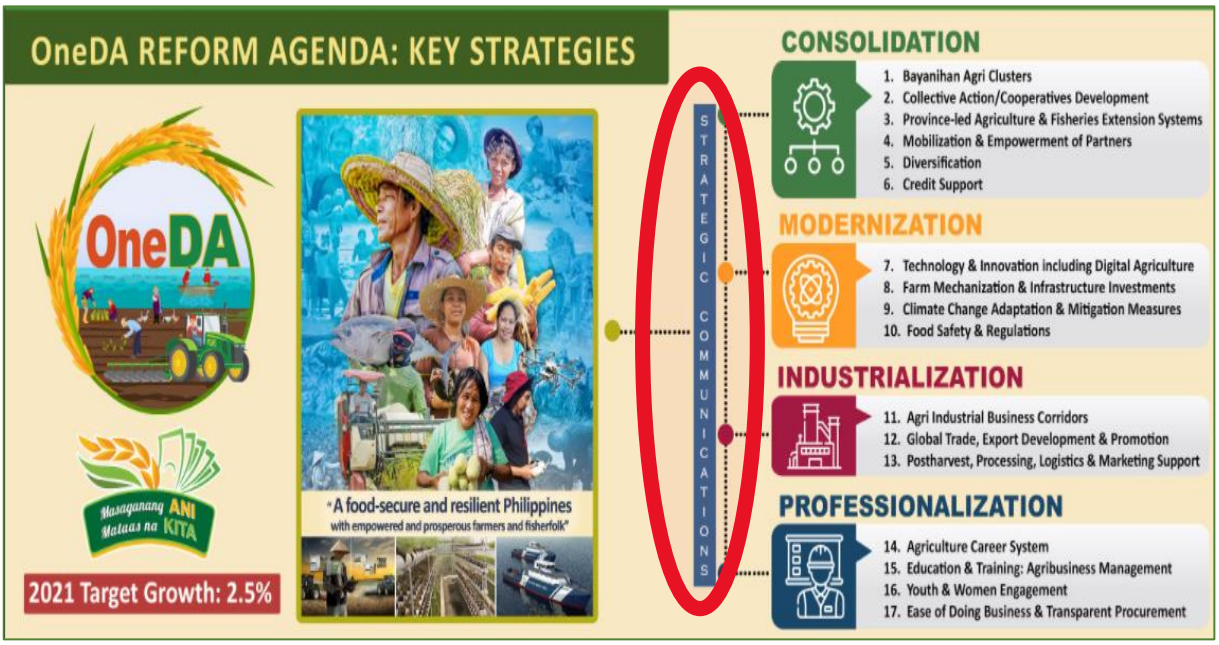
Solution-oriented and Crosscutting Strategic Communication

Context and Rationale

The lackluster growth of the agricultural and fisheries sector over the past few decades, compounded by the pandemic and other challenges, have led to persistent poverty among farmers and fisherfolk. This all requires a transformative approach, as studies have shown that business-as-usual development efforts have failed in achieving their objectives mainly due to the lack of participation of stakeholders and ineffective communication (Mefalopolus, 2008). This demands communication to play a strategic role in both facilitating knowledge generation and exchange, as well as fostering active collaboration of stakeholders through dialogue and participatory decision-making (FAO, 2014).

Under the OneDA Reform Agenda, strategic communication has been identified as critical among the 18 key strategies in achieving an inclusive modernization and industrialization of the sector's value chains. Its cross-cutting function in advancing and reporting on the gains of the strategic goals of the sector to important stakeholders, partners, and target publics is grounded in thoughtful planning, execution, and assessment of strategic and proactive communication strategies (Figure 10.1).

Figure 10.1: Strategic Communication's Crosscutting Role in OneDA Reform Agenda



Further, the DA has laid out a vision in 2020 to implement key strategies "to grow and fuel the transformation of the Philippine agriculture and fisheries sector into a modernized and industrialized economic powerhouse." The vision is anchored on getting the support of various stakeholders and partners amidst challenging times, so the sector can continue to "survive, reboot and grow" in the new normal. Recent developments attest to the government's

commitment in attaining the vision, with global initiatives bolstering collective efforts to promote higher incomes, healthier consumption, and more sustainable practices.

In 2021, the DA-led Food Security Summit contributed to deepening the dialogue with key stakeholders on the challenges and opportunities to promote recovery from both the Covid19 pandemic and natural and man-made disasters, while working toward enhancing food security and resilience to various shocks. Participants at the National Farmer-Fisher Congress held last year also called for a directional shift in agriculture, underscoring the need to provide support services to the sector. Globally, a transformative movement led by the United Nations is gaining ground among governments and organizations in promoting healthier, more sustainable, and more equitable food systems. These and more form part of the backdrop in developing and rolling out the NAFMIP. An assessment highlighting best practices, gaps, and opportunities where participatory communication interventions can potentially make a difference is also helpful in establishing strategic communication as part of the solution (Letargo/Chapter 11 in NAFMIP Preparation Team, 2021).

With issues on human capacity and access to information, knowledge, and services gaining more and more attention in promoting development initiatives, the NAFMIP Communication Plan provides a directional guide to managers, planners, and communication professionals in the AF sector. In particular, this chapter advances the following key elements for this iteration of the AFMP:

1. ***Integrating communication in planning.*** Early planning for communication outreach with core planners ensures that efforts align with the goals and objectives of the NAFMIP. It facilitates identifying communication-related gaps and related outputs/indicators in the logical framework prepared by technical experts and validated by planners and stakeholders. Profiling and analysis of stakeholders, reviewing the communication resources available, and studying the organizational map and institutional environment are some of the crucial steps in planning that inform developing specific communication strategies.
2. ***Designing communication strategies and workplans.*** Formulating specific strategies should be based on communication-related development issues that will shape and define objectives, priority stakeholders at all levels, approaches, channels, tools/activities, as well as the resources/budget needed. In particular, the strategies will employ participatory communication interventions that will help build support and ownership of the plan among stakeholders. These communication strategies will serve other components of the NAFMIP in terms of helping promote greater private agri-fishery investment in rural and urban areas, an integrated commodity systems and spatial planning, and in updating stakeholders on the progress of plan implementation based on M&E reports. The strategies will also harmonize with DA banner programs, linked to relevant national government programs and global initiatives that will outline quad-media, stakeholder engagement, and other information, education, and communication (IEC) activities, given the diverse range of audiences and stakeholders in the sector.
3. ***Identification of budget and resources.*** Aligned with the whole-of-government and whole-of-nation approach in implementing NAFMIP, this component plan will likewise indicate initial estimates of required funding and resources. Figures will be based on the needs assessment and consultation with planners and communication officers from central and regional offices, and summarized in the OU logframe of the DA Communication Group led by the Agriculture and Fisheries Information Division (AFID). These include funding for developing and executing communication strategies and tools, as well as conducting stakeholder engagement activities to build knowledge, awareness, and support for NAFMIP's transformative concepts, investment promotions, and RDE and M&E reports. Funding will also be required for capacity development on strategic communication, such as in monitoring and assessing communication outreach,

stakeholder mapping, and analyzing stakeholders' knowledge, skills, attitude, and practices.

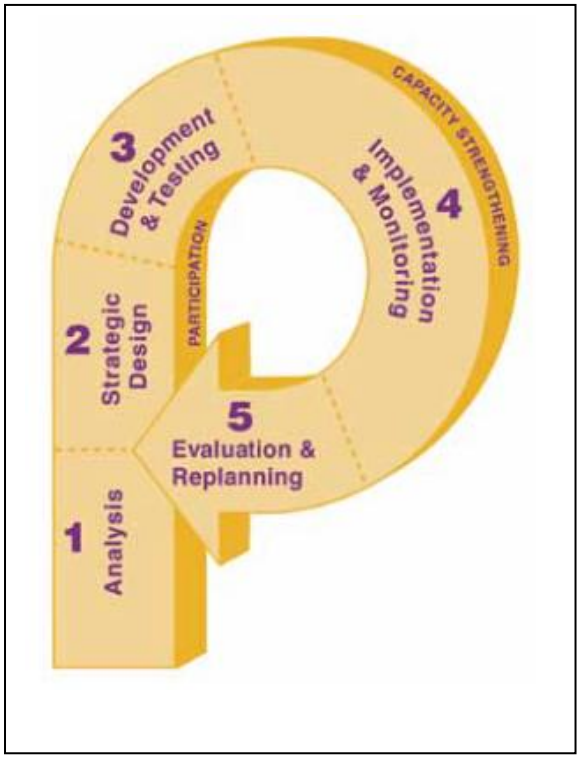
Communication Framework

Developing the NAFMIP communication plan and its strategies therein are grounded overall in the principles of communication for development planning, with clearly defined objectives, priority stakeholders, approaches, and budget with a measurable impact on target stakeholders. Also referred to as development communication or devcom, planners and communication focals have been adopting this comprehensive, flexible, and participatory approach that is well-suited to the diverse set of stakeholders in the agri-fisheries sector.

This dynamic approach underscores "two-way, dialogic processes based on listening, interaction with and among stakeholders, convergence of different media, valorization of indigenous knowledge, and the generation of local content." This participatory process ultimately aims to achieve social change by engaging and empowering key stakeholders through "dialogue, knowledge exchange, and mutual learning" (Acunzo et al., 2014).

The 2003 framework developed by the Johns Hopkins Bloomberg School of Public Health embeds participation and capacity strengthening throughout the entire cycle of strategic communication planning (Figure 10.2). Strategic communication is an umbrella term that means "purposeful communication" to achieve an organization's objective through various methods, techniques, and media. It is also multidisciplinary in nature, straddling public relations, advertising, advocacy, marketing, and other fields (Thorson, 2013). This serves as a good model for strategic communication planning in NAFMIP for several reasons, as follows:

Figure 10.2: P-Process Framework



1. Communication is solution-oriented that helps achieve the Plan objectives.

2. Communication strategies will be informed by the logical framework developed by the NAFMIP Preparation Team (NPT) and their analyses of underlying development issues, especially related to communication gaps (e.g., low knowledge and adoption of healthy, nutritious, and sustainable practices).

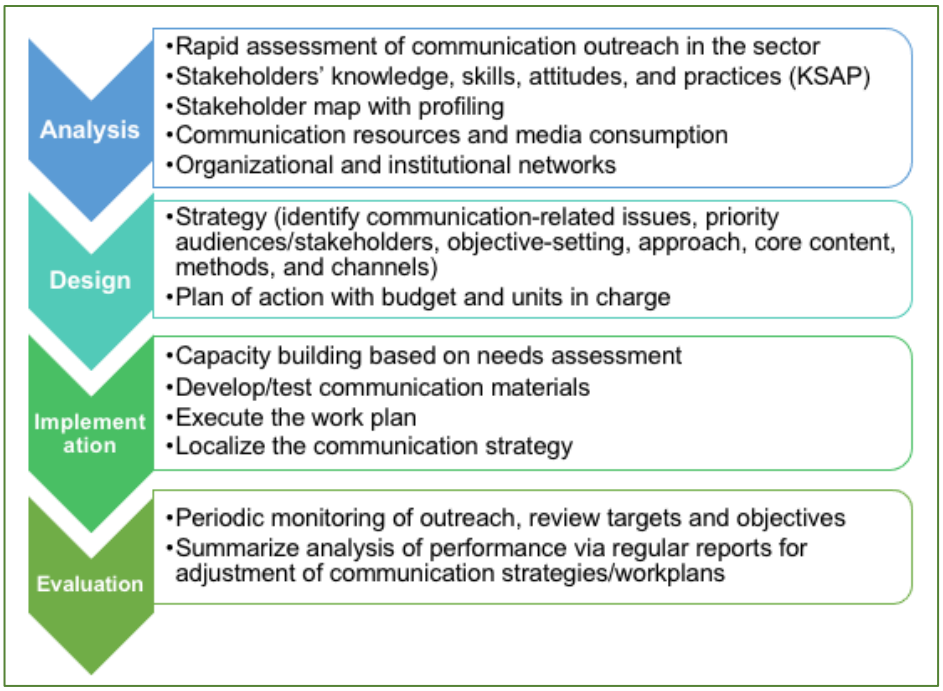
3. Issues-based communication strategies outline specific objectives, programs, participatory approaches, dissemination methods, and channels tailored to stakeholders, such as quad media (print, television, radio, and digital); stakeholder engagement activities (face-to-face or virtual fora such as media workshops, newsroom visits, press conferences, project site visits, and knowledge-sharing activities); or localized IEC materials.

4. Strategic communication encourages regular planning and analysis, research, and monitoring and assessment of participatory communication and engagement efforts vis-à-vis one-way dissemination of information without any assessment.

5. It fosters inter-departmental, inter-agency, and multi-level stakeholder collaboration to address communication-related AF development issues.

The workflow in Figure 10.3 is derived from the framework outlining the activities for each of the key stages of analysis, design, implementation, and evaluation. Details of the process are described in Annex 3.

Figure 10.3: Communication for Development Workflow (World Bank, FAO)



With the NAFMIP serving as the macro plan for the sector, its component communication plan will likewise serve as a directional plan aligned with the DA's communication strategies for its various banner programs led by the DA AFID. Strengthening stakeholder engagement under the communication component will also utilize the mechanisms under the strategic plan of the Philippine Council for Agriculture and Fisheries (PCAF), the policy advisory and consultative arm of the DA. In particular, the Omnibus Guidelines of PCAF for engaging with stakeholders provides an expanded approach moving forward.

Goal and Timeline

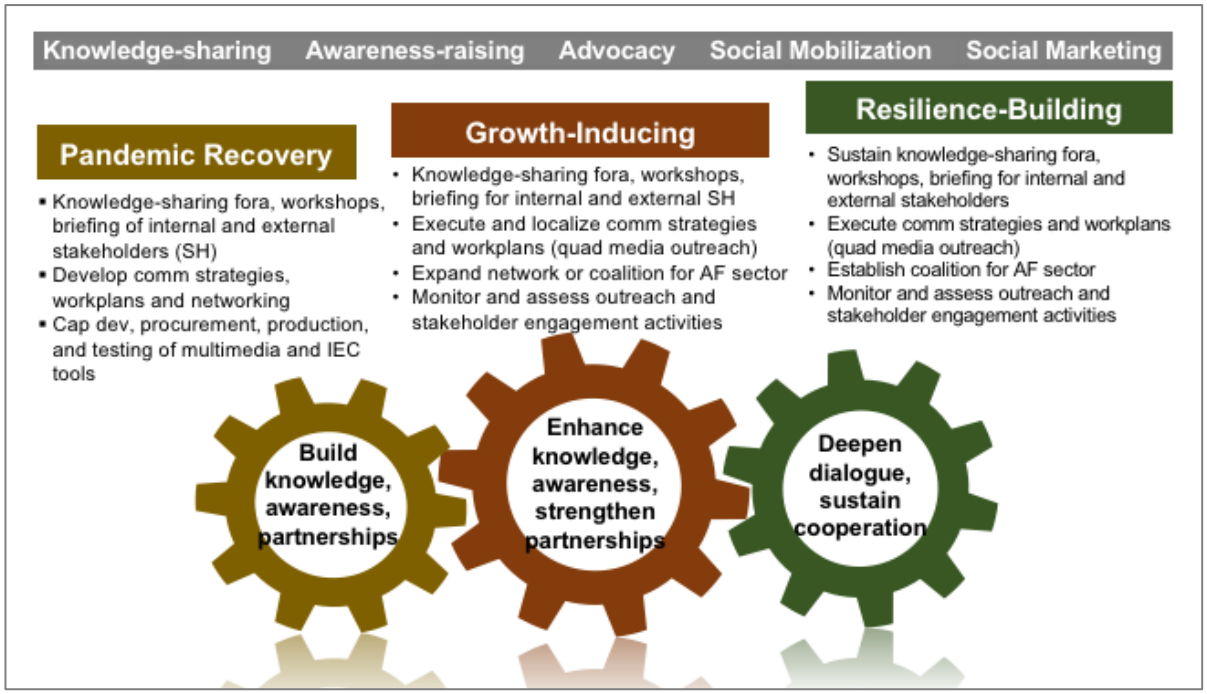
Aligned with NAFMIP's strategic objectives to guide and link to other sector plans, inspire collective action among stakeholders, and mobilize private and public resources, the overarching communication goal is to increase awareness and build support and ownership for the Plan. Achieving this goal requires all stakeholders to work together, aided by three guiding pillars, where NAFMIP serves as the compass to navigate to our destination of a food-and-nutrition-secure, resilient Philippines with empowered and prosperous farmers and fisherfolk:

- Doubling incomes of farmers and fisherfolk
- Promoting consumer health and nutrition via the 'Filipino' Diet
- Enhancing environmental sustainability and climate resilience

Communicating NAFMIP follows the phased implementation of the Plan (Figure 10.4), grounded on specific communication strategies for key development issues identified by

planners and validated by stakeholders. Phase 1 entails awareness-raising and advocacy, followed by Phase 2, which aims to strengthen partnerships in support of NAFMIP and enhance knowledge on the transformative concepts of the plan. Phase 3 strives to sustain cooperation and deepen dialogue, through stakeholder engagement activities and a build-up of quad-media outreach. Capability-building will be periodically conducted based on a needs assessment, while strategies will also be monitored and assessed throughout the plan period for necessary adjustment.

Figure 10.4: Participatory Communication Approaches and Interventions (2021-2030)



Major Components

Communication Strategy Design

Prior to designing the communication strategy, robust analysis should be conducted covering the range of stakeholders including their knowledge, skills, attitudes, and practices (KSAP) to tailor-fit approaches and tools for them. In addition, a review of communication resources is also helpful in determining the appropriate interventions needed (Letargo, 2021). Knowledge about media consumption practices and sources of information is important in customizing participatory activities and tools for specific stakeholders. For instance, evidence showing that farmers and fisherfolk rely mainly on their fellow farmers/fisherfolk for information will require more face-time participatory interventions such as small townhall gatherings and meetings to complement local radio outreach and IEC materials. An analysis of organizational and institutional networks detailed in Chapter 8 will also help inform designing communication strategies in terms of building support with internal stakeholders within the DA family, and forging external partnerships and collaborations with NGAs and different stakeholder groups.

Developing an issues-based communication strategy is a systematic, well-planned series of actions aimed at achieving specific objectives using communication methods, techniques, and approaches with available resources within a specific timeframe. The steps are outlined in Figure 10.5, which begins with identifying key issues to address, based on the NAFMIP logical

framework (Annex 3). This helps to answer the basic question, "what do we want to communicate about NAFMIP, to whom, and how?"

Figure 10.5: Steps in Designing a Communication Strategy (Acunzo et al., 2014)

Key issues

The selection of two overarching key development issues related to communication is based on the logframe outcomes and outputs/sub-outputs, with indicative gaps or communication entry points (Table 10.1). These two key issues have been validated by regional and national planners, communication focals, and regional stakeholders during various workshops and consultations in 2021-2022. These will in turn form the basis for formulating specific communication strategies by DA regional and central planners. Other related issues will be identified and fleshed out at the local level.

The selected issues on unhealthy food choices and an unconducive policy environment are what stakeholders have confirmed to bear communication-related gaps or opportunities in the sector pertaining to issues on awareness, knowledge, attitudes, and practices, as well as participation issues. The identification of the specific issue on Filipinos' unhealthy food choices is also affirmed by studies that underscore the need to harmonize and enhance communication strategies and outreach among national government agencies including the DOST, in order to address low levels of awareness among Filipinos on food-based dietary guidelines (Madrid, Alcuin et al 2018). These in turn are important information in identifying participatory communication interventions that directly contribute to achieving outcomes and outputs. Emphasis is placed on issues/problems that are related to communication given that some issues are structural in nature or financing-related. Selected issues related to outputs 5 and 6 in the logframe are shown in Table 10.1.

Table 10.1: Key Issues for Communication Intervention

OUTPUT/SUB OUTPUT	KEY DEVELOPMENT ISSUES	COMMUNICATION GAP
Output 5 Capacities of LGUs, AF groups (agri-fishery cooperatives and associations) and Individuals (i.e., small farmers, livestock raisers, and fisherfolk) improved Sub-output 5.9 Level of knowledge of consumers in urban areas on traditional Filipino diet (TFD) increased, by key consumer segment, by sex Sub-output 7 SO7.3 (LGUs) Number of LGUs trained on strategic communication and communication (tools e.g., stakeholder mapping) SO7.16 (Consumers) Number of netizens engaging in official sites and social media channels to obtain information on TFD SO7.17 (Consumers) Number of consumers who agree to shift toward more nutritious TFD	Unhealthy food choices among consumers that are detrimental to the agri-fishery sector and to the environment	Lack of knowledge on nutritious, affordable and locally-grown food
Output 6. Policy environment (i.e., legislative, executive, policy and regulatory support) to accelerate and sustain sector transformation strengthened Sub-output 9. Enforcement of policies, regulations and products standards SO9.1. LGU ordinances and resolutions enacted to incentivize and accelerate agri-industrialization SO9.4. Periodic multisector fora to report and discuss plan implementation and impact	Unconducive policy environment to accelerate sector transformation and promote recovery from the impact of the pandemic	Lack of strategic and sustained engagement with policymakers, executives, technical managers, LGUs, private sector, and civil society for sector transformation and recovery from the effects of COVID

From these two issues and gaps identified in the logical framework, the role of strategic communication is clear in terms of increasing awareness on healthy food choices as it impacts not just the health of consumers but the incomes of farmers and fisherfolk, and the health of the planet as a whole. As intermediary, communication also helps facilitate strategic engagement with policy makers, civil society, LGUs, the private sector, and development partners toward collective action in transforming our food systems.

Prioritizing Stakeholders

Segmenting and prioritizing stakeholders is the next logical step in designing the communication strategy. This is critical in determining communication activities, services, and messages that are matched with their characteristics. This also ensures that suitable approaches, content, and platforms are selected for communicating key issues in NAFMIP. Based on the workflow, prioritization of stakeholders both internal and external follows the process of stakeholder mapping and profiling.

The indicative list of priority stakeholders both internal and external is provided in Table 10.2, informed by the DA AFID and the PCAF. In particular, the PCAF implements the Omnibus Guidelines for engaging Agricultural and Fishery Councils and separately, with civil society organizations, for co-implementation of projects. Table 10.2 illustrates prioritization specific to the issue of unhealthy food choices.

Table 10.2: Prioritization of Broad Set of Stakeholders

RANK	STAKEHOLDER GROUP	REASON	CHARACTERISTICS
Top priority	Farmers and fisherfolk	Directly affected by programs and projects implemented	• Men and women • Poor, marginalized members/non-members of associations • Middle to old aged • Land tenants • Unstable income for men; women having low to no income • Little or no education and low knowledge of ICTs • Can adapt and adopt innovative strategies
Second Priority	National policymakers	As intermediaries,* can craft and implement national policies on integrative food and nutrition Allocate budget for AF sector	• Supportive of sector transformation • Highly-educated and influential in pushing for food and nutrition-security • Health-conscious • Middle to upper socio-economic class
	Local government units	As intermediaries: • Can craft and implement local policies on integrative food and nutrition • Allocate higher budget for AF sector	• Supportive of sector transformation • Educated to highly-educated and instrumental in pushing for healthy food choices • Middle to upper socio-economic class

RANK	STAKEHOLDER GROUP	REASON	CHARACTERISTICS
	Consumers - women	Benefits from healthy food choices	• Co-income earners in the family and budget holders • Influencers on healthy lifestyle and food choices
	Youth	Millennial farmers benefit from DA programs Intermediaries in knowledge exchange	• Growing interest in agriculture • Educated and adept in ICTs • Fast learners • Influencers on social media
	DA	Intermediary and lead implementor of programs and projects	• Closely familiar with AF sector issues, constraints and challenges • Engages with AF stakeholders directly • Leads in developing a consumer-driven program to promote the TFD
	Other NGAs	Intermediary and co-implementor of programs and projects	• Source of technical and financial resources • Contribute to the development of a Program on Consumer Awareness
	Private sector	Investors and partners	• Source of transformative investments • Source of technical support • Supportive of sector transformation
Third Priority	Civil society organizations (academe, media, people's organizations etc.)	Partners in facilitating coalition-building for sector transformation	• Source of feedback for monitoring of NAFMIP implementation • Influential in mobilizing national government and LGU support for healthy food choices
	Development partners including bilateral and multilateral institutions and donor agencies	Supportive of sector transformation Enablers, knowledge and technical experts	• Authority to promote collaboration and convene dialogues on development issues including food and nutrition security, green recovery, and resilient food systems • Mobilize public and private resources and financing schemes • Provide technical expertise

Objective-setting

As the overarching goal of the NAFMIP communication component will be to increase knowledge, awareness, and build support for the Plan, which will guide the next government and future administrations, the next step is to formulate objectives. Critical to developing specific communication objectives is the perspective of stakeholders captured at consultations at the regional and local levels. Hence, the objectives will be crafted with the stakeholders in mind—indicating the specific group, the behavior desired, the condition for the change to happen, and the intended degree of success.

Objectives that are specific, measurable, achievable, relevant, and time-bound will be guided by the targets set by planners and validated at the national and local levels by stakeholders. Objectives should also consider existing or planned national/local government or global development programs where the strategy can be anchored. An illustration of a strategy matrix is provided with general objectives that can be further fleshed out in column 2. It addresses the key development issues on unhealthy food choices derived from Outcome 5, *Capacities of key agri-fishery stakeholders (LGUs, cooperatives, associations, and individuals, small farmers, livestock raisers, fisherfolk) strengthened* (Table 10.3).

Selecting the Communication Approach

In the framework of communication for development or devcom, approach refers to specific functions that participatory communication achieves, such as knowledge-sharing, awareness-raising, advocacy, and social mobilization (Acunzo et al., 2014). These are the main approaches identified in Tables 10.3 and 10.4, in communicating key development issues of NAFMIP given the following challenges for AF stakeholders:

- Bridging the gap between local knowledge and scientific knowledge for informed choices and adoption of new ideas;
- New and transformative concepts require orientation to promote increased understanding toward positive changes in perceptions, attitudes, beliefs, and actions;
- Influencing public and policy support and action from political, business, and social leaders for more inclusive policy environment through dialogue and negotiation; and
- Broad-based demand and support from government, the private sector, civil society, and development partners requiring networking and forging partnerships and alliances to pool resources and harmonize efforts.

Determining Core Content

Deciding on the core content or messages will flow from the identified key issues, priority stakeholders, approach, and objectives of the communication strategy. Content that is accessible, accurate, verifiable, complete, timely, and relevant is recommended to ensure the success of the strategy (OECD, 1999). Initial content is outlined in column 4 (Table 10.3). Throughout NAFMIP's ten-year implementation, DA planners and communication officers are encouraged to work with their counterparts from other NGAs and partners in drawing out and refining content together with stakeholders, in keeping with participatory principles, e.g., through regular planning workshops and consultations.

Choosing Methods and Channels

Selecting the appropriate media mix will be informed by the analysis of stakeholders' KSAP including media consumption choices and habits in order to "maximize cost effectiveness and impact" (Acunzo et al., 2014). Planners and communication officers will also be guided by findings from related baseline studies and surveys conducted by the DA, the DOST, and other institutions in the area of food and nutrition. Successful rural development programs have shown that deploying a combination of methods (whether mediated, interpersonal, or mass communication) and channels (community-owned or mass media, social media, etc.) is

effective at the national and local levels. An illustration is provided in the last column of Table 10.3 for a multiple approach.

Table 10.3: Illustrative Communication Strategy Matrix for the Issue on Unhealthy Food Choices and Lack of Knowledge on Nutritious, Affordable, and Locally-grown Food that Impacts Consumer Health, Incomes of Farmers and Fisherfolk, and Environmental Sustainability

PRIORITY STAKEHOLDERS	COMMUNICATION OBJECTIVES	APPROACHES	CORE CONTENT	METHODS/CHANNELS
Farmers and fisherfolk	Twenty-five percent (25%) of farmer and fisher associations from Region IVA will have gained knowledge about the following by end of 2024: 1. The traditional Filipino diet (TFD) and how it helps raise their incomes 2. Describe their roles in transforming the Philippine food system 3. Identify NGAs and partners to support livelihood and marketing opportunities	Knowledge-sharing Awareness-raising	1. Description and composition of the TFD 2. Benefits of adopting nutritious, balanced and safe TFD 3. Roles and functions of farmers and fisherfolk in transforming the food system 4. Programs and projects to raise incomes and productivity	Face-to-face (F2F) Training Orientation seminars and townhall meetings Local community papers and radio
NGAs (DA, DILG, DOST, DOH, NNC, DSWD) etc.	By end 2023, all concerned agencies identified will: 1. Gain knowledge about NAFMIP and its strategic objectives 2. Identify their functions in transforming the Philippine food system 3. Harmonize communication strategies and workplans on food and nutrition to promote the TFD	Advocacy	1. NAFMIP's transformative planning, areas of concern, strategic objectives, and investment requirements 2. Stakeholder roles and responsibilities in transforming the food system 3. Transformative governance and institutional environment	F2F and virtual planning workshops and seminars NAFMIP primer Digital outreach on official websites and social media
LGUs	By mid 2024, 50% of LGUs in NCR will: 1. Gain knowledge about NAFMIP and its strategic objectives 2. Identify their roles and functions in transforming the Philippine food system 3. Plan and implement localized communication and stakeholder	Advocacy	1. NAFMIP's transformative planning, areas of concern, strategic objectives, and investment requirements 2. Stakeholder roles and responsibilities in transforming the food system including increasing funding	F2F and virtual planning workshops and seminars NAFMIP primer Digital outreach on official websites and social media

PRIORITY STAKEHOLDERS	COMMUNICATION OBJECTIVES	APPROACHES	CORE CONTENT	METHODS/CHANNELS
	engagement activities promoting the TFD		3. The benefits of adopting the TFD for consumers, farmers and fisherfolk and for environmental sustainability and resilience	
Consumers (youth and women)	1. Gain knowledge on the TFD by 50% in NCR by Q4 of 2024 via social media campaign 2. Gain awareness about their roles in transforming the food system 3. Join the national campaign on promoting the TFD	Knowledge-sharing Awareness-raising Social mobilization Social and behavior change communication (SBCC)	1. Description of the TFD and its benefits to consumers, AF sector, and the planet 2. Role in promoting health, increasing incomes of farmers and fisherfolk, and environmental sustainability 3. Programs and projects they can support to transform the food system	Social media (using popular apps e.g., TikTok, Twitter, FB and Instagram) Mass Media (TV, radio)
Development Partners (UN, WB, ADB, etc.)	By Q3 of 2023, development partners will: 1. Gain greater awareness about NAFMIP and its strategic objectives, and the investments required to transform the Philippine food system through two (2) KS events 2. Convene one (1) development forum to promote dialogue	Advocacy Information-sharing Awareness raising	1. NAFMIP's transformative planning, areas of concern, strategic objectives, and investment requirements 2. Stakeholder roles and responsibilities in transforming the food system 3. Transformative governance and institutional environment	F2F and virtual planning workshops, seminars, and other and knowledge-sharing fora NAFMIP primer Digital outreach on official websites and social media

Work Plan

Following completion of the strategy matrix/matrices based on the validation and agreement with stakeholders, it is useful to develop detailed work plans that indicate the resources required for implementation. This is the plan of action, where communication approaches will be specified, including basic messages and core content based on the key issues identified. The work plan will also include appropriate channels and media platforms; and outline financial, material, and human or institutional resource requirements—the last including responsibilities of DA and other teams or partners—to address the communication gaps (Table 10.4).

Table 10.4 illustrates a work plan that operationalizes the communication strategy addressing the issue of unhealthy food choices among consumers. Further refinement of the preliminary work plan provided below is an iterative process with the central planners, implementors, partners and key stakeholders that will be localized at the provincial and municipal levels. Particularly useful is data from the Operating Unit Log Frame on the types of communication interventions and activities under each phase of the ten-year plan, including the resources and budget required, as consolidated by the DA AFID. The data can be used to later expand the illustrative workplan to the national one in scope, particularly in adding more participatory communication interventions for key cities or areas of the country under the growth and resilience period of the NAFMIP, based on the success of the interventions applied or the challenges encountered in the recovery phase.

Upon completion and approval of the detailed work plans based on the communication strategies for each identified key development issue, implementation can commence, in collaboration with identified partners. Regular monitoring and assessment of communication outreach and stakeholder engagement will also be conducted together with capacity development, aligned with strategic communication planning.

The Way Forward

Budget and Resources

Planned programs and activities for strategic communication and stakeholder engagement will be covered by a budget over the 10-year plan period, determined by central and regional planners and indicated in their OU logframes, informed by stakeholder consultations.

Allocating budget and resources as well as identifying the fund sources early in the planning cycle strengthens commitment to the plan. These also reinforce the position that communication will be solution-oriented and help achieve the goals and objectives of NAFMIP, with sufficient funding and other means of support. In particular, investments in activities related to changing consumption attitudes, behavior, and practices over a phased implementation period are integral to sector-wide transformation. Strategic communication should be seen as complementing other measures to include sustained education, transformative governance, and institutional arrangements for a gradual shift in mindsets and patterns of behavior.

A review of the budgetary requirements (Annex 3) consolidated by the DA Communication Group has pegged the total figure at an initial PHP70 million, with mixed sources of funding comprised of DA and other NGAs, multilateral funding agencies, the private sector and SUCs.

Table 10.4: Sample Work Plan Focusing on Unhealthy Food Choices among Consumers beginning in the Recovery Phase

PROGRAM	ACTIVITIES AND TOOLS	UNITS RESPONSIBLE	INTENDED STAKEHOLDERS	IMPACT	TIMEFRAME	BUDGET ESTIMATE AND SOURCE
National Integrative Food and Nutrition (The Traditional Filipino Diet or TFD) UN Food Systems Food-based Dietary Guidelines including *Pinggang Pinoy*	Knowledge-sharing via social media campaign (socmed toolkit with messages, apps e.g., TikTok, Instagram; Tools (vlogs, infographs, animation vids) Knowledge sharing via TV and radio (PSA, ads, news features) Awareness-raising and social mobilization via webinars and videos, vlogs	Inter-agency taskforce composed of DA + NGAs including DILG, DOST, DOH, NNC (AFID and regional AFID focals and their communication specialist counterparts with PCAF will facilitate the cascading of policies and strategies and lead the execution at the national and local levels with support from key CSOs including consumer groups (youth and women orgs)	Youth and women consumers in NCR	Increased knowledge on: • Impact of consumption habits on health, AF productivity, and environmental sustainability • Importance of consumer roles and responsibilities in transforming the food system	One year beginning Q1 of 2023 til Q4 of 2024	PHP 5M • Cost-sharing with NGAs, development partners

Table 10.5 provides a summary of proposed major programs and activities under the phased implementation until 2030, indicating communication's cross-cutting role for knowledge-sharing and awareness-raising on NAFMIP's transformative concepts and progress of the plan implementation via knowledge products harvested from M&E reports. It also reflects support for RDE and investment promotion, and for facilitating stakeholder engagement toward building support and ownership of NAFMIP as a trans-administration guide requiring collective action.

Table 10.5: Summary of Major Programs and Activities under Strategic Communication

PHASE	PROGRAM	ACTIVITIES
Phase 1: Pandemic Recovery	**Communication strategy development:** • Stakeholder (SH) and other analysis • **Design of issues-based strategies and workplans** (e.g., consumer awareness program on the TFD) • Implementation • Monitoring and assessment	Internal: Planning workshops for DA and attached agencies, bureaus and corporations involving planning, communication, and stakeholder engagement teams (F2F and virtual) 1. Development of NAFMIP web page on official social media platforms with key content, components, and highlights 2. Review and/or conduct baseline studies and related surveys, stakeholder maps at national and local levels 3. Assess prior communication outreach and develop pre-survey questions that are gender-sensitive; assess available resources, organizational map and institutional networks, and topics of capacity development; review speakers' bureau profiles, etc. 4. DA-wide audit of communication plans and harmonization 5. Development of major communication strategies for key communication-related development issues aligned with banner programs External: inter-agency **workshops** involving DOH, NNC, DSWD, DILG, and other NGAs; development partners and key CSOs such as consumer, women, and youth groups, to ensure alignment with global/national programs on food and nutrition
Phase 1: Pandemic Recovery	**Awareness-raising for internal stakeholders and key partners on NAFMIP key strategies, components and**	• Series of briefing events e.g., knowledge-sharing forum, seminars, etc. with policy makers, NGAs, private sector, and civil society leaders

PHASE	PROGRAM	ACTIVITIES
	investment requirements	• Disseminate NAFMIP copies (hard and soft), FAQs and other multimedia content via digital and hard copies
Phases 1-3: Pandemic Recovery, Growth-inducing to Resilience-building	**Capability building on strategic communication**	• F2F and virtual training on SH profiling and prioritization with KSAP analysis from survey results for DA communication teams at national and regional offices (see following section) • Training on new social media platforms • Training on monitoring, assessment and analysis of communication outreach • Training on strategic communication planning for LGUs
Phase 1: Pandemic Recovery	**Integrative food and nutrition-security:** • Quad media outreach, knowledge sharing on the strategic objectives • Storyline and key messages ("We need to work together with NAFMIP as our compass, aided by three guiding stars to achieve food and nutrition security with empowered and prosperous farmers and fisherfolk."	1. Internal: series of briefings for DA and attached agencies, bureaus, corporations, primer on NAFMIP
Phases 2-3: Growth-inducing to Resilience-building		2. External: • Quad media dissemination and participatory SH engagement to orient policy makers, private sector, partner NGAs, development and donor community, key CSOs on transformative concepts of NAFMIP via F2F and virtual activities (integrated commodity system and spatial planning, governance, climate-resilient and gender-responsive AF sector) • Participatory engagement with consumers and farmer/fisher organizations on the TFD • Prepare and disseminate reports and studies on food and nutrition security from FAO-UN, ADB, WB and other development partners, policy papers from the DOST-FNRI and NAST, as well as other related academic research for target stakeholders • Support M&E results dissemination through knowledge exchange, other SH engagement activities, and targeted media outreach • Promote RDE innovations via knowledge exchange forums and quad media outreach for key stakeholders
Phase 1: Pandemic Recovery	Support to investment promotion	• Develop and produce tools and campaigns in support of marketing strategies led by DA-AMAS/MDD in partnership with DOF/BOI, NNC, DTI, DILG, PSA and other relevant agencies as well as SUCs, LGUs and the private sector to boost agribusiness/agripreneurship and

PHASE	PROGRAM	ACTIVITIES
		promote domestic products in local and foreign markets, among others[1]
Phases 2-3: Growth-inducing to Resilience-building		• Publish and disseminate investment promotion activities and investment opportunities • Knowledge sharing on project pre-feasibility studies via consultations and other advocacy fora with PDS and other concerned DA units • Knowledge exchange of upcoming analysis on stakeholder map, profiling, and client perception to complement market research data

Capacity Development

Building the capacity of implementors and partners is an inherent component of strategic communication planning at all stages of the planning cycle, which will address immediate, medium, and long-term needs. These are aimed at improving knowledge and information exchange between and among implementors, and with stakeholders, as well as understanding stakeholders in order to develop stakeholder-driven strategies that are periodically assessed. Given that changes in food consumption is central to all transformation envisioned in the Plan, analysis of consumers' knowledge, skills, attitudes, and practices (KSAP) to include consumption habits will be primary among the studies to be conducted and the subject of capacity development.

The DA Agriculture and Fishery Information Division (AFID), together with the PCAF, will lead in conducting needs assessment and training for communication and stakeholder-engagement focals, as identified in Chapter 6 (national steering functions of the DA). Based on the results of the needs assessment from planners, communication focals and interviews with stakeholders, the following topics and areas have been recommended for capacity-building among DA operating units and teams involved in communication and stakeholder engagement:

- KSAP survey of target stakeholders with a gender lens;
- Stakeholder mapping, profiling, and gender-sensitive analysis;
- Organizational mapping, profiling of potential institutional partners,[2] and areas of collaboration, including the private sector and investors;
- Popular social media platforms and analytics;
- Data visualization tools (graphs, maps, charts, and tables); and
- Monitoring and assessment of communication outreach and performance (content analysis, analytics for digital campaigns, report preparation of findings with analysis).

[1] Preparation and dissemination of summarized policy papers concerning food and nutrition security and related aspects in the country, such as from studies conducted by the DOST attached offices which are the Food and Nutrition Research Institute and National Academy of Science and Technology, in optimizing information and knowledge sharing, as an additional activity for Program under Integrative Food and Nutrition-Security (External).

[2] Potential partner organizations need to be profiled in terms of their mandates, communication programs, communication capacity and resources, and potential areas of collaboration relating to the NAFMIP strategic communication plan.

Organizational and Institutional Environment

Strategic communication will help contribute to the key result area of the DA on strengthening partnerships with LGUs, NGAs, SUCs, FCAs, the private sector, and other stakeholders. However, successfully executing the NAFMIP communication plan and issues-based strategies and workplans therein will depend to a large extent on the institutional environment both at the national and local levels. At the organizational level, the NAFMIP demands closer collaboration internally between DA central and regional teams involved in planning, communication, and stakeholder engagement, as well as with their counterparts in the attached agencies, bureaus, and corporations. This is to ensure alignment and complementation of NAFMIP as the macro plan with a communication component and specific strategies, along with the respective communication plans of DA's banner programs. Internal linkages are discussed in detail in Chapter 8 on transformative governance and institutional arrangements, providing guidance on further strengthening existing coordination mechanisms or ideas for new approaches.

The focus on food and nutrition security, environmental sustainability, and climate resilience should also be linked with global and other relevant national programs to optimize efforts and impact. The creation of inter-agency taskforces such as the *Zero-Hunger* taskforce under the Duterte administration is an example of synergy of efforts that produced a roadmap and initiatives to help fight hunger during the pandemic. Thus, stronger coordination between and among external stakeholders is critical in building support and ownership for NAFMIP, also discussed in Chapter 8.

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Hopia
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Glossary

Activities/tools	(In Communication Planning) Task/actions to be carried out in order to produce specific project outputs such as delivery of a training workshop, production of audiovisual materials, series of knowledge-sharing fora, quarterly posting on social media channels, policy dialogues; creative materials that will carry key messages and will be disseminated on quad media including videos, blogs, opinion columns, infographics, social media cards
Adaptation	In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects (IPCC Glossary)
Adaptation options	The array of strategies and measures that are available and appropriate for addressing adaptation. They include a wide range of actions that can be categorized as structural, institutional, ecological, or behavioral. Adaptation strategies and actions may range from short-term coping to longer-term, deeper transformations, aims to meet more than climate change goals alone, and may or may not succeed in moderating harm or exploiting beneficial opportunities.
Adaptive capacity	Adaptive capacity is “the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.” The definition comes from the Inter-governmental Panel for Climate Change (IPCC) and Millennium Ecosystem Assessment.
Agribusiness	The sum of all operations involved in the manufacture and distribution of farm supplies; production activities on the farm; and the storage, processing and distribution of farm commodities and items made from them (DAR, 2009)
Agricultural insurance	A risk managing tool that provides protection to farmers, fisherfolk, and other agricultural stakeholders against losses of their crops and produce, including their farm machineries and equipment, transport facilities, and related infrastructure arising from natural calamities, pests and diseases, and other perils beyond their effective control
Agriculture and fisheries modernization	Process of transforming the sector into one that is dynamic, technologically advanced, and competitive, yet centered on human development, guided by the sound practices of sustainability and the principles of social justice (AFMA, 1997)
Agri-industrialization	Process of adding value to agriculture and fishery raw materials through processing, manufacturing, and handling operations (FAO and UNIDO, Agro-industries for development, 2009)
Agricultural lands	Lands devoted to or suitable for the cultivation of the soil, planting of crops, growing of trees, raising of livestock, poultry, fish or aquaculture production, including the harvesting of such farm products, and other farm activities and practices performed in conjunction with such farming operations by

	persons whether natural or juridical and not classified by the law as mineral land, forest land, residential land, commercial land, or industrial land (RA 8435, 1997).
Agri-fishery	Commodity production plus processing, storage, marketing, consumption, waste management, i.e., all segments of the value chain
Agripreneurship	Application of entrepreneurial principles to identify, develop and manage viable agricultural enterprises/projects optimally and sustainably for profit and improved livelihoods (Mukembo and Edwards, 2016)
Agrobiodiversity	The variety and variability of living organisms that contribute to food and agriculture in the broadest sense, and that are associated with cultivating crops and rearing animals within ecological complexes.
Anchor commodity	A farming system's commodity base, according to five major types of commodity systems found predominant in Philippine farms, namely: (1) rice (rice-based); (2) corn, livestock, and poultry (corn/livestock/poultry-based); (3) coconut (coconut-based); (4) fisheries (fisheries-based); and (5) commodities that a region specializes in, e.g., highland vegetables in CAR, banana in Mindanao, coffee in Batangas and Cavite, and other niche farming types such as organic, urban, artisanal farming (geographically-specialized commodity system or GSCS).
Aquaculture	Fishery operations involving all forms of raising and culturing fish and other fishery species in fresh, brackish, and marine water areas
Assumption	An external factor (i.e., event, condition or decision) that could affect the progress or success of a project or program. They are necessary to achieve the project objectives but are largely or completely beyond the control of project management. They are worded as positive conditions.
Budget and Source	Annually allocated funding aligned with the budget process in the DA and other partner NGAs, with source of funding
Circular economy	A production and consumption model that involves sharing, renting, reusing, repairing, renovating, and recycling existing materials and products for as long as possible, and reducing to the minimum of waste," offering a better alternative to the current model of economic development; the "take, do, and dispose of" model with a view to economic, environmental, and social sustainability
Climate change	A change of climate attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (UNFCCC: Framework Convention on Climate Change)
Climate change adaptation	The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (RA 9729, 2009)
Climate governance	Purposeful mechanisms and measures aimed at steering social systems toward preventing, mitigating, or adapting to the risks posed by climate change
Climate resilience	The ability of an agricultural system to anticipate and prepare for, as well as adapt to, absorb, and recover from the impacts of changes in climate and extreme weather (FAO)

Climate resilient agriculture (CRA)	A fundamental concept of climate risk management that reflects an ambition to improve the integration of agricultural development and climate responsiveness. It aims to achieve food security and broader development goals under a changing climate and increasing food demand (CGIAR).
Climate system	The highly complex system consisting of five major components: the atmosphere, the hydrosphere, the cryosphere, the lithosphere, the biosphere, and the interactions between them. The climate system evolves in time under the influence of its own internal dynamics and because of external forcings such as volcanic eruptions, solar variations and anthropogenic forcings such as the changing composition of the atmosphere and land-use change.
Climate-resilient development pathways (CRDPs)	Trajectories that strengthen sustainable development and efforts to eradicate poverty and reduce inequalities while promoting fair and cross-scalar adaptation to and resilience in a changing climate. They raise the ethics, equity and feasibility aspects of the deep societal transformation needed to drastically reduce emissions to limit global warming (e.g., to 1.5°C) and achieve desirable and livable futures and well-being for all (IPCC Glossary)
Climate-resilient pathways	Iterative processes for managing change within complex systems in order to reduce disruptions and enhance opportunities associated with climate change.
Climate-smart agriculture (CSA)	An approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate. CSA aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change, and reducing and/or removing greenhouse gas emissions, where possible (FAO, 2018).
Co-benefits	The positive effects that a policy or action aimed at climate actions might have on other objectives. Co-impacts of climate actions and policies which have positive effects on non-climate related objectives are termed co-benefits.
Commodity-neutral	Interventions such as infrastructure such as roads, ports, trading centers, and small water impounding projects which have good productivity impacts
Commodity system	Any feasible combination of two or more crops, livestock, poultry, and/or fishery commodities, e.g., combined rice and fish system, and possibly non-food commodities, e.g., abaca and coconut intercropping. Seeks to significantly raise farm and fishery household total incomes, and to avoid risks inherent to single commodity-based livelihood.
Conservation agriculture	A coherent group of agronomic and soil management practices that reduce the disruption of soil structure and biota
Disaster	Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs that may require external support for recovery

Early warning systems (EWS)	The set of technical, financial and institutional capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organizations threatened by a hazard to prepare to act promptly and appropriately to reduce the possibility of harm or loss. EWS are also considered for ecological applications, e.g., conservation, where the organization itself is not threatened by hazard but the ecosystem under conservation is (an example is coral bleaching alerts) in agriculture (for example, warnings of extreme weather) and in fisheries (storm and tsunami warnings) UNISDR (2009) and IPCC (2012).
Environmental sustainability	Responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality. The practice of environmental sustainability helps to ensure that the needs of today's population are met without jeopardizing the ability of future generations to meet their needs.
Evaluation	The systematic and objective assessment of an on-going or completed project, program or policy, its design, implementation, and results. The aim is to determine the relevance and fulfillment of objectives, development efficiency, effectiveness, impact, and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors. Evaluation also refers to the process of determining the worth or significance of an activity, policy, or program. It is an assessment, as systematic and objective as possible, of a planned, on-going, or completed development intervention.
Farm-to-market roads	Roads linking the agriculture and fisheries production sites, coastal landing points and postharvest facilities to the market and arterial roads and highways
Fisherfolk	People who are directly engaged in catching, culturing, and processing of fisheries and/or aquatic resources
Food loss	The decrease in the quantity or quality of food resulting from decisions and actions by food suppliers in the chain, excluding retailers, food service providers, and consumers. Empirically, it refers to any food that is discarded, incinerated, or otherwise disposed of along the food supply chain from harvest/slaughter/catch up to, but excluding, the retail level, and does not re-enter in any other productive utilization, such as feed or seed (FAO)
Foodprint	Environmental impacts resulting from the food demands of individuals, organizations, and geopolitical entities;[1] or everything it takes to get food from the farm to plate. It is often discussed synonymously with an individual's contribution to greenhouse gas emissions and climate change. In NAFMIP, foodprint is a term used to capture the various elements of resource consumption to sustain a healthy diet, and the environmental impacts associated with the production, processing, distribution, and waste generation of food demanded by the population.

[1] Goldstein, Benjamin; Birkved, Morten; Fernández, John; Hauschild, Michael (2016-01-07). "Surveying the Environmental Footprint of Urban Food Consumption." *Journal of Industrial Ecology*. 21 (1): 151–165. doi:10.1111/jiec.12384. hdl:1721.1/122022. ISSN 1088-1980.

Food security	A condition where all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2002); the policy objective, plan, and strategy of meeting the food requirements of the present and future generations of Filipinos in substantial quantity, ensuring the availability and affordability of food for all, either through local production, or importation, or both based on the country's existing and potential resource endowment and related production advantages and consistent with the overall national development objectives and policies. However, sufficiency in rice and white corn should be pursued.
Food waste	The decrease in the quantity or quality of food resulting from decisions and actions by retailers, food service providers, and consumers. Food is wasted in many ways: (1) fresh produce that deviates from what is considered optimal, for example in terms of shape, size and color, is often removed from the supply chain during sorting operations; (2) foods that are close to, at, or beyond the "best-before" date are often discarded by retailers and consumers; (3) large quantities of wholesome edible food are often unused or left over and discarded from household kitchens and eating establishments (FAO).
Geotagging	The process of adding geographical information to various media in the form of metadata. The data usually consist of coordinates like latitude and longitude, but may even include bearing, altitude, distance, and place names.
Goal	The higher-order objective to which a development intervention is intended to contribute. Goals are generally long-term.
Good Agricultural Practices	Practices that address environmental, economic, and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products (FAO, 2003)
Greenprint	A strategic plan or framework to advance the pace and scale of voluntary conservation in a region. It addresses the needs and opportunities for keeping working agricultural lands viable; and it prioritizes conservation of plants and wildlife, habitat protection and connectivity, community conservation values, water resource management, and increased resilience to climate change. A greenprint is developed largely through technical and scientific input, and from the collaboration of general public and conservation groups, reflecting local shared priorities and culture.
Halal Certification	Halal certification is a process where products and/or services offered by a company meet the specified halal standard. In the case of halal food certification, every stage of the food processing is examined and verified on site by the Shariah and technical auditors. Halal certificates are awarded to companies that meet the requirements in the set standard and they are allowed to use the halal logo on their products. The benefit of halal certification is to assure Muslims that they can lawfully consume a company's products based on Shariah principles.
High-value crops	Non-traditional agricultural and horticultural commodities that include coffee, cacao, fruits, root crops, vegetables, spices and condiments, cut flowers, and ornamental plants.
Impact	Positive or negative change among intended stakeholders or effect/outcome brought about by a program or project

Impact assessment	A means of measuring the effectiveness of organizational activities and judging the significance of changes brought about by those activities
Inclusive growth	Growth that is rapid enough to matter, given the country's large population, geographical differences, and social complexity. It is sustained growth that creates jobs, draws the vast majority into the economic and social mainstream, and continuously reduces mass poverty.
Incremental adaptation	Refers to adaptation that maintains the essence and integrity of a system or process at a given scale. In some cases, incremental adaptation can accrue to result in transformational adaptation.
Indicator	A specific, observable, and measurable characteristic that can be used to show changes or progress a program is making toward achieving a specific outcome
Indigenous knowledge	Understandings, skills, and philosophies developed by societies with long histories of interaction with their natural surroundings. This knowledge is integral to cultural complexes, which also encompass language, systems of classification, resource use practices, social interactions, values, ritual, and spirituality (UNESCO, 2018).
Labor productivity	In agriculture, forestry, and fisheries, pertains to the value of agricultural output per employed person in agriculture, forestry and fisheries
Land use	The total arrangements, activities, and inputs undertaken in a certain land cover type (a set of human actions). The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g., grazing, timber extraction, conservation, and city dwelling). In national greenhouse gas inventories, land use is classified according to the IPCC land use categories of forest land, cropland, grassland, wetland, settlements, other.
Lessons learned	Generalizations based on evaluation experiences with projects, programs, or policies that are abstracted from the specific circumstances to broader situations. Frequently, lessons highlight strengths or weaknesses in preparation, design, and implementation that affect performance, outcome, and impact.
Linked commodity	Secondary or other commodities grown in a farming system defined by its anchor commodity, e.g., mushroom, ducks, or fish in a rice-based farming system; mungbean or soybean in a corn/livestock/poultry-based farming system; vegetables or pasture grass in a coconut-based system, or farm animals in a GSCS.
Logical framework	Also known as “logframe” or “logframe matrix.” A table, usually consisting of four rows and four columns, that summarizes what the project intends to do and how (necessary inputs, outputs, purpose, objectives), what the key assumptions are, and how outputs and outcomes will be monitored and evaluated.
Loss and damage	Associated with impacts of climate change, including extreme events and slow onset events, in developing countries that are particularly vulnerable to the adverse effects of climate change. While loss and damage typically refer to the economic consequences of climate change, the term can also apply to cultural and traditional practices that are lost due to climate impacts.

Market access	The ability to acquire farm inputs and farm services, and the capability to deliver agricultural produce to buyers
Matrix-based planning	Adapted from project design and preparation practice, and applied in all previous AFMP iterations, a planning approach whereby the Plan Logical Framework is prepared prior to and as basis for writing up of the Narrative Plan.
Means of verification (MOV)	The expected source/s of information that can help answer the question of performance, or indicators. This is found in the third column of the standard logframe. It is detailed further in the M&E matrix.
Micro, small, and medium enterprise	In the AF sector, food businesses as defined within the classification of industries by the Department of Trade and Industry
Mitigation (of climate change)	Human intervention to reduce emissions or enhance the sinks of greenhouse gases (GHG). Mitigation options are technologies or practices that reduce GHG emissions or enhances sinks.
Mitigation measures	In climate policy are technologies, processes or practices that contribute to mitigation, for example, renewable energy (RE) technologies, waste minimization processes, and public transport commuting practices.
Monitoring and evaluation (M&E)	A continuous management function to assess if progress is made in achieving expected results, to spot bottlenecks in implementation and to highlight whether there are any unintended effects (positive or negative) from an investment plan, program, or project
Nutrition security	Having secure access to an appropriately nutritious diet, comprising all essential nutrients and water, coupled with a sanitary environment and adequate health services and care to ensure a healthy and active life for all household members (FAO, 2012. The state of food insecurity in the world)
Objective	A specific statement detailing the desired accomplishments or outcomes of a project at different levels (short- to long-term). A good objective meets the criteria of being impact-oriented, measurable, time-limited, specific, and practical.
Operating unit (OU)	DA bureaus, agencies, corporations, Regional Field Offices, and OSEC units responsible for implementing programs, projects, and activities
Outcome	The likely or achieved short-term and medium-term effects of an intervention's outputs. Goals are generally long-term, such as the MDGS or SDGS. For comparison, outcomes, in the case of MDGS, are of intermediate time frame (five to ten years).
Outputs	The products, capital goods, and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes
Partners	The individuals and/or organizations that collaborate to achieve mutually agreed-upon objectives
Planetary health diet (PHD)	A global reference diet for adults that is symbolically represented by half a plate of fruits and vegetables. An optimal diet for human health and environmental sustainability, it emphasizes a plant-forward diet where whole grains, fruits, vegetables, nuts, and legumes comprise a greater

	proportion of foods consumed. Meat and dairy constitute important parts of the diet but in significantly smaller proportions than whole grains, fruits, vegetables, nuts and legumes. (https://eatforum.org/eat-lancet-commission/the-planetary-health-diet-and-you/)
Poverty incidence	The proportion of persons with per capita income less than the per capita poverty threshold
Primary production	The production, rearing, or growing of primary products including harvesting, milking, and farmed animal production up to slaughter; and the rearing and growing of fish and other seafood in aquaculture ponds. It also includes fishing, and the hunting and catching of wild products.
Processing	Any action that substantially alters the initial raw materials or product or ingredients including, but not limited to, heating, smoking, curing, maturing, drying, marinating, extraction, extrusion and a combination of those processes intended to produce food.
Program	Set of actions linked to the DA's strategic pillar/s and which contribute to the achievement of the outcomes and outputs of the NAFMIP (e.g., level of knowledge of consumers in urban areas on traditional Filipino diet increased, by key consumer segments, by sex)
Project	An intervention that consists of a set of planned, interrelated activities designed to achieve specific objectives within a given budget and a specified period of time.
Project management	The process of leading, planning, organizing, staffing, and controlling activities, people, and other resources in order to achieve particular objectives
Results	The output, outcome, or impact (intended or unintended, positive and/or negative) of a development intervention
Results framework	The chain of logic that explains how the development objective is to be achieved, including causal relationships and underlying assumptions. For the AFMP, the Results Framework is a tool to assist with achieving and measuring specific objectives at the agri-fishery sector, country, and sub-country (regional) level. It is laid out in a diagram and as a matrix (compendium). To formulate it, the Problem Tree Analysis and Objectives Tree approach was undertaken to link high-level objectives through a hierarchy to program-level outcomes (and ultimately individual activities) and then sets out a means by which achievement at all levels of the hierarchy can be measured. The Results Framework approach has a lot in common with the Logframe used on an individual activity basis.
Results-based Monitoring and Evaluation	An M&E approach focusing on performance and achievement of outputs, outcomes and impacts
Revealed comparative advantage (RCA)	A country's export potential (or a specific commodity within a country), indicating productivity differences across countries estimated using actual trade data. The comparative advantage measured and inferred from observed data is "revealed" comparative advantage. RCA provides important information about the potential trade prospects within new trading partners. The Rapid AF Sector Assessment Report for NAFMIP provides more technical detail on how RCA is computed.

Risk	Possible negative external factors, i.e. events, conditions, or decisions, which are expected to seriously delay or prevent the achievement of the project objectives and outputs (and which are normally largely or completely beyond the control of the project management)
Risk analysis	An analysis or an assessment of factors (called assumptions in the logframe) that affect or are likely to affect the successful achievement of an intervention's objectives. A detailed examination of the potential unwanted and negative consequences to human life, health, property, or the environment posed by development interventions; a systematic process to provide information regarding such undesirable consequences; the process of quantification of the probabilities and expected impacts for identified risks.
Risk capital	Investment in a company or project at an early or high-risk stage
Small/smallholder farmers/fisherfolk	Smallholder farmers and fisherfolk are those dependent on small-scale subsistence farming and fishing activities as their primary source of income.
Social protection	Social protection constitutes programs and policies that seek to reduce poverty and vulnerability to risks, and enhance the social status and rights of the marginalized. To achieve these aims, it (1) promotes and protects livelihood and employment, (2) protects against hazards and sudden loss of income, and (3) improves people's capacity to manage risks. Social protection has four main components: labor market interventions, social insurance, social welfare, and social safety nets.
Soil carbon sequestration (SCS)	Land management changes which increase the soil organic carbon content, resulting in a net removal of CO2 from the atmosphere
Stakeholders	Agencies, organizations, groups, or individuals who have a direct or indirect interest in the development intervention or its evaluation
Sustainability	The continuation of benefits from a development intervention after major development assistance has been completed; the probability of continued long-term benefits; the resilience to risk of the net benefits that flow over time
Sustainability	A dynamic process that guarantees the persistence of natural and human systems in an equitable manner
Sustainable development (SD)	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs and balances social, economic, and environmental concerns.
Sustainable Development Goals (SDGs)	The 17 global goals for development for all countries established by the United Nations through a participatory process and elaborated in the 2030 Agenda for Sustainable Development, including ending poverty and hunger; ensuring health and well-being, education, gender equality, clean water and energy, and decent work; building and ensuring resilient and sustainable infrastructure, cities and consumption; reducing inequalities; protecting land and water ecosystems; promoting peace, justice, and partnerships; and taking urgent action on climate change
Target (or key) stakeholders	Priority stakeholders who are affected by the Plan implementation, as well as those implementing and facilitating achievement of the goals and objectives of the communication efforts

Timeframe	Period for implementing the activities which may also indicate if schedule of activities falls under **recovery**, **growth-boosting**, and **resilience** phases under NAFMIP-phased implementation
Traditional Filipino diet (TFD)	The consumption pattern prior to 1970, before the Green Revolution that resulted in large-scale monocropping and introduction of fast food. This diet differs across regions and factors such regional differences. On the average, reverting to the traditional Filipino diet would result in going back to average per capita rice consumption below 90 kg per capita/year, which is much less than the current consumption of about 120 kg per capita/year.
Transformational adaptation	Adaptation that changes the fundamental attributes of a socio-ecological system in anticipation of climate change and its impacts
Transformative planning	Involves both operational/ functional and structural changes or reforms in agri-fishery planning and food systems. Replaces incremental planning which only tries to improve on what is already being done.
Unit/s responsible	Operating units in the DA and partner NGAs who will participate in the planning, implementation, and monitoring of the communication strategies that will address specific development issues
Value chain	The full range of activities that are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use
Yield	An indicator of productivity for agricultural commodities derived by dividing total production by the area planted or harvested

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Annexes

Annex 1: The NAFMIP Logframe

Goals and Purpose

In a nutshell, a logframe is "a tool for planning, management, and evaluation activities, …widely adopted by organizations involved in development work…that allows planners and evaluators to specify the components of their activities and identify the logical linkages between a set of means and a set of ends…and a means wherein a project may be structured for analytical purposes."[1] Annex 1 Table 1 presents the format and description of the logframe components.

Annex 1 Table 1: Logframe Template

NARRATIVE SUMMARY (Hierarchy of Plan Objectives)	**OBJECTIVELY VERIFIABLE INDICATORS** (OVI)	**MEANS OF VERIFICATION** (MOV)	**ASSUMPTIONS AND RISKS**
Column 1	**Column 2**	**Column 3**	**Column 4**
Row 1: SECTOR GOAL (Impact) is the higher level and long-term objective to which the NAFMIP will contribute within the Plan lifetime	How Plan implementation performance will be tracked and measured at each level (Rows 1 to 4 of matrix)	Data sources and collection methods to be specified per row of the Matrix Plan	Factors beyond full control of the Plan implementers (to be specified per row of the Matrix Plan) Assumption: what Plan implementers **expect will happen** Risks: what Plan implementers **expect will not happen**
Row 2: SECTOR PURPOSE (Outcomes) Medium-term changes in the AF sector to be attained by the end of the Plan period, produced from the synergy of various sector outputs			
Row 3a: SECTOR OUTPUTS – Short-term tangible goods and services produced from the synergy of sub-outputs delivered by the different DA Operating Units (OUs), LGUs, NGAs, SUCs, private sector, and other key AF stakeholders			
Row 3b: OU SUB-OUTPUTS – Short-term tangible deliverables produced by each DA OU, LGUs, NGAs, private sector, SUCs, and other AF stakeholders			
Row 4: INPUTS – Resources (budget, expertise, technology, and other such resources) necessary (for Plan implementation			

[1] NEDA. nd. NEDA Ex-Post Evaluation Manual. p. 10

Both AFMP 2016–2020 and AFMP 2018–2023 used the **logframe matrix** in organizing its intended results and performance indicators. Column 1 of this logical framework approach, the **ultimate goal** (also called **societal impact**) is the long-term change to which the sector Plan intends to contribute to, even beyond the lifetime of the Plan. Clearly stating the **sector goal** provides a North Star to which all other intended sector changes at various governance levels must align. The **sector outcomes** are the medium-term changes in the Agri-Fishery sector, explicitly intended to be realized within the timeframe of the Plan. **Sector outputs** are the short-term tangible goods and services that will be generated from the synergy of the different **sub-outputs** delivered by the various AF stakeholders, i.e., all DA Operating Units (OUs), LGUs, other NGAs, SUCs, private sector, and other key AF stakeholders. The sub-outputs are the short-term tangible deliverables produced by the different activities undertaken by individual DA OU, LGUs, NGAs, private sector, SUCs, and other AF stakeholders Lastly, **inputs** refer to all the resources (budget, expertise, technology and other such resources) necessary (coming from multiple fund sources) to successfully execute NAFMIP.

Column 2 of the matrix provides the **objectively verifiable indicators**, which will show how Plan implementation performance will be tracked and measured at every level. The third column, the **means of verification** (MOV), provides the data sources and collection methods relative to each performance indicator. The fourth column provides **assumptions** (what Plan implementers expect will happen during Plan period) and **risks** (what Plan implementers expect will not happen during Plan period)—factors beyond the **full** control of the Plan implementers.

NAFMIP Performance Indicators

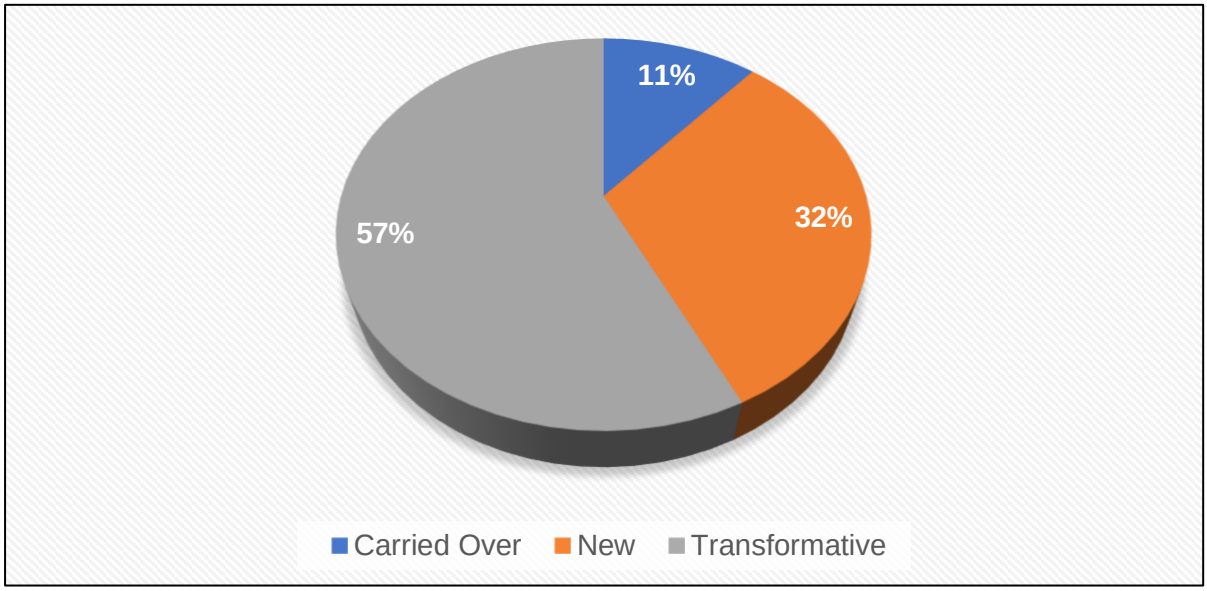
Chapter 1 already presents the NAFMIP Results Framework and Results Chain (Figure 1.2). As pointed out in Chapter 1, it is the NAFMIP Logframe that translates the results framework from sector outcomes to outputs and sub-outputs to indicators, articulating the sector-wide transformations envisioned for the entire agri-fisheries sector within a span of ten years. It explains how the different OneDA strategies are operationalized at the national level down to the field implementing units.

The NAFMIP Logframe includes 168 performance indicators: 12 percent goal indicators; 45 percent outcome indicators; and 43 percent output indicators (Annex 1 Figure 1).[2] The Plan clusters these indicators into three groups: **carried-over indicators**; **new indicators**; and **transformative indicators**. The Plan Logframe includes **19 carried-over indicators** (11%), or those indicators that were lifted from other planning documents such as the PDP Results Matrix and previous AFMPs. It also has **53 new indicators** (32%), or those that were not previously found in DA planning documents but were already being collected or may be found in other government reports such as from PSA, FNRI, DOST and from the DA Baseline Study.

On the other hand, the **transformative indicators** are those that reflect the paradigm shifts advocated in the OneDA strategies and which directly and strongly support the attainment of outcomes related to these strategies, namely, agri-fishery industrialization, modernization, digitization of agriculture, spatial planning, among others. The NAFMIP has a total of **96 transformative indicators** (57%) in the Plan Logframe. Data for some of these indicators may exist albeit these are not yet being systematically collected. Most of these indicators would require the conduct of baseline studies or surveys to be able to identify baseline values and corresponding Plan targets.

[2] This does not include about 167 sub-output indicators, which can only be finalized after the planning workshops.

Annex 1 Figure 1: Distribution of NAFMIP Indicators, by Type



Baselines. Each of the performance indicators in the Plan Logframe requires corresponding baseline values to set the starting line from which to measure the accomplishments of the Plan over its 10-year lifetime. All 168 performance indicators will require baseline values. All carried-over indicators will derive their baseline values from the identified data sources (indicated in the Means of Verification column), using the most recent data available (preferably Year 2020). Similarly, some new can also get baseline values from the identified sources. However, all 96 transformative indicators as well as some of the new indicators would require the conduct of baseline surveys and studies within the first two years of Plan implementation in order to set credible baseline values (as well as provide bases for targets). This does not mean that one study is required for every indicator. Rather, indicators will be clustered so that data for a set of indicators may be collected in one study or survey. Baseline studies or surveys should be initiated or whenever possible conducted, by the respective indicator owners.[3]

Targets. Likewise, overall Plan targets need to be identified by DA for every indicator prior to Plan execution. Targets need to be considered judiciously as these have implications on magnitude and allocation of resources irrespective of their sources. Moreover, the overall targets need to be broken down into annual (i.e., each year of Plan implementation) or periodic targets (i.e., every three years, midterm and endline, etc.) in order to facilitate more efficacious monitoring and evaluation.

Means of Verification (MOV)

There are generally four sources of data to populate the indicators: websites and documents of other agencies and organizations such as but not limited to the Philippine Statistics Authority (PSA), Food and Nutrition Research Institute (FNRI) of the Department of Science and Technology (DOST), Food and Agriculture Organization (FAO), Asian Development Bank (ADB), Global Food Security Index (GFSI), Global Hunger Index (GHI), among others; regular and periodic reports of the different DA Operating Units; reports from various DA-

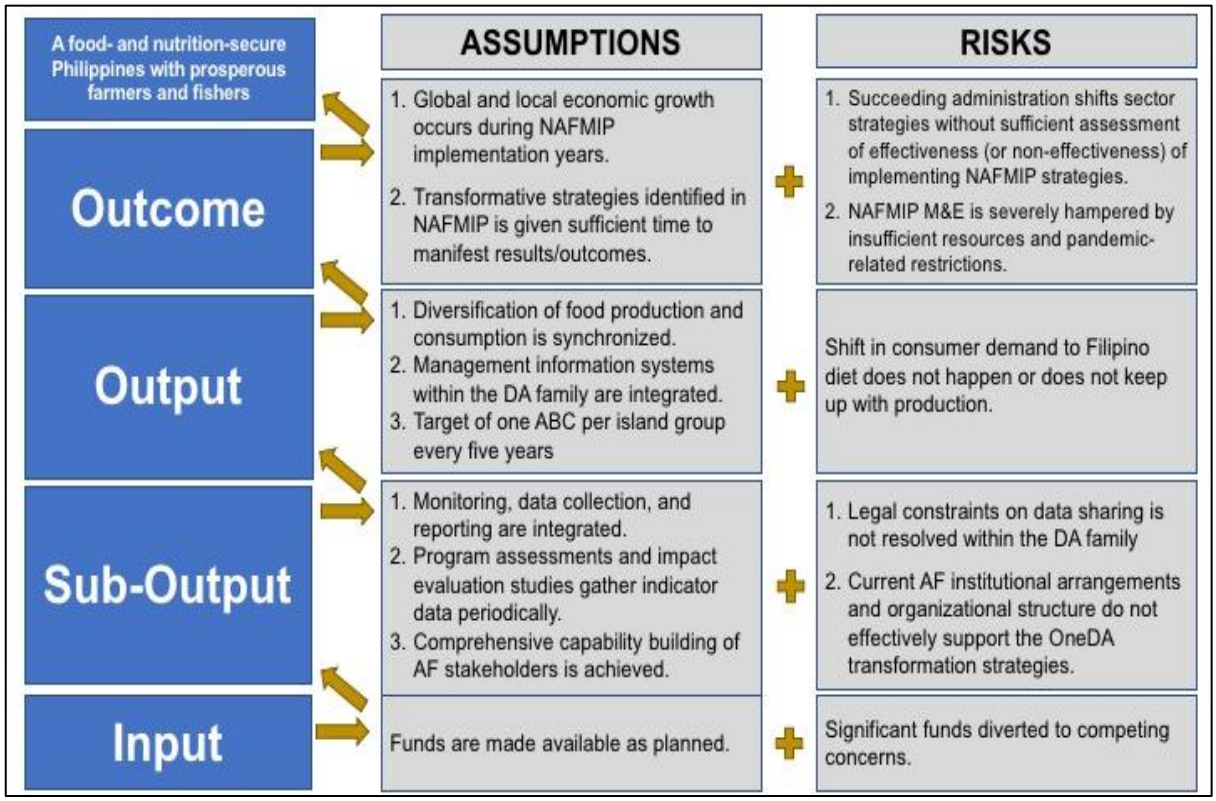
[3] Indicator owners can be identified from the Performance Indicator Reference Sheets (PIRS) prepared together with the NAFMIP Logframe (excluding the indicators taken from the DA Baseline study and the sub-output indicators identified during the consultation workshops).

commissioned assessment and evaluation studies and other such publications; and NAFMIP M&E Reports. Other MOVs may be possible during Plan implementation period.

Assumptions and Risks

The NAFMIP Logframe also considered several assumptions and risks, which are best understood when shown as a causal chain (Annex 1 Figure 2). The assumptions are indeed self-explanatory. However, it is noteworthy to mention that one of the critical assumptions is the synchronization of the efforts on diversification of food production and consumption. On the other hand, there are two critical risks that are worth emphasizing. First is the risk associated with the failure to resolve issues on data sharing among the DA family while the second is the risk of failing to transform the DA organizational structure and institutional arrangements to effectively support the OneDA transformation strategies.

Annex 1 Figure 2: NAFMIP Assumptions and Risks



Annex 1 Table 2: NAFMIP 2021-2030 Logframe[4]

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
Societal Goal A food-and-nutrition-secure, resilient Philippines with empowered and prosperous farmers and fisherfolk	G1. Philippine Food Security Index Score	55.7 (2020)	60.0	–[6]	67.1	Food Security Index website	
	G2. Philippine Hunger Index Score	19.0 (2020)	16.8	–	13.2	Global Hunger Index website	
	G3. Percentage of families who experienced hunger among the poor	9.9 (2020)	–	–	7.5	Annual Poverty Indicator Survey (APIS)	
	G4. Proportion of households meeting 100% recommended energy intake[7]	45.5 (2018)	–	–	100	Philippine Statistics Authority (PSA)	
	G5. Food self-sufficiency ratio improved, by key commodity *(within the context of commodity systems)*	(2020)				PSA. Agricultural Indicators System	
	G5.1. Grains and staples: corn	91.4	–	–	100		
	G5.2. Fruits: banana, pineapple, mango	100	–	–	100		
	G5.3. Vegetables: tomato, cabbage, eggplant, *ampalaya*	100	–	–	100	PSA	

[4] [a] Results Chain is a series of expected achievements, or positive changes, linked by causality; continuum from inputs to activities to outputs, and to outcomes.
[b] Performance Indicators provide measurable bases for monitoring and evaluation of achievements; it includes the baseline year and value (starting point) and the targets or planned accomplishments at certain periods of plan implementation.
[c] Means of Verification (MOV) provide the sources of evidences or official data sources and reports
[d] Risks and Critical Assumptions [Assumption: positive condition, event, or action to achieve results. Risk: negative condition, event, or action that could jeopardize achievement of results.]

[5] For indicators without existing baseline values *such as transformative indicators*, baseline studies (which may consist of simple desk reviews and surveys to full blown research studies) will have to be conducted by the respective indicator owners on the first year of Plan implementation to identify baselines and subsequently, to set annual or midterm and end-of-plan targets

[6] This means a target is not set at this period.

[7] See SDG 2.1.1.p.1

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	G5.4. Vegetables: garlic	7.1	–	11.0	15.0		
	G5.5. Vegetables: onion	72.4	–	90.0	90.0		
	G5.6. Nuts: peanut	30.1	–	35.0	40.0		
	G5.7. Legumes: mungbean	47.5	–	52.5	65.0		
	G5.8. Starchy root and tuber crops: Cassava, sweet potato	81.0	–	85.2	95.0		
	G5.9. Starchy root and tuber crops: potato	81.0	–	85.2	95.0		
	G5.10. Fish: milkfish, *tilapia*, shrimps, crabs, oyster	–	–	–	95.0		
	G5.11. Fish: tuna	79.5	–	83.9	90.0		
	G6. Poverty incidence among farming and fishing families (%)	14.0	–	TBD	<1.0		
	G6.1. Farmers (%)	23.7 (2020)	–	–	15	PSA	
	G6.2. Fisherfolk (%)	26.2 (2018)	–	–	15		
Purpose (Outcome) P1. Economic opportunities in agriculture, forestry and fisheries products expanded	P1.1. Growth rate of gross value added (GVA) in agriculture, forestry and fisheries (AFF) increased (%, at constant prices) - raw materials	0.1 (2015)	2.3-3.5	–	>3.5	PDP 2017-2022 PSA. Economic Growth: Agriculture Report	Assumptions: (1) Global and local economic growth occurs during NAFMIP implementation years (2) Transforma-tive strategies identified in NAFMIP is given sufficient time to manifest
	P1.1.1. Agriculture crops-based products	-1.8 (2015)	2.0-3.0	–	>3.0		
	P1.1.2. Livestock-based products	3.8 (2015)	3.0-4.0	–	>4.0	PSA. Economic Growth: Agriculture Report	
	P1.1.3. Poultry-based products	5.7 (2015)	3.0-4.0	–	>4.0		
	P1.1.4. Commercial fishery-based products	0.1 (2015)	2.3-3.5	–	>3.5		
	P1.1.5. Municipal fishery-based products	-1.8 (2015)	2.0-3.0	–	>3.0		

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	P1.1.6. Aquaculture-based products	3.8 (2015)	3.0-4.0	–	>4.0		results/ outcomes
	P1.2. Growth rate of gross value added (GVA) in agriculture, forestry and fisheries (AFF) increased (%, at constant prices) - manufactured/processed agri-fishery products	TBD[8]	–	TBD	TBD	PDP 2023-2028 PSA	(3) Philippines Statistics Authority & BAR collaborate to establish systems for data collection for transformative indicators
	P1.2.1. Agriculture crops-based products						Risks: (1) Successor administration shifts sector strategies without sufficient assessment of effectiveness (or non-effective-ness) of the implementation of NAFMIP Strategies
	P1.2.2. Livestock-based products						
	P1.2.3. Poultry-based products						
	P1.2.4. Commercial fishery-based products						
	P1.2.5. Municipal fishery-based products						
	P1.2.6. Aquaculture-based products	TBD	–	TBD	TBD		
	P1.3. Growth in large-scale agro-industries[9] increased (%)	NA[10]	–	TBD	TBD	NAFMIP surveys	
	P1.4. Growth in agriculture and fishery manufactured/processed exports increased	NA	–	TBD	TBD		

[8] TBD refers to "To Be Determined"; Targets will be determined by the Department of Agriculture or the concerned DA Operating Unit

[9] Large scale agro-industry investments refer to those with assets of equal to or higher than PhP100 million

[10] NA is short for Not Available; it means that the baseline value is not yet available until the NAFMIP survey/study is completed.

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	P1.4.1. Volume of agriculture and fishery manufactured exports (cumulative, '000 mt)	NA	–	TBD	TBD		(2) NAFMIP Monitoring and Evaluation is severely hampered by insufficient resources and pandemic-related restrictions
	P1.4.2. Value of agriculture and fishery manufactured exports (cumulative, FOB in million US$)	NA	–	TBD	TBD		
	P1.5. Rejected agriculture and fishery exports decreased	NA	–	TBD	TBD	NAFMIP surveys	
	P1.5.1. Volume of agriculture and fishery exports rejected decreased (cumulative, '000 mt)	NA	–	TBD	TBD		
	P1.5.2. Value of agriculture and fishery exports rejected decreased (cumulative, FOB in million US$)	NA	–	TBD	TBD		
	P1.6. Revealed comparative advantage (RCA) of Philippine agri-fishery exports enhanced	0.8	–	>1.0	>0.8	NAFMIP surveys	
	P1.6.1. Fresh banana	23.57	–	TBD	>23.57		
	P1.6.2. Coconut oil	54,50	–	TBD	>54,50		
	P1.6.3. Sugar	1	–	TBD	>1		
	P1.6.4. Pineapple and products	41.75	–	TBD	>41.75		
	P1.6.5. Seaweeds (carrageenan)	7.41	–	TBD	>7.41		
	P1.6.6. tuna	10.68	–	TBD	>10.68		
	P1.7. Export market penetration index by major export commodity					NAFMIP surveys	

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	P1.7.1. Banana	TBD	–	TBD	TBD		
	P1.7.2. Coconut	TBD	–	TBD	TBD		
	P1.7.3. Sugar	TBD	–	TBD	TBD		
	P1.7.4. Pineapple canned	TBD	–	TBD	TBD		
	P1.7.5. Pineapple fresh	TBD	–	TBD	TBD		
	P1.7.6. Seaweeds (carrageenan)	TBD	–	TBD	TBD		
	P1.7.7. Tuna	TBD	–	TBD	TBD		
	P1.7.8. Overall	TBD	–	TBD	TBD	MED Baseline	
	P1.8. Conduciveness of enabling environment for profitable, competitive and sustainable agri-fishery improved	TBD	–	TBD	TBD	NAFMIP surveys	
	P1.9. Growth in agro-fishery input service industries (%, constant prices):	TBD	–	TBD	TBD	NAFMIP survey	
	P1.9.1. Production of local AF machineries						
	P1.9.2. Production of pesticides						
	P1.9.3. Production of fertilizers						
	P1.9.4. Packaging materials (decline in plastics and growth in biodegradable materials)						
	P1.9.5. Use of renewable energy for farming						
	P1.10. Growth rate of restaurants and food service activities	TBD	–	TBD	TBD	NAFMIP survey	
	P1.11. Share of AFF R&D government budget to total AFF GVA increased (%, cumulative)	0.3 (2016)	1.1 (2022)	TBD	TBD	PDP RM 2017-2022 NAFMIP survey	

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
P2. Access to economic opportunities of small and subsistence farmers and fisherfolk increased	P2.1. Growth in total income of farm/livestock/ fishery sustained (%)	NA	–	TBD	TBD	NAFMIP survey	
	P2.1.1.% Small farms						
	P2.1.2.% Livestock farms						
	P2.1.3.% Fisher farms						
	P2.2. Growth in employment generated from inclusive large-scale agro-industries sustained (%)	NA	–	TBD	TBD	NAFMIP survey	
	P2.3. Growth in household income of small farmers, livestock raisers, and fisherfolk from total diversified sources sustained (%, in real terms)	NA	–	TBD	TBD	NAFMIP survey	
	P2.4. Growth in rural farm income sustained, by region (cumulative, at constant prices)	NA	–	TBD	TBD	NAFMIP survey	
	P2.4.1.Growth in AFF employment (in percent)						
	P2.5. Volume of production losses of crops/livestock/fish of small farmers, livestock raisers, and fisherfolk from economic and environmental shocks reduced, by type of disasters	NA	–	TBD	TBD	NAFMIP survey	
	P2.5.1.Due to climate and weather-related disasters[11]						

[11] Examples of climate and weather-related disasters are flooding, typhoons, among others

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	P2.5.2. Due to biological disasters[12]						
	P2.5.3. Due to geophysical disasters[13] (e.g., volcanic activity, earthquakes)						
	P2.6. Value of production losses of crops/livestock/fish of small farmers, livestock raisers, and fisherfolk from economic and environmental shocks reduced, by type of disasters	NA	–	TBD	TBD	NAFMIP survey	
	P2.6.1. Due to climate and weather-related disasters						
	P2.6.2. Due to biological disasters						
	P2.6.3. Due to geophysical disasters						
	P2.7. Number of farming households displaced due to conflict and protracted crises	NA	–	TBD	TBD	NAFMIP survey	
	P2.7.1. Number of farming HH displaced, by sex of HH head						
	P2.7.2. Size of farm areas affected						
P3. Consumer options for more	P3.1. Per capita production and supply of balanced and nutritious Filipino diet increased	NA	–	TBD	TBD	NAFMIP survey	

[12] Examples of biological disasters are outbreak of animal and plant pests and diseases, among others

[13] Examples of geophysical disasters are volcanic activity, earthquakes, among others

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
affordable, nutritious and locally-grown food expanded	P3.1.1. Whole grains and alternative staples						
	P3.1.2. Fruits						
	P3.1.3. Vegetables						
	P3.1.4. Nuts						
	P3.1.5. Legumes						
	P3.1.6. Starchy root and tuber crops						
	P3.1.7. Milk						
	P3.1.8. Fish						
	P3.1.9. Coconut oil						
Modernized, climate-smart, crises-resilient, knowledge-based and/or transformative:							
<u>Output 1.</u> Agriculture and fishery industrial business corridors (AFIBCs) with supporting hard and soft infrastructure and "orgware" operationalized	O1.1. Growth of overall investments in agriculture and fishery in rural areas	NA	–	TBD	TBD	DA PMS studies/ reports	Assumptions: (1) Synchronization of diversification of food production and consumption is achieved (2) Integration of management information systems within the DA family is achieved
	O1.1.1. Growth of public sector investments in agriculture and fishery in rural areas						
	O1.1.2. Growth of private sector investments in agriculture and fishery in rural areas						
	O1.2. Extent of AF plans utilized as references for policy, budgeting and programs/ projects (%)	0[14]	–	50%	100%	DA PMS studies/ reports	
	O1.3. No. of AF Industrial Business Corridors established and actually	0	–	3	3		Risks:

[14] Baseline value is zero (0) for many of the transformative indicators because it is the first time that such indicators will be used.

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	hosting public and private investors, by regions, by AFIBCs						(1) Shift in consumer demand to "Filipino diet" does not happen or does not keep up with production (2) Substantial increase in global oil prices and prices of agricultural inputs such as fertilizers
	O1.4. No. of private investors locating in AFIBCs increased (cumulative), by type of industry	NA	–	TBD	TBD		
	O1.5. No. of farmers, livestock raisers, fisherfolk and their organizations linked to AFIBCs increased (cumulative), by sector beneficiaries, by type of business arrangements	NA	–	TBD	TBD		
	O1.6. Growth in labor productivity of farmers and fisherfolk linked to AFIBCs	TBD	TBD	TBD	TBD		
<u>Output 2.</u> Commodity system-based value chains (i.e., production, processing, and distribution systems) established	O2.1. Shorter food miles, by anchor commodity system	TBD	–	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O2.2. Share of investments in targeted profitable segments of value chains increased, by type of partnership	TBD	–	TBD	TBD		
	O2.3. Percent of commodity systems-based/ integrated value-chain plans used for identifying profitable segments of value chains	0	–	100%	100%		
	O2.4. Share of sector beneficiaries with diversified income sources, by anchor commodity systems, by sex and by type of beneficiaries	NA	–	75%	85%		
	O2.5. Quality and inclusiveness of commodity system-based value chain investments improved (%)	0	50%	75%	85%		

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	O2.6. Ratio of farm mechanization (measured in terms of horsepower per hectare) enhanced	TBD	TBD	TBD	TBD	PhilMech Reports	
	O2.7. Percent of wastes and losses in the entire food system decreased (%)	NA	–	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O2.7.1. Losses due to poor inputs (%)						
	O2.7.2. Production losses (%)						
	O2.7.3. Post-harvest losses (%)						
	O2.8. Value of damages to agri-fishery ecosystems decreased (Php), and by type of damages	NA	–	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O2.8.1. Value of damages to irrigation systems and AF infrastructure, by type of disasters[15], by type of damages and by type of infrastructures						
	O2.8.2. Value of damages to farm assets[16], by type of disasters						
	O2.8.3. Value of damages to perennial crops, by type of crops and by type of disasters						

[15] Type of disasters refer to climate and weather-related disasters (e.g., flooding, typhoons, etc.) and geophysical disasters (e.g., volcanic activity, earthquakes, etc)
[16] Farm assets refer to farm buildings and sheds, storage facilities, agricultural inputs, farm equipment and machinery and other farm assets

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	O2.8.4. Area (ha) and value of land degradation hotspots decreased, by type of activities[17]						
	O2.8.5. Uncultivated areas (ha) due to shortage of water for agriculture[18] decreased						
Output 3. Market support systems in agri-fishery that are technology and/or ICT-enabled strengthened	O3.1. On-line domestic market matching between local agro-industries and small farmers, livestock raisers, and fisherfolk organizations operationalized:	NA	–	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O3.1.1. Volume of AF products sold through online domestic market matching increased						
	O3.1.2. Value of AF products sold through online domestic market matching increased						
	O3.2. Online international market matching between exporters and small farmers, livestock raisers, and fisherfolk organizations operationalized:	NA	–	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O3.2.1. Volume of AF products sold through online						

[17] Activities refer to agricultural practices which cause or enhance soil erosion

[18] Shortage of water maybe due to drought or prolong dry season, declining vegetation cover, and pollution and other reasons

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	international market matching increased						
	O3.2.2. Value of AF products sold through online international market matching increased						
	O3.3. Degree of National Information Network (NIN) operationalized to link all agri-fishery e-commerce platforms	TBD	TBD	TBD	TBD	DA ICTS Report	
	O3.4. Number of market support facilities for commodity systems established increased, by type of support	NA	–	TBD	TBD		
	O3.5. Percent of small farmers, livestock raisers, and fisherfolk organizations linked to online platforms on climate and disaster risk information increased	NA	–	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O3.6. Degree of engagement of private sector stakeholders on official AF sites and social media channels	NA	–	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
Output 4. Research, extension and training for development	O4.1. Percent of Province-led Agriculture and Fisheries Extension System (PAFES) established and operationalized, by region	0	50%	100%	100%	BAR studies/ reports	
	O4.2. Percent of agri-fishery new technologies developed and	TBD	TBD	TBD	TBD		

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
(RETD) system intensified	commercialized increased, by research areas						
	O4.3. Percent of small farmers, livestock raisers, and fisherfolk sustainably adopting and utilizing new and resilient technologies increased (%), by type of technology training by type of beneficiary, by sex of beneficiary	TBD	TBD	TBD	TBD	BAR studies/ reports	
	O4.4. Degree of contributions of modern and resilient technologies to farm productivity and resiliency increased (%)	TBD	TBD	TBD	TBD	BAR studies/ reports	
	O4.5. Sector-wide agricultural innovation system (AIS) established and operationalized	TBD	TBD	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O4.6. Percent of funded studies on agri-fishery innovations completed within approved timeline	TBD	TBD	TBD	TBD	BAR studies/ reports	
	O4.7. Percent of completed AF R&D studies on agricultural innovations published in reputable outlets	TBD	TBD	TBD	TBD	BAR studies/ reports	
Output 5. Capacities of LGUs, AF groups (agri-Fishery	O5.1. Share of LGUs with formal partnerships for implementation of agricultural insurance increased (%)	TBD	TBD	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O5.2. Share of LGUs with local programs assisting establishment and	TBD	TBD	TBD	TBD		

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
cooperatives and associations) and Individuals (i.e., small farmers, livestock raisers, and fisherfolk) strengthened	operations of small and medium agri-fishery enterprises						
	O5.3. Level of knowledge of LGUs on spatial and commodity-systems planning increased, by province	TBD	TBD	TBD	TBD		
	O5.4. Share of small farmers and fisherfolk covered by risk insurance increased (%), by sex	TBD	TBD	TBD	TBD	PCIC reports	
	O5.5. Share of small farmers, livestock raisers, and fisherfolk borrowing from formal credit sources increased (%), by sex	TBD	TBD	TBD	TBD	ACPC reports	
	O5.6. Share of agrarian reform beneficiaries (ARBs) with emancipation patents (EPs) or certificates of land ownership award (CLOA) increased (%) by sex	TBD	TBD	TBD	TBD	DAR reports	
	O5.7. Share of registered small fisherfolk with preferential access to municipal waters increased (%) by sex	TBD	TBD	TBD	TBD	BFAR reports	
	O5.8. Level of knowledge of farmers, livestock raisers, and fisherfolk on digital platforms increased, by sector beneficiary, by sex	TBD	TBD	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O5.9. Level of knowledge of consumers in urban areas on "Filipino" diet increased , by key consumer segments, by sex of consumer	TBD	TBD	TBD	TBD		

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	O5.10. Capacity of AF sector on waste management and recycling increased, by type of stakeholders[19]	TBD	TBD	TBD	TBD		
	O5.11. Degree of resiliency of farming households displaced by local conflicts and protracted crises increased, by sex of HH head	TBD	TBD	TBD	TBD	DA CRAO Report	
	O5.12. Proportion of farming and fishing families with absorptive, adaptive and transformative capacities, by sex of HH head	TBD	TBD	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	05.12.1. Farm sustainability in relation with water use	TBD	TBD	TBD	TBD		
	05.12.2. Farm sustainability in relation with fertilizer pollution risk	TBD	TBD	TBD	TBD		
	05.12.3. Farm sustainability in relation with pesticides	TBD	TBD	TBD	TBD		
	05.12.4. Use of agri-biodiversity supportive practices	TBD	TBD	TBD	TBD		
	O5.13. Proportion of small farmers and fisherfolk expanding to other profitable segments of the value chain	TBD	TBD	TBD	TBD		
	O5.14. Proportion of small farmers and fisherfolk engaged in agripreneurship	TBD	TBD	TBD	TBD		

[19] LGUs, private sector, SUCs, etc.

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
Output 6. Policy environment (i.e., legislative, executive, policy and regulatory support) to accelerate and sustain sector transformation enhanced	O6.1. Share of national policy measures enacted in support of agricultural innovation, commodity system approach and other NAFMIP agri-fishery transformation strategies, by type of legislation and by policy objectives (%)	0	TBD	TBD	TBD	DA PMS studies and/or reports	
	O6.1.1. Share of national legislative measures enacted (%)						
	O6.1.2. Share of national executive policies promulgated (%)						
	O6.2. Amount of private sector investments in transformative AF in support of NAFMIP increased (Php)	0	TBD	TBD	TBD	DA PMS studies and/or reports	
	O6.3. Share of sector, national and regional plans[20] aligned with NAFMIP as "directional plan" (%)	0	TBD	TBD	TBD		
	O6.4. Share of transformative AF studies[21] completed that supported decisions on agro-industrial investments[22] and other NAFMIP innovations increased, by type of studies (%)	0	---	12	12		

[20] Examples are commodity plans, Value Chain plans, RFO plans, among others

[21] Such as policy studies, investment studies, among others

[22] Which means studies were utilized as references for policy, budgeting and programs/projects or used in policy dialogues, discussions and other fora

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
	O6.5. Degree of integration and utilization of agri-fishery management information systems for policy making, decision-making and resource programming, by type of information system (%)	TBD	TBD	TBD	TBD	DA ICTS studies and/or reports	
	O6.6. Conduciveness of enabling environment for profitable, competitive and sustainable agri-fishery improved (%)	TBD	TBD	TBD	TBD	DA commissioned studies/surveys: baseline, mid-term and end-line	
	O6.7. Level of participation of local stakeholders in AF planning, implementation and M&E increased (%)	TBD	TBD	TBD	TBD	PCAF studies and/or reports	
							Assumptions: (1) Integrated monitoring, data collection and reporting is attained (2) Program assessments and impact evaluation studies are conducted periodically to gather data on the indicators (3) Comprehensive

RESULTS CHAIN[a]	PERFORMANCE INDICATORS[b]	BASELINE YEAR AND VALUE[5]	TARGETS			MEANS OF VERIFICATION (MOV)[c]	CRITICAL ASSUMPTIONS AND RISKS[d]
			Recovery Phase, 2021-2023	Midterm Period, 2025	End-of-Plan, 2030		
							capability building of stakeholders within the sector is achieved
							Risk: (1) Legal constraints on data sharing is not resolved with the DA family (2) Current AF institutional arrangements and organizational structure does not effectively support the OneDA transformation strategies

Annex 2: Commodity Systems Sample Planning Worksheet and Bibliography

Planning exercise REFERENCE for matrix-based, food systems- and commodity systems-based plan

Example: Laguna, Region IVA

For Level 1 Workshop: Identifying priority commodities and services for the commodity systems

	Sources of income/growth/innovation in the food system (5 commodity systems, plus inputs industry and services industry)						
	Rice-based	**Corn and livestock/ poultry based**	**Coconut based**	**Fish based**	**GSCS** (no anchor commodity)	**Food system inputs industry**	**Food system services industry**
Priority level	1	3	2	1	1	1	1
Town							
Barangay							
Commodities and services	Leafy vegetables (*kangkong*, *pechay*, lettuce, mustard), fruit vegetables (cucumber, tomato, watermelon, melon), root vegetables (radish)	Sweet corn, yellow (feed) corn, silage, short season upland vegetables such as eggplant, pepper	Papaya, *lanzones*, oranges. Banana, underutilized fruits such as *balimbing*, *mabolo*, guava, *santol, duhat*), coffee, cacao	*Tilapia*	Ornamentals	Machinery and tools fabrication/manufacturing (e.g., waste-to-energy setup, harvesters, compost bins, water pumps and small electric engines	Machinery repair and servicing; logistics, storage; farmers' markets
	Dairy	Dairy	Dairy	*Bangus*	Urban farming (conventional and controlled environment)	Vermicompost/ vermicast, biofertilizer	Digital platform for selling food system products, inputs and

	Rice-based	Corn and livestock/ poultry based	Coconut based	Fish based	GSCS (no anchor commodity)	Food system inputs industry	Food system services industry
							services (e.g., traditional Filipino diet App)
	Ducks	Chicken	Goat		Organic vegetables	Fish cage supplies (bamboo poles, abaca ropes, nets)	Training of inputs producers, farmers, processors, government regulators, waste managers, and other players in the food system; cooperatives leadership; training on farm consolidation (different pathways)
	Mungbean						Fish cage design and construction services
	Camote	Camote				Mushroom spawn, tissue cultured plantlets, seeds, fingerlings	Innovative Insurance, credit
		Swine	Ornamentals				
			Bamboo				

For Level 2 Workshop: Identifying support mechanisms for the products and services identified in Level 1 Workshop							
	Rice-based	**Corn and livestock based**	**Coconut based**	**Fish based**	**GSCS** (no anchor commodity)	**Food system inputs industry**	**Food system services industry**
Product forms	Fresh, fermented vegetables, camote and mungbean noodles,	Fresh, balut, cheese (white), feeds for livestock, poultry and fish	Fresh, cheese, various coconut products (cooking oil, coir, virgin coconut oil, charcoal). Fruit juices and fermented fruits and vegetable products	Fresh, frozen	Ornamentals: Live plants, planting materials	Nursery soil mix, prefabricated rain shelters, biodegradable packaging materials	On-site and online services
			Baskets and other biodegradable packaging, fishpens, furniture		Urban farms: packed fresh vegetables		Cloud kitchen, Filipino food delivery service and restaurants
							Waste management (e.g. rice hull to energy)
Main target market	Mega Manila	Mega Manila	Mega Manila, San Pablo, Sta Cruz, export	Mega Manila,	Mega Manila; export	Mega Manila, the rest of the Philippines	Nationwide
Partner agencies	PhilRice, UPLB, IRRI, PAFES, DOST,	UPLB, PAFES, DOST, DepED,	PCA, DENR, PAFES, DOST, DepED, DSWD, DOH	BFAR, LLDA/DENR, PAFES, DepED, DSWD, DOH	UPLB	PhilMech, UPLB, DOST, Provincial Government	TESDA, DTI, Provincial Government

For Level 2 Workshop: Identifying support mechanisms for the products and services identified in Level 1 Workshop							
	Rice-based	**Corn and livestock based**	**Coconut based**	**Fish based**	**GSCS** (no anchor commodity)	**Food system inputs industry**	**Food system services industry**
	DepED, DSWD;DOH	DSWD, DOH					
Governance : Organizational and policy changes needed	DA and PAFES: Organize commodity system-based teams; strengthen agricultural coops	DA and PAFES: Organize commodity system-based teams; strengthen agricultural coops	DA and PAFES: Organize commodity system-based teams; strengthen agricultural coops	DA and PAFES: Organize commodity system-based teams; strengthen agricultural coops; Legislative: Create Department of Fishery and Aquatic Resources	Product standards (ornamental for exports); export promotion	Strengthen local metals and machinery manufacturing industry, biodegradable packaging industry; extend agri-agra law to this sector	Establish government quality control services for seeds and seedlings, fertilizers, growing media, fingerlings, machines
Priority capital outlays	Rehab FTI; small scale irrigation based on renewable energy; food innovation/ processing center[1]	Rehab FT; small scale irrigation based on renewable energy; food innovation/p rocessing center	Rehab FTI; small scale irrigation based on renewable energy; food innovation/ processing center	Rehab FTI; cold chain improvement; food innovation/proc essing center	Laboratories and nurseries for disease free plants production and quality control	Training center for food system inputs industry	Training center for food system services industry

[1] May be integrated with similar centers in corn, coconut, and fish-based commodity systems

For Level 2 Workshop: Identifying support mechanisms for the products and services identified in Level 1 Workshop							
	Rice-based	**Corn and livestock based**	**Coconut based**	**Fish based**	**GSCS** (no anchor commodity)	**Food system inputs industry**	**Food system services industry**
Communication support	DA, PAFES	DA, PAFES	DA, PAFES	DA, PAFES	DA, PAFES	DA, PAFES	DA, PAFES
M and E support (external)	SEARCA/ University	SEARCA/ University	SEARCA/ University	SEARCA/ University	SEARCA/ University	SEARCA/ University	SEARCA/ University
Fund sources	DA, PAFES	DA, PAFES	DA, PAFES	DA, PAFES	DA, PAFES	DA, PAFES, DOST	DA, PAFES,TESDA, DOST

Categories of linked commodities for the 4 major commodity systems

1. Cereal grains - rice (brown rice, conventional), maize, adlai,
2. Grain legumes - mungbean, soybean, peanut, cowpea, pigeon pea
3. Fruits and nuts - pili, mango, pineapple, banana, etc.
4. Vegetables and condiments - fruit vegetables (tomato, eggplant, pepper, etc.), leafy vegetables (pechay, cabbage, mustard, etc), vegetable legumes (sitao, batao, patani, etc.), cucurbits (pumpkin, bitter gourd, bottle gourd, sponge gourd, watermelon, melon), root vegetables (carrot, radish), onion, garlic, black pepper
5. Root and tuber crops - cassava, camote, white potato, arrowroot, taro, yam
6. Fish and seafoods - aquaculture (tilapia, bangus, shrimp, tahong, crabs, etc._, capture fishery (seaweeds, crabs, bivalves, shrimps)
7. Dairy - carabao, cattle, goat
8. Beverages - coffee, cacao, tea
9. Red meat (swine, beef, goat, sheep)
10. Poultry meat - chicken, duck
11. Eggs - chicken, ducks, quail
12. Oil crops - African oil palm
13. Non-food - ornamentals, tobacco, medicinals, abaca, rubber

For GSCS

1. Highland vegetables
2. Urban gardening
3. Ornamentals

Cross-cutting programs

1. Halal
2. Organic

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Note: This is an indicative rather than an exhaustive list, meant to generate interest and follow-up study or application.

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From Chapter 4 Reference List

See complete citations in the Reference list for Chapter 4

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Annex 3: Additional Details on Strategic Communication

Detailed Steps of the Communication Component for NAFMIP

STEP	DETAILS
Analysis	1. Review NAFMIP Logframe, Sector Assessment (desk review, interviews, consultations) and Problem Tree 2. Progress meetings with DA Mancom, Execom, PMS 3. Thematic consultation on communicating NAFMIP to a. Identify and profile stakeholders. b. Preliminary smart communication objectives c. Draft communication strategy matrix with output. b. Activities, inputs, and media
Design of communication strategy	4. Regional planning workshops and stakeholder consultations on key issues: • Present proposed issues for communication intervention • Draft smart objectives • Draft communication strategy matrix 5. Analyze findings from stakeholder consultation on key development issues and adjust communication strategy matrix 6. Define other items in the matrix: • Core content from issues and objectives • Design mode • Approaches and methods 7. Assemble Communication Plan with detailed work plan for review with NPT and DA 8. Submit final Communication Plan incorporating feedback from stakeholders, NPT, DA
Implementation	9. Develop the communication materials 10. Pre-testing and Subsequent Review of the Materials 11. Supervise production of materials 12. Training on stakeholder analysis, social media campaigns and analytics 13. Organize knowledge-sharing and mobilization activities 14. Supervise implementation of social media campaigns, online and face-to-face fora, quad media placements and publications, media interviews etc.
Monitoring and assessment	Monitoring and assessment with quarterly reports (from media monitoring, content analysis, analytics, surveys and other means)

NAFMIP Budgetary Requirements, AFID (PHP)

2022	2023	2024	2025	2026	2027	2028	2029	2030
(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)
-	1,000,000.00	6,000,000.00	-	-	-	-	-	-
-	-	-	900,000.00	900,000.00	900,000.00	900,000.00	900,000.00	900,000.00
-	150,000.00	300,000.00	450,000.00	300,000.00	300,000.00	450,000.00	450,000.00	600,000.00
-	175,000.00	175,000.00	350,000.00	525,000.00	525,000.00	525,000.00	525,000.00	700,000.00
2,000,000.00	2,000,000.00	2,000,000.00	-	-	-	-	-	-
-	-	11,150,000.00	-	-	-	-	-	-
-	450,000.00	-	900,000.00	-	450,000.00	-	-	-
-	-	900,000.00	-	1,800,000.00	-	900,000.00	-	-
-	-	-	11,150,000.00	-	-	-	-	-
-	-	-	675,000.00	2,025,000.00	-	-	-	-
-	2,000,000.00	2,000,000.00	2,000,000.00	-	-	-	-	-
-	1,770,000.00	1,770,000.00	1,770,000.00	-	-	-	-	-
-	1,350,000.00	1,350,000.00	-	-	-	-	-	-
-	-	-	-	297,500.00	-	297,500.00	-	-
2,000,000.00	**8,895,000.00**	**25,645,000.00**	**18,195,000.00**	**5,847,500.00**	**2,175,000.00**	**3,072,500.00**	**1,875,000.00**	**2,200,000.00**
								GRAND TOTAL = PHP69,905,000

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Office of the Secretary Units

Office of the Undersecretary for Agri-Industrialization and Fisheries (OUAIF)
Office of the Undersecretary for Regulations & Infrastructure (OURI)
Office of the Assistant Secretary for Regulation (OASR)
Office of the Assistant Secretary for Strategic Communications (OASSC)
Agriculture and Fisheries Information Division (AFID)
Agribusiness and Marketing Assistance Service (AMAS)
Climate Resilience Agriculture Office (CRAO)
Food Development Center (FDC)
Field Operations Service (FOS)
Farm to Market Road Development Program (FMRDP)
Financial and Management Service (FMS)
Gender Equality and Social Inclusion (GESI)
Information and Communications Technology Service (ICTS)
National Convergence Initiative (NCI)
Philippine Rural Development Program (PRDP) - IPLAN
Planning and Monitoring Service (PMS)
- Planning and Programming Division (PPD)
- Investment Programming Division (IPD)
- Monitoring and Evaluation Division (MED)

Policy Research Service (PRS)
Project Development Service (PDS)

Banner Programs

Halal Food Industry Development Program (HFIDP)
High Value Crops Development Program (HVCDP)
National Corn Program (NCP)
National Livestock Program (NLP)
National Organic Agriculture Program (NOAP)
National Rice Program (NRP)
National Urban and Peri-Urban Agriculture Program (NUPAP)

Regional Field Offices

Cordillera Administrative Region
Region I - Ilocos Region
Region II - Cagayan Valley
Region III - Central Luzon
Region IV-A - CALABARZON
Region IV-B - MIMAROPA
Region V - Bicol Region
Region VI - Western Visayas
Region VII - Central Visayas
Region VIII - Eastern Visayas
Region IX - Zamboanga Peninsula
Region X - Northern Mindanao
Region XI - Davao Region
Region XII - SOCCSKSARGEN
Region XIII - CARAGA
BARMM – Bangsamoro Autonomous Region in Muslim Mindanao

Bureaus

Agricultural Training Institute (ATI)
Bureau of Animal Industry (BAI)
Bureau of Agricultural and Fisheries Engineering (BAFE)
Bureau of Agricultural Research (BAR)
Bureau of Agriculture and Fisheries Standards (BAFS)
Bureau of Plant Industry (BPI)
Bureau of Soils and Water Management (BSWM)
Philippine Rubber Research Institute (PRRI)

Attached Agencies

Agricultural Credit Policy Council (ACPC)
Bureau of Fisheries and Aquatic Resources (BFAR)
Fertilizer and Pesticide Authority (FPA)
National Meat Inspection Service (NMIS)
National Fisheries Research and Development Institute (NFRDI)
Philippine Carabao Center (PCC)
Philippine Center for Postharvest Development and Mechanization (PhilMech)
Philippine Council for Agriculture and Fisheries (PCAF)
Philippine Fiber Industry Development Authority (PhilFIDA)

Attached Corporations

National Dairy Authority (NDA)
National Food Authority (NFA)
National Irrigation Administration (NIA)
National Tobacco Administration (NTA)
Philippine Coconut Authority (PCA)
Philippine Fisheries Development Authority (PFDA)
Philippine Rice Research Institute (PhilRice)
Sugar Regulatory Authority (SRA)

Development Partners and Stakeholders

Asian Development Bank (ADB)
Food and Agriculture Organization of the United Nations (FAO)
World Bank (WB)
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About the NAFMIP 2021-2030 Cover

An upward arrow represents NAFMIP 2021-2030, a directional plan for transforming the Philippines' food system. The positively-pointing, directional arrow showcases some features of a modernizing and industrializing agri-fisheries sector: a healthy, well-bred farm animal with its energetic, young livestock raiser; mechanized transplanting of rice seedlings; accessible water resources for in-season fishing; healthy hybrid corn harvest; grain legume harvest toward a plant-based protein diet; safety standards practiced in handling fresh vegetables for marketing; a controlled-environment plant factory; and cluster marketing of produce, among many others. The goal is a food-and-nutrition-secure, resilient Philippines, represented by the Filipino family, by or before 2030—especially among farmers and fisherfolk who make up a significant proportion of the country's poor. This vision, as of now, remains a somewhat hazy or uncertain reality but with our whole-of-nation efforts via NAFMIP 2021-2030, we will get there.

ADB

Food and Agriculture Organization of the United Nations

SEAMEO SEARCA

SGV
Building a better working world