INSTITUTIONALIZATION OF CLIMATE RESILIENT AGRICULTURE

POLICY OPTIONS AND INVESTMENT ROADMAP FOR BUILDING LONG-TERM RESILIENCE IN AGRI-FOOD VALUE CHAINS IN THE PHILIPPINES

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ASIAN DEVELOPMENT BANK

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EXECUTIVE SUMMARY

This report explores the intersection of agriculture and economic resilience in the Philippines, particularly under the pressures of climate change. It provides a comprehensive analysis of the current status of the agriculture sector, its economic implications, and the anticipated impacts of climate variability. The report concludes with strategic investment and policy recommendations aimed at enhancing long-term resilience and sustainability.

Agriculture is crucial for food security, income, and livelihoods in the Philippines, especially in the context of economic recovery post-pandemic. However, the sector faces significant threats from climate change. The introduction emphasizes the need for strategic policies and investments to enhance agricultural resilience and adaptability, ensuring it remains a catalyst for economic growth

Accounting for about 11% of GDP and 26% of employment, agriculture is a key economic pillar. Despite minimal decline during the pandemic, the sector's vulnerability to international market fluctuations and climate impacts underscores the need for sustainable practices and increased domestic production. Key facts include a reliance on imports for essential food commodities and the resilience shown during economic downturns, highlighting the sector's role in economic stability.

Projected climatic changes by 2050, including significant temperature increases and variability in rainfall, pose threats to agricultural productivity. Detailed biophysical and economic modeling predicts reductions in crop yields, with corn and sugar yields potentially decreasing by up to 23% and 11%, respectively. The chapter underscores the urgency of adopting adaptive strategies to mitigate these effects through technology improvements and agricultural practice enhancements.

The review of various investment and policy options to counteract the impacts of climate change, suggests technology, infrastructure, and market responses, such as the development of climate-resilient agricultural technologies. A comparative analysis of investment programs like AMIA Plus and AMIA Enterprise offers insights into potential benefits, emphasizing that strategic investments are crucial for maintaining agricultural productivity under changing climatic conditions.

The report concludes with key policy recommendations, advocating for a comprehensive policy framework and significant investments in resilient technologies and infrastructure. The necessity of developing detailed implementation roadmaps for these strategies is highlighted, along with their integration into national and local government planning to ensure the agricultural sector's long-term sustainability and resilience.

The report underscores the critical role of proactive measures and strategic planning in safeguarding the Philippine agriculture sector against the backdrop of global climate change. Through detailed analysis and targeted recommendations, it aims to guide policymakers in fostering an agricultural sector that is both resilient and capable of contributing to the nation's economic growth.

ACRONYMS

ADAPTs	Agricultural Development and Policy Transformation Strategies
AMIA	Adaptive Management of Information in Agriculture
AR5	Fifth Assessment Report
AR6	Sixth Assessment Report
CH4	Methane
CMIP6	Coupled Model Intercomparison Project Phase 6
CO2	Carbon Dioxide
CRA	Climate-Resilient Agriculture
CS	Climate-Smart Agriculture
DSSAT	Decision Support System for Agrotechnology Transfer
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
GCM	Global Climate Model
GDP	Gross Domestic Product
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
N2O	Nitrous Oxide
Phil-DCGE	Philippines Dynamic Computable General Equilibrium
R&D	Research and Development
RCP 8.5	Representative Concentration Pathway 8.5
SPAM	Spatial Production Allocation Model
SSP2	Shared Socioeconomic Pathway 2
WDI	World Development Indicators

1 INTRODUCTION

The recent health pandemic and regional conflicts highlighted the importance of a resilient agriculture in providing food security, livelihoods and household income and in cushioning the adverse impacts of subsequent years of economic slowdown. Similarly, in the context of post-pandemic economic recovery, the country can continue to rely on the agriculture sector to be the catalyst in spurring economic growth. However, agriculture itself is under threat – of changing climate that poses an even more significant and longer-lasting danger to the future of the food systems and food security.

The resilience, competitiveness, and sustainability of Philippine agriculture depend on the strategic decisions of the government, agricultural producers, and consumers to adapt to and mitigate climate impacts. This report models the productivity and economic effects of climate change on Philippine agriculture, highlighting adaptation and mitigation potentials. It emphasizes the importance of formulating proactive government policies and investment strategies that support the country's nutrition and food security goals. These strategies must be institutionalized at national and local levels and integrated into development planning. Investments in agriculture are crucial for long-term resilience in the agri-food system through the development of technologies, infrastructure building, and community mobilization for climate adaptation.

Climate change is a growing and lasting threat exacerbated by land and water scarcity. Temperatures are projected to continue increasing, accompanied with wider annual and seasonal variability in rainfall can drastically reduce farm yields and production. Climate change, along with water and land scarcity, need to be addressed and mainstreamed in government policies and strategic investments on adaptation and mitigation.

The impacts of climate change on the agricultural sector are often subtle as temperature and precipitation regimes are changing gradually. These gradual changes are interspersed with extreme events, such as droughts and flooding that are increasing in frequency and in intensity with climate change. Higher temperatures and low precipitation in this already arid country can result in adverse impacts for the country's agriculture and food systems.

Land and water scarcity will further exacerbate the production impact of climate change to Philippines's agricultural future. The limited fertile lands suited for agriculture is in decline due to high rate of urbanization in the last 20 years. Water is also in limited supply, relying mostly on small river basins and groundwater resources. Agriculture as the dominant user of freshwater consumes the equivalent to 82% of total supply. With increasing population, growing investment in industry, and the increasing loss to evaporation – reduced water availability will be a growing threat to the country's agricultural economy.

Agriculture also contributes 10% of the country's GHG emissions, next to energy (72%) and industry (14%) sectors. GHG emissions from agriculture are mostly in the form of methane (CH_4) and nitrous oxides (N_2O), and in terms of CO_2 equivalent the major contributors are enteric fermentation from livestock (35%), synthetic fertilizers (21%), animal manure (17%), rice cultivation (13%) and on-farm energy use (11%) (FAOSTAT). Additionally, unaccounted food losses and GHG emissions permeate the food supply chain – due to poor harvesting and post-harvesting practices, inadequate storage, transport and handling facilities, and inefficiencies in the market system.

2 AGRICULTURE AND THE PHILIPPINE ECONOMY

Agriculture is a key sector in the Philippine economy, representing around 11% of annual GDP and 26% of employment, while the industrial sector accounts for 30% of GDP and a fifth of employment. The service sector accounts for the largest share of GDP and employment (Table 1). The agriculture sector was the most resilient during the pandemic year of 2020 – declining only by 0.2%, compared to service sector's 9% decline and industry's -13% (WDI), although the industry and service sectors were growing of agriculture during the last three decades and during the last ten years.

The Philippines remains highly vulnerable to international market developments because it relies on imports for key food commodities, including wheat and rice. All wheat and around 22% of recent rice demand are imported. Food imports are twice the value of food exports and constitutes 11% of the country's merchandise import receipts – and growing at annual rate of 8% from 1990 to 2020.

The number of undernourished population and malnourished children have been declining respectively by 5.5% and 0.2% during the last two decades, and even more so in the last ten years.

Table 1: Agriculture and the Philippine Economy, 1990, 2000, 2010 and 2020

Indicators	Units	Decades				Annual Growth Rates by period (%)			
		1990	2000	2010	2020	1990-2000	2000-2010	2010-2020	1990-2020
Gross domestic product (GDP)									
Gross domestic product (GDP)	constant 2015 US$ billion	107.1	142.8	228.6	358.5	3.3	5.0	5.7	4.7
GDP growth	annual rate (%)	3.1	4.4	7.3	-9.5				
Agriculture, forestry, and fishery	constant 2015 US$ billion	17.6	21.2	29.9	35.5	1.7	3.8	1.7	2.8
Agriculture, forestry, and fishery	% of GDP	19.2	13.9	13.7	10.2				
Agriculture, forestry, and fishery	annual rate (%)	0.2	3.4	1.3	-0.2				
Industrial sector	constant 2015 US$ billion	36.2	46.4	69.8	106.3	4.3	3.1	4.2	5.8
Industrial sector	% of GDP	38.2	35.0	32.3	28.4				
Services sector	constant 2015 US$ billion	53.3	75.1	128.8	216.7	5.4	3.9	5.7	6.4
Services sector	% of GDP	42.7	51.1	53.9	61.4				

Indicators	Units	Decades				Annual Growth Rates by period (%)			
		1990	2000	2010	2020	1990-2000	2000-2010	2010-2020	1990-2020
Food Production and Trade									
Food production	index: 2014–2016 = 1.00	58.0	70.0	91.5	100.7	1.9	3.0	0.8	2.2
Food imports	current US$ billion	1.3	2.6	6.4	12.5	10.6	10.2	8.8	8.1
Food exports	current US$ billion	1.7	1.8	3.8	6.0	1.3	8.0	3.6	5.2
Labor and Employment									
Total labor force	million	23.9	29.8	38.1	42.4	2.6	2.5	1.4	2.4
Employment rate	% of labor force	96.1	96.2	96.4	97.5				
Employment in agriculture	% of total employment	45.5	37.1	33.0	24.8				
Employment in industry	% of total employment	16.0	16.2	15.5	18.3				
Employment in services	% of total employment	38.5	46.7	51.5	56.9				
Population									
Total population	million	61.6	78.0	94.6	112.2	2.4	2.0	1.7	2.0
Population growth	annual rate (%)	2.4	2.2	1.8	1.6				
Rural population	million	32.6	42.0	51.7	59.0	2.6	2.1	1.3	2.0
Rural population	% of population	53.0	53.9	54.7	52.6				
Health and Nutrition									
Life expectancy	years	65.9	69.4	70.8	72.1	0.5	0.2	0.2	0.2
Rate of undernourishment	% of population	--	18.6	12.3	8.1				
Undernourished population	million	--	14.5	11.6	9.1		-3.8	-8.7	-5.5
Children malnourishment	% of children < 5 years	--	34.8	32.6	29.7				
Malnourished children	million	--	3.7	3.8	3.5		0.3	-0.7	-0.2

(Note: "--" means no data; blank cells not estimated. **Source: Data from World Development Indicators)**

Agricultural and food productivity grew rapidly during the past 30 years, with rice production almost doubling from 1990 to 2020, and combined meat products almost tripled during the same period. However, in terms of annual growth, moderate growth were achieved by the poultry and

dairy sectors at around 5% annual growth, with all food commodities gaining positive growth rates, albeit modest.

Table 2: Performance of the Philippine Agriculture Sector – Food Production Growth, 1990-2020.

Food Commodities	Production (*000 mt*)				Annual Growth Rates by period (%)				Change from 1990 to 2020
	1990	2000	2010	2020	1990-2000	2000-2010	2010-2020	1990-2020	
All meat products	1,151	2,140	2,991	3,234	6.1	3.5	1.1	3.6	181
Beef	246	517	592	345	8.4	1.5	-5.3	2.2	40
Mutton/Goat meat	47	59	96	55	2.8	6.5	-6.1	2.1	18
Pork	906	1,543	2,082	1,909	5.0	3.2	-0.5	2.7	111
Poultry meat	158	364	587	926	8.5	4.5	5.1	5.7	484
Dairy	285	404	578	894	3.5	3.8	4.4	3.6	214
Eggs	13	6	9	15	-7.7	4.2	4.9	2.2	14
All cereals	10,844	12,229	16,026	19,835	0.9	3.7	1.6	2.7	83
Corn	4,628	4,092	5,784	7,364	-1.4	5.4	1.8	2.5	59
Rice	6,389	8,008	10,194	12,471	2.0	3.0	1.5	2.8	95
Fruits	11,574	13,294	19,780	20,122	1.4	4.4	0.3	2.3	74
Vegetables	4,585	5,265	6,356	7,178	1.2	1.8	1.2	1.6	57
Oilseed crops	13,384	14,733	17,085	16,877	1.2	1.4	-0.4	1.0	26
Pulses	71	63	66	76	-0.7	0.8	0.8	0.5	7
Roots and tubers	2,413	2,257	2,611	3,043	-0.6	2.1	1.9	1.0	26
Sugar	3,135	2,611	2,206	3,002	-1.1	-0.2	0.3	0.4	-4

Source: Data from FAOSTAT online.

3 IMPACTS OF CLIMATE CHANGE TO AGRICULTURE AND THE ECONOMY

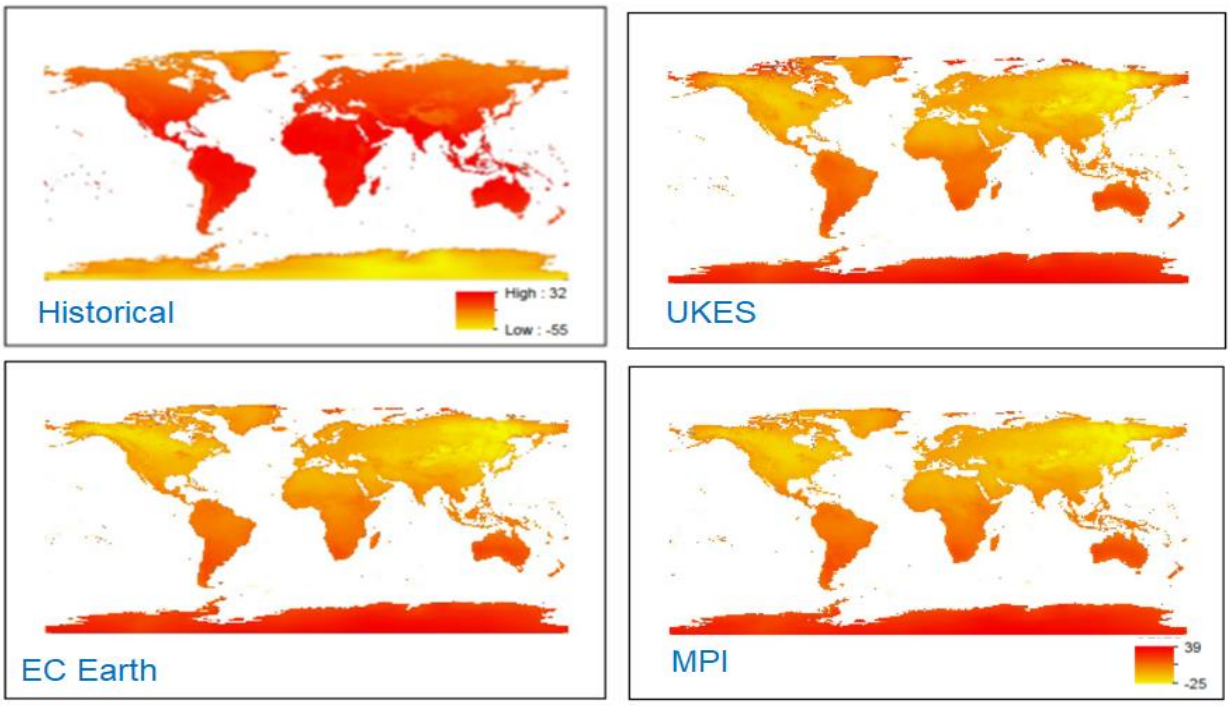
Projections of future climates for the Philippines and the entire world are implemented by comparing the average historical (*or* baseline) climate data for 1970-2000 with projections of future climate centered on 2050 (2040-2060) using downscaled datasets of three CMIP6 global climate models (GCMs) of UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SSP2. These selected GCMs project the highest, lowest and medium temperatures to represent an ensemble of at least 12 downscaled CMIP6 GCMs. Changes in rainfall (*or* precipitation) and temperature are examined to gain better understanding of the potential impact of climate change to Philippine agriculture.

3.1 Changing climate patterns

3.1.1 Changes in Temperature Patterns by 2050

Figures 1 and 2 present the temperature gradient-maps of the historical and projected changes in the mean daily temperature for the world and for the Philippines. The higher temperature changes are projected for the below the equator countries and regions of south America, southern Africa and Australia. Projected temperature changes range from maximum increase of 31.6 ºC to minimum of -23.0 ºC, and temperature mean of 4.4 ºC, on average (Table 3)

Figure 1: Projections of Average Global Temperature, by 2050



Source: WorldClim 2.0 online

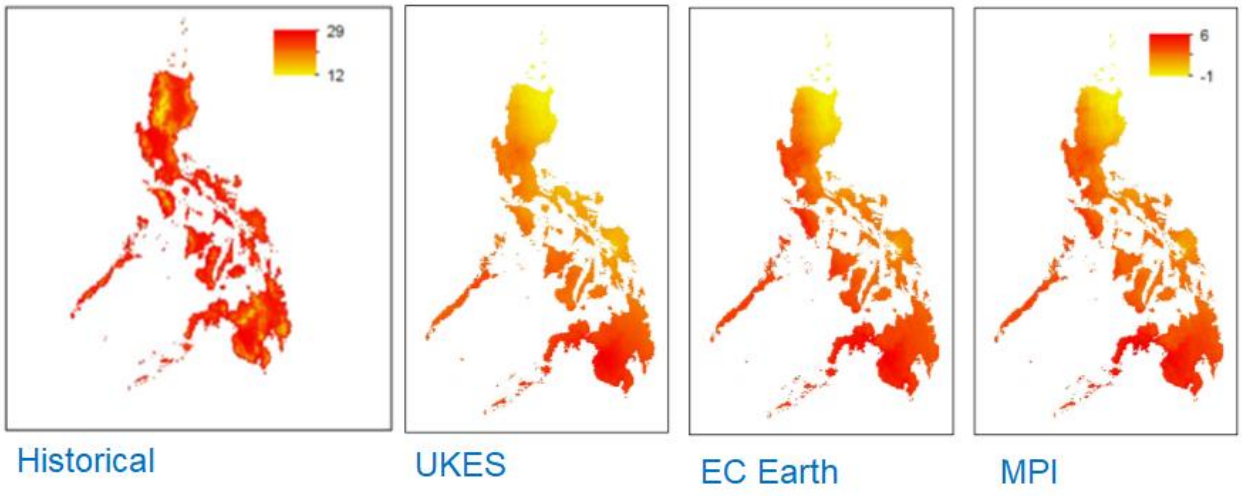
For the Philippines, the western and southern regions of the country are projected to be hottest by 2050, with maximum average temperature increase of 4.3 °C, and minimum temperature decrease of 0.4 °C – and mean average temperature of 2.3 °C (Table 4)

Table 3: Historical and Projected Average Global Temperatures, By 2050

Temperature (°C)	Historical (1970-2000)	Change from Historical (2040-2060)			
		UK-ESM (UK-ESMM1-0-LL)	EC Earth (EC-Earth3-Veg)	MPI-ESM (MPI-ESM-ESM1-2-H-R)	Average
Maximum (°C)	31.4	38.9	28.1	27.7	31.6
Mean (°C)	-4.4	6.7	4.0	2.5	4.4
Minimum (°C)	-54.8	-20.8	-23.6	-24.6	-23.0

Note: The global climate models are adopted from UK Earth System Modeling (UK-ESM); European Community Earth System Model (EC Earth); and Max Planck Institute for Meteorology Earth System Model (MPI-ESM). Source of basic data: WorldClim 2.0 online

Figure 2: Projections of Average Philippines Temperature by 2050



Source: WorldClim 2.0 online

Table 4: Projections of Average Philippine Temperature by 2050

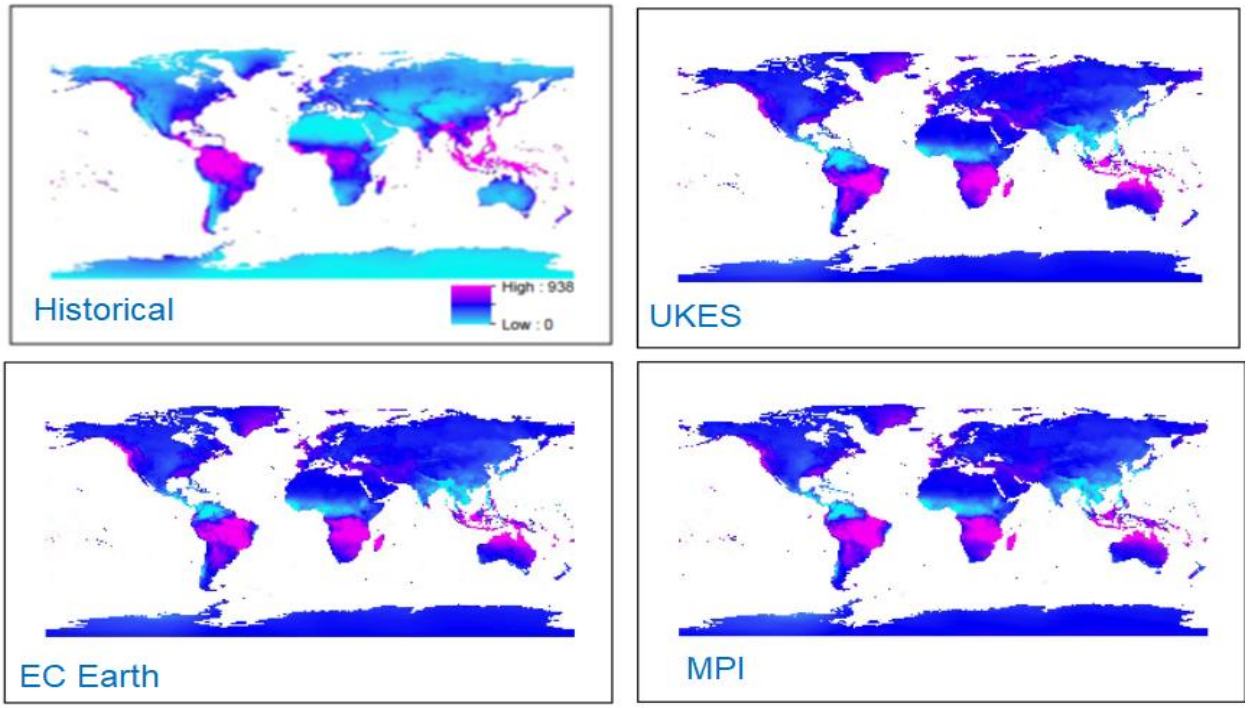
Temperature (°C)	Historical (1970-2000)	Change from Historical (2040-2060)			
		UK-ESM (UK-ESMM1-0-LL)	EC Earth (EC-Earth3-Veg)	MPI-ESM (MPI-ESM-ESM1-2-H-R)	Average
Maximum (°C)	28.9	5.9	4.3	2.8	4.3
Mean (°C)	25.7	3.0	2.6	1.4	2.3
Minimum (°C)	12.4	-0.1	-0.2	-0.9	-0.4

Note: The global climate models are adopted from UK Earth System Modeling (UK-ESM); European Community Earth System Model (EC Earth); and Max Planck Institute for Meteorology Earth System Model (MPI-ESM-ESM). Source of basic data: WorldClim 2.0 online

3.1.2 Changes in Rainfall Patterns by 2050

Corresponding changes in rainfall patterns are shown in Figure 3 and Table 5 for the world, and Figure 4 and Table 6 for the Philippines. Globally, the average mean monthly rainfall is projected to decline slightly by 0.4 mm, but with average maximum rainfall increase of 765 mm/month. Higher increases in rainfall are projected for the regions just below the equator – the countries of Brazil and Argentina, Central African countries and Southeast Asian countries and northern Australia. In the Philippines, average mean rainfall is to decline by 47.2 mm/month, with average maximum increase in rainfall of 529.7. The eastern corridor of Visayas and Mindanao can be the relatively wetter part of the country by 2050.

Figure 3: Projections of Average Global Rainfall, by 2050



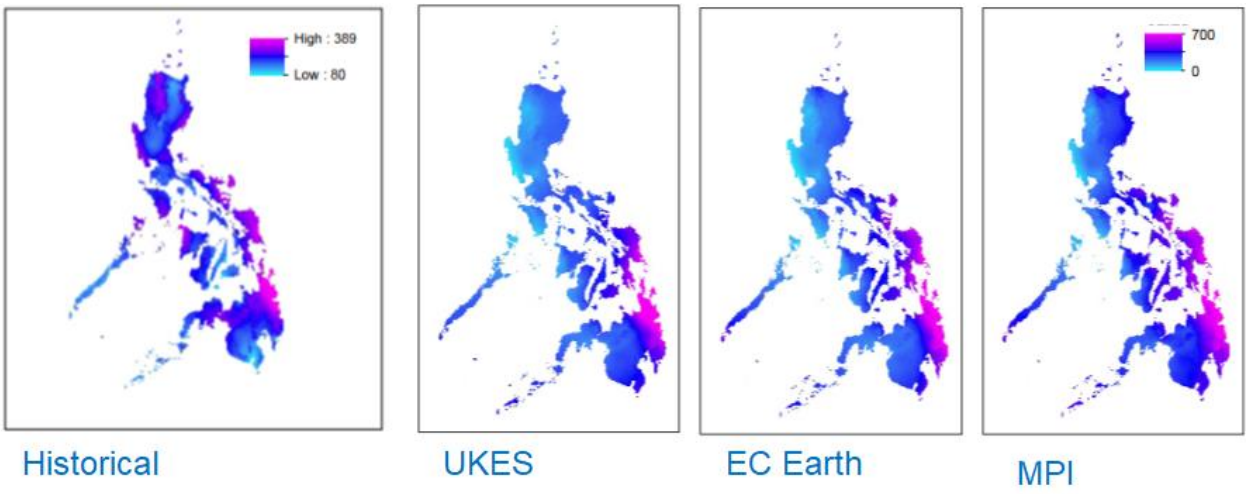
*Source: **WorldClim** 2.0 online*

Table 5: Historical and Projected Average Global Rainfall, by 2050

Rainfall (mm/month)	Historical (1970-2000)	Change from Historical (2040-2060)			
		UK-ESM (UK-ESMM1-0-LL)	EC Earth (EC-Earth3-Veg)	MPI-ESM (MPI-ESM-ESM1-2-H-R)	Average
Maximum	938.0	715.0	816.0	764.0	765.0
Mean	43.9	-0.5	0.9	-1.7	-0.4
Minimum	0.0	0.0	0.0	0.0	0.0

Note: The global climate models are adopted from UK Earth System Modeling (UK-ESM); European Community Earth System Model (EC Earth); and Max Planck Institute for Meteorology Earth System Model (MPI-ESM-ESM). Source of basic data: WorldClim 2.0 online.

Figure 4: Projections of Average Rainfall, Philippines by 2050



Source: WorldClim 2.0 online

Table 6: Historical and Projected Average Rainfall, Philippines by 2050

Rainfall (mm/month)	Historical (1970-2000)	Change from Historical (2040-2060)			
		UK-ESM (UK-ESMM1-0-LL)	EC Earth (EC-Earth3-Veg)	MPI-ESM (MPI-ESM-ESM1-2-H-R)	Average
Maximum	389.0	701.0	589.0	299.0	529.7
Mean	209.8	-59.4	-26.3	-56.1	-47.2
Minimum	80.0	0.0	0.0	0.0	0.0

Note: The global climate models are adopted from UK Earth System Modeling (UK-ESM); European Community Earth System Model (EC Earth); and Max Planck Institute for Meteorology Earth System Model (MPI-ESM-ESM). Source: WorldClim 2.0 online

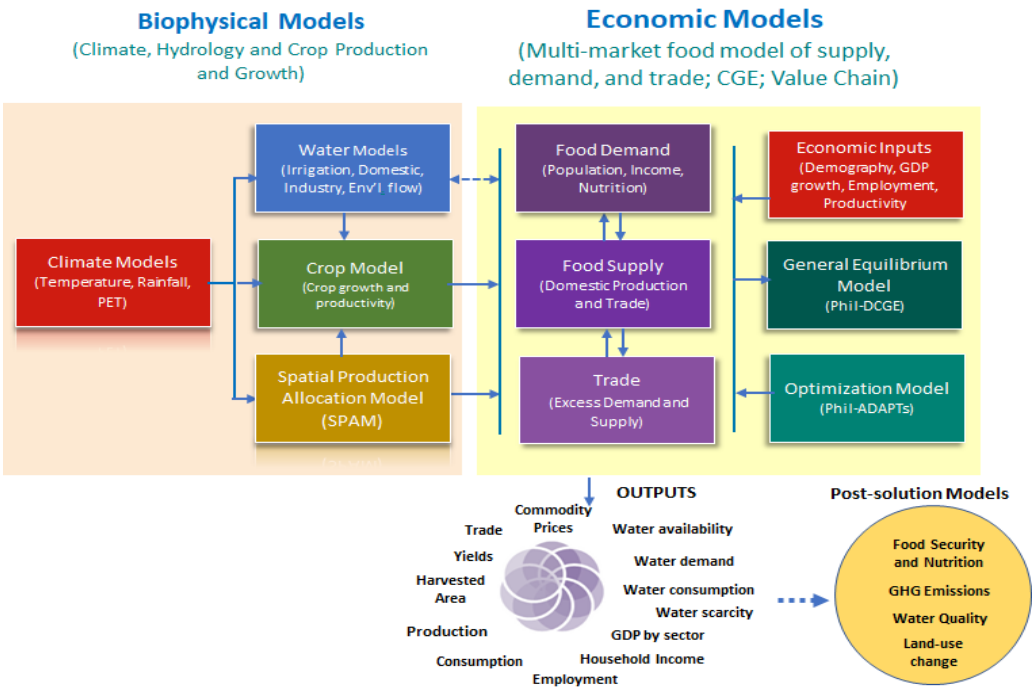
3.1.2.1 Impact of Climate Change to the Food System

Quantifying the impacts of climate change to the agriculture sector and to the entire economy can be a daunting task that needs to include the bio-physical effects on production and crop productivity; the economic effects on food prices, income and employment; producer and consumer responses to market signals; and the welfare-effects and food security implications.

3.1.3 Implementation of Biophysical-Economic Modeling

A suite of biophysical and economic models were calibrated for Philippines and implemented to estimate the impacts of climate change to the agriculture sector and to the entire economy in a more comprehensive manner (Figure 8). The biophysical models include; (a) three water modules (*i.e.,* global hydrology, water allocation, and water-stress model) that focus on water supply and demand and allocation to competing uses such as irrigation, domestic and industrial uses, and environmental flow; (b) a crop module (*i.e.,* DSSAT Model) that determines crop growth and productivity under different soil, water, and climate conditions; (c) a spatial production allocation model (SPAM) that maps the geographical distributions of foodcrops globally under different land- and water environment; (d) general circulation models (GCMs) of future climates to 2050. (See Appendix B on Methodology for details).

Figure 5: The Impact Modelling Framework



Note: The Phil-DCGE and Phil-ADAPs Optimization models are still to be calibrated and added to the Philippine version of IMPACT. Source: Authors' depiction.

The economic models include: (a) a core multi-market food model of supply, demand, and trade; (b) a computable general equilibrium model of Philippines (Phil-DCGE) to evaluate the economy-wide impacts of climate shocks; (c) an optimization module (ADAPTs) that focuses on production and value chains analyses; and (d) macro-economic module (demography, national income, employment and productivity) that serves as inputs and initial values for the model.

3.1.3.1 Productivity-effect, and Farmers Supply Response to Prices

The influence of climate change can be categorized into biophysical and economic effects. The biophysical effects are reflected in the changes of plant growth and productivity due to heat-stress from higher temperatures; water-stress due to projected decline in rainfall and increasing crop-water demand through increase in plant evapotranspiration. Table 7 shows that the cumulative effects of biophysical stressors can reduce yields by as much as 23% for corn and 11% for sugar crops. The least affected are rootcrops and other crops.

Table 7: Biophysical and Economic Effects of Climate Change on Crop Productivity in Philippines, by 2050

Food commodities	Climate Effects (Heat and Water Stress)	Climate and Economic/ Market Effects*
Yield Levels	----------% from NoCC----------	
All foodcrops	-8.50	-3.93
All cereals	-11.04	-8.53
Corn	-22.86	-19.40
Rice	-4.64	-3.76
Other crops	-3.12	-4.21
Fruits	-5.01	-1.65
Vegetables	-5.01	5.81
Oilcrops	-5.02	-4.29
Pulses	-5.51	-4.80
Roots & tubers	-4.49	-0.25
Sugar crops	-11.25	-9.64

**** Market effects include positive response of producers to higher prices***

*Notes: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * NoCC means no climate change that serves as the counterfactual scenario. The direct effects of climate change on animal-sourced foods were not simulated. Instead, they reflect indirectly the effects of climate on feedstuffs like corn and oilseed crops. Source: Biophysical and Economic Modules in IMPACT.*

On the other hand, the economic effects of climate change are triggered by increasing market prices of food induced by global reduction in yields and production (Table 9 and Table 10 and Figure 7). They work through the economic concept of *producer supply response* that motivates farmers to take advantage of previous year's favorable prices in boosting their incomes in the

current year – by producing more, either by expanding production area or by implementing available productivity- enhancing technologies on their farms. In the Philippine context, where farm areas are limiting, the logical supply response is through the adoption of better technologies, and in this case – climate change adaptation technologies, or climate-smart agriculture (CSA) technologies.

This shows that farmers, by their own initiative, are willing to adopt CSA technologies made available to them in order to take advantage of increasing prices of their produce.

Combined with the economic effects, *i.e.,* farmers' positive *supply-response* to increasing food prices, productivity losses due to climate change are dampened while productivity gains are further enhanced (Table 7 and Table 8) – especially for vegetables where increases in price are high enough to reverse the productivity effects of climate change. For all other foodcrops, farmers supply responses are to effectively reduce the yield-effects of climate change – notably for corn (from -23 % to -19%), rootcrops (-4.49% vs -0.25%) and fruits (-5.01% vs -1.65%). Overall, however, farmers supply response alone is not sufficient to fully counter the negative productivity-effects of climate change. Government interventions and investment policies are still needed to fully counter the effects of climate change and related economic and biophysical shocks.

Table 8: Impact of Climate Change on Yields of Food Commodities in the Philippines by 2050

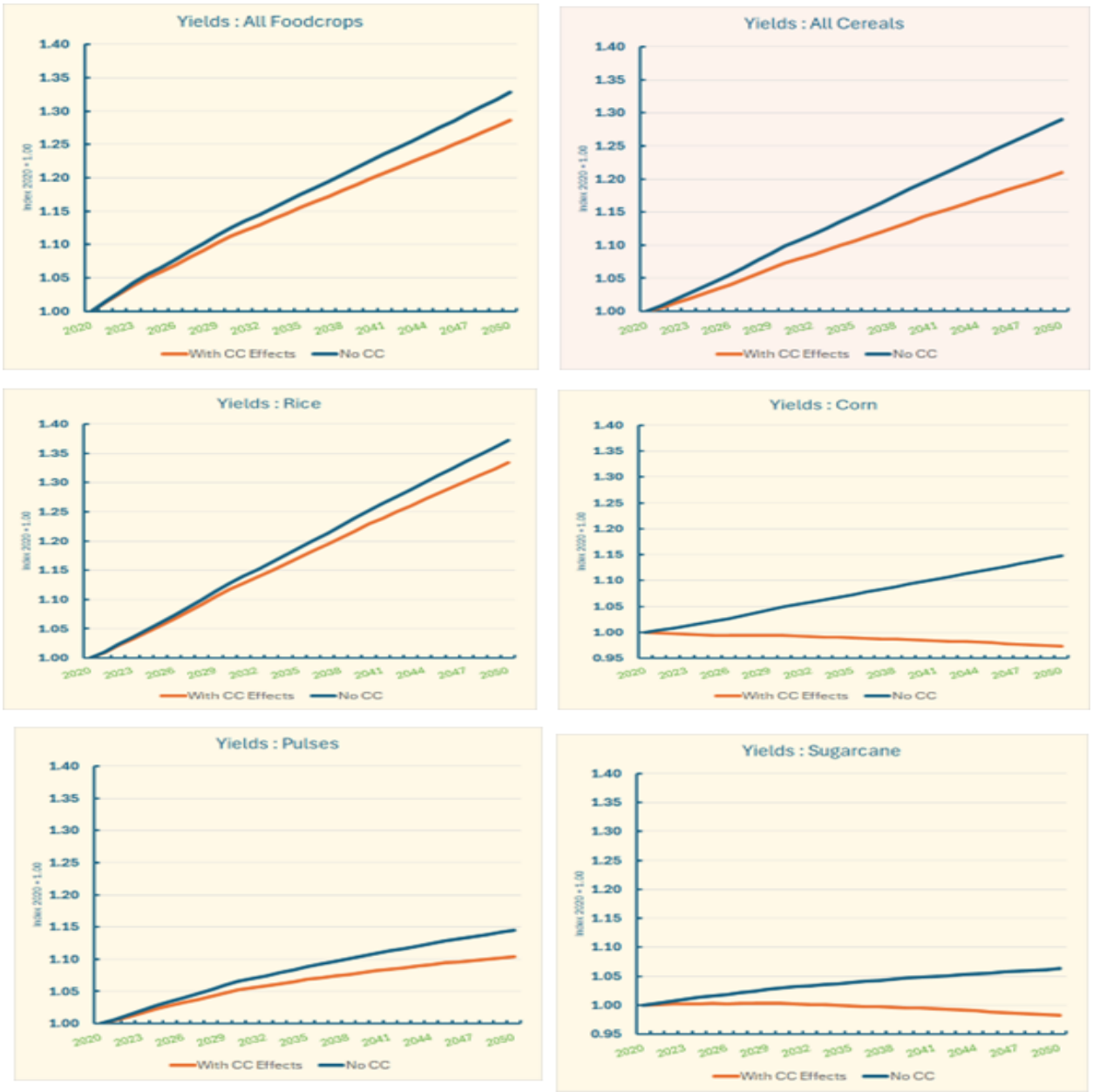
Food commodities	2020	2050 Projections		
		No Climate Change (NoCC)	With Climate Change	Change from No CC
Yields	---------- *mt/ha* ----------			%
All Foodcrops	7.71	10.25	9.84	-3.93
All cereals	2.81	3.63	3.32	-8.53
Corn	2.71	3.11	2.51	-19.40
Rice	2.88	3.95	3.80	-3.76
Other Crops	1.30	1.55	1.49	-4.21
Fruits	15.26	20.52	20.18	-1.65
Vegetables	10.70	13.78	14.58	5.81
Oilseed crops	4.59	5.27	5.04	-4.29
Pulses	0.92	1.06	1.00	-4.80
Roots and tubers	8.16	10.20	10.17	-0.25
Sugar	83.19	88.46	79.93	-9.64

*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * NoCC means no climate change that serves as the counterfactual scenario. Productivity-effects of climate change were not simulated for animal-sourced foods. Source: IMPACT-Phil simulations.*

The negative yield effects of climate change, however, do not mean that yield levels are not to increase, *i.e.,* negative rate of growth. Yields are still to have positive growth but at lower rates. Figure 6 illustrates the divergence of yield pathways due to climate change. The gaps between the *NoCC* pathways and *CC- effects* are the *percentage differences* described by the negative

values in Table 7 and Table 8 The wider the gaps the more severe the effects of climate on crop productivity.

Figure 6: Diverging Trajectories of Yields Under the Influence of Climate Change, 2020-2050



*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * NoCC means no climate change that serves as the counterfactual scenario. Source: IMPACT-Phil simulations*

Subsequent effects of productivity losses are further reflected in the production of food commodities. Note that although direct productivity-effects of climate on animal-sourced foods are not estimated, their production is indirectly affected by the productivity losses of feedstuff (*i.e.,* coarse grains and cereals).

Production of most food commodities, including animal-sourced foods are projected to decline due to climate change – except for rootcrops, fruits and vegetables which are to get production boost from climate change. Highest production declines are projected for pulses (-9.55%) and cereals (-8.67%), especially for corn (-21.57%) and rice (-8.10%), while egg and mutton productions are to increase by 2.02% and 0.39% relative to the *no-climate-change* (*i.e.,* counterfactual) scenario (Table 9).

Table 9: Impact of Climate Change on Food Production in the Philippines by 2050

Food commodities		2050 Projections		
	2020	No Climate Change (NoCC)	With Climate Change	Change from No CC
Production	---------- *000 mt* ----------			%
All meat products	3,234	5,090	5,016	-1.45
Beef	345	635	627	-1.28
Mutton/Goat meat	55	95	95	0.39
Pork	1,909	2,714	2,710	-0.13
Poultry meat	926	1,646	1,583	-3.79
Dairy	15	20	20	-1.68
Eggs	894	1,738	1,773	2.02
All cereals	19,835	26,476	24,179	-8.67
Corn	7,364	8,668	6,798	-21.57
Rice	12,471	17,808	17,381	-2.40
Other crops	656	1,001	955	-4.61
Fruits	20,122	33,524	33,971	1.34
Vegetables	7,178	11,575	12,629	9.10
Oilseed crops	16,877	19,809	19,520	-1.46
Pulses	76	95	86	-9.55
Roots and tubers	3,043	3,922	3,939	0.44
Sugar	3,002	4,383	4,163	-5.02

*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * NoCC means no climate change that serves as the counterfactual scenario. Source: IMPACT-Phil simulations.*

3.1.4 Effects on Access to, Availability and Consumption of Food

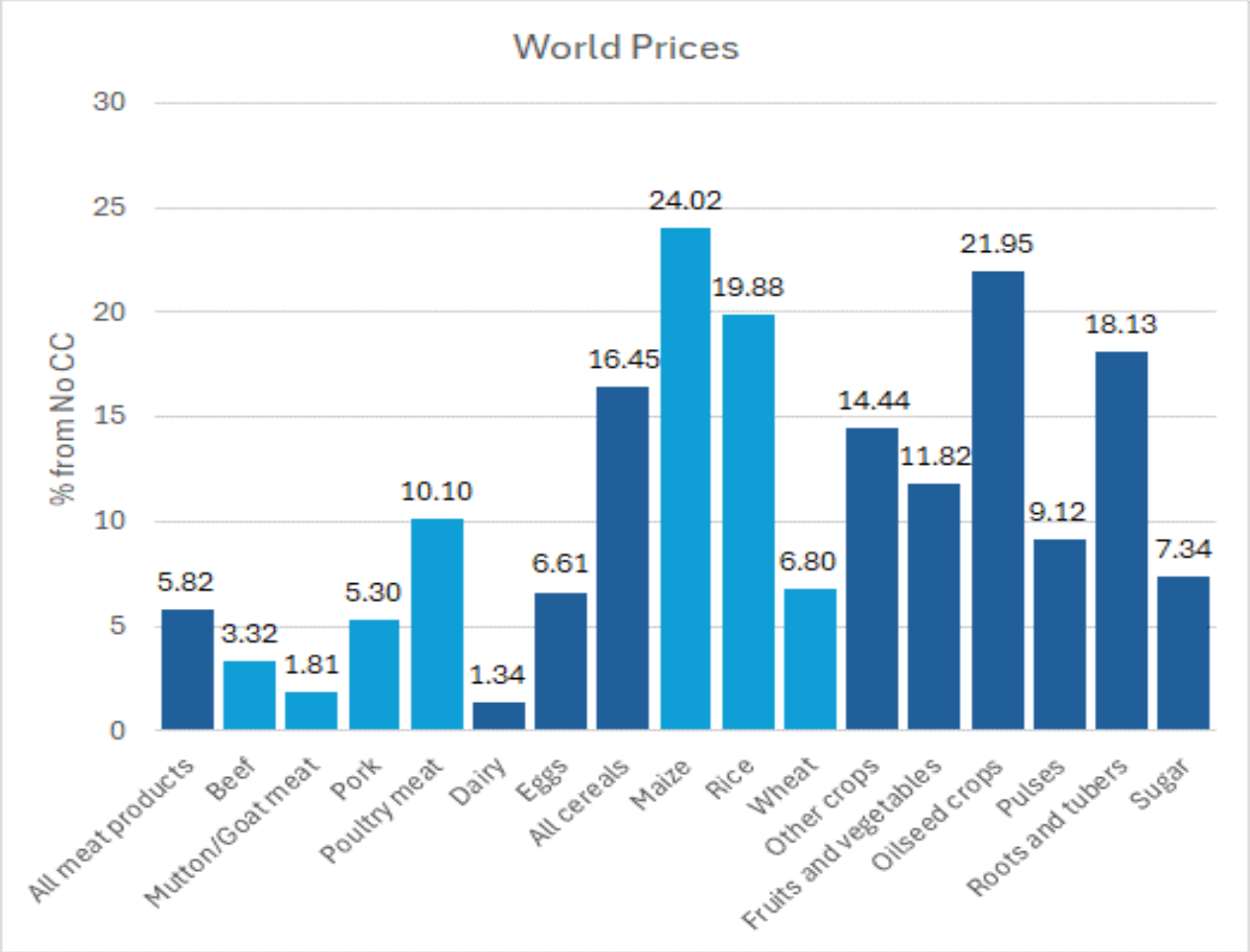
Similar trends of climate-induced productivity losses and production declines in Philippines are projected globally. Subsequently, prices of food commodities are also to increase by as much as 24% for corn, by 22% for oilseed crops, and by 18% for rootcrops (Table 10 and Figure 7) – making food less affordable and thus less accessible for the poor.

Table 10: Changes in the World Prices of Food Due to Climate Change, by 2050

Food commodities		2050 Projections		
	2020	No Climate Change (NoCC)	With Climate Change	Change from No CC
World Prices		------- US$/mt --------		%
All meat products	3,034	3,472	3,675	5.82
Beef	3,933	4,258	4,400	3.32
Mutton/Goat meat	4,985	4,578	4,661	1.81
Pork	2,708	3,214	3,384	5.30
Poultry meat	2,318	2,857	3,145	10.10
Dairy	555	591	599	1.34
Eggs	2,356	2,587	2,758	6.61
All cereals	248	285	332	16.45
Corn	179	220	273	24.02
Rice	413	487	584	19.88
Wheat	259	298	318	6.80
Other crops	1,368	1,541	1,763	14.44
Fruits and vegetables	1,007	1,246	1,394	11.82
Oilseed crops	528	570	695	21.95
Pulses	1,098	1,170	1,277	9.12
Roots and tubers	391	465	549	18.13
Sugar	403	473	508	7.34

*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * NoCC means no climate change that serves as the counterfactual scenario. Source: IMPACT-Phil simulations.*

Figure 7: Projected Increases in World Prices of Food Due to Climate Change by 2050



*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * NoCC means no climate change that serves as the counterfactual scenario. Source: IMPACT-Phil simulations.*

Domestic production and trade are determinants of available food for consumption in the country. Net food trade for Philippines is projected to decline – generally less imports for cereals (*i.e.,* corn and rice), and rootcrops; and for the Philippine case, more exports of fruits and vegetables and oilseed crops (Table 11). While imports of sugar, wheat, and meat products are to increase.

However, changes in trade position can be either due to changes in domestic production or due to higher world prices. For rootcrops, pulses, fruits and vegetables, and poultry, the changes in trade positions are due to changes in production, i.e., decline in imports of rootcrops and increase of exports of eggs and fruits and vegetables are due to increases in domestic production. While the import declines of rice, corn, dairy and pork are due to increases of prices in the world market.

Table 11: Impact of Climate Change on Trade of Food in the Philippine by 2050

Food commodities		2050 Projections		
	2020 Baseline	No Climate Change (No CC)	With Climate Change	Change from NoCC*
Net Trade	---------- 000 mt ----------			%
All meat products	-829	-2,380	-2,418	1.58
Beef	-391	-926	-931	0.50
Mutton/Goat meat	-6	-49	-49	0.13
Pork	-257	-1,004	-994	-0.98
Poultry meat	-174	-402	-444	10.62
Dairy	-1,936	-3,094	-3,086	-0.26
Eggs	317	643	692	7.59
All cereals	-7,320	-16,484	-16,149	-2.04
Corn	516	-4,737	-4,422	-6.66
Rice	-3,708	-3,476	-3,281	-5.61
Wheat	-3,792	-7,816	-7,983	2.14
Other foodcrops	-139	-150	-164	9.35
Fruits and vegetables	5,391	9,037	11,673	29.16
Oilseed crops	3,248	2,779	2,857	2.81
Pulses	-123	-240	-251	4.35
Roots and tubers	-841	-1,430	-1,280	-10.46
Sugar	-106	-561	-674	20.11

*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * NoCC means no climate change that serves as the counterfactual scenario. *Negative values mean either decline in exports or increase in imports, positive values mean either increase in exports or decline in imports. Value less than -100 means a shift from net importer to net exporter (or from net exporter to net importer). Source: IMPACT-Phil simulations.*

Since domestic production of these imported commodities are projected to decline, the general declines in imports are attributable to higher food prices – as they become less affordable for consumers, and thus, to cause declines in consumption, threatens the food security and state of nutrition the country.

Declines in consumption, brought about by high world prices of food and declines in domestic food production are presented in Table 12. Consumption of all food commodities is projected to decline, except for pulses and mutton. Declines in consumption are to be highest for oilseeds (-4.37%), rice (-3.27%) and corn (-3.16%). In terms of calories intake, daily per capita consumption declines by 2.32% with climate change.

In addition, less access to food has nutritional and health repercussions, as it increases the risk of hunger or undernourishment to the population and contributes to children's malnutrition. Due to higher prices of food, the number of undernourished populations is to increase by 8% and malnourished children by 3%.

Table 12: Changes in Daily Calories Intake and Annual Food Consumption, Philippines, 2050

Food commodities		2050 Projected Consumption		
	2020 Baseline	No Climate Change (NoCC)	With Climate Change	Change from NoCC
Annual consumption	---------- *kg/capita/year* --------			*%*
All meat products	37.0	50.1	49.9	-0.49
Beef	6.7	10.5	10.5	-0.22
Mutton/Goat meat	0.6	1.0	1.0	0.31
Pork	19.7	24.9	24.9	-0.36
Poultry meat	10.0	13.7	13.6	-0.97
Dairy	17.0	20.0	19.9	-0.27
Eggs	4.8	6.7	6.6	-1.26
All cereals	170.6	180.2	174.9	-2.93
Corn	14.3	12.9	12.5	-3.16
Rice	127.8	122.4	118.4	-3.27
Wheat	27.9	44.4	43.5	-1.95
Other foodcrops	4.1	4.2	4.1	-3.60
Fruits and vegetables	177.0	212.2	206.0	-2.93
Oilseed crops	5.4	6.1	5.9	-4.37
Pulses	1.8	2.2	2.2	0.44
Roots and tubers	27.7	27.2	26.5	-2.40
Sugar	26.1	31.0	30.3	-2.26
Food Security/Nutrition				
Calorie Consumption (*Kcal/day*)	2,721	2,984	2,915	-2.32
Undernourished population (*million*)	9.1	8.2	8.8	8.01
Malnourished children (*million*)	3.5	2.4	2.5	3.14

*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * NoCC means no climate change that serves as the counterfactual scenario. Source: Source: IMPACT-Phil simulations.*

3.1.5 Economic Costs of Climate Change to Agriculture

The economic surplus framework for cost-benefit analysis (CBA) was used to estimate the long-term economic impact of climate change on the welfare of food producers and consumers, and

hence on society as a whole. It measures the costs and benefits that accrue to society from projected shifts in supply and demand over time due to climate change.

At the global level, the economic cost of climate change is calculated to be US$2.734 trillion for the 25-year period from 2025 to 2050 (Table 13) with consumers bearing the brunt of the costs by paying higher prices for food, incurring overall welfare losses of $4.89 trillion. Producers, on the other hand, are to register a net gain of $2.47 trillion overall, because of higher prices for their produce, which on average are projected to offset declines in production.

The economic costs to the Philippine population are estimated at $17.2 billion for the 2025–2050 period, or $690 million per year. Similarly, Philippine consumers are to bear most of the costs of climate change, amounting to $80.2 billion for the 25-year period or $3,207 million per year, while producers gain $62.9 billion overall, or $2,517 million per year, implying that shifts to higher prices, on average, can more than compensate for declines of productivity. However, most farmers — and especially smallholder farmers — are marginal producers and net buyers of food themselves, and thus are expected overall to suffer net economic losses from the combined producer and consumer effects of climate change.

Table 13: Changes in Society's Welfare due to Climate Change, World and the Philippines, 2025-2050

Country/Region	Welfare Measure		
	Producer Surplus	Consumer Surplus	Total Economic Surplus
	US$ billion		
World	**2,968**	**-5,703**	**-2,734**
Philippines	**62.9**	**-80.2**	**-17.2**
Annual value US$ million)	**2,517**	**-3,207**	**-690**

*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2, in comparison with the no-climate-change, i.e., counterfactual scenario. *Application of real discount rate equal to 3% Source: IMPACT-Phil simulations.*

4 INVESTMENT AND POLICY OPTIONS FOR BUILDING LONG-TERM RESILIENCE

The impacts of climate change and water scarcity can be substantial, estimated for Philippines to be around US$690 million annually, thus the urgency to put in place the investment policies and adaptation options for long-term resilience and sustainability in the agri-food systems.

The recent IPCC AR6 Report, Climate Change 2022: Impacts, Adaptation and Vulnerability, not only assess the impacts of climate change, but also reviews vulnerabilities associated with representative key risks areas in the land and water ecosystems, that include water and food security. Feasible climate adaptation options to respond to water security risks comprise water-use efficiency and water resource management, while adaptation options to food security risks include improved cropland management and efficient livestock systems. Specific adaptation technologies for better cropland management consist of cultivar technology, soil-fertility management, irrigation water management, changes in planting dates, and combined or mixed technologies. These adaptation options, together with supportive public investment policies can enhance food availability and stability and reduce climate risks for food systems while enhancing sustainability.

Further, the AR6 report continues to support the AR5 version that categorized adaptation responses into: technological responses (e.g., development of new crop varieties more adaptable to climate change; improved soil and water management practices; new generation of crop protection); smallholder farmer-support responses (e.g., enhancing access to credit and other critical production resources; diversifying livelihoods); institutional responses (e.g., strengthening institutions at local, national, and regional levels to support agriculture, including community-based organizations, rural enterprises, and gender-oriented policies); and agronomic adaptation responses, like agroforestry and conservation agriculture (IPCC, 2014).

Along this principle, this report aims to develop, analyze and recommend investment and policy options, not only to adapt and counter the effects of climate change, but also to build long-term resilience in Philippine agriculture while exploring the synergies among adaptation and mitigation along with community mobilization for potential decarbonization of the sector.

4.1 Technology, Infrastructure, and Market Responses to Climate Change

Based on the country-specific climate risks the country is facing, *i.e.,* land and water-resource limitations and declining performance of agriculture – that threaten the stability and sustainability of the food systems – two sets of investment programs are presented and simulated as potential adaptation responses to climate change. They are also deemed to build longer-term resilience and sustainability to the sector. Resilient – by remaining efficient and competitive under climate and economic shocks; and sustainable – by minimizing GHG emissions and water footprints as much as possible.

These sets of investment scenarios, defined below – are formulated and implemented in IMPACT-Phil, the suite of biophysical-economic models described in detail in Appendix B on methodology.

The first set of policy options include:

- A technological response of investing agricultural research and development (R&D) for adaptation technology development and promotions suited to the Philippine farming environment – with crop-technology and livestock-technology components. R&D activities in crops and livestock are also independent and separable, but at the farm level, the horizontal integration of crops and livestock has synergies and complementarities from which the farming households and communities can take advantage of and benefit from. Box 1 presents potential crop adaptation technologies that can be applied on farmers' fields.

  Basic assumption of this policy scenario, coded as R&D (Crop-Livestock) includes 20% productivity increase for crops and 10% productivity enhancement and 10% stock increase for livestock with 50% rate of adoption in the next 15 years (2025-2040).

- An infrastructure response of expanding irrigation development coded as Irrigation Devt of investing in irrigating additional lands by expanding 20% of irrigation system in 50% of farm areas, in the next 15 years.

- An institutional response reducing post-harvest losses and waste along the food value chain by 50% – coded as Market & Value Chain scenario. This includes increasing processing, transport and storage efficiencies to minimize waste and losses in the form less food spoilage and quality maintenance, better milling rates, and longer shelf-life, along the food value-chains. Included also in this scenario is the building of more efficient market structures that shorten the food supply-chains, thus minimizing marketing costs and product losses along the supply-chains.

  Since post-harvest losses and waste are estimated to be around 5-10% of production, this scenario is to reduced losses/waste equivalent to 2.5- 5% production. This scenario also runs for the next 15 year to cover 50% of market supply-chains and food value-chains.

Table 14: Description of Selected Technology Options

Technology Suite	Individual Technology	Brief Description
Seed Varietal/ Cultivar Technologies	Heat tolerance	Using improved varieties that allow the plant to maintain yields at higher temperatures.
	Flood tolerance	Seed varieties tolerant to flooding or heavy rainfall conditions. Some varieties withstand excess water and prolong underwater submergence.
	Drought tolerance	Improved varieties that allow better yields than regular varieties because of enhanced soil moisture uptake capabilities and reduced vulnerability to water deficiency.
	Saline tolerance	Development of seed varieties more resistant to saline soil and water, salt-water intrusion and rising sea level due to changing climate.
Soil Fertility Management Technologies	No-till and direct seeding	Minimum or no soil disturbance, often in combination with residue retention, crop rotation, and use of cover crops – retain or enhance natural soil fertility. Direct seed broadcasting is also often used in this technology.

	Integrated soil fertility management	Combination of chemical fertilizers, crop residues, and manure/compost. Includes site-specific soil fertilizer management, soil analysis and nutrient-deficiency fertilizer matching.
	Organic farming, brown and green manuring	Use of only organic sources of fertilizers, pest and weed control. Non-use of chemicals in crop production and crop protection.
	Full and partial intensification	Increased use of inputs to raise and optimize yield level. Usually involves increased fertilizer usage and land spaces to maximize light absorption.
	Precision agriculture	GPS-assisted delivery of agricultural inputs, as well as low-tech agricultural practices that aim to optimize management of crops (this includes effective plant spacing and use of appropriate planting windows). Localized and spot water, chemical and fertilizer application.
Irrigation Water Management Technologies	Water harvesting	Channeling rainwater or run-off toward crop fields through macro- or micro-catchment systems or by using earth dams, ridges, or graded contours
	Laser land leveling	Use of precision laser technology in the construction of bunds and land preparation to efficiently manage water flow and the application of irrigation water.
	Alternate wet and dry system	Water-saving technology that involves efficient application of irrigation water. Includes timing of irrigation to coincide with plant water demand at different stages of plant development. Also, in combination with fertilizer application and weed control.
	Precision water application	Like precision agriculture but limited to site-specific and time-specific application and efficient non-application of irrigation water. Included also are the types of water delivery like drip, sprinkler and hydroponics systems
Crop protection Technologies	Weed protection	Chemical treatment to protect crops against existing weeds and changing weeds regime brought about by changing climate.
	Insect protection	Chemical treatment to protect crops against current and future climate-related onset of insects and arthropod pests.
	Disease protection	Chemical treatment to protect crops against diseases and pathogens related to changing climate.
Stacked Technology Package	Mix of complementary technologies	Combined application in the same farm of complementary technologies from different technology suites. This specifically involves the application two or more complementary technologies – *i.e.,* one from seed varietal suite; another one from either soil-fertility and/or irrigation water suite; and one from the crop protection suite.

Source: Adopted from Perez et al 2021.

These three investment options were simulated with the IMPACT-Phil model determine their individual (i.e.,3 separate scenarios) effectiveness in countering the impact of climate change with changes in yields, production, and net trade as main indicators. Results for respective indicators are presented in Table 15, Table 16 and Table 17.

Yield-effects are limited only to R&D (Crop-Livestock), since this is the only scenario where productivity increases are particularly specified for both crops and livestock. Irrigation can increase yields of rainfed lands, but not beyond the yields of existing irrigated lands – only raise the yields to that level. The Market & Value Chain scenario is not specified for increasing yields, although food available for consumers is increased due to prevented losses and waste along the market's value and supply chains.

As specified in the R&D (Crop-Livestock) scenario, crops have higher yield-response than livestock and poultry, almost uniformly between 6-7% for crops and between 2-3% for livestock and poultry. Oilseeds, however, has the highest potential yield response of 7.02%, followed by corn and all other crops. Yield-responses for eggs and dairy products are highest for the livestock and poultry sector.

Table 15: Potential Yield-Effects of Selected Policy Options on Food Commodities, Philippines by 2050

Food commodities	2020 Values	2050 no CC effects	2050 with CC Effects	Technology, Infrastructure and Market Devt			% change from CC Effects		
				R&D (Crop-Livestock)	Irrigation Devt*	Market & Value Chain **	R&D (Crop-Livestock)	Irrigation Devt*	Market & Value Chain **
Yields	---------- *kg/head or mt/ha* ----------						*percent*		
All meat products	5	8	8	8	8	8	1.81	-	-
Beef	263	350	350	358	350	350	2.48	-	-
Mutton/Goat meat	13	16	16	16	16	16	2.49	-	-
Pork	79	111	111	114	111	111	2.47	-	-
Poultry meat	2	3	3	3	3	3	2.45	-	-
Dairy	2,346	2,637	2,637	2,703	2,637	2,637	2.49	-	-
Eggs	5	5	5	6	5	5	2.50	-	-
All cereals	2.81	3.63	3.32	3.55	3.33	3.31	6.91	*-ns-*	*-ns-*
Corn	2.71	3.11	2.51	2.68	2.50	2.50	6.96	*-ns-*	*-ns-*
Rice	2.88	3.95	3.80	4.06	3.80	3.79	6.92	*-ns-*	*-ns-*
Other foodcrops	1.30	1.55	1.49	1.59	1.48	1.48	6.95	*-ns-*	*-ns-*
Fruits	15.26	20.52	20.18	21.52	20.04	20.10	6.64	*-ns-*	*-ns-*
Vegetables	10.70	13.78	14.58	15.56	14.51	14.54	6.71	*-ns-*	*-ns-*
Oilseed crops	4.59	5.27	5.04	5.39	5.08	5.04	7.02	*-ns-*	*-ns-*
Pulses	0.92	1.06	1.00	1.07	1.00	1.00	6.54	*-ns-*	*-ns-*
Roots and tubers	8.16	10.20	10.17	10.88	10.12	10.14	6.93	*-ns-*	*-ns-*
Sugar	83.19	88.46	79.93	85.39	80.49	80.11	6.84	*-ns-*	*-ns-*

Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; NoCC means no climate change that serves as the counterfactual scenario; blank cells have no measurable yield response, while "-ns-" means no significant yield-effect i.e., yield effects less than 0.05%. SOURCE: IMPACT-PHIL SIMULATIONS.

With respect to the production-effects of the policy options, a different response pattern are presented in Table 16. All three scenarios now exhibit significant production responses – consistently higher for the R&D (Crop-Livestock) scenario, but with relatively higher production response from the livestock and poultry sector than for crops sector. This is due to the combined effects of yield-enhancement and increased stock for animal-source foods. Dairy production is now to increase by 9.3%, poultry by 8.6%, and production of beef by 8.6%, while crop production effects are limited to a percentage point higher – i.e., within 6-7% compared to yield response.

The Irrigation Devt scenario, on the other hand, displays mixed production responses, with both positive and negative production effects for both crops and livestock sectors. This mixed result is explained by farmers land allocation decisions based on crops relative profitability. Similar to farmer's supply response to prices, farmers tend to allocate additional land area to the more profitable crops. With new irrigated lands generated by the Irrigation Devt scenario, this profitability-based allocation is further emphasized in the cropping pattern. Thus, more areas are planted to rice, oilseeds and sugarcane and less for other crops. Similarly, with additional farm water, farmers prefer to raise more dairy cows, broiler chicken and cattle. Consequently, the productions of rice, oilseed crops, and sugarcane are to increase relative to other crops, and dairy, poultry meat and beef production are to increase under the Irrigation Devt scenario.

The Market & Value Chain reveals additional nuances with respect to production response from minimized waste and marketing costs. This scenario does not directly impact farmers' production behavior since prevented waste and losses do not accrue to producers but to processors, aggregators and ultimately to consumers and trade demands. So that in effect, it is creating slight excess supply of foodcrops (and depressing domestic prices), in favor of animal-sourced foods both in the production and land allocation. This is further re-enforced by increases in export demand and declines in import receipts, despite slight declines in farm produce under this scenario.

Table 16: Potential Productions-Effects of Selected Policy Options on Food Commodities, Philippines by 2050

Food commodities	2020 Values	2050 no CC effects	2050 with CC Effects	Technology, Infrastructure and Market Devt			% change from CC Effects		
				R&D (Crop-Livestock)	Irrigation Devt*	Market & Value Chain**	R&D (Crop-Livestock)	Irrigation Devt*	Market &Value Chain**
Production	---------- *000 mt* ----------						*percent*		
All meat products	3,234	5,090	5,016	5,410	5,034	5,090	7.85	0.34	1.48
Beef	345	635	627	681	633	638	8.55	0.95	1.64
Mutton/Goat meat	55	95	95	102	95	96	7.24	-0.27	0.41
Pork	1,909	2,714	2,710	2,907	2,705	2,743	7.27	-0.18	1.20
Poultry meat	926	1,646	1,583	1,720	1,600	1,614	8.60	1.04	1.96
Dairy	15	20	20	22	20	21	9.33	1.63	2.75
Eggs	894	1,738	1,773	1,891	1,761	1,784	6.69	-0.67	0.66
All cereals	19,835	26,476	24,179	25,936	24,751	23,828	7.26	2.36	-1.45
Corn	7,364	8,668	6,798	7,302	6,724	6,704	7.41	-1.09	-1.39
Rice	12,471	17,808	17,381	18,633	18,027	17,124	7.21	3.72	-1.48

Other foodcrops	656	1,001	955	1,025	955	941	7.35	0.00	-1.53
Fruits	20,122	33,524	33,971	36,327	33,605	33,470	6.93	-1.08	-1.48
Vegetables	7,178	11,575	12,629	13,592	12,582	12,469	7.63	-0.37	-1.26
Oilseed crops	16,877	19,809	19,520	20,601	19,996	20,019	5.54	2.44	2.56
Pulses	76	95	86	92	85	84	7.15	-0.93	-2.35
Roots and tubers	3,043	3,922	3,939	4,215	3,912	3,904	7.01	-0.71	-0.89
Sugar	3,002	4,383	4,163	4,364	4,272	4,372	4.82	2.62	5.03

Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; NoCC means no climate change that serves as the counterfactual scenario. Source: IMPACT-Phil simulations.

The Philippines is a small food producing country relative to the global food market, so that even substantial gains in production achievable under the R&D (Crop-Livestock) policy scenario – cannot move the world price needles in significant manner. And without declines in food prices, increases in domestic food production do not lead to higher domestic consumption and better nutrition for the population. Instead, they are to boost the trade position of the country – that is decrease in import demand and increase of export receipts.

Table 17: Potential Trade-effects of Selected Policy Options on Food Commodities, Philippines by 2050

Food commodities	2020 Values	2050 no CC effects	2050 with CC Effects	Technology, Infrastructure and Market Devt			% change from CC Effects		
				R&D (Crop-Livestock)	Irrigation Devt*	Market & Value Chain**	R&D (Crop-Livestock)	Irrigation Devt*	Market & Value Chain**
Net Trade	---------- *000 mt* ----------						*percent*		
All meat products	-829	-2,380	-2,418	-2,046	-2,421	-2,203	-15.37	0.13	-8.88
Beef	-391	-926	-931	-880	-927	-903	-5.50	-0.39	-3.02
Mutton/Goat meat	-6	-49	-49	-42	-49	-45	-14.36	0.36	-7.24
Pork	-257	-1,004	-994	-807	-1,007	-883	-18.86	1.32	-11.13
Poultry meat	-174	-402	-444	-318	-438	-372	-28.37	-1.45	-16.31
Dairy	-1,936	-3,094	-3,086	-3,092	-3,094	-3,093	0.20	0.26	0.23
Eggs	317	643	692	803	673	753	16.01	-2.77	8.78
All cereals	-7,320	-16,484	-16,149	-15,865	-16,140	-16,460	-1.76	-0.05	1.93
Corn	516	-4,737	-4,422	-4,766	-4,680	-4,607	7.79	5.85	4.19
Rice	-3,708	-3,476	-3,281	-2,394	-2,871	-3,245	-27.04	-12.50	-1.08
Wheat	-3,792	-7,816	-7,983	-8,234	-8,122	-8,141	3.14	1.74	1.97
Other foodcrops	-139	-150	-164	-109	-179	-164	-33.40	9.13	-0.10
Fruits	6,050	11,555	13,048	15,076	12,390	13,306	15.54	-5.05	1.97
Vegetables	-659	-2,518	-1,376	-474	-1,485	-1,201	-65.51	7.90	-12.70
Oilseed crops	3,248	2,779	2,857	3,230	2,965	2,881	13.04	3.78	0.84
Pulses	-123	-240	-251	-246	-253	-251	-1.87	0.91	0.33

Roots and tubers	-841	-1,430	-1,280	-1,071	-1,360	-1,246	-16.35	6.27	-2.64
Sugar	-106	-561	-674	-500	-591	-352	-25.84	-12.33	-47.75

*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * NoCC means no climate change that serves as the counterfactual scenario. *Negative values mean either decline in exports or increase in imports, positive values mean either increase in exports or decline in imports. If values are less than -100, there are shifts from net importer to net exporter (or from net exporter to net importer). Source: IMPACT-Phil simulations.*

Increases in production due to R&D (Crop-Livestock) policy scenario, presented in Table 16 are to result in increases in export of fruits by 16%, of egg products by 16% and of oilseed crops by 13%. While increased production of traditionally imported food like rice, vegetables, sugar and meat products are to result to reduced import bills, by as much as 27% for rice, 65% for vegetables, 26% for sugar, and 28% for poultry meat.

Similarly, for Irrigation Devt scenario, any increase in production e.g., for rice, sugar, oilseed crops, poultry meat and beef, there is corresponding positive trade position, i.e., decline in imports for rice by 13% and 12% for sugar, and increase in export of oilseed crops by 4%.

And for Market & Value Chain scenario, where substantial food savings ultimately accrue to consumers and/or trade demand, that even reduction in foodcrops production can increase export volume of fruits by 2% and reduce import volume of vegetables by 13%, and by smaller amount for rice.

4.2 Complementary Investment programs: Technology and Rural Enterprise Development

Among the three investment options presented earlier, investment in R&D (Crop-Livestock) holds greater potential for countering the impact of climate change, as it has the advantage horizontally integrated crop and livestock production. Nevertheless, the benefits of having additional water and land under the Irrigation Devt scenario cannot be ignored, especially in light of worsening land and water scarcity. Modern technologies need irrigation water to maximize yield-potentials, while irrigated lands need modern technologies to achieve higher productivity of the land.

The Market & Value Chain scenario also has the potential of additional 5-15% of food supply without using land and water resources by simply minimizing food losses and waste. And with sound business model, investment in this scenario can augment the income and livelihood of rural communities.

These three policy options can, therefore, be packaged into combinations of 1) R&D (Crop-Livestock) + Irrigation Devt investment program, and 2) R&D (Crop-Livestock) + Irrigation Devt + Market & Value Chain investment program.

The effective operations of these two investment programs on the ground are to be greatly enhanced when implemented with existing framework and structure consistent with climate resiliency objectives of the agricultural sector – the AMIA Program.

4.2.1 The AMIA Plus Investment Strategy: R&D (Crop-Livestock) + Irrigation Devt

This adaptation investment program includes a technological response (R&D Crop-Livestock) and an infrastructure response (Irrigation Devt) to climate change, developed and pre-tested in the previous section. The R&D (Crop-Livestock) is aimed to develop and disseminate adaptation technologies - dubbed as climate-smart agriculture (CSA) or climate-resilient agriculture (CRA) technologies and practices. CRA technologies are more productive, efficient, and resilient to short-, medium- and long-term shocks and risks associated with climate change and climate variability.

Increased Crop Productivity

Although the research community is already in the forefront of climate-resilient technology development suitable for Philippines, additional and more intensive funding for agricultural research, development and extension (RD&E) are needed to adequately address the urgency and the magnitude of climate risks the country is facing. Most of these technologies are still in laboratory and/or in on-farm evaluation phases – but others, on limited basis, are already being implemented by farmers in their fields (selected adaptations options are listed in Box 1).

Increased Yields and Stock of Animal-source Food

Smallholder livestock production in Philippines may be classified as mixed irrigated systems with significant proportion of irrigated cropping interspersed with livestock and fodder crops. Other classifications include backyard (monogastric, ruminant, poultry), grassland-based with minimal or no crop-based agriculture (pastoralism). On average, animal-sourced food provides 39% of protein and 18% of calories in human diets.

The effects of climate change on livestock productivity, however, are not adequately modelled in this report due to limited definitive studies on the topic for the Philippines. Only the indirect impacts on feedstuff are simulated here. Although evidence is accumulating that rising temperatures can lead to heat stress that may significantly affect the productivity of domestic species (Das *et al*., 2016b; Godde *et al*., 2021). Investment in livestock productivity should be part of any adaptation options against climate risks – and thus simulated in this report. Prices of animal-sourced foods are projected to rise steeply so that the combination of crop-livestock can be another source of livelihood for small landholders.

Initial results on productivity indicators (*i.e.,* yield, area and animal number, production) show separability (exclusivity or independence) between crops and livestock scenarios, and with minimal loss of synergies when simultaneously implemented. Therefore, the simultaneous implementation of crop and livestock technology is recommended.

Expanded Irrigation and Increased Water Productivity

On top of this is the Irrigation Devt response, that includes the expanded development of irrigation systems to include different water sources (e.g., surface water, groundwater, and effective precipitation), and various irrigation water delivery system (e.g., gravity, drip irrigation, precision irrigation) and diverse energy sources including solar energy.

Implicit in the strategy is the promotion and cultivation of high-valued, less water-intensive horticulture crops (i.e., fruits and vegetables) over low-value water-intensive cereals like rice,

resulting to better irrigation efficiency by reducing flood-irrigated rice areas. Efficiency is further enhanced when drip irrigation systems for fruit and vegetable fields are constructed. A level of environmental sustainability is also attained when methane (CH4) emissions are reduced with declines in rice areas.

4.2.2 The AMIA Enterprise Investment Strategy: R&D (Crop-Livestock) + Irrigation Devt + Market & Value Chain

The AMIA Enterprise investment program is a notch higher – an investment in community-based rural enterprise development that implements the Market & Value Chain scenario on the ground is added to the AMIA Plus program

This addition is a comprehensive adaptation option is based on institutional response that includes rural mobilization and the strengthening of community-based institutions at local, national, and regional levels to support the triple-win nexus of productivity, livelihood and household income, and the potential of reducing the rate of GHG emissions and water footprints from Philippine agri-food systems.

It is, however, predicated in the restructuring of rural cooperatives into business-oriented community-based rural enterprises, where every farmer or farmer group serves as shareholders with financial stake in the business operations. These community-owned rural enterprises or rural agribusiness enterprises are to operate as business-concerns whose main objectives are to be competitive in the agribusiness industry and to be profitable to every farmer-owner member.

4.3 Comparative Analysis of AMIA Plus and AMIA Enterprise Investment Programs

4.3.1 The Investment Program Scenarios

Both the AMIA Plus and AMIA Enterprise investment scenarios incorporate the R&D (Crop-Livestock) and Irrigation Devt investment options in their investment portfolios.

1. AMIA Plus Investment Strategy is centered in the development, dissemination and accessibility of site-specific and cropping system-specific (e.g., all-crop, all-animal, or mixed crop-animal systems) single or stacked technology packages to smallholder farmers. In its core is an accelerated investment in R&DE (research and development and extension) to support the national agricultural research system (NARS) in collaboration with international agricultural research centers (IARCs) based in Philippines and in the region. Investment in ancillary services like seed industry and other input markets (e.g., fertilizer, chemicals, and farm machinery), veterinary services, IT-based information support, marketing information, weather early-warning system, crop insurance, and credit facilities – are the support components of the AMIA Plus investment program, which need to be put in place to for the investment to be effective.

   In addition, the program includes: (a) the expansion of irrigation system and the modernization of the irrigation delivery systems i.e., drip irrigation for fruits and vegetable crops and sprinkler systems; (b) expansion of the animal industry, inclusive of livestock, dairy, poultry and egg production operations, by 10%.

The rate of adoption is projected at 50% in 15 years with targets of 20% for the first five years (2025-2030) and the other 30% by 2040.

2. AMIA Enterprise Investment Strategy is a more comprehensive investment option that incorporates all the AMIA Plus components and adds a community mobilization component of developing community-based agribusiness industry. It has the potential for higher economic and social benefits by achieving the triple-win nexus of productivity, livelihood and household income, and reductions in GHG emissions and water footprints – which are the indicators of resilience and sustainability in the country's agri-food systems.

   In addition to same R&DE and ancillary support in the AMIA Plus scenario, the AMIA Enterprise investment scenario is to include (a) provision of post-harvest, processing, storage, and marketing infrastructure and facilities to minimize wastes and lower marketing costs – consequently reducing wastes and spoilage and marketing costs by 50%; (b) provision of ancillary input services e.g., seed industry for cereals and horticulture crops; fertilizer and pest control chemicals or technology; crop insurance; early warning weather stations; and IT services for soil and water management.

   On top of these is the development and operation of community-based agribusiness enterprises around the country, where farmers or farmers associations hold ownership and financial stakes.

   The rate of adoption is similarly projected at 50% in 15 years with targets of 20% for the first five years (2025-2030) and the other 30% by 2040.

4.3.2 AMIA Plus vs AMIA Enterprise: Impacts on Productivity – Yield, Production and Area

Climate change is shown to directly affect agricultural productivity, reducing yields of cereals by -8.53%, highest declines for corn (-19.40%) and rice (-3.76%) (Table 6).

However, both the AMIA Plus and AMIA Enterprise investment scenarios are designed to counteract the direct productivity- impact of climate change, so that yields for AMIA Plus are projected to increase for cereals by 7.72% relative to CC scenario; corn by 6.95%; rice by 7.48% (Table 18). For the AMIA Enterprise scenario, positive yield gains are also projected at 7.93% for cereals; 7.22% for corn; 7.69% for rice – all at higher rates due to the additional investments in market infrastructure and rural agribusiness development.

Table 18: Comparative Impacts of AMIA Investment vs AMIA Enterprise Investment Options on Crop and Livestock Yields in the Philippines by 2050

Food commodities	2020 Values	2050 with CC Effects	Technology and Rural Enterprise Development		% change from CC Effects	
			AMIA Plus	AMIA Enterprise	AMIA Plus	AMIA Enterprise
Yield	---------- *kg/head or mt/ha* ----------				*percent*	
All meat products	**5.0**	**8.2**	**8.3**	**8.4**	**1.81**	**2.01**
Beef	**263**	**350**	**358**	**358**	**2.48**	**2.48**

Mutton/Goat meat	**13.1**	**15.6**	**15.9**	**15.9**	**2.49**	**2.49**
Pork	**79**	**111**	**114**	**114**	**2.47**	**2.47**
Poultry meat	**1.5**	**2.7**	**2.8**	**2.8**	**2.45**	**2.45**
Dairy	**2,346**	**2,637**	**2,703**	**2,703**	**2.49**	**2.49**
Eggs	**5.4**	**5.4**	**5.6**	**5.6**	**2.50**	**2.50**
All cereals	**2.81**	**3.32**	**3.57**	**3.58**	**7.72**	**7.93**
Corn	**2.71**	**2.51**	**2.68**	**2.69**	**6.95**	**7.22**
Rice	**2.88**	**3.80**	**4.08**	**4.09**	**7.48**	**7.69**
Other foodcrops	**1.30**	**1.49**	**1.60**	**1.60**	**7.31**	**7.56**
Fruits	**15.26**	**20.18**	**21.52**	**21.59**	**6.65**	**7.00**
Vegetables	**10.70**	**14.58**	**15.59**	**15.66**	**6.91**	**7.36**
Oilseed crops	**4.59**	**5.04**	**5.45**	**5.46**	**8.09**	**8.37**
Pulses	**0.92**	**1.00**	**1.07**	**1.08**	**6.64**	**7.11**
Roots and tubers	**8.16**	**10.17**	**10.88**	**10.90**	**6.89**	**7.13**
Sugar	**83.19**	**79.93**	**86.19**	**86.60**	**7.84**	**8.35**

Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; CC means with climate change scenario. Source: IMPACT-Phil simulations.

Both AMIA Plus and AMIA Enterprise scenarios are able to effectively counter the negative productivity-impacts of climate change, except for corn and sugar crops that are severely affected by climate change the most.

Increases in productivity are further translated into better changes in production for both AMIA Plus and AMIA Enterprise. Table 19 shows that most of productivity gains with AMIA Plus are translated into increases in production – positive to all animal products and most foodcrops, except for corn and pulses, whose productivity gains are the lowest, rendering them most vulnerable against crop area competition.

Table 19: Comparative Impacts of AMIA Plus Investments vs AMIA Enterprise Investment Options on Food Production in the Philippines by 2050

Food commodities	2020 Values	2050 with CC Effects	Technology and Rural Enterprise Development		% change from CC Effects	
			AMIA Plus	AMIA Enterprise	AMIA Plus	AMIA Enterprise
Production	---------- *000 mt* ----------				*percent*	
All meat products	**3,234**	**5,016**	**5,410**	**5,471**	**7.85**	**9.06**
Beef	**345**	**627**	**681**	**685**	**8.55**	**9.29**
Mutton/Goat meat	**55**	**95**	**102**	**103**	**7.24**	**7.97**
Pork	**1,909**	**2,710**	**2,907**	**2,947**	**7.27**	**8.74**
Poultry meat	**926**	**1,583**	**1,720**	**1,735**	**8.60**	**9.59**
Dairy	**15**	**20**	**22**	**22**	**9.33**	**10.54**

Eggs	**894**	**1,773**	**1,891**	**1,917**	**6.70**	**8.12**
All cereals	**19,835**	**24,179**	**26,917**	**26,882**	**11.32**	**11.18**
Corn	**7,364**	**6,798**	**7,327**	**7,331**	**7.78**	**7.84**
Rice	**12,471**	**17,381**	**19,589**	**19,550**	**12.71**	**12.48**
Other foodcrops	**656**	**955**	**1,041**	**1,041**	**9.00**	**8.96**
Fruits	**20,122**	**33,971**	**36,503**	**36,529**	**7.45**	**7.53**
Vegetables	**7,178**	**12,629**	**13,746**	**13,775**	**8.85**	**9.08**
Oilseed crops	**16,877**	**19,520**	**21,251**	**21,975**	**8.87**	**12.58**
Pulses	**76**	**86**	**93**	**93**	**8.91**	**9.10**
Roots and tubers	**3,043**	**3,939**	**4,229**	**4,234**	**7.35**	**7.48**
Sugar	**3,002**	**4,163**	**4,512**	**4,786**	**8.39**	**14.97**

Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; CC means with climate change that scenario. Source: IMPACT-Phil simulations.

4.3.3 AMIA Plus vs AMIA Enterprise: Impacts on Access to, Availability and Consumption of Food

Despite huge increases in production projected for both AMIA Plus and AMIA Enterprise investment adaptation options, the influence of a small-country market like Philippines, relative to global trade, is not expected to counter the effects of climate change on the prices of food in any significant way. Consequently, consumption is not expected to significantly increase either. Global cooperation and concerted efforts at adaptation and mitigation are needed to substantially increase global food production and restore the world prices of food.

However, there are lags in the transmission of prices from domestic market to global market due to artificial barriers to trade, with sticky price assumption, increases in domestic production can influence domestic consumer prices – along the wedge between export and import tariffs. Sticky prices are assumed for the succeeding simulations presented in Table 20, Table 21, Table 22 and Figure 8.

Table 18 presents the general decline in consumer prices of food due to AMIA Plus and AMIA Enterprise – with bigger price declines for AMIA Enterprise through additional supply gains from prevented food losses and waste.

The most price declines are projected for oilseed crops (-13%), rice (-7.4%) and rootcrops (-6.9%) (Table 20). Figure 8 further presents the correspondence between production and domestic prices – moving in opposite directions.

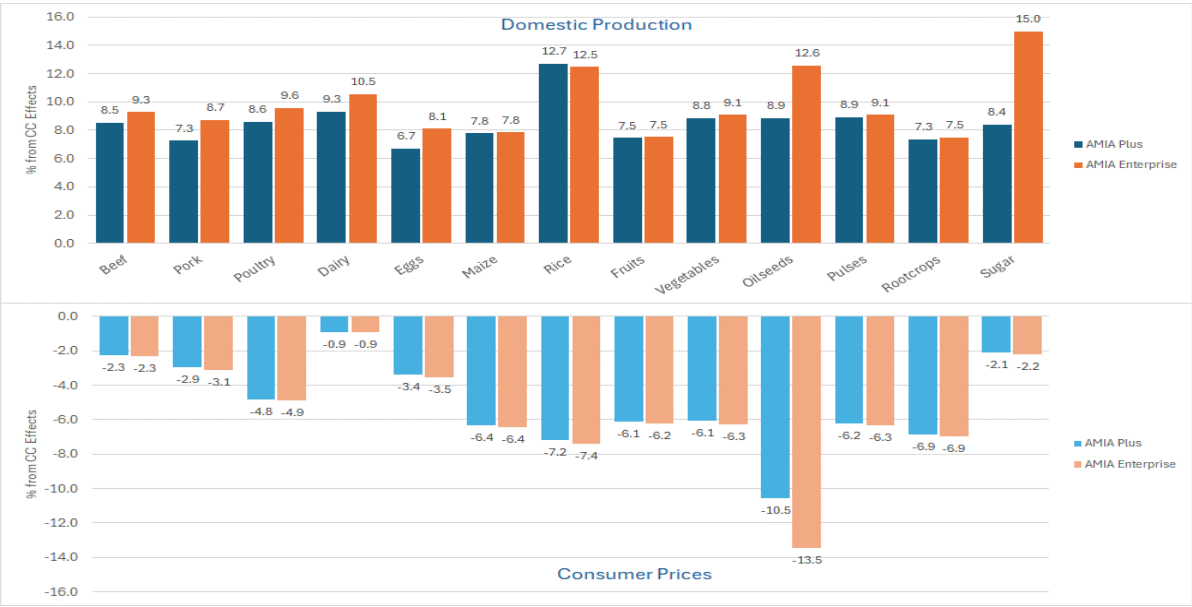
Table 20: Comparative Impacts of AMIA Plus Investment vs AMIA Enterprise Investment on Consumer Prices in the Philippines by 2050

Food commodities	2020 Values	2050 with CC Effects	Technology and Rural Enterprise Development		% change from CC Effects	
			AMIA Plus	AMIA Enterprise	AMIA Plus	AMIA Enterprise

Consumer Prices	---------- US$ per mt ----------				percent	
All meat products	3,908	4,873	4,716	4,712	-3.22	-3.31
Beef	5,269	5,895	5,762	5,759	-2.25	-2.30
Mutton/Goat meat	6,679	6,245	6,164	6,162	-1.29	-1.33
Pork	3,628	4,534	4,400	4,394	-2.95	-3.09
Poultry meat	3,397	4,611	4,389	4,387	-4.81	-4.86
Dairy	722	778	771	771	-0.91	-0.91
Eggs	3,453	4,043	3,906	3,901	-3.39	-3.53
All cereals	452	628	581	580	-7.53	-7.78
Corn	258	394	369	369	-6.35	-6.43
Rice	557	836	775	774	-7.20	-7.40
Other foodcrops	353	434	407	407	-6.29	-6.35
Fruits and Vegetables	1,644	2,080	1,953	1,951	-6.09	-6.20
Vegetables	1,408	1,952	1,833	1,829	-6.08	-6.27
Oilseed crops	85	138	123	119	-10.53	-13.46
Pulses	1,901	2,173	2,038	2,036	-6.23	-6.31
Roots and tubers	472	671	625	624	-6.85	-6.94
Sugar	510	643	630	629	-2.11	-2.20

Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; CC means no climate change scenario. SOURCE: IMPACT-PHIL SIMULATIONS.

Figure 8: Comparative Impacts of AMIA Plus Investments vs AMIA Enterprise Investment Options on Domestic Food Prices in the Philippines by 2050



Gains in production are still beneficial to the country and are reflected in substantial decreases in imports and increases in exports of food commodities (Table 21). Higher magnitudes of net trade changes are projected for AMIA Enterprise, on average by 50%, over AMIA Plus scenario, due to huge supply boosts from prevented food losses and waste under this scenario.

Exports of eggs, fruits and oilseeds are to increase respectively by 28%, 26% and 27%. While imports are to declines the most for rice (72%), other foodcrops (-62%), and poultry meat. The country is also projected to turn from net importer to net exporter for sugar and vegetables.

Table 21: Comparative Impacts of AMIA Plus Investment vs AMIA Enterprise Investment Options on Food Trade in the Philippines by 2050

Food commodities	2020 Values	2050 with CC Effects	Technology and Rural Enterprise Development		% change from CC Effects	
			AMIA Plus	AMIA Enterprise	AMIA Plus	AMIA Enterprise
Net Trade	---------- *000 mt* ----------				*percent change*	
All meat products	-829	-2,418	-2,046	-1,812	-15.37	-25.05
Beef	-391	-931	-880	-853	-5.50	-8.33
Mutton/Goat meat	-6	-49	-42	-38	-14.36	-22.52
Pork	-257	-994	-807	-674	-18.86	-32.21
Poultry meat	-174	-444	-318	-247	-28.37	-44.33
Dairy	-1,936	-3,086	-3,092	-3,091	0.20	0.17
Eggs	317	692	803	889	16.01	28.41
All cereals	-7,320	-16,149	-14,889	-14,243	-7.80	-11.80
Maize	516	-4,422	-4,732	-4,617	7.03	4.42
Rice	-3,708	-3,281	-1,451	-898	-55.78	-72.62
Wheat	-3,792	-7,983	-8,235	-8,255	3.15	3.40
Other foodcrops	-139	-164	-94	-61	-42.90	-62.64
Fruits	6,050	13,048	15,247	16,415	16.85	25.80
Vegetables	-659	-1,376	-321	146	-76.66	-110.59
Oilseed crops	3,248	2,857	3,484	3,650	21.93	27.73
Pulses	-123	-251	-244	-241	-2.47	-3.72
Roots and tubers	-841	-1,280	-1,058	-921	-17.38	-28.08
Sugar	-106	-674	-352	73	-47.82	-110.84

*Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; * CC means with climate change scenario. *Negative values mean either decline in exports or increase in imports, positive values mean either increase in exports or decline in imports. If values are less than -100, there are shifts from net importer to net exporter (or from net exporter to net importer). Source: IMPACT-Phil simulations.*

Annual Per capita food consumption is projected in increase in both scenarios, a little higher for AMIA Enterprise, though still fails to fully compensate for the effects of climate change – prices of food remains high. Daily calorie consumption is to increase slightly by 1%, while the number of undernourished individuals is to decline by 3.78% and number of malnourished children reduced by 1.6% (Table 22)

Table 22: Comparative Impacts of AMIA Plus Investments vs AMIA Enterprise Investment Options on Selected Food Security Indicators in the Philippines by 2050

Food commodities	2020 Values	2050 with CC Effects	Technology and Rural Enterprise Development		% change from CC Effects	
			AMIA Plus	AMIA Enterprise	AMIA Plus	AMIA Enterprise
Annual Consumption	---------- kg per capita/year ----------				percent	
All meat products	37.0	49.9	50.0	50.0	0.30	0.31
Beef	6.7	10.5	10.5	10.5	0.16	0.16
Mutton/Goat meat	0.6	1.0	1.0	1.0	-0.06	-0.06
Pork	19.7	24.9	24.9	24.9	0.26	0.28
Poultry meat	10.0	13.6	13.7	13.7	0.50	0.49
Dairy	17.0	19.9	20.0	20.0	0.26	0.26
Eggs	4.8	6.6	6.7	6.7	0.73	0.76
All cereals	170.6	174.9	177.5	177.6	1.49	1.52
Corn	14.3	12.5	12.6	12.6	0.89	0.90
Rice	127.8	118.4	119.9	120.0	1.31	1.35
Wheat	27.9	43.5	44.5	44.5	2.14	2.17
Other foodcrops	4.1	4.1	4.1	4.1	1.54	1.57
Fruits and Vegetables	177.0	206.0	208.2	208.3	1.07	1.12
Oilseed crops	5.4	5.9	6.0	6.0	1.80	1.90
Pulses	1.8	2.2	2.2	2.2	0.43	0.43
Roots and tubers	27.7	26.5	26.8	26.8	1.07	1.09
Sugar	26.1	30.3	30.5	30.5	0.58	0.61
Food Security and Nutrition						
Consumption (*Kcal/day*)	2,721	2,915	2,946	2,947	1.06	1.10
Undernourished (*million*)	9.1	8.8	8.50	8.49	-3.66	-3.78
Malnourished children (*million*)	3.5	2.5	2.47	2.46	-1.20	-1.60

Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2; CC means with climate change scenario. SOURCE: IMPACT-PHIL SIMULATIONS.

4.3.4 Economic and Environmental Health

The overall impact of the investment options on society's welfare are summarized in Table 22. Society gains in both scenarios – with AMIA Enterprise investment option to have total economic surplus amounting to US$ 63.4 billion for the 25-year period, equivalent to US$2,535 million per year, around 42% higher compared to AMIA Plus. This projected economic gains from AMIA Enterprise investment are much higher than the losses inflicted by climate change. Producers get the most benefits due to increases in productivity, while consumers are slightly benefitted since food prices remain expensive. AMIA Plus investment is projected to gain US$1,773 million per year of total economic surplus, which can fully compensate for losses from climate change.

Table 23: Changes in Society's Welfare Due to Climate Change, World and Philippines, 2025-2050

Climate models	Welfare Measure		
	Producer Surplus	Consumer Surplus	Total Economic Surplus
	net present value (billion US dollars)*		
Impact of Climate Change			
World	**2,968**	**-5,703**	**-2,734**
Philippines	**62.9**	**-80.2**	**-17.2**
Annualized value (US$ million)	**2,517**	**-3,207**	**-690**
Impact adaptation to of Climate Change			
AMIA Plus	**9.2**	**35.1**	**44.3**
Annualized value (US$ million)	**370**	**1,404**	**1,773**
AMIA Enterprise	**27.2**	**36.2**	**63.4**
Annualized value (US$ million)	**1,086**	**1,449**	**2,535**

Note: Results are averages of 3 climate models UK-ESM, EC Earth and MPI-ESM under RCP 8.5 and SPP2. SOURCE: IMPACT-PHIL SIMULATIONS.

5 POLICY RECOMMENDATIONS

The report has shown the urgency of putting in place appropriate policies and strategic investments on making agriculture and the food system more resilient, competitive and sustainable to be able to counter the intensifying effects of climate change and climate shocks, and other potential or unexpected political and economic upheavals, locally or globally, that can disrupt the food systems.

There are two sets of policies and strategic investments this study recommends.

1. to continue, improve, repurpose or rationalize – past and current policies and investments that contributed (or could have contributed to the resiliency, competitiveness and sustainability of the agriculture sector; and
2. to step-up a notch in the next 15 years into a more comprehensive policy and investment framework that includes institutional and market mechanisms and incentives – to prepare the agriculture sector in meeting up future challenges and to remain resilient, competitive and sustainable in the next decades to 2050.

5.1 Key Policy Recommendations from the Study

5.1.1 Step-up Into a More Comprehensive Policy and Investment Framework

To prepare the agriculture sector in meeting up to future challenges and to remain resilient, competitive and sustainable in the next decades to 2050, two alternative investment options were developed and analyzed, and both were shown able to fully compensate for the impact of climate change and similar shocks to the food systems. They both include institutional and market mechanisms and incentives.

Adoption of AMIA Enterprise Investment Strategy

Both AMIA Plus and AMIA Enterprise investment options are able to fully compensate for the impact of climate change and similar shocks to the food systems in the near future. However, the AMIA Enterprise investment option is designed to have stronger institutional mechanisms and more attractive market-based incentive systems.

Whereas the AMIA Plus Investment Strategy

- is based on technological response to climate change to develop site–specific climate-smart agricultural technology packages for smallholder farmers.
- at its core is to enhance the agricultural (R&DE) capability of the national agricultural research system (NARS).
- includes the development of domestic seed industry and other input markets (e.g., fertilizer, chemicals, and farm machinery), veterinary services, IT-based information support, market information, weather early-warning system, crop insurance, credit facilities, and extension services, as its Institutional and market mechanisms.

The AMIA Enterprise Investment Strategy, on the Other Hand

- is an adaptation option based on institutional response to climate change aimed at mobilizing rural communities and the strengthening of agriculture-based organizations and institutions, to complement CSA technology development and extension.
- is the more comprehensive adaptation option that shares most of AMIA Plus components, including agricultural R&DE and the critical ancillary support services, and
- adds the development and operation of community-based agribusiness enterprises around the country, where farmers and farmers associations hold ownership and financial stakes.

(Note that although presented as alternative investment options, the AMIA Plus and AMIA Enterprise options can be both operationalized, as a two-pronged approach, sequentially (AMIA Plus first followed by AMIA Enterprise) or simultaneously (in separate provinces).

5.1.2 Invest in Developing a More Comprehensive and Detailed Roadmap

Although this report includes a *Roadmap* to the implementation of AMIA Plus/AMIA Enterprise investment framework, a more detailed study is needed to prepare a comprehensive investment and implementation "Roadmap Towards Resilient and Sustainable Food SYSTEMS " based on AMIA Plus/AMIA Enterprise investment framework.

This document can serve as basis for:

- Coordinated longer-term planning by the different government Department and Institutes
- Investment planning with international donors and funding agencies.

5.2 AMIA Plus/AMIA Enterprise Implementation Roadmap

The implementation roadmap for AMIA Plus and AMIA Enterprise investment options focuses only on sequential and simultaneous phasing of their respective activities and milestones. Although the phases (i.e., Phases I to III) are arbitrary to coincide with common practice of having plans in 5-year steps (e.g., 5-year short-term plan, 10-year medium-term plan, etc.).

The first phase (Phase I) starts in 2023 to 2025, while Phase II is for the period 2026-2030, and Phase III for 2031-2035 (Table 24). Phase I activities basically include assessments (e.g., assessment of technology stock), soft-implementation of activities (e.g., input industry development, financial and technical support systems), consolidation and strengthening (e.g., of the NARS and extension agencies), pilot testing of new system (e.g., drip irrigation and hydroponics systems, and solar pump). Phase II, on the other hand, mostly involves the start of hard or full-implementation of most activities for both AMIA Plus and AMIA Enterprise options.

The roadmap includes the implementation of four broad categories of activities: 1) technology development; 2) ancillary support; 3) development of institutions and markets; and 4) investment in infrastructure. Activities and milestones under technology development categories include - technology stock assessment, research and technology development, field testing of potential technologies, technology packaging by commodity or cropping system, technology promotion and

dissemination, technology adoption and wider application, and maintenance research to sustain and maintain productivity gains of the technology.

The ancillary support system includes the development of input industry, such as seeds, fertilizers, chemicals, and other material inputs; establishment of financial support such as crop insurance and credit facilities; and technical extension services. Development of institutions and markets concerns the strengthening of the national agricultural research system (NARS), the consolidation of extension services from various institutions, and the establishment of rural enterprises.

The establishment of rural enterprises is key in the AMIA Enterprise investment options and distinguishes it from AMIA Plus. Whether from conversion of existing agricultural cooperatives or by creation of new rural enterprises – they are to run as on-going business concerns, owned and managed by farmers, or by farmers-designate management teams. These rural enterprises are aimed to make food production competitive and profitable for smallholder farmers by engaging in various value-adding activities, such as input and output marketing; operation of processing, storage and marketing facilities; contract farming with farmers; and participation in the export-import markets. They can also serve as partners and providers of critical technical extension services, thereby delivering timely and effective technical advice to farmers.

Investment in infrastructure is mostly concerned with the modernization of the country's irrigation system that includes increasing basin efficiency to support the field-level water-use technologies. They also include the pilot testing and subsequent wider implementation of drip irrigation and hydroponics systems and solar irrigation pumps on smallholder farms. However, investment in IT-based infrastructure holds the highest potential as catalysts to the widespread dissemination and adoption of AMIA Plus/AMIA Enterprise technologies.

Table 24: Phasing of Implementation Activities and Milestones of AMIA Plus and AMIA Enterprise Investment Options, 2025-2040

Investment Options, Activities, Milestones, Roadblocks	Phase I - 2023-2025			Phase II - 2026-2030					Phase III- 2031-2035				
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
AMIA Plus/AMIA Enterprise and AMIA Enterprise only													
Technology Development													
Technology stock assesment													
Technology development													
Field testing of technologies													
Technology packaging													
Technology promotion													
Technology adoption													
Maintenance research													
Ancillary Support System													
Input industry development													
Seed, fertilizer and chemicals													
Financial support system													
Crop insurance, credit facilities													
Technical support system													
Extension services													
Institutions and Markets													
Strengthening of the NARS													
Consolidation of extension institutions													
Establishment of rural enterprises													
Conversion of cooperatives to rural enterprises													
Business operation of rural enterprises													
input and output marketing services													
ownership of processing, storage and marketing facilities													
entering into contract farming agreements													
participation in export-import markets													
Extension partners of government institutions													
Investment in infrastructure													

Modernization of irrigation													
Increasing basin efficiency													
Retrofitting for drip irrigation and hydroponics													
Piloting of drip irrigation system													
Expansion of drip irrigation system													
Piloting of hydroponics system													
Expansion of hydroponics system													
Piloting of solar irrigation pumps													
Expansion of solar irrigation pumps													
IT-based extension infrastructure													

Note: Black texts are applicable to both AMIA Plu and AMIA Enterprise, while red texts are applicable toAMIA Enterprise only

= full implementation

= soft implemetation

Source: Authors' depiction

6 REFERENCES

Alston, J.M., P.W. Norton, and P.G. Pardey. 1995. "Science under Scarcity: Principles and Practice for Agricultural Research Evaluation and Priority Setting." London, UK, and Ithaca, NY: Cornell University Press for the International Service for National Agricultural Research. https://www.cabi.org/bookshop/book/9780851992990/

Das, R., et al., 2016: Impact of heat stress on health and performance of dairy animals: a review. Vet World, 9(3), 260–268, doi:10.14202/vetworld.2016.260-268.

FAO. 2021. *Global Dialogue on the Role of Food and Agriculture in the Post-2020 Global Biodiversity Framework*.

FAO (Food and Agriculture Organization of the United Nations). 2020. FAOSTAT [database]. http://www.fao.org/faostat/en/#home

FAO (Food and Agriculture Organization of the United Nations). 2020. AQUASTAT [database]. http:// www.fao.org/aquastat/en/#home

FAO, 2019. Developing Sustainable Value Chains for Small-Scale Livestock Producers, Animal Production and Health Guidelines, Rome.

FAO, 2017. Climate-Smart Agriculture Sourcebook, Summary, Second Edition.

Godde, C.M., et al., 2021: Impacts of climate change on the livestock food supply chain; a review of the evidence. Glob Food Sec, 28, 100488, doi:10.1016/j.gfs.2020.100488.

Nelson, G. C., Rosegrant, M. W., Palazzo, A., Gray, I., Ingersoll, C., Robertson, R., Tokgoz, S., Zhu, T., Sulser, T. B., & Ringler, C. (2010). *Food security, farming, and climate change to 2050: scenarios, results, policy options* (Vol. 172). Intl Food Policy Res Inst.

Nhemachena, Charles, and Rashid Hassan. 2007. *Micro-Level Analysis of Farmers Adaption to Climate Change in Southern Africa*. Intl Food Policy Res Inst.

Nin-Pratt, A., H. El-Enbaby, J.L. Figueroa, H. ElDidi, and C. Breisinger. 2018. "*Agriculture and Economic Transformation in the Middle East and North Africa: A Review of the Past with Lessons for the Future*. Food Policy Report. Washington, DC: IFPRI; Rome: FAO. https://doi.org/10.2499/9780896292956

Perez, Nicostrato D et al. 2021. *Climate-Resilience Policies and Investments for Philippines's Agriculture Sector: Sustaining Productivity and Food Security*. Intl Food Policy Res Inst.

Perez, N.D., and M.W. Rosegrant. 2018. "A Partial Equilibrium Approach to Modelling Alternative Agricultural Futures under Climate Change." In *The Future of Philippine Agriculture under a Changing Climate: Policies, Investments and Scenarios*, eds. M.W. Rosegrant and M.A. Sombilla, 450–491. Singapore: ISEAS–Yusof Ishak Institute.

Robinson, S., D. Mason d'Croz, S. Islam, T.B. Sulser, R.D. Robertson, T. Zhu, A. Gueneau, G. Pitois, and M.W. Rosegrant. 2015. "The International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT): Model Description for Version 3." IFPRI Discussion Paper 1483. International Food Policy Research Institute, Washington, DC. http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/129825

Rosegrant, M.W., J. Koo, N. Cenacchi, C. Ringler, R.D. Robertson, M. Fisher, C.M. Cox, K. Garrett, N.D. Perez, and P. Sabbagh. 2014. *Food Security in a World of Natural Resource Scarcity: The Role of Agricultural Technologies*. Washington, DC: IFPRI.http://dx.doi.org/10.2499/9780896298477

Swinnen, Johan, Channing Arndt, and Rob Vos. 2022. "Climate Change and Food Systems: Transforming Food Systems for Adaptation, Mitigation, and Resilience." *IFPRI book chapters*: 6–15.

World Bank. 2020. World Development Indicators [database]. Accessed at https://databank.worldbank.org/source/world-development-indicators

World bank, Data https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=E.G.,

WorldClim 2.0 Dataset online

Appendix A: Supplementary Tables and Figures

Table 25: Differential Impact of Technology Package Development Scenarios on Crop Area/Animal in Philippines by 2050

Food commodities	2050 with CC Effects	Technology, Infrastructure and Market Devt			% change from CC Effects		
		R&D (Crop-Livestock)	Irrigation Devt*	Market & Value Chain**	R&D (Crop-Livestock)	Irrigation Devt*	Market & Value Chain**
Area/Number	----------000 heads or 000 ha ----------				percent		
All meat animals	612,392	648,736	618,359	624,132	5.93	0.97	1.92
Cattle	1,794	1,900	1,811	1,824	5.92	0.95	1.64
Sheep/Goat	6,125	6,409	6,109	6,151	4.64	-0.27	0.41
Swine	24,432	25,576	24,388	24,724	4.68	-0.18	1.20
Poultry	580,040	614,851	586,051	591,434	6.00	1.04	1.96
Dairy cows	8	8	8	8	6.67	1.63	2.75
Layers	326,422	339,778	324,238	328,569	4.09	-0.67	0.66
All cereals	7,288	7,312	7,441	7,203	0.33	2.11	-1.17
Corn	2,710	2,722	2,695	2,680	0.42	-0.57	-1.11
Rice	4,578	4,590	4,747	4,523	0.27	3.69	-1.20
Other foodcrops	642	645	643	634	0.38	0.19	-1.24
Fruits	1,683	1,688	1,677	1,665	0.27	-0.38	-1.10
Vegetables	864	872	866	856	0.86	0.17	-0.95
Oilseed crops	3,873	3,819	3,939	3,973	-1.39	1.69	2.59
Pulses	85	86	85	84	0.57	-0.16	-1.93
Roots and tubers	387	387	387	385	0.07	-0.14	-0.59
Sugar	722	708	736	733	-1.89	1.91	1.57

Note: Results are averages of 3 climate models under RCP 8.5 and SPP2; NoCC means no climate change that serves as the counterfactual scenario. SOURCE: IMPACT-PHIL SIMULATIONS.

Appendix B: Methodology - Biophysical and Economic Modeling

This report is tasked to identify and recommend investment policy options for building long-term resilience in Philippines's agri-food system. And in the process highlight opportunities for adaptation to climate change which are highly correlated to mitigation and GHG emission reduction (i.e., decarbonization). Especially in the context of global and national economic recovery post pandemic and regional conflicts. Corollarily, these adaptation policies and investment strategies need to be institutionalized in the national and local units of the government and fully mainstreamed in the development planning activities.

Other subsequent goals in support of the main objective include:

- To provide analytical insights on possible agricultural support measures that could lead to the *triple-win nexus* of productivity, livelihood and household income, and resilience and sustainability) in Philippine agri-food systems.

- To contribute to the ongoing dialogue with the government on green, resilient and sustainable food systems transformation.

- To contribute to the move toward a greener, more resilient, and sustainable development path for reduction in GHG emissions from agriculture, by leveraging the agriculture sector for livelihood and household income opportunities.

- To evaluate policy incentives to scale-up climate-smart technologies and practices in Philippines' agriculture, under a broad theme of food systems assessment.

The key beneficiaries for the proposed policy-focused activity include the (i) the Climate Resilient Agriculture Office of the Department of Agriculture (DA-CRAO) a leading government agency for planning and coordination of high level government policies, including those related to climate change adaptation and mitigation; (ii) the Department of Environment and Natural Re3sources (DENR); (iii) the Local Government Units (LGUs) for coordinating the implementation of climate-resiliency program; (iv) academic and expert community of Philippines interested in the results of climate policy-focused analytics.

IMPACT – A Suite of Linked Biophysical and Economic Models

To facilitate achievement of these objectives, we calibrated a Philippine version of the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT-Phil) that can be maintained and further developed in-house by the DA-CRAO. The simulations of potential investment policy options were implemented with the IMPACT-Phil version depicted in Figure B1. It is the main modeling framework used in this study to: first, estimate the impacts of climate change on the agriculture sector; and next, to determine the effectiveness of adaptation response policies designed to counter them, and promote the building-up of long-term resiliency and sustainability in agriculture.

IMPACT-Phil combines biophysical models (climate, hydrology, and crop growth) with economic models to project water and food supply and demand as well as food trade and prices under climate change. The water models, informed by the climate models, estimate the changes in the

supply of water from various sources and allocate available supplies to different users, including households, industry, livestock, irrigation, and the environment. The IMPACT-Phil economic model simulates national and global markets for agricultural production, demand, and trade that are associated with 62 agricultural commodities across 158 countries and regions.

The Core Multi **Market** Model

The core multimarket model simulates the operation of national and international markets, solving for production, demand, and prices that equate supply and demand across the globe. The core model is linked to a number of modules that include climate models (Earth System Models, ESMs), water models (hydrology, water basin management, and water stress models), crop simulation models (for example, Decision Support System for Agrotechnology Transfer [DSSAT] used in this study), value chain models (for example the ADAPTs to be developed in the next phase of the study), and post-processing models of land use (pixel-level land-use, cropping patterns by regions), nutrition and health models, and welfare analysis (see Figure B 1).

In addition, a dynamic computable general equilibrium model for the Philippines (Phil-DCGE) model that covers the entire economy, to complement the partial equilibrium multimarket model in the analysis of long-run trends under climate change, may be added to the IMPACT modules.

Supply and Demand Functions

Although complex in structure with various biophysical and economic modules – at its core, IMPACT-Phil has very simple framework, organized around a global multimarket model of agricultural food production, demand, trade and prices. The multimarket model simulates the operation of national and global markets for agricultural commodities that specifies supply and demand behavior in all markets. Thus, solving for market-clearing prices and quantities, implemented by iterative readjustment of supply and demand at the national levels first and then at the global level – until world supply and demand balance, intersecting at equilibrium world price, where global net trade equals zero.

As core supply and demand functions for food commodities, the component modules serve as either supply shifters or demand shifters. The climate model with crop model, for example, together determine the changes in yield and production due to climate change – and thus serve as supply shifters. The macroeconomic inputs of population growth, income/GDP growth and employment, and changes in preferences for food, on the other hand, serve as demand shifters.

The IMPACT-Phil model system integrates information flows among the component modules in a consistent equilibrium framework that supports longer-term scenario analysis. Some of the model communication is one way, with no feedback links (for example, climate scenarios to hydrology models to crop simulation models), while other links require capturing feedback loops (for example, water demand from the core multimarket model and water supply from the water models must be reconciled to estimate water-stress impacts on crop yields (for details see Robinson *et al.* 2015 http://ebrary.ifpri.org/cdm/ref/collection/ p15738coll2/id/129825).

Data and Calibrations

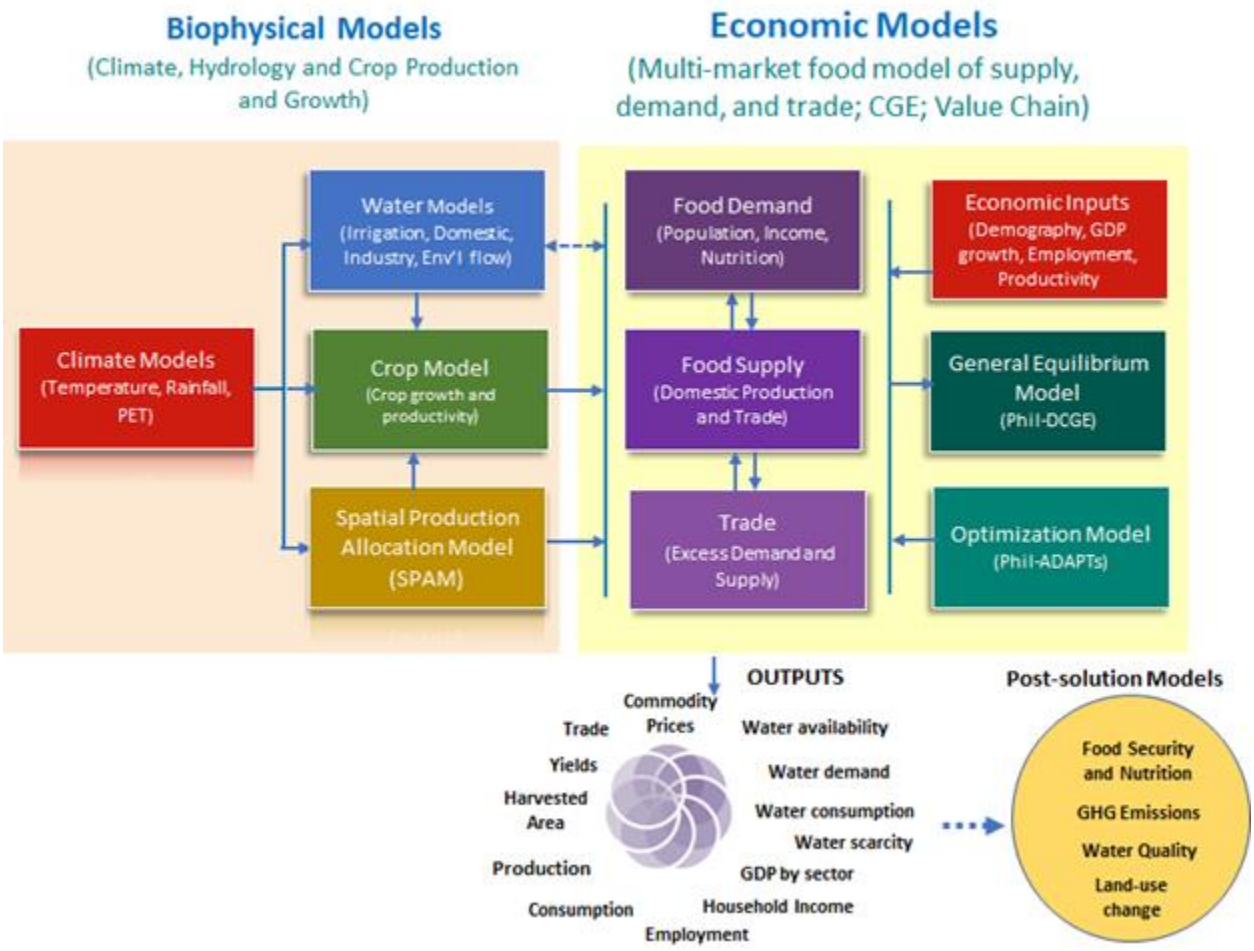
IMPACT-Phil as a global model, requires data sources that provide, at a minimum, comprehensive information about 168 countries and regions, and 62 agricultural commodities. Dataset on food supply (i.e., crop area/ animal stock; production; yields, trade); and food demand

(i.e., food and feed demand, other uses [bio-fuel, seeds, industrial], and prices) were mainly from FAOSTAT; while data and projections of population and GDP are based on Shared Socio-economic Pathways (SSPs) assumptions taken from IIASA Database (SSP Database (iiasa.ac.at)) collected from various sources. Projections of spatially (grided) downscaled climate data on precipitation and temperature are from WorldClim.

Since there are no data sources and studies that can provide income and cross- and own-price elasticities for all food items in all countries and regions, they were initially taken (in 1995) from available country studies and meticulously applied to countries and regions with similar income levels and demographics. Backward validations and adjustments were then done to approximate country-level historical data and global closure conditions of zero net trade and one price. In the updated IMPACT-Phil version (2014) especially calibrate4d for the Philippines, the price and income elasticities were validated and oftentimes adjusted by experts from various CGIAR centers until found to be sensible approximations, and that model simulation should also result to sensible country-level and global projections of supply, demand and trade. Same type of expert calibrations were done for country-level crop and livestock productivity growth rates.

Base-year for IMPACT-Phil is 2020 (data are averages of 2019-2021). This is the year where values of endogenous and exogenous variables, parameters, and coefficients populated the model. Area, production, yields, trade and prices are all endogenous to the model, so are demand and consumption.

Figure B 1: Graphic Representation of Suite of Biophysical-Economic Models



Source: Authors' depiction of IMPACT model

For Philippines the model was calibrated to approximate the 2020 values of the endogenous variables by recursively adjusting the relevant elasticities and growth rates – while maintaining the country-level and global integrity of model projections.

Use of IMPACT-Phil in Climate Change Modeling

Changes in temperature and rainfall patterns brought by climate change alter crop yields both directly and indirectly via changes in water availability for irrigation. Livestock productivity is indirectly affected by changes in feed availability. Direct heat stress on livestock is not yet considered in the model. The biophysical and economic effects of climate change were estimated with the UKES, EC Earth, and MPI-ESM climate models (temperature, rainfall, and PET), the DSSAT crop model (yields, temperature stress, water stress), and the IMPACT-Phil water module (availability of irrigation water and water demand). All under the representative concentration pathways (RCP) 8.5 of GHG emissions, and shared socioeconomic pathways, SSP2, population and GDP assumptions (IIASA 2015, 2018).]

INSTITUTIONALIZATION OF CLIMATE RESILIENT AGRICULTURE

GENDER ACTION PLAN FOR CLIMATE RESILIENT AGRICULTURE IN THE PHILIPPINES

2024

INSTITUTIONALIZATION OF CLIMATE RESILIENT AGRICULTURE

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2024

Prepared by TRTA Consultant under

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ACRONYMS

A&F	-	Agriculture and fisheries
AFE	-	Agriculture and Fisheries Extension
AMIA	-	Adaptation and Mitigation Initiative in Agriculture
AMIA CREATE	-	Adaptation and Mitigation Initiative in Agriculture-Climate Resilient Agri-Fishery Technology-Based Enterprise
ATI	-	Agricultural Training Institute
CIS	-	Climate Information System
CRA	-	Climate resilient agriculture
CRAO	-	Climate Resilient Agriculture Office
CRVA	-	Climate Risk and Vulnerability Assessment
CSO	-	Civil society organization
DA	-	Department of Agriculture
FAO	-	Food and Agriculture Organization of the United Nations
FGD	-	Focus Groups Discussion
GA	-	Gender Action
GAD	-	Gender and Development
GDFS	-	Gender and Development Focal System
GM	-	Gender mainstreaming
LGAP	-	Localized Gender Action Plan
MEL	-	Monitoring, Evaluation and Learning
NAFMIP	-	National Agriculture and Fisheries Modernization and Industrialization Plan
NGO	-	Non-government organization
PDP	-	Philippine Development Plan
PFSI	-	Philippine Food Security Index
PIP	-	Provincial Commodity Investment Plan
PCRVA	-	Participatory Climate Risk and Vulnerability Assessment
SDG	-	Sustainable Development Goal
SUC	-	State universities and colleges
RFO	-	Regional Field Office
UPLBFI	-	University of the Philippines Los Banos, Foundation Inc.
VC	-	Value chain
WG	-	Working Group

EXECUTIVE SUMMARY

In the Philippines, women farmers are recognized to not only play critical roles in household caring, food and nutrition security but also in agricultural production, community, and environmental protection. However, gaps remain in their access to and control of agricultural assets, inputs and services, which consequently limit their participation to value chain development with their limited agency and generally impeding gendered social norms, and policies and governance. They also face distinctive risks and vulnerabilities with changing economies and climate. Despite of this, women farmers have become integral parts in emerging good climate resilient agriculture technologies and practices in the country. Gender equality and women empowerment are crucial towards transformative and sustainable climate resilient agriculture (CRA).

The Adaptation and Mitigation Initiative in Agriculture (AMIA) Program is the flagship program of the Department of Agriculture (DA) through the Climate Resilient Agriculture Office (CRAO) that aims to build farming and fishing communities by ensuring that their livelihoods and enterprises are resilient to economic and climate shocks. The program offers twofold interventions: first are the local-specific CRA technologies and practices; the second is an integrated support to farmers and fisherfolk in building resilient livelihoods, enterprises, and communities through the establishment of AMIA-based villages and AMIA Climate Resilient Agri-Fishery Technology-Based Enterprises (AMIA CREATE). The composition of these villages varies from farmer associations to cooperatives, enterprises, irrigator associations, women-based organizations, farmer federations and others. Various interventions are provided to these villages to increase their incomes and productivity of farming and fishing livelihoods amidst climate change.

To facilitate this, the AMIA Agricultural Development Pathway has been developed. This Pathway presents the transition of AMIA villages from Phase 1 to Phase 2 where farmers and fisherfolk organize, test and practice CRA technologies. The goal is to transition these into Phases 3 and 4 where clustered or federated AMIA village are engaged in multiple income sources through farm/fish-based enterprises. With this framework, a total of 181 AMIA villages have been established across the country as of 2023 where about 27% are in Phase 1 (48), 55% in Phase 2 (100), 15% in Phase 3 (28) and 3% in Phase 4 (5). Many of those villages in Phase 1 are in Region III (Central Luzon), Phase 2 in Regions V (Bicol) and VI (Western Visayas) while those in Phases 3 and 4 in Region IV-A (CALABARZON).

In 2022-2023, DA-CRAO engaged the University of the Philippines Foundation, Inc. (UPLBFI) to assist in mainstreaming gender in CRA. The first project was on “Integrating Gender Considerations into the Development of Projects for Vulnerable Sectors in Selected AMIA Villages in the Bicol Region”. The AMIA villages involved were (i) Joroan, Tiwi, Albay, (ii) Alayao, Capalonga, Camarines Norte, (iii) Cagbunga, Pamplona, Camarines Sur, (iv) Biong, Gigmoto, Catanduanes, (v) Alas, Mandaon, Masbate, and (vi) San Isidro, Prieto Diaz, Sorsogon. The project has two level: (i) developing tailored-fitted and gender-sensitive interventions for women and men farmers and/or fisherfolk, and (ii) providing capacity-building activities for both AMIA extension staff and beneficiaries. These were achieved through (i) sex-disaggregated baseline data collection, (ii) gender analysis/capacity assessment, (iii) gender-responsive projects development, and (iv) capacity-building.

The second project entitled "Strengthening Selected AMIA Villages through Mentorship Program, and Establishment and Implementation of Gender-Sensitive Projects (Regions VI, VII, VIII and CAR) was implemented particularly in (i) Banga, Aklan, (ii) Sibunag, Guimaras, and (iii) Ponteverde, Negros Occidental in Region VI. Some of the salient features in this second project were: (i) it reviewed and improved the process of establishing new AMIA villages with gender lens, including testing the gender based participatory climate risk and vulnerability assessment data collection tool; (ii) the objectives were to development tailor-fitted interventions for women and men farmers-fisherfolk and other vulnerable groups in these regions, share best practices of Region VI to other regions (Regions VII , VIII and CAR) through leadership coaching and mentoring in building climate-resilient following AMIA's standards and processes, and conduct capacity-building of AMIA Regional Coordinators, extension staff and beneficiaries in these regions; and (iii) project highlights include the process documentation, training needs assessment, and monitoring and evaluation instrument, among others.

These experiences provide important lessons that DA-CRAO can build on as it continues to improve gender mainstreaming on CRA and in AMIA villages. These projects started to touch on other vulnerable sectors other than women; this provides an opportunity to go beyond gender and integrate Gender Equality and Social Inclusion (GESI) as a framework in CRA. Some of the lessons learned include:

- **Sex-disaggregated survey data on gender assessment** enables understanding on the similarities and differences between women and farmers in socio-demographic and economic profile. It also presents the statistics to see the variation by adaptation strategies by gender to further help in identifying interventions that are targeted, needs and gender based. Depending on the number of members per organization, the number of respondents may be expanded and close the gaps in terms of number between women and men respondents. It would also be good to discuss the sampling technique in the methodology to guide in the analysis (the extent of data coverage/representation). Data can also be further used in GESI analysis with basic variables from the same datasets such as age (to better understand youth), location (farmers in remote areas), ethnicity (indigenous and non-indigenous farmers), land ownership (as it influences long-term investments on farm) and others to generate important information on other vulnerable groups in the farming sector.
- The **use of the Kobo-Collect app in the survey is commendable** to simplify the process of data collection, management, processing and presentation. It also enables data sharing. CRAO may consider decentralizing the access of datasets; however, a mechanism has to be put in place considering the Data Privacy Act of 2012 with regards to disclosing respondents' personal information or perceptions.
- The addition of the **checklist in the Gender-Responsive Project Development activity in Region VI** is important as another layer to ensure the gender responsiveness of the prioritized interventions.
- **The Gender Analysis provides qualitative information** about gender roles, access to and control of resources, and others, which are important in designing extension and interventions. The GESI framework can be integrated with this analysis to uncover barriers that prevent, not only the women farmers but also other vulnerable groups in A&F sector, such as the youth, elderly, indigenous peoples, landless and many others,

from full access them from full access and participation to CRA related activities, and consequently find ways to overcome these.

- **The generated gender action plans on CRA in these villages reflect the importance of considering gender differences in A&F sector.**

There are opportunities to enhance gender mainstreaming on CRA at CRAO, such as the additions of: (i) gendered (inclusive) value chain development, (ii) gendered organizational assessment, (iii) gendered value chain analysis (vertical and horizontal links), (iv) genderizing the AMIA Agricultural Development Pathway, and (v) integrating gender-disaggregated baseline data with CRVA, climate information system and other decision-support tools to inform the localized gender action plans, among others. In the process of encouraging the participation and engagement of women and other vulnerable groups, such as youth, indigenous farmers, etc., the aim it to collaborate and work with them in each aspect of the decision including the development of alternatives and the identification of preferred solutions (Phase 3) and empower them by enabling them to make the final decisions for themselves and their AMIA villages (Phase 4).

With this background, this proposed gender action plan for CRA and AMIA villages is aimed towards **gender economic and social empowerment in AMIA villages and climate resilient agriculture and fishery sector strengthened**. For the immediate first two years (April 2024-March 2026), there are two expected outputs on localized gender responsive action plans and gendered CRVA.

To achieve the Expected Output 1: localized gender responsive action plans in AMIA villages in Phases 3 (50% of 28) and 4 (100% of 5) and 15% of AMIA villages in Phases 1 and 2 operationalized and accessible in CRAO website, the recommended steps are:

- **Action Area 1: Establishment of Regional Gender and Development Focal System** committees for Phases 3 and 4, including the local Gender Working Groups in AMIA villages and the implementation of a comprehensive capacity building program for them to implement Actions Areas 2, 3 and 4.
- **Action Area 2: Implementation of localized gender assessment at different levels.** At the household level, activities will include gender-disaggregated survey and Gender Analysis, GESI and VC analysis. These will be integrated in CRVA, CIS and other decision support tools of CRAO to inform Action Areas 3 and 4. At the farmer association level, GESI-based organizational assessment will be conducted. At the community – AMIA level, these household and organizational assessments will be combined into AMIA village gendered baseline assessment reports.
- **Action Area 3: Development of localized gender responsive action plans.** Participatory planning workshops will be carried out to develop localized gender responsive action plans. The gendered baseline assessment reports and gendered CRVA, CIA and other tools will be used in the planning process to identify site-specific, and context based CRA interventions with gender and VC perspectives.
- **Action Area 4: Replication and upscale preparation and implementation of gender responsive action plans in AMIA Phases 1 and 2** as performed in AMIA Phases 3 and 4.

To achieve the Expected Output 2: Gendered data in CRAO's CRVAs integrated, the recommended action area is:

- **Action Area 1: Strengthen CRAO's GESI in CRA and AMIA villages.** This will include creating a GESI database (local gender assessments from Action Area 2), capacity building to integrate local gender assessment data in CRVA, CIS, DSS and others to inform local gender planning process (Action Area 3 and 4), creating database of gender sensitive CRA technologies, practices and crops, adapting and implementing gendered AMIA Agricultural Development Pathways, appointing more Gender Focal Points, and implementing a comprehensive CRA training with GESI and VC lenses to implement local gender assessments and localized gender action planning.

In Years 3 to 4 (March 2026 to April 2028), the actions areas for Output 1 will be more on (i) facilitating localized gender action planning to assist the remaining Phases 1, 2 and 3 AMIA villages develop their gender responsive action plans and (ii) rolling out the guidelines developed in integrating local gender assessments in CRAO's CRVA, CIS and other DSS tools to inform the gender action planning and other decision-making processes at AMIA villages and others. For Output 2, the databases established will be continuously updated while capacity building will also be continuously provided to CRAO staff and its local counterparts to be effective in extending extension support to AMIA villages. In addition, during this period, **Action Area 2 on Enabling environment on GESI and VC-development in CRA and DA.** This will include (i) enacting supportive policies, such as clustering of AMI villages to achieve economies of scale and further VC adding activities, etc. and (ii) implementing infrastructure such as irrigation facilities, training and demonstration farms, access to internet and mobile facilitated information, etc.

While CRAO will lead the implementation of these, the support of DA's top management and its bureaus (e.g., BSWM), institutes (e.g., ATI), offices (e.g. GAD, GESI) and its regional and LGU counterparts will be critical in terms of budget, human and technical resources. Similarly, the commitment of AMIA villages and local stakeholders, including NGOs, SUCs and private companies will be crucial in operationalizing their gender responsive action plans.

Ultimately, this action plan proposes mainstreaming gender and inclusive value chain in the effort of improving the integration of agricultural development and climate responsiveness, which are key preludes to achieving food security, poverty reduction and broader development goals amidst increasing food demand and changing climate.

1 INTRODUCTION

The long-term strategic development outcomes for the Philippines by 2040 are rooted towards building *Matatag* (strongly rooted)*, Maginhawa* (comfortable), and *Panatag* (secure) *na Buhay* (*Ambisyon Natin* 2040) (National Economic and Development Authority, 2023). To achieve this, the societal outcome as articulated in the **Philippine Development Plan (PDP)** for 2023-2028 is "to lay the foundation for inclusive growth, a highly-trust and resilient society, and globally competitive knowledge economy". At the agriculture sector level, the achievement of the PDP's outcome is anchored on the implementation of the Department of Agriculture's (DA) **National Agriculture and Fisheries Modernization and Industrialization Plan** (NAFMIP) for 2021-2030. It envisages the transformation of the agriculture sector into modern climate-resilient agro-based value chains (value chains) whose ultimate outcome is "a food-and-nutrition-secure, resilient Philippines with empowered and prosperous farmers and fisherfolk."

The Philippine Food Security Index (PFSI), a composite of four indices (affordability, availability, quality and safety, and sustainability and adaptation), serves as a barometer of how the country (and its agriculture sector) fared in terms of achieving food-and-nutrition security relative to the performance of other economies worldwide. In 2022, the PFSI ranked 67th out of 113 countries surveyed, which is below the global average of the Global Food Security Index[1]. Broken down by its four sub-indices, the country performed best in the availability sub-index because of the steady consumer price in 2022, low proportion of the population under the poverty line, and the relative ease of agriculture trade and a good food safety net program. This good performance rating in the availability sub-index was threatened however, in late 2022 to 2023 as regional and global food prices especially rice skyrocketed, largely due to the confluence of external factors, mainly the adverse climate change impacts, the prevailing COVID-19 pandemic, and the geopolitical Ukraine conflict. The weakest sub-index of the PFSI was the sustainability and adaptation category. Contributory factors for its lackluster performance were the exposure and threats to marine biodiversity, risks to the agriculture water supply and worsening land deterioration, low political commitment to adaptation, and weak governance in disaster risk management. The availability sub-index is the second weakest among the PFSI indicators, and this was due to the disruptions in the regional and global food logistics during the COVID-19 pandemic brought about by widespread work stoppages on the various nodes of the food supply chains. The PFSI likewise recorded lackluster scores on food quality and safety sub-index, which was reflected in the low dietary diversity especially among low-income Filipino food consumers who prefer relatively low-priced starchy foods, as well as the acute lack in micronutrient availability. These hampered the tackling of the structural problems on nutrient deficiency, resulting in sustained high stunting and wasting indicators.

There are **two strategic approaches that are embedded in the NAFMIP's outcome** statement that if implemented in tandem, can reverse the sector's poor performance in achieving the ultimate goal of food-and-nutrition security. These are gender empowerment and equality, and the

[1] https://impact.economist.com/sustainability/project/food-security-index/reports/Economist_Impact_GFSI_2022_Philippines_country_report_Sep_2022.pdf

development of climate resilient ago-based food and nonfood VCs. The Philippine government is committed to strengthening its efforts in achieving the Sustainable Development Goals (SDGs)[2] of sustainable development and leaving no one behind. Sustainable development requires that present agricultural development and response to climate change should never be at the expense of future generations, particularly women and other vulnerable sectors in the society. SDG 5 is about gender equality – a huge goal that positions gender in agricultural development among others as a key endeavor and priority for investment. In 2024, the DA stressed the importance of "a gender-inclusive and sustainable agriculture and fisheries sector (as pivotal in ensuring) empowered farmers and fisherfolk." As will be noted below, ample evidence illustrates the positive correlation of gender economic empowerment and social inclusiveness with the economic and sustainable growth of the agriculture sector.

To further deepen the gender perspective in the DA's programs, activities, and projects, two policy measures were introduced in 2023. The first dealt on the reconstitution of the DA's gender and development (GAD) focal point system for the central office, regional field offices, bureaus and attached agencies[3]. The second detailed the guidelines on gender mainstreaming (GM) strategies for the agriculture and fisheries extension (AFE) system[4]. The purpose of the first gender policy action is to ensure that there are specific management teams assigned in the DA's central and regional offices as well as in the bureaus and attached agencies who will be responsible for mainstreaming gender and development from planning to implementation as well as in budgeting and monitoring and evaluation. The purpose of the second Administrative Order is to integrate and operationalize "gender perspective into all aspects/stages of a program/project cycle so as to institutionalize gender equality and women's empowerment as integral aspects of the operation and culture of each AFE stakeholder." This policy action specified the key principles on GM, the GM strategies, the monitoring and evaluation of these strategies, and the communication plan.

Another strategic component of NAFMIP in the proposed sector's transformation into an agro-industry is the development of efficient climate-resilient agro-based food and nonfood VCs. There are triple wins on the promotion of climate-resilient agro-based VCs: productivity-enhancing, income-generating, and employment-inducing. Not only are higher productivity, and improved incomes and job creation achieved at the farm production systems but that these positive outcomes compound resulting from the upgrading of the nodal chain functions and products through the vertical coordination of farm-fishery/livestock production with their upstream (inputs), midstream (processing and storage), and downstream (marketing and logistics) nodes. Additionally, horizontal coordination or the organization of actors and stakeholders into collective action improves their bargaining leverage and leadership at the different value chain nodes and contribute significantly to sustaining these outcomes.

A myriad of targeted interventions is provided by the DA to facilitate value chain development. These include the construction of marketing and logistics facilities (warehouses, postharvest and

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[2] Particularly SDG 5 Gender equality, SDG 13 Climate action, SDG 14, Life below water, and SDG 15 Life on land.

[3] https://www.da.gov.ph/wp-content/uploads/2024/01/ao09_s2023.pdf

[4] https://www.da.gov.ph/wp-content/uploads/2024/01/ao09_s2023.pdf).

processing facilities, fish landing and trading centers), and farm-to-market roads; credit programs and financial grants; local and international promotion and strengthening of regional and global market access; meat establishment improvement programs and processing facilities; farm and fisheries clustering and consolidation; standards and development; capacity building interventions; and innovations through research and development.

One key flagship program of the DA that promotes climate resilient agriculture (CRA) and improves the risk governance and management of the farmers and fisherfolk is the adaptation and mitigation initiative in agriculture program (AMIA). The program offers twofold interventions: first are the local-specific CRA technologies and practices; the second is an integrated support to farmers and fisherfolk in building resilient livelihoods, enterprises, and communities through the establishment of AMIA-based villages and AMIA Climate Resilient Agri-Fishery Technology-Based Enterprises (AMIA CREATE). The latter transforms AMIA villages into market-oriented enterprises while scaling up efforts to ensure resilience of agri-fishery communities. The amalgam of market-oriented enterprises in AMIA villages can progress to climate-resilient VCs that form networks linking domestic rural and urban markets and the global markets. In the long-term, the proliferation of climate resilient and VC oriented AMIA networks can become one of the assured climate-resilient and sustainable agro-industrialization trajectories for the Philippine agriculture sector.

To ensure an inclusive agro-industrialization pathway, **the proposal of this action plan is to integrate and mainstream gender empowerment and social inclusion with the development of AMIA villages and AMIA CREATE**. To elaborate on this proposal, the discussion of this paper is as follows: the next section looks at gender, agriculture and climate situation in the country; this is followed by an elaboration of the AMIA program and the transformation trajectories. The framework integrating gender empowerment and social inclusion with climate resilient value chain AMIA villages and AMIA CREATE is then discussed. Applying the framework, two gender case studies in AMIA villages are first presented, to extract the good lessons learned from these studies and the potentials for replication and up-scaling gender mainstreaming to other AMIA village. These shall serve as guideposts for a gendered climate-resilient value chain AMIA villages. The last section proposes Gendered Climate Resilient and VC-Oriented AMIA villages and AMIA CREATE.

2 GENDER, AGRICULTURE AND CLIMATE CHANGE: THE PHILIPPINE SITUATION

2.1 Gender and Agriculture

Simply defined, gender refers to the characteristics of women and men that are socially constructed. This includes norms, identities, expressions, behaviors, and roles associated with being a woman or man. Gender influences how they view themselves and relate to each other – how they act and interact. It also affects the distribution of power and resources in society, as well as how they are recognized or rewarded. As it is a social construct, gender varies from one society to another and changes over time.

There are four gender dimensions as these relate to VCs: women's agency, access to and control over resources, gendered social norms, and policies and governance (Pyburn et. al., 2023). Women's agency is the ability to define one's goals and act upon them. Access to and control over key resources and inputs for agriculture VCs, mainly land, labor, credit, information, extension, training, and technology. Gendered social norms are collective beliefs of what are appropriate and acceptable behavior for women and men in a cultural group or part of society. Policies and governance deal with decision-making and changing power relations at the household level and nature and extent of participation in VC activities or community groups or organizations.

Gender equality and women empowerment are crucial towards sustainable and resilient agrifood systems that are transformational in nature (Food and Agriculture Organization [FAO], 2023). Transformational change entails doing things differently, which requires a complete change in a system to bring huge improvements. This message is a key follow up to FAO's earlier study (2012), which emphasized the need to close the existing gaps in accessing agricultural assets, inputs, and services because of its negative impact not only to women but also for agriculture and the broader economy and society. This is because women's access to land, water, financial capital, and knowledge remains limited in many countries, such as the Philippines. These limits and lowers their productive agricultural capacity and incomes and hinders their effective management of natural resources.

In the Philippines, it is recognized that women not only play critical roles in household caring, food and nutrition security but also make essential contributions to agricultural production, community, and environmental protection (Javier et al., 2010). Although women are not counted in the official statistics, women's role in vegetable farming and pesticide use is crucial causing them occupational health issues (Lu, 2010). With men out-migrating for better income, women take responsibility on productive farming work (Tatlonghari & Paris, 2014; Lukasiewicz, 2011).

A growing body of empirical evidence also shows that understanding and mainstreaming gender differentials in agriculture have long-term and high impacts in agricultural development programs and projects (Mishra et al., 2017; Javier et al., 2010; Lu, 2010). Such understanding and efforts to mainstream gender in agriculture are keys in upholding the principles of gender equality and social inclusion (GESI). Local experiences also reveal that effective mitigation and adaptation to the impacts of climate change uphold these principles (Chandra et al., 2017; Tatlonghari & Paris,

2014). GESI are fundamental tenets of an enabling environment for VC development and CRA (ADB, 2020).

However, despite the recognized significant contributions of women in the agriculture sector, gender inequality persists in the country's agriculture sector:

- There is a big wedge between women and men who are employed in the sector: in 2019, 7.46 million are males, while there were just 2.24 million female workers (Philippine Statistics Authority, 2022). These labor force figures do not record the unpaid household and caring work of women, the retailing and marketing for domestic and informal markets particularly near farm centers, and the work in planting, weeding, and harvesting as well as post-production activities in threshing and processing.
- There is a wage differential with men's earnings being more than the women's take-home pay.
- Women are disadvantaged with regard ownership and control of productive land assets and capital due to property rights and inheritance laws. Land is a key resource in farming and ownership comes with decision-making in cultivation. In 2015, in the survey of distribution of agricultural landholders in 14 Asian countries, including the Philippines, about 89% were men and only a fraction (10.9%) were women (Dela O Campos et al. 2015; FAO, 2018). This shows differences in women and men's land ownership. Differences can also be observed in access to livelihood assets, gender roles, and soil perception that could have implications in the adoption of conservation agriculture (Park et al., 2014).
- Differences are likewise manifested in their access to and use of agricultural inputs, improved and gender-appropriate technologies, market and credit access, and human capital among others (Mishra et al., 2017). These contribute to significant gender gaps in farm productivity and earnings.
- Because of social norms and differing access to important resources, men and women have different capacities to mitigate risk and respond to disturbances. These responses include absorptive, adaptive, and transformative capacities.
- Women's participation in agriculture training has been limited; there is also lack in registration in the Registry System for Basic Services in Agriculture, and they have inadequate representation in farmers' and marketing groups, thus limiting their ability to capture the gains from commercialization.
- Women are over-represented in micro and small agriculture trading and marketing activities which generate lower sales and profits.
- Studies have shown that adoption of agricultural technologies are not developed with women's preferences and their constraints are properly considered.
- Women are concentrated in activities where entry barriers and returns are low, while men tend to be over-represented in value chain nodes with high entry costs and high returns.

- Women have limited mobility and thus are restricted to activities proximate to their homes. Often, women because of lack of mobility combine productive work with their domestic household work.

Several studies acknowledge that addressing the specific constraints faced by women farmers can enhance agricultural productivity and improve development outcomes. women were found to have higher values of rice production, have higher seed and labor costs and gains lower net profit, but are most likely to adopt improved seed varieties (Mishra et al., 2017). This strengthens the need for transformational change towards gender equality that can lead to agricultural productivity gains where women's increased access to and use of resources can facilitate higher economic growth and a better quality of life.

2.2 Gender-based Climate Vulnerabilities and Impacts

There is an integral connection between gender and climate, and gender relations are an integral part of social transformations that relate to climate change (Pearse, 2016). As such, recognizing gender vulnerabilities and impacts is vital. Moreover, gendered impacts of climate-related disasters and hazards are site-and-context-specific and are often influenced by normative expectations about their roles in society. In Nueva Ecija, the gendered vulnerabilities to extreme flooding events are influenced by the traditional roles in reproductive and productive dimensions, as well as in women's lack of access to resources and assets (Tatlonghari & Paris, 2014).

Women farmers also face distinctive risks related to climate-induced resource scarcity. For example, water and fuelwood are basic needs in farming households. Unfortunately, these are among the most climate-affected resources with the greatest impact and consequential effect to the most vulnerable members of the community as they need to walk long distances and carry heavy loads for these resources (Yadav & Lal, 2018). Scarcity of these means more labor and time in collecting water and fuel wood in further sources and entails physical strain and risks with distance. These vulnerabilities and risks to climate change are worsened by poverty, especially in conflict-stricken parts of the country like in Mindanao (Chandra et al., 2017).

Women and men farmers' response to the impact of climate change differs, which is based on their traditional roles and gender relations (Tatlonghari & Paris, 2014). Although women, elderly, and children suffer more during and after climate-induced disasters (e.g. flooding and drought), they need to endure such vulnerabilities as they serve as caretakers of those affected by disasters despite themselves being affected already (Rahman, 2013). This substantially increases their emotional, material, and physical stresses. Similarly, apart from physical, social, economic and political advantages, men, in general, have plenty of time available to cope with climate-related vulnerabilities as they do not have regular reproductive responsibilities compared to women (Damptey & Essel, 2012). These situations proved the resilience of women and other vulnerable groups of the society that needs collective actions to help them confront the impact of climate extremes.

In recent years, CRA emerged as a strategy to enhance the resilience of farmers with changing environments (Rai et al., 2018). CRA technologies and practices are low-emission technologies that aim to improve food production while enhancing resilience. It follows several practices, such as cultivating drought-tolerant varieties, organic farming, diversifying crops, soil and water conservation measures, integrating trees on farms and others (Srivastav et al., 2021).

In the Philippines, women farmers are integral parts of these practices in agriculture, yet their roles in agricultural production systems and the complex gender relations that shape access to resources, and economic opportunities have received minimal attention. For example, although coffee farming in the Philippines is dominated by men, women participate in harvesting cherries (75%), drying (67%), and selling (60%) (Deluna 2023).

The ways women respond to these show that actual adaptations exist, which are varied and specific to their sites and socioeconomic and cultural contexts. Experiences show that while gendered impacts of climate change include normative disruptions to personal and economic life that led to new forms of gender inequality, it also poses possibilities for resilience (Crease et al., 2018) and social change (Tatlonghari & Paris, 2014). Thus, strengthening climate resilient agriculture is critical to enhance gender equality and reduce the impacts of climate change.

Some of these gender responsive CRA practices are discussed below:

- Experiences in Asia, Africa, and Latin America reveal the importance of co-production of knowledge through the climate-smart village approach where the use of participatory methods enable farming communities, scientists, policymakers, and other stakeholders engage in **research for development** to test or develop technologies, policy and institutional options to better deal with the impacts of climate change (Agarwal, et al. 2018). **Understanding on women and men's perceptions on agriculture** can help make interventions more gender responsive. For example, while profitability was the main consideration for adopting agroforestry systems in Bukidnon where crop-based farms was perceived as more beneficial by both men and women, fruit trees are preferred by men, while plantation crops and timber trees for women farmers (Ureta et al. 2016). This shows the importance of research that is gender-based to understand the intersectionality of gender, agriculture and climate change, which consequently helps in providing more gender-responsive interventions.
- **Changing women's roles requires also changing the roles of men** to avoid multiple burdens to the former. In Nueva Ecija, rice farmers are exposed to climate hazards (e.g. flooding) and have limited access to assets and resources. These have changed not only women's source of livelihood but also the husbands and wives gender roles and relations where women spend more time doing non-farm work while men assume household and childcare responsibilities (Tatlonghari & Paris, 2014).
- Involving women and other vulnerable groups in planning and decision-making process helps in **identifying and introducing gender sensitive CRA practices.** In the Philippines, gender-sensitive practices that promote climate smart agriculture was implemented in Benguet (e.g. crop-livestock integration, greenhouses, nurseries, etc.) and Quezon (coconut-based agroforestry with small live-stock, integrated fruit-trees, and understory crops). These practices empower women and encourage their active participation in various farming activities and promote gender equalities between husband-and-wife farmers (Rosimo et al., 2021).
- **Developing VCs with a gender lens** is important in promoting women's participation and empowerment in VC. This is shown in the study of Malapit et al. (2020) where most women and men disempowered in the abaca, coconut, seaweed and swine

values VCs in Albay, Sorsogon, Leyte, Southern Leyte, and Bohol. Some sources of disempowerment across and some nodes along VCs are respect within household and attitudes about gender-based violence, the control of use of income and autonomy in income-related decision and excessive workload and lack of group membership. On the other hand, women empowerment is associated in access to community programs while it is access to extension services and education for men. Although gender gap is relatively small, this study shows the importance of gendered value chain analysis and development to measure, compare and identify areas of disempowerment of women and men in specific VCs. Understanding this will help address these disempowering areas.

In the process, these experiences showed that approaches to integrating GESI in CRA must consider inequalities, site-specific biophysical, environmental, and economic conditions, socio-cultural contexts, and norms.

To assist agriculture and fisheries (A&F) communities adapt to changing climate while ensuring resilient and sustainable agricultural livelihoods, DA launched the AMIA in 20125. It is the Department's flagship program in climate change through an integrated and multi-stakeholder approach in promoting climate resilient agri-fisheries. It is a participatory action research with farmers and fisherfolk towards building climate-resilient livelihoods and communities.

AMIA envisions farming communities to become resilient to the increasing negative impact of climate change. To achieve this, Climate Resilient Agriculture Office (CRAO) sets up the AMIA villages to serve as model communities where technological and institutional innovations are introduced for them to access relevant support services, such as climate information services, access to credit and insurance, computer-aided decision-making technology, training on climate change adaptation and disaster risk reduction practices, and market linkages.

[5] As a National Program on Climate Change in Agriculture, making agri-fisheries communities climate resilient is crucial in achieving SDGs 1, 2, 5, 8, 10, 12, 13, 14 and 15 in the Philippines.

3 ADAPTATION AND MITIGATION INITIATIVE IN AGRICULTURE PROGRAM

3.1 AMIA Villages, Public-Initiated Intervention Measures, and Strategic Objectives

Establishment of AMIA villages. AMIA villages are organized from among site-specific A&F areas that face similar climate change risk and vulnerability attributes. These villages comprise of households and communities that cultivate a contiguous agricultural land area (about 100 hectares) or are fishery community sites or raise livestock. An AMIA village model and the selection criteria are illustrated in Figure 1.

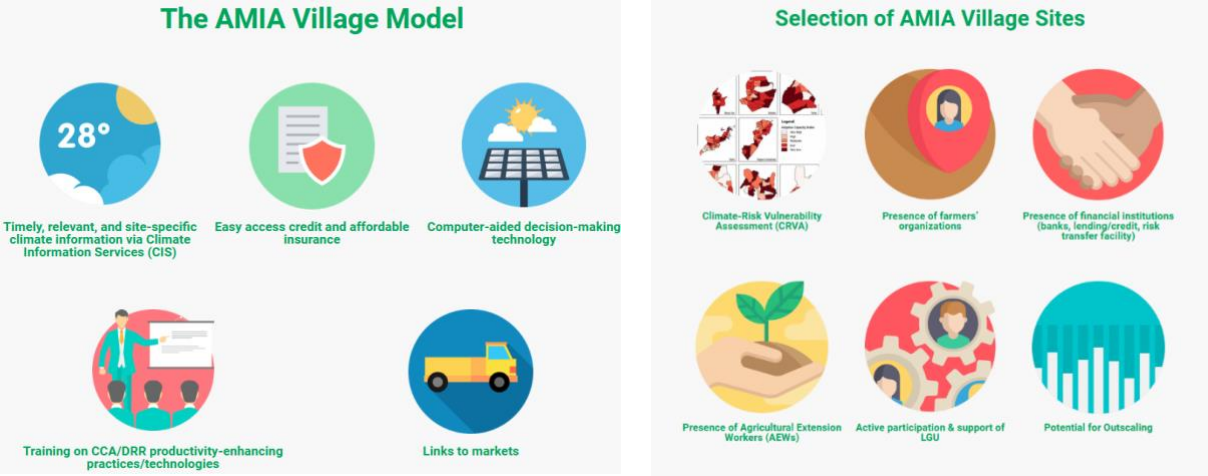


Figure 1. AMIA Village Model and Site Selection Criteria

Farmers, fisherfolk, and livestock producers in each AMIA village identify the nature and type of climate risks and select as a group common adaptation strategy that will increase productivity and incomes especially among the poverty-stricken farmers/fisherfolk who are the most vulnerable to climate change. A package of tailor-fitted interventions suited to their climate realities and the perceived needs of their production systems is provided; these include science-based information and tools, CRA technologies and practices, and together with other DA offices, a myriad of targeted assistance such as seeds, fertilizers, machinery, and credit.

The integrated and tailored extension and support services that are provided include the following aspects:

- Community-level climate-resilient agri-fisheries technologies;
- Climate Information Services (CIS);
- Computer-aided decision-making technologies;
- Links to market;

- Training on climate change adaptation and disaster risk reduction productivity enhancing practices and technology; and
- Easy access to credit and affordable insurance.

Important measures in enabling greater empowerment of the farmers through the establishment and building of the AMIA villages are considered:

- Enabling farmers to identify and understand their vulnerability to climate change through Participatory Climate Risk and Vulnerability Assessments (PCRVA);
- Providing guidance in the use of climate- and weather-informed farm and fishing advisories to identify that to plant, when to plant, and what cultural management practices to adopt including the application of 10-day weather-based farm/fishing advisories to guide their day-to-day farming activities; seasonal climate based farm-fishing advisories as a guide to six month planning periods for farming/fishing; and special weather farm/fishing advisories as a guide to avoid damage during typhoons as well as recover after typhoons;
- Testing and adopting CRA practices, technologies, and tools that address their climate risks to produce that they sell and not just sell what they produce; and
- Identification of support services that are needed and partner with the DA offices, local government units (LGUs), civil society organizations (CSOs) and non-government organizations (NGOs) to practice CRA.

A pivotal intervention of the AMIA program through CRAO is the promotion of science-based decision-support tools in identifying climate risks and vulnerabilities of the local-specific sites. These tools include:

- National, Color-coded Agricultural Guide Maps that comprise an overlay of 29 maps from different source agencies to serve as tool and investment guide for various sectors particularly agriculture and features the natural suitability of 20 economically important crops which are key to food security and eight major and climate change-induced hazards that largely affect the A&F sector.[6]
- Climate Risk Vulnerability Assessment (CRVA) Maps that provide a tool that analyzes three main factors namely, exposure to hazards (exposure to significant climate variation), sensitivity (climate suitability of crops), and adaptive capacity that also support DA resilience-building initiatives for better and longer-term geographic targeting.
- Typhoon Risk Information that shows the monthly typhoon incidence in each province and provides a useful guide for adjusting planting calendars to ensure that production losses and damage losses are minimized. The patterns indicate that most super typhoons occur in the 3rd and 4th quarters of the year which is a critical period for the harvesting of crops.

[6] Available as an on-line version: https://amia.da.gov.ph/

- CIS though which the DA-Regional Field Office (RFOs) provide weather information and corresponding advisories including climate resilient approaches to assist farmers and fisherfolk in better decision making during extreme weather events. The CIS Decision Support Tool helps farmers to decide when to plant, harvest and use the most appropriate CRA practice to build resilience and improve their livelihoods.

The juxtaposition of these decision-support tools to the country's geographical regions embedded climate change factors in determining the appropriate A&F production and processing sub-systems. These are shown in Figure 2.

Figure 2. Distribution of agricultural production systems for regions

The strategic objectives of the AMIA program are to:

- Increase adaptive capacity and productivity potential of agricultural and fisheries livelihoods by modifying commodity combinations to better meet weather issues and natural resources endowments.
- Redefine the Strategic Agricultural Fisheries Development Zones including climate change vulnerabilities as part of mapping variables.
- Redefine the Agricultural Development Planning Framework as the basis for agricultural planning by including key factors/variables associated with climate change.
- Develop a new framework and plan for the provision of a "new" government agricultural service towards the accelerated development of climate smart agriculture and fisheries industries.

3.2 Toward Climate Resilient, Inclusive and Sustainably Income-Inducive Agro-Industrialization Trajectory

While the AMIA approach introduces a participatory, localized, climate-based and targeted provision and adoption of a package of public extension services, it also envisages a mutually

reinforcing development of the AMIA villages from mere subsistence production systems to a cluster of market-oriented and commercially viable AMIA CREATE.

Phases of AMIA Development. The AMIA Program envisages a four-phased agriculture development of the AMIA villages (Figure 3). The first phase is about the establishment of new AMIA villages and the identification and set up of the tailor-fit package of climate information and extension services. Agriculture households in these villages are loosely organized and are dependent on agri-based production as their main source of income.

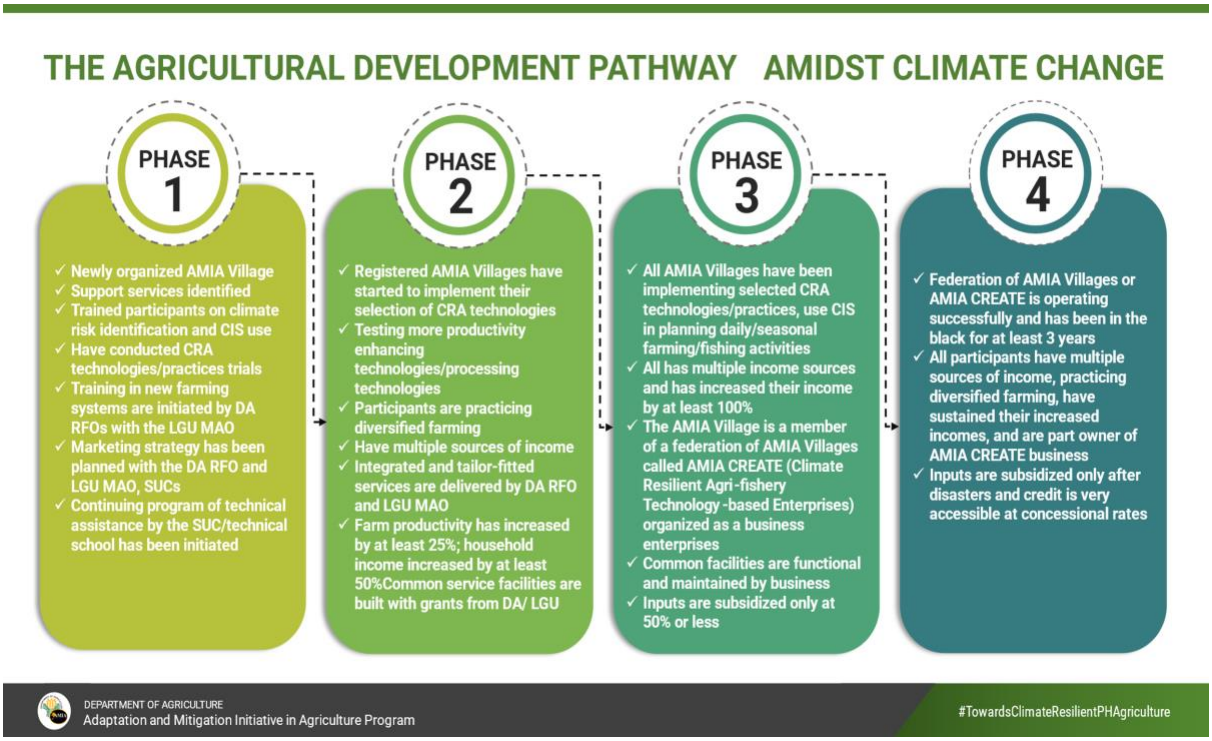


Figure 3. The Agricultural Development of the AMIA Villages amidst Climate Change

At the second phase, the agriculture producers register as organized groups like farmers' associations, and taking advantage of the climate information knowledge, CRA technologies and practices and other targeted and tailor-fitted services suitable for the locality, the agriculture producers shift to diversified farming systems. Improved production and productivity ensue, resulting in higher incomes for the households.

In the third phase of AMIA development, the AMIA villages have multiple income sources, upgrading their take home by a hundredfold. The AMIA villages become members of the federation of AMIA villages with access to AMIA CREATE hub/s that have common facilities for upstream (e.g., input provision) and/or midstream value chain nodal activities (e.g., processing, marketing/trading wholesale or retailing). These will enable the membered AMIA villages with access to the AMIA CREATE hub/s to become actively integrated with their respective food and nonfood agri-based value chains. About 50% of their input and other public extension services are, however, still subsidized.

The fourth phase is the apex of agriculture development of the AMIA villages where these villages are federated with flourishing and profitably sustainable AMIA CREATE.

The actions that are needed to facilitate movement up the ladder of the AMIA transformation ladder comprise the following:

- The CRAO, in cooperation with the respective RFOs, conduct an assessment of the existing AMIA villages and identify the initial areas as proof of concept for the menu of climate resilient crops, livestock, aquaculture and fisheries for production and expansion.
- Each RFO will adjust their current budgets to support the implementation of the AMIA CREATE networks.
- The AMIA CREATE proof-of-concept shall include farm clustering/consolidation and professional management/business service provider to support the enterprise development approach that will be introduced.
- To ensure the transformation of AMIA villages, CRAO in collaboration with Agribusiness and Marketing Assistance Service and Agricultural Credit Policy Council, Philippine Crop Insurance Corporation, the DA Banner Programs and all other programs will continue to strengthen their engagement with business service providers and professional managers to provide communities with integrated and support services.
- The RFOs will also strengthen their partnerships with the LGUs to integrate the AMIA CREATE network in the LGU Climate Change Action Plans.

To date, there are about 181 AMIA villages in 59 provinces and 127 municipalities/cities across the entire country[7]. The most number of AMIA villages are found in Region VI (Western Visayas); a far second in terms of distribution is Region-IVB (MIMAROPA) with the rest of the regions have a more even distribution (Figure 4). Based on the AMIA Agricultural Development Pathways (Figure 3), many of the established AMIA villages are in Phase 2 with a total of 100, followed by those in Phase 2 with 48, and then in Phase 3 with 28. Only a few at 5 have reached Phase 4. Table 1 presents some information of the AMIA villages under Phase 4: Sustained AMIA CREATE, including the CRA practices and interventions.

[7] https://amia.da.gov.ph/index.php/amia-villages-2/

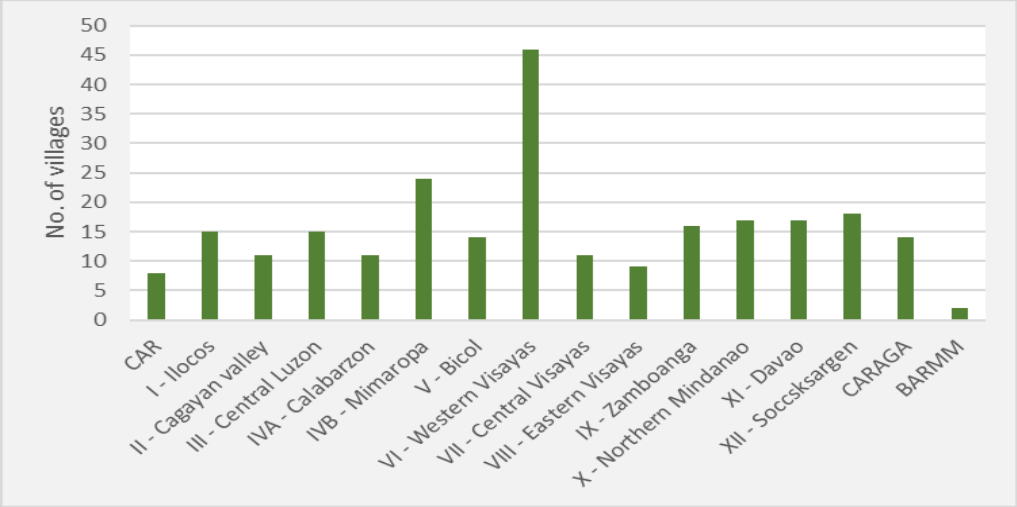


Figure 4. Distribution of AMIA villages by region

Table 1. Profile of the AMIA villages in Phase 4: Sustained AMIA CREATE (2023)

Region	AMIA Village Site	Major Commodity/ Product	Climate-Related Risks	CRA Practices/ Interventions
II (Cagayan Valley)	Brgy. Santa Victoria, Ilagan City, Isabela	Corn, rice, cassava	Drought, flood, Typhoon, and soil erosion	AMIA Climate Information and Learning Center; agricultural machineries (4-wheel drive tractor, riding-type direct rice seeder); nursery for fruit trees, forest tree seedling production, and Citrus Foundation Groove; crop diversification/ integrated farming (communal garden, mushroom production, swine production, and chicken layer production); soil analysis; provision of hybrid rice seeds; training on Organic Agriculture Production NC II funded by TESDA R02

II (Cagayan Valley)	Brgy. Lucban, Benito Soliven, Isabela	Rice, corn	Drought, flood, and tropical cyclone	Agricultural machineries (combine harvester, 4-wheel drive tractor, riding-type direct rice seeder); AMIA Climate Information and Learning Center; solar-powered irrigation system; alternate wetting and drying in rice; provision of hybrid rice seeds; soil analysis; greenhouse for vegetable seedling production, vermicomposting facility, brown rice mill, watershed development for Lucban SWIP, crop diversification/integrated farming (SWIP-based tilapia production, mushroom production, gulayan sa bakuran, dragon fruit production
IV-A (CALABARZON)	Brgy. Gapas, Guinayangan, Quezon	Coconut, Native Chicken and eggs, Vegetables	Typhoon, Landslide, Soil Erosion, Flood, Drought	• Coconut (Intercropping and crop diversification) • Coconut+vegetables (eggplant, squash, hot pepper) • Coconut+blackpepper production, CIS
IV-A (CALABARZON)	Brgy. Magsaysay, Guinayangan, Quezon	Coconut, Native Chicken and eggs, Vegetables	Typhoon, Landslide, Soil Erosion, Flood, Drought	• Coconut (Intercropping and crop diversification) • Coconut+vegetables (eggplant, squash, hot pepper) • Coconut+blackpepper production, CIS
IV-A (CALABARZON)	Brgy. Himbubulo, Guinayangan, Quezon	Coconut, Native Chicken and eggs, Vegetables	Typhoon, Landslide, Soil Erosion, Flood, Drought	• Coconut (Intercropping and crop diversification) • Coconut+vegetables (eggplant, squash, hot pepper) • Coconut+blackpepper production, CIS

For each AMIA village there are various parameters identified that characterize their situation in respect of climate related risks, CRA practices/interventions and the major commodities/products.

- **Climate related risks:** The most frequently noted climate related risks concern were exposure to drought and dry spell (142), flooding (120) and typhoons (102). Other climate-related hazards are erosion (94) and landslides (90). The severity of these risks is not clearly quantified but there is certainly anecdotal evidence of an increase in the severity of flash flooding and the adverse impact that this has on standing crops. Secondary factors of increased risk of landslides and soil erosion as well as storm surge are also noted that result from the increased intensity of storms. The increased frequency of drought is stressed as well as the increased unpredictability of rainfall that impact directly on the

timing of planting and risk of crop failure. There are some instances of earthquakes being included although this is not a climate related risk.

- **CRA practices/interventions:** There are an enormous range of options or strategies identified that include not only measures to introduce climate resilience into existing production practices, but also a very large number of new initiatives some of which appear to have a strong element of transformational change in production with, in many cases, an expressed need for technical assistance and further training to enable the shift to new commodities. There has been a noticeable increase in farm diversification (all or 181 villages), supplemented with the use of CIS (173 villages), and a rising number of organic agriculture practices (114). Other common CRA practices are the use stress tolerant varieties and water management technologies. The range of options varies greatly between AMIA villages suggesting that more technical assistance may be needed in some cases to enable farmers to gain a better understanding of CRA approaches that could be relevant to their own situation.
- **Major commodities/products:** For each municipality/city there is also an indication of the major commodities that and/or products that should be the focus on the expansion of production within the AMIA villages. The commodities that have been identified do not always include the other commodities that have been identified for CRA practices/interventions but tend to relate only to the main commodities that are currently being produced. Nevertheless, there is a very wide range of commodities included (23 in total) but rice and corn continue to predominate (Figure 5). This is of some concern since it shows little change away from the existing structure of the Philippines agriculture sector, that has not changed over the past 50 years, wherein the 74% of the arable land is used to produce the three primary commodities of rice, corn and coconuts, that in turn continue to receive the majority of the government support.

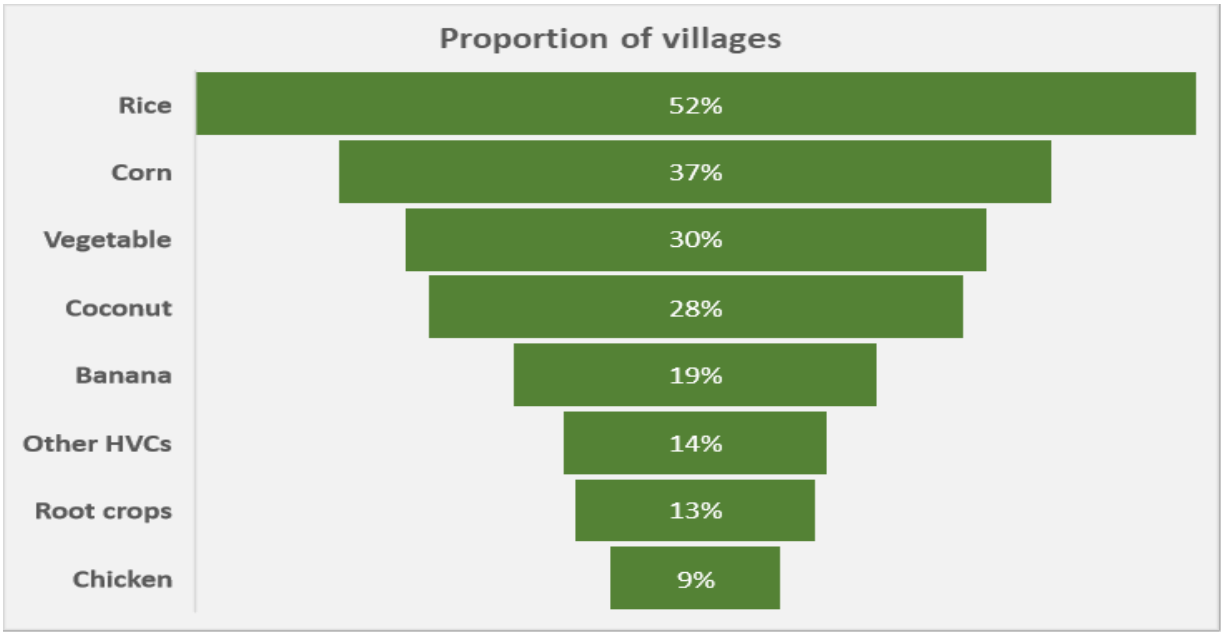


Figure 5. Distribution of main commodities for all AMIA villages[8]

The transition to Phase 3 in the AMIA village model is premised on the achievement of specific achievements in respect of (i) the adoption of CSA practices and use of CIS in planning daily/seasonal farming and fishing activities; (ii) farmers have multiple income sources and their income has increased 100%; (iii) the village(s) are a part of the AMIA CREATE network and is organized as a business enterprise; (iv) common facilities are functional and maintained by business; and (v) inputs are subsided only at 50% or less. The final Phase 4 is reached when (i) the AMIA CREATE network of villages has been profitable for at least 3 years; (ii) all farmers have multiple sources of income, practice diversified farming; (iii) all farmers have increased their incomes and are part owners of the AMIA CREATE business; and (iv) inputs are only subsidized after disasters and credit is easily accessible at concessional interest rates.

AMIA and VC approach for an agro-industrialization trajectory. The pathway of agriculture development of the AMIAs and the AMIA CREATE networks can be further enhanced by applying the value chain approach (Figure 6). Two modes of value chains are taken: the vertical and horizontal modalities of coordination or integration. The latter considers the upgrade into upstream (inputs provision and logistics), midstream (processing in terms of upgrade of processes and/or product; from simple to more complex processing), logistics support for marketing (wholesale and retail), and downstream nodes (market outlets: rural and urban, domestic and foreign).

Horizontal coordination is the modality of organizing the actors involved in the chain, whether these are the farmers/fisherfolk groups, or processors, or input suppliers, or those who do the marketing and logistics side. In this case, the focus is on the agriculture producers in AMIA villages who can organize as cooperatives or register into partnerships or corporations. In turn, the service hubs can also be formally registered, providing the services and contracting arrangements for bulk purchase of inputs or other vital materials in production and processing. The hubs can also "shorten" the VCs by ensuring the processing or logistics works, thus removing the intermediaries.

At Phase 4, AMIAs and AMIA hub centers are organized as networks of registered federations with substantial bargaining leverage. The AMIA villages in turn are organized into networks of food or nonfood agri-based VCs operating like industries. The trajectory is one from simple agriculture development to climate-resilient, inclusive, and growth-based agro-industrial. This new network of AMIA CREATE enterprises and federations with operating hubs will expand and change the agriculture sector's landscape into modern and climate resilient agri-based VCs that are linked to industries and service rural and urban markets.

This agro-industrialization envisages different levels of public intervention: from CRAO, its service of providing climate information, tools, and foresight will continue ensuring updated climate tools and science-based information. Provision and adoption of other extension services can be done with public and private collaborations. Lastly, policies will continually be needed to ensure enduring development of agro-industrialization trajectory.

[8] Multiple commodities have been identified for some AMIA villages.

Table 2. AMIAs and the Agro-Industrialization trajectory

Nature of value chain/ government measures	Phase 1	Phase 2	Phase 3	Phase 4
Horizontal integration/ coordination	Loose organization	Registered to farmers' groups, or coops	Registered as federation → Service Hubs	Registered as federation networks → Large service Hubs
Vertical integration/ coordination	Primary production, small-sized; diversified incomes	Primary production; diversified farms→ Processing (simple)→ Warehouses/ storage→	Inputs→ Primary production: F2CF; consolidation→ Processing →upgrade including Product development Logistics/storage→ upgrade process (just-in-time, digital)→ Marketing/market centers (local, foreign)	Agro-industries (link of agriculture & industries; rural & urban markets)
Government measures	CRAO on climate information services; impact assessments; foresight studies Others on extension support	CRAO on climate information services; impact assessments; foresight studies Others on extension support (75% subsidy)	CRAO on climate information services; impact assessments; foresight studies Others on extension support (50% subsidy	CRAO on climate information services; impact assessments; foresight studies Minimal support
Policy measures	• Participatory guarantee system • Amendments on coop law • Geographic indicator			

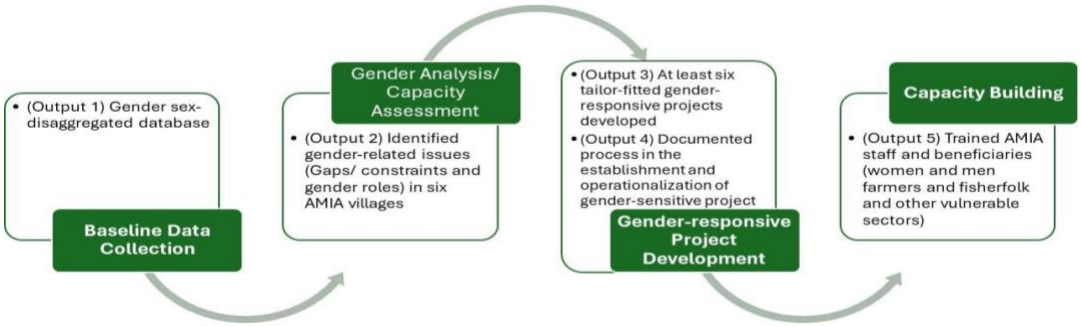
4 TOWARD A GENDERED AMIA FRAMEWORK

4.1 A. Case Study: Gender Mainstreaming in AMIA villages in Regions V and VI

CRAO is committed to not only establishing climate resilient livelihoods and communities in the country but also in addressing gender gaps and social exclusion of some vulnerable groups within AMIA villages. This is line with AMIA's objective to facilitate at least 50 villages and help them implement pilot projects that enhance the adaptive capacity of women to changing economies and climate. This case study is mainly referred from the experience of CRAO and the University of the Philippines Los Baños Foundations, Inc. (UPLBFI) on two gender mainstreaming projects[9] at AMIA villages in Regions V (Bicol Region) and VI (Western Visayas) (UPLBFI, 2023a; and UPLBFI, 2023b).

The first project is aimed to integrate gender considerations in the development of projects of selected AMIA villages in six AMIA villages in Region V including (i) Joroan, Tiwi, Albay (2) Alayao, Capalonga, Camarines Norte, (iii) Cagbunga, Pamplona, Camarines Sur, (iv) Biong, Gigmoto, Catanduanes, (v) Alas, Mandaon, Masbate, and (vi) San Isidro, Prieto Diaz, Sorsogon. The project has two level: (i) developing tailor-fitted and gender-sensitive interventions for women and men farmers and/or fisherfolk and (ii) providing capacity-building activities for both AMIA extension staff and beneficiaries (women and men farmers and/or fisherfolk).

Gender is mainstreamed in its four-step process starting from (i) Baseline Data Collection through a survey for a sex-disaggregated database. This was followed by a (ii) Gender Analysis using the Harvard Analytical Framework as adapted by agriculture (ADB, 2002) (Annex 1) and Capacity Assessment and then (iii) Gender-Responsive Project Development through a series of focus group discussions (FGDs). Finally, the implementation of (iv) Capacity-Building activities with both the AMIA extensionists and the women and men farmers of the selected villages. See Figure 6 below for the methodological framework.



[9] (i) Integrating Gender Considerations into the Development of Projects for Vulnerable Sectors in Selected AMIA Villages in the Bicol Region and (ii) Strengthening selected AMIA Villages through Mentorship Program, and Establishment and Implementation of Gender-Sensitive Projects.

Figure 6. Project's methodological framework

A quantitative baseline survey was conducted to profile the AMIA beneficiaries. A total of 241 farmers participated in the survey where about 57% were women; although within villages, the number varies and between gender while sampling was also not discussed. For example, in Tiwi, Albay, the average age of women farmers is 41, which is higher than men farmers at 27. Both genders mostly finished high school. Men owned an average land area of 3.5 hectares, which is lower with women at 2.21 hectares. Farm to house is more distant with women at 2.58 kilometers (km) as compared to men at 1.45 km. More women owned the farms they cultivated than men. Monthly income is the same for both genders that is <PHP10,000 while income per cropping is slightly higher with women at PHP15,000 while it is PHP14,500 for men.

When it comes to perceptions on climate change, both genders in Tiwi, Albay have the same thoughts when it comes major climate-related problems such as flooding, high crop losses, low crop production, and occurrence of pest and disease. Some of their adaptation practices include following early warning system, use of flood/drought tolerant seeds, availing of crop insurance, backyard gardening, use of organic fertilizer, and use of alternative feeds for animals. The most beneficial support they received from the Program is financial and material support like seeds and fertilizer. The same information is gathered from the other five AMIA villages. Although not quantified, this information is important in understanding their context in relation to their perception regarding climate change.

Following this survey, around six FGDs were organized in the studied villages, where about 62% of the participants were women. In the Gender Analysis, it is recognized that women remain focused in delivering reproductive roles, which are unpaid and often less valued. However, they also perform key roles in productive roles (e.g., marketing); hence are performing multiple roles than men. With time allocation, women spend an average of 12 hours doing reproductive work as opposed to men with three hours; while men spend an average of 11 hours on productive activities as compared to women with five hours. This information is relevant on how to strategize the delivery of extension services for improved access and participation in training, seminars, and the likes.

With Access and Control Profile, it was found out that decision on land use remain with men, which on the part of women becomes a barrier for them to access income-generating activities as farming is the only main source of income in the sites. With this, farm-based value adding activities is essential as it can provide opportunity for women to earn income. There were no household issues raised when it comes to women discrimination, gender-based violence, or women's participation and leadership. With regards to farming-related issues, they generally identified lack of equipment, high cost of farm inputs, and the need for additional livelihood sources. There were differences between gender by AMIA village. For example, in Prieto Diaz, Sorsogon, women identified proper handling of budget and savings, lack of capital and knowledge to start a business, and lack of tools and equipment in processing boneless bangus as their concerns; for men, it is the need for more training about intercropping, lack of equipment, and selling of harvested crops. Recognizing these differential perceptions on farming concerns is important in identifying needs-based interventions.

Finally, the discussion in Influencing Factors Profile provided a more in-depth understanding of the problems and issues by drawing upon their experiences, feelings, attitudes, beliefs, and

reactions that cannot be captured in the baseline survey. They also helped in determining the appropriate interventions that will be developed in the targeted areas.

They then identified appropriate training events that can be organized on the project sites identified during the Gender-Responsive Project Development activity. For example, in Gigmoto, Catanduanes, training on meat processing was identified. This aligns with the livestock (native pigs and poultry) provided to them. This training on processing meat into food products can help them earn additional income.

The GAPs of women and men farmers were based on the (i) gender issues they face, (ii) their proposed CRA and project activities and programs, and (iii) gender indicators and targets. In implementing their GAPs, various Capacity Building activities were organized with AMIA beneficiaries. These training activities were aimed to provide them with additional knowledge and skills on utilizing available resources for supplementary income. Alternative incomes are necessary to help them sustain their daily basic needs, especially their vulnerability to changing climate. These activities were related to product development towards AMIA CREATE goal. While the sustainability of these interventions needs to be ensured and scaled up for wider reach, the landscape and social transformations, especially how women manage climate risks while pursuing their farming livelihood, should be documented to get lessons from.

Similarly, training for RFO extensionists were facilitated to discuss various gender-related concepts, understand the nexus pf gender, agriculture, and climate change, and capacitate them on how to integrate gender considerations in planning of climate change projects and activities. The training program involved three modules: (i) introduction to Gender and Climate Change, (2) How to conduct Gender Analysis, and (3) Mainstreaming Gender into Planning. This capacity development is fundamental for these extensionists to do the same process on their own and not rely on external support.

Learning from this experience in Region V, the second project provided opportunities to review and improve the process of establishing new AMIA villages with gender lens, including testing the gender based PCRVA data collection tool. The objectives were to (i) develop tailor-fitted interventions for women and men farmers-fisherfolk and other vulnerable groups in these regions, (ii) share best practices of Region VI to other regions (VII, VIII and CAR) through leadership coaching and mentoring in building climate-resilient following AMIA's standards and processes; and (iii) conduct capacity-building of AMIA Regional Coordinators, extension staff and beneficiaries in these regions. With these intentions, prominent in this project were the process documentations, training needs assessment, and M&E instrument, among others.

As stated in Objective 2, three AMIA villages were involved from Region VI, namely (i) Banga, Aklan, (2) Sibunag, Guimaras, and (3) Pontevedra, Negros Occidental. The sex-disaggregated gender assessment basically followed Figure 6 using the improved version of PCRVA data collection tool. As part of improving the Gender-Responsive Project Development activity, they subjected the identified gender-sensitive interventions into a checklist, which includes indicators that will further ensure that gender considerations are integrated into the building blocks of climate change response through adaptation, mitigation, financing mechanism and technological development. The higher the number, the more the intervention is gender responsive. Another emphasis in this project is the monitoring and mentoring, followed by training events to capacitate coordinators and staff and involved in AMIA program, particularly on proposal and enterprise

development cost-benefit analysis. As a result, one unit of mobile vehicle and women-friendly mini-rotary tiller were distributed to the three pilot sites as gender-sensitive projects that could uplift farmers, especially women, and empower them to improve their livelihood and income.

4.2 Lessons Learned from AMIA Program and other Gender Mainstreaming in CRA

The AMIA study provided many important lessons that can be deduced in both the findings and methods for replication and scaling. Some of these are:

- **The sex-disaggregated survey data on gender assessment** enables understanding on the similarities and differences between women and farmers within and amongst AMIA villages in terms of socio-demographic and economic characteristics. Understanding these characteristics is critical for RFO extensionists as this influences their decisions and practices on farming and collective behavior. For the climate related information, it is suggested to also present the statistics to see the variation by adaptation strategies by gender. These statistics can help in identifying interventions that are targeted, needs and gender based. Depending on the number of members per organization, this can also be improved by expanding the number of respondents and closing the gaps in terms of number between women and men respondents, as some differences were quite big such that generalization can be challenging. In line with this, sampling methods can also be discussed in the methodology.
- **The gender assessments provided basic but important determinants on the ways farmers behave, act and respond to climate change. To be inclusive, these basic variables from the same datasets can be further analyzed such as based on age (to better understand youth), location (farmers in remote areas), ethnicity (indigenous and non-indigenous farmers), land ownership (as it influences long-term investments on farm) and others to generate important information on other vulnerable groups in the farming sector.** For example, this can help in understanding the barriers of youth or farmers in remote areas or indigenous farmers and others from accessing CIS or participating in training. Such understanding could also result in designing and implementing more inclusive interventions in AMIA villages.
- **It is commendable that the Kobo-Collect app was used** in the survey to simplify the process of data collection, management, processing and presentation. It also enables data sharing. As such, it would be good to decentralize the access of the datasets, especially with the RFO extensionists to maximize the use of the data. They should be capacitated to process and analyze these for work use. However, a mechanism has to be put in place considering the Data Privacy Act of 2012 with regards to disclosing respondents' personal information or perceptions. The addition of the checklist in the case study is also important in the prioritization of interventions based on being gender responsive. This is critical considering the government's limited resources.
- The addition of the **checklist in the Gender-Responsive Project Development activity in Region VI i**s also important as another layer to ensure the gender responsiveness of the prioritized interventions.
- **The Gender Analysis provides qualitative, more crystallized information** about gender roles, access to and control of resources, and others. Considering this in extension

and intervention, design and implementation can contribute to the AMIA transformation. The GESI framework can be mixed with this analysis to uncover barriers that prevent, not only the women farmers but also other vulnerable groups in A&F sector, such as the youth, elderly, indigenous peoples, landless and many others, from full access them from full access and participation to CRA related activities, and consequently find ways to overcome these. Annex 2 presents some of the key topics that can be discussed related to this.

- **The generated GAPs in these villages reflect the importance of considering gender differences in A&F sector.** The gender-responsive projects, which were identified by the beneficiaries themselves (Region VI), reflect the importance of understanding the differences in the characteristics, perceptions, and needs among other women and men members in organizations.
- The g**ender action planning relied on the gender assessment, Gender Analysis and Gender-Responsive Project Development activities, and followed a participatory process.** However, there was no integration of these local assessments (based on perceptions) with CRAO's rich CIS, PCRVAs, and other innovations (based on science) nor the use of these to inform GA planning. Such integration could have developed science-based information for more proactive planning and decision-making on interventions. Moreover, there was also no value chain analysis done based on priority commodities, as well as environmental assessment to know the status of natural resources (land, water, biodiversity) that they depend on for their farming livelihoods.
- Providing gender-sensitive support services and technologies are empowering, such as the projects provided to the three AMIA villages in Region VI. **Effective and adaptive M&E** systems **will ensure that intended and unintended effects are recorded to improve future interventions.** Ensuring feedback mechanism is important to learn from lessons and be adaptive to changes during implementation.

Meanwhile, the gender action planning relied on the gender assessment, Gender Analysis and Gender-Responsive Project Development activities. There was no integration of these local assessments (based on perceptions) with CRAO's rich CIS, CRVAs, and other innovations (based on science) nor the use of these to inform GA planning. Such integration could have developed science-based information for more proactive planning and decision-making on interventions. Moreover, there was also no value chain analysis done based on priority commodities, as well as environmental assessment to know the status of natural resources (land, water, biodiversity) that they depend on for their farming livelihoods.

Based on AMIA's experiences and others within the country and beyond, there are emerging elements to integrating GESI in CRA that are worth considering in developing the GAP for CRA and AMIA. These are:

- **Improving access to and control of resources is a basic requirement to women empowerment.** Among others, such access to and control of resources enables them to make meaningful decisions. This can only be possible with institutional structures that recognize women and gendered social norms.
- **Climate-resilient technologies and practices that increase the adaptive capacity of women, youth and other vulnerable social groups** is important. These have to be

accessible, feasible, easy to use, and inexpensive. To be gender-responsive, these have to reduce women's work loads and support their livelihood activities by increasing agricultural production and income.

- Instead of a dole-out system, **incentives followed by rewards-based approaches to projects can be beneficial to women and other vulnerable groups.** This encourages co-investment and co-management from them and with other local stakeholders, which ensures their stake; hence will motivate them to give their best for the success and sustainability of the projects.
- Farming livelihood alone may not provide women sufficient income for their households' needs. **Initiating value adding activities from existing commodities will increase their income while diversifying livelihood activities will ensure income inflow considering economic and climate change uncertainties.**
- In the advent of digital transformation, the **access to and use of decision-support systems and digital technologies** for tools and information, CIS, early warning signs, and other uses is important for women, youth and other vulnerable social groups. This includes **utilizing social media platforms** like Facebook, Tiktok, and others to encourage and empower them more and help cultivate empathy and support around gender and CRA.
- **To achieve scale for CRA, organizing and capacitating women, youth and other vulnerable social groups,** is crucial for knowledge and skills development, linking and networking, and initiating collective actions.
- With Senate Bill 782 "Poverty Reduction through Social Entrepreneurship" that acknowledges and supports social enterprise for their roles in poverty reduction, **CRA-based women enterprises** are at the forefront of fostering social businesses that are environment-friendly and economically profitable.

4.3 Engendering the AMIA Agricultural Development Pathways: A proposal

To genderize the AMIA Agricultural Development Pathways, this action plan proposes integrating gender dimensions under each phase. Through GESI, interventions channeled through AMIA can positively affect the associations involved, and consequently their households. Effective delivery of AFE services and facilitation work in these villages can raise the level of women empowerment and make the program transformative for them.

To do this, the indicators under each of the four pathways (Figure 3) were deconstructed to identify the development outcomes (Table 2). This brings us to six development outcomes: (1) organizational development and governance, (2) capacitation development, (3) farm development, (4) CRA technologies and practices, (5) livelihoods and social enterprise, and (6) government and other stakeholder interventions. As discussed, Phase 1 is the initiation stage where government intervention is at the highest. In Phase 3, the village has organized business enterprise, which they are able to sustain in Phase 4. Apparently, there are no indicators related to gender. Hence, the proposition.

A development outcome on GESI is proposed to deliberately engage women and other vulnerable groups in AMIA village and contribute to their empowerment (Table 2). A ladderized approach can be adopted where interventions will ensure the (1) economic empowerment of women in

Phases 3 and 4, and (2) social inclusion for organizational strengthening. Focusing on these can raise the level of women empowerment phase after phase. To wit,

- In Phase 0, there is no established AMIA village yet; such that farmers do their farming activities on their own. At this stage, farmers are not organized with limited collectives. They receive extension services from RFO extensionists and respond to them individually. With the effects and risks of changing economies and climate to their farming livelihood, they will be interested in the AMIA program.
- In Phase 1, it is assumed that the organized AMIA village is generally gender blind[10] or in some aspects of the organization or their activities may be gender blind. To increase women participation, at least 10% of the beneficiaries will be women farmers, or youth and other vulnerable sub-farming groups. Women members will be consulted in all the initiatives and CRA trials in this stage.
- In Phase 2, it is presumed that the AMIA village has acknowledged the ideal phase of gender per AMIA pathways. The organization has become gender sensitive[11] acknowledging gender differences and the associated issues and concerns in the design and implementation of interventions. The intention here is to increase women's involvement in testing and practicing CRA technologies. This can be manifested with at least 20% of the beneficiaries being women.
- In Phase 3, the AMIA has become gender responsive[12] with increased collaboration of women with the AMIA village being organized as a business enterprise. The goal is to increase women collaboration in the enterprise by at least 30%. Dialogues will be organized to provide them opportunities in collaborating in the business enterprise with their advice sought in the process. An example of this is micro-financing to support their farm-based business enterprises.
- Finally in Phase 4, the program has made transformative[13] changes in gender with empowered women in the AMIA villages. More than 30% of the beneficiaries are women and they are empowered. Such that women's self-confidence increased, enabling them to make meaningful decisions for the organization. This can be attributed to activities deliberately organized to address their concerns while reflexive dialogues were sustained. For example, they have strong organizations (social inclusion) that enable them to manage their own farm-based business enterprises (economic empowerment).

With the assistance of RFO extensionists, AMIA villages will prepare annual status reports. This will assist in determining where they are based on the Gendered AMIA Agricultural Development Pathways (Figure 2). This report will not only include the status of their CRA practices or interventions and business enterprises but also their activities based on the gender development indicators in their localized GESI plans for CRA (Annex 3). Implementing the MEL system is critical as it will provide insights, learnings and gaps (e.g., what worked and didn't work) and

[10] Gender differences is not taken into account in farming activities
[11] Acknowledging existing gender differences, issues and concerns. and consider these in the design and implementation of plans, programs and projects
[12] Addressing the strategic issues and needs of women and other vulnerable groups, as well as valuing their perspectives and experiences
[13] Removes structural barriers to women and vulnerable groups by empowering them

recommendations that are critical information for RFO extensionists and AMIA. This will further inform their localized GESI plans for CRA in the following year.

Table 3. Proposed integration of gender dimensions in the AMIA's Agricultural Development Pathways

Gender development indicators	**AMIA Agricultural Development Pathways**			
	1 (Initiation & CRA Trials)	***2 (Testing & Practicing CRA Technologies)***	***3 (AMIA CREATE)***	***4 (Sustained AMIA CREATE)***
Organizational development and governance	• Newly organized • Support services identified	• Registered AMIA • Common service facilities are granted by DA/LGU	• Common facilities are functional and maintained by enterprise	• Cluster/Federation of AMIA Villages or sole AMIA Village is operating successfully and has been in the black for at least 3 years
Gender and social inclusion (and engagement for empowerment)	Gender blind → Increased women participation • At least 10% of women farmers, youth and other vulnerable sub-farming groups consulted	Gender sensitive → Increased women involvement • At least 20% of women farmers were involved • Gender differences in perceptions, experiences, and practices recognized • Gender differences are incorporated in the design of interventions or activities	Gender responsive → Increased collaboration with women • At least 30% of women farmers collaborated • Organized dialogues that provide opportunities for reflection • Advices and innovations sought from women farmers for interventions	Gender transformative → empowered women in AMIA Villages • More than 30% of women farmers are empowered • Built women's agency and strengthened self-efficacy • Implemented specific activities to

				address women concerns • Sustained reflexive dialogues
Capacitation development	• Continuing program of technical assistance by the SUC/technical school has been initiated.	• Integrated and tailored fitted services are delivered by DA RFO and LGU-MAO	• 100% of participating households are above the poverty threshold	
Farm development	• Training in new farming systems are initiated by DA RFOs with the LGU MAO	• Testing more productivity enhancing technologies/processing technologies • Participants are practicing diversified farming • Farm productivity has increased by at least 25% households	-	• are practicing diversified farming,
CRA technologies and practices	• Trained participants on climate risk identification and CIS use • Have conducted CRA technologies/practices trial	• Villages have started to implement their selection of CRA technologies	• All AMIA Villages have been implementing CRA technologies/practices, use CIS in planning daily/seasonal farming/fishing activities	-

Livelihoods/Social enterprise	• Marketing strategy has been planned with the DA RFO and LGU MAO, SUCs	• Have multiple sources of income • Household income increased by at least 50% • 50% of participating households are above the poverty threshold	• All has multiple income sources and has increased their income by at least 100% (household and organization levels) • The AMIA Village is a member of a cluster/federation of AMIA CREATE (Climate Resilient Agri-fishery Technology-based Enterprises) organized as a business enterprise	• All participants have multiple sources of income, have sustained their increased incomes, and • are part owners of AMIA CREATE • 100% of participating households are above the poverty threshold sustained
Government interventions	-	-	• DA assistance only at 50% or less	• Inputs are subsidized only after disasters, and credit is very accessible at concessional rates

5 RECOMMENDED ACTIONS AND NEXT STEPS

The recommended gender responsive action plan for CRA and AMIA villages will address the gender gaps discussed in the preceding sections and incorporate economic and social empowerment lenses into the relevant activities with reference to the policy, technological and institutional changes developed for scaling up agribusiness value chains for AMIA projects (Sub-output 1.1.6). The expected outcome is ***gender economic and social empowerment in AMIA villages and climate resilient agriculture and fishery sector strengthened***. By using the GESI framework in CRA, the approach will focus not only women farmers but also other vulnerable groups in A&F sector, such as the youth, indigenous farmers, and others. Also in this context, economic empowerment will refer to profitable women-managed agriculture-based business enterprises in Phases 3 and 4 while social empowerment will allude to organizational strengthening in AMIA villages.

Several principles will underpin the successful mainstreaming of gender and inclusive VC development in the design, implementation and monitoring of CRA and AMIA program, projects and activities. Among these are the following:

- Evidence-based. Robust data will be important to inform and make gender-sensitive decisions and gender-responsive actions that are evidence- and science-based.
- Participatory. This approach to gender and GESI mainstreaming will acknowledge the differential experiences, capacities and perceptions, needs and priorities of women and men farmers and other vulnerable groups. Acknowledging this will ensure their parity or balanced participation where collaboration will be important elements.
- Inclusive. To reflect GESI, this plan will uphold the use of gender-inclusive or gender-neutral language so as not to discriminate any social gender or gender identity nor perpetuate gender stereotypes.
- Empowerment. This principle will refer to the economic empowerment of farmers of any gender, including other vulnerable groups. While this plan is directed to women farmers due to existing gender gaps, as mentioned in previous sections, it will also include other vulnerable groups. As such, economic strategies and measures will be geared towards gender balance, especially at all levels of decision-making, planning implementation, and monitoring.
- Transformative. The goal is to reshape gender dynamics within AMIA villages by redistributing resources and responsibilities between women and men farmers, and other vulnerable groups. This will be reflected in the collective design of interventions, in setting these up, and operations.

While there are good practices from the Philippines and other developing countries, this gender action plan will build on the experiences of AMIA program, particularly the gender mainstreaming projects in Regions V and VI (UPLB 2023a; UPLB 2023b). Among others, these practices will require deliberate efforts and dedicated resources, as well as knowledge and skills development, paradigm shifts, and behavioral changes in the process.

To develop gender action plans in AMIA villages in Phases 3 (50% of 28) and 4 (100% of 5) and 15% in Phases 1 and 2 (22 of 148) and make these plans operational and accessible in CRAO website by Q1 2026, the following four action areas are recommended (Table 4).

Action Area 1: Establishment of Regional Gender and Development Focal System (GDFS) committees for Phases 3 and 4. Based on the recommendations of CRAO and GESI, these committees will issue the guidelines for the operationalization of localized gender action plans for CRA alongside the creation of GDFS at regional and local levels. Gender Working Groups (GWGs) will be created in AMIA villages. A comprehensive capacitation training will be developed and implemented in a participatory fashion by CRAO, GESI and ATI for regional GDFS, GWGs and others to collect, manage and analyze data for AMIA villages gendered baseline report writing, particularly (i) gender assessments at household, organizational and community levels and (ii) localized gender responsive action planning. This will be conducted strategically to save time and resources as well as appreciate the connection of these activities.

Action Area 2. Implementation of localized gender assessment. This will prioritize Phases 3 and 4 during Year 1 considering that they are already in their advanced stage of AMIA development; integrating GESI data, gender analysis and localized gender action plans in their policies, and activities will be beneficial to the organization and its members. The expected outputs are gendered baseline reports that are evidence- and science-based in CRA, which will help enhance the overall quality and relevance of the AMIA program. This Action will be carried out in three levels: (i) household, (ii) organizational, and (iii) community.

At household level, gender-disaggregated baseline surveys will be conducted. To do this, existing data collection tools developed and implemented with UPLBFI will be revisited by CRAO, GESI and GDFS at RFOs to ensure that they will capture and quantify sex disaggregated socio-demographic and economic profile of beneficiaries, their needs, as well as the climate change-related problems, their adaptation measures, and suggested interventions to arrest the problems. These tools will be translated to local dialects where AMIA villages are for GDFS and RFO extensionists to easily facilitate the interviews. Information that will be generated from this survey will be important to better understand the organizational context based on the profile and perceptions of members, which consequently will contribute to developing more empowering and inclusive interventions and innovations.

Training events will be organized by CRAO, GESI, Agricultural Training Institute (ATI) with support from the GDFS and the RFO extensionists on how to use the household survey tool, especially that this tool will be converted into Kobo-Collect app[14]. This app will be used to easily collect, manage, analyze, and present the data for use during the report writing of the GESI assessment.

Once local capacities are capacitated, a comprehensive gender-disaggregated data collection using Kobo-Collect will be implemented in the context of GESI, inclusive value chain, and climate change. In the analysis, aside from looking at the datasets by gender, the same can also be done by ethnicity, age, income, and others if time and resources will allow to reflect these equally

[14] https://www.kobotoolbox.org/

important social dimensions. Implementation will be in selected AMIA villages according to their current phases and locations.

Localized decision support tools like maps, data sets in tabular or graphical forms are important to make better plans and decisions for the organizations. As such, the local GESI assessment will be integrated with CRAO's CIS to generate (i) actual hazards due to climate change and (2) actual losses for instructive information among others. If possible, local assessments will also be fed in CRAO's computer-aided decision-making technology, climate vulnerability assessments and other climate risk management tools in AMIA existing technological and institutional innovations to generate more localized information. This kind of information is crucial to identify and implement both proactive and preventive measures focusing on prevention and early interventions and reactive care focusing on addressing immediate issues. Finding a balance between these two measures will lead to more efficient and effective plans that will minimize farmers' losses, as measures prioritize both prevention and timely interventions.

Also at the household level, FGDs will be conducted to facilitate Gender Analysis and GESI analysis. Like the previous survey activity, the UPLFI on Gender Analysis following the Harvard Analytical Framework will be used (Annex 1). This be enhanced to include the following questions: (i) Based on the baseline data collected, what gender inequalities prevail and how are these manifested at household, community, and organizational level? (ii) Has an analysis or study/ies been undertaken to identify existing gender inequalities, including those induced or exacerbated by climate change? (iii) What gender gaps are shown by the surveys and qualitative research in terms of economic (division of labor, workload, and access and control of productive resources by women and men) and decision-making, governance, and leadership attributes (social inclusion)? (iv) Who and how do women and respond to induced or exacerbated natural hazards? What are the adaptation methods? and (v) Who, what, how, and why participate in value chain works (vertical and horizontal). In addition to Gender Analysis, adding the use of GESI framework will enable better understanding on the barriers experienced by women and other vulnerable groups, which will inform in identifying ways to address these (Annex 2).

GESI-based organizational assessments will be conducted through FGDs. As previous activities, data collection tools will be developed to systematically assess organizations with GESI, inclusive value chain, and climate change lenses. Data collection may be through FGD, SWOT analysis, interviews, and financial analysis among others. This assessment will essentially include (i) economics, particularly inclusive value chain assessment, (ii) social inclusion, which is the organizational assessment itself, and (iii) environmental aspects. For the organizational assessment, discussion may include (i) governance and leadership, (ii_ operations and management, (iii) human resource development, (iv) financial management, (v) business delivery, and (vi) external relations. In the process, gender balance will be observed where both genders will be represented.

The FGDs may include the association's (i) Board of Directors, (ii) Officers, and (iii) member in separate discussions to minimize issue on power relations. Where feasible, non-government organizations (NGOs) and state universities and colleges (SUCs) will be encouraged to participate in all these collections of gender information at different levels.

Implementation of these data collection activities will be sequential; such that the gender-disaggregated household survey will be conducted first, followed by the Gender, GESI and VC

analysis. Initial results will inform the data collection tools of GESI organizational assessment. It is important to note the site conditions and local contexts such that there will be variations in the tools on top of minimum general information requirement to assess organizational capacities. As a follow up activity to the gender-disaggregated survey and Gender, GESI and VC analysis, the GESI organizational assessment will follow the former's site selection and phasing of implementation. The GESI organizational assessment will particularly be important for those operating under Phases 3 and 4 of the AMIA phases, which to date have not included GESI analysis and action plans that will bolster the organizational structure in terms of enhancing their governance, achieving the productivity and efficacy of the organizations as these business organizations pursue value chain linkages vertically and horizontally.

The availability of two datasets: (1) GESI assessment (household/member level from survey and Gender. GESI and VC analysis) and (ii) GESI organizational assessment will enable ***the development of gender-based baseline assessment reports of farmer organizations in AMIA villages (Community level)***. This will be further enhanced by combining local assessments with CRAO's CRVA, CIS and others to generate a localized decision support system that will be useful in AMIA villages.

These baseline assessment reports of AMIA villages will serve as bases in future interventions and undertakings of organizations. Special attention will be directed to gender, inclusive value chain concerns, and adaptations at beneficiary and organizational levels to help them become resilient to economic and climate changes. This may include putting in place gender-sensitive policies and mechanisms as a foundation to creating an enabling environment for gender at AMIA level. Formal organizational structures will have to be established, which is one of the prerequisites toward more formal marketing arrangements (Phases 1 and 2). Such will also help them better implement their localized gender action plans and transition to more advanced AMIA CREATE (Phases 3 and 4). The motivation is for GM to be part of the AMIA scaling up indicators and an integral component of the AMIA CREATE networks.

Action Area 3: Development of localized gender responsive action plans. Localized gender action plans are important as they guide decisions on future development proposals while addressing current needs and opportunities in AMIA villages. As it will be GESI-based, it will include where interventions will take place and with whom. To do this, a capacity building program will be implemented by CRAO, the GDFS at regional levels, and the RFO extensionists with support from the GESI office to develop internal capacities and facilitate Participatory Gender Planning Workshops at AMIA villages. Depending on the resources, this may be done as one-time regional level training or more localized workshops at regional level. See Annex 3 for the proposed guidelines.

After the training, a local GWG will be created amongst the officials/members with about 6-10 core members. One of them will serve as the Gender Focal Point. As a group, they will be tasked to develop their localized gender responsive action plan in a participatory manner and based on evidence-based gender assessments; as such, they will be capacitated as part of the planning process. Capacitation may include seminars about gender sensitivity, GESI, inclusive value chains, climate change adaptation, as well as field visits in nearby successful women-and-youth-managed business enterprises for learnings and inspirations. This will develop the knowledge

base in areas on climate risks with gaps in GESI and inclusive value chains, which consequently enable them to be effective during the planning process.

Localized Participatory Gender Planning Workshops will be facilitated to develop gender responsive action plans at AMIA villages. With the GWGs, these plans will be contextualized based on their respective organizational, economic, cultural and political environments. The GESI-based baseline assessment reports will be used for evidence-based planning process. The plans will importantly include interventions on (i) CRA technologies, practices and crops (the gender sensitive CRA database will be useful), (ii) inclusive value chain development on priority commodities and agri-based products or inputs (building on local and international markets), (iii) capacity building and organizational development, (iv) financing and budget, and (v) MEL plan. After finalizing the plans, these will be presented to AMIA villages for approval and adoption. The City/Municipal Agriculture Office, SUCs and other local stakeholders may be invited in these planning workshops for inputs to make the plans comprehensive and inclusive. The planning workshops will be piloted in selected AMIA villages. From this pilot experience, the planning process will be improved for rolling out in other AMIA villages in the next three years. It is envisaged that these plans will serve as important inputs to the localized and Municipal Investment and the Provincial Investment Plans.

Considering limited fundings of AMIA villages, funding the implementation of gender action plans will be challenging. One route is of course to propose the implementation of the plans to their respective RDFS, which can access the DA budget that is earmarked for gender and development activities. The other is the inclusion of these plans for funding through the Municipal Investment and the Provincial Investment Plans. Localized fund generation activities can likewise be initiated. For instance, local forums will be organized inviting government and NGOs, private companies, CSOs, and others for any potential support. There will be different pathways to support the implementation of plans. Provision of support can be direct (funds) or indirect (in kind materials, technical assistance, etc.). They may also directly implement specific activities in plans that align to their own mandates and programs as part of their Corporate Social Responsibility. Climate financing will also be explored through payments for ecosystem services (e.g., land health and productivity), rewards or incentive-based approach to CRA interventions, access to crop insurance or credit, and others. The overall approach to the gender action plan implementation will be promoting co-investment where other local stakeholders will provide capital or support alongside the AMIA villages' own investments like their lands for CRA, time, knowledge and skills, and others.

A participatory gender responsive MEL system in every AMIA village will be established and implemented. This MEL plan is aimed to monitor and evaluate the implementation of GESI plans, and design feedback mechanism for learning and uptake of findings. This framework will provide the means to explore the gendered impact of AMIA program and its projects on the women and men behind the AMIA villages whose lives and farming livelihood are affected by it (Bowman and Sweetman, 2014). The learning part will be the use of findings to guide their efforts and resource use and mobilization, and decision-making. In the process of monitoring, participatory methods for data collection will be used to engage AMIA's Gender Working Group considering the limited number of RFO extensionists. Participating in implementing the MEL component of their plans will also be capacitation on the part of the Gender Working Group. Several evaluation methods will be used but will be inclined more on qualitative ones to capture the perceptions of beneficiaries

themselves and intricacies of organizations and collective actions with overlapping gender, inclusive value chains, and climate change impacts. Some of these methods are Most Significant Stories, Outcome Stories, and other similar ones.

Action Area 4. Replication and upscale preparation and implementation of gender responsive action plans in AMIA Phases 1 and 2 as performed in AMIA Phases 3 and 4. Where possible, the "big brother-small brother" approach will be employed to facilitate the development of gender action plans in AMIA Phases 1 and 2. Following the experience in Phases 3 and 4, data collection at household, organizational (farmer association) and community (AMIA villages) will be conducted incorporating gender and VC perspectives in CRVA, CIA and other DSS tools. These data collections will importantly include gender equities and analysis of organizational structures of AMIA villages. Development of gender responsive action plans will be participatorily, including the identification and prioritization of targeted interventions from DA. For new sites that intend to become AMIA village, the same process of organizational establishment and development of gender action plans will be done.

For expected output that is to integrate gender data in CRAO's CRVA, the following action areas are recommended.

Action Area 1: Strengthening CRAO's GESI role in CRA and AMIA villages. A GESI database will be developed at national and regional levels to collate the data collected from Action Area 2 in Output 1. Before that, CRAO played a critical role in revisiting and finalizing existing data collection tools of UPLBFI, which will be first used in AMIA Phases 3 and 4. It is important that these capture and quantify the gender-based socio-demographic and economic profile of members, their needs and adaptation strategies to climate change and risks. There will be opportunities to improve the data collection tools, such as on (i) qualitative questions, where needed, to generate better data, (ii) the gendered VC data related to economic and financial analysis on efficiency and efficacy of the vertical coordination links, and (iii) gendered data with climate information for better examination of effects and impacts of climate hazards by gender among others. As such, this database will enable the integration of local gender assessments in CRVA, CIS and other computer-aided decision-making technology and climate risk management tools in AMIA existing technological and institutional innovations. This readily available and accessible database can be used to provide recommendations for sector-wide development.

A guideline will be developed on how to do this integration, which methods will be pilot tested in at least two regions following the experience of UPLBFI in developing gender responsive action plans. Providing on time and localized science-based decision support system and associated tools (like visual representation of data sets, maps, etc.) is important for AMIA villages to make both proactive, preventive and reactive measures to changing economies and climate. As such, developing internal capacities to integrate GESI assessments with CIS and other computer-based decision-making approaches for AMIA villages to use will be crucial. Decision support tools should include abilities to predict future impacts to develop preventive strategies and minimize the effects of climate to women and other vulnerable groups, especially on their farming and other livelihood activities. These tools will be made available to Regional GDFS and AMIA villages for evidence and science-based Participatory Gender Action Planning process.

Another database will be created that will bring together gender responsive CRA technologies, practices and crops/fishery/livestock products that consider gender-differentiated needs and

constraints. This may include those as experienced in AMIA villages, other sites in the Philippines and in other countries will similar conditions and contexts. This may also include conservation agriculture that includes maintaining permanent soil cover, minimum soil disturbance or no tillage, and crop diversification. The intention is to improve soil organic matter; thereby increasing farm productivity and serve as a good mitigation project. The organic farming aspect of this faming system will be important for women's household function on food and nutrition. In this regard, collaboration between CRAO and the national Organic Agriculture program (NOAP) with support from the GESI will be actively strengthened. Similarly, 'women's crops' like banana, root crops (e.g., sweet potato, cassava), corn, and indigenous vegetables among others will be recommended. Composting and vermicomposting may also feed the women and youth's households and provide income while enhancing soils with organic matter. Another will be the drip irrigation to reduce women's and youth's manual watering of plants. Establishing rainwater harvesting may also ensure water supply for farms, which can be added with fingerlings for household's protein requirements. Likewise, agroforestry or integrating trees on farm with fruit trees, medicinal trees, fuelwood trees and other tree crops are also crucial to women's domestic roles. Due attention will be given on CRA technologies, practices and crops that are proven to benefit women in terms of increased production and income, improve their household functions in food security and nutrition, and reduce workloads and labor requirements among others. The latter is an important consideration for them to have extra time for alternative activities, especially for welfare gains. These are just a few examples of widely practiced CRA technologies that RFOs extensionists can build on and promote in AMIA villages.

It will be important to capture these gender responsive CRA technologies and practices in an integrated farming system. This can be exhibited by establishing demonstration gender responsive CRA farms within AMIA villages. These farms can serve as a model farm of various CRA technologies and practices suitable in the site, as well as a learning venue for farmers to train and learn. The same farms can also host facility for value adding or social enterprise activities for women. With support from the LGU, DTI, DA and/or DENR, these farms may develop into agri-eco-tourism sites that may provide additional incomes for the farmers, and in the process, further develop their capacities while scaling good practices on gender transformative CRA.

This gender responsive database of CRA technologies, practices and commodities/agri-based products will be intended for use by RFO extensionists but will also be open for access by other fields and development practitioners and the sector-wide GDFS, and their counterparts in bureaus, attached corporations, and banner programs. With a good stock of gendered knowledge products, it will work systematically to the local level to ensure that these are communicated and used in the development of innovative policies, projects and activities at AMIA villages. This database will enable them to provide options to farmers with site-and-context specific guidance and considerations. This will be continually updated with research updates to continuously assess the gender-responsiveness of these in different AMIA villages with changing economies and climate.

The proposed Gendered AMIA Development Pathways will be an attempt to build on community-based interventions towards inclusive value chains and gender-transformative climate resilient programs and projects in agriculture. As such, mainstreaming gender in CRA and AMIA villages requires that at the onset, from community or organizational profiling to needs assessment, the process should not only limit from identifying women and men, youth and other vulnerable social

groups' characteristics and conditions but also allow understanding their life's aspirations. Aligning interventions to aspirations is crucial in driving their interests and motivations in farming livelihood and other economic empowering activities like Phases 3 and 4.

1. As in other components of AMIA, mainstreaming gender in CRA and AMIA program will require sufficient time and focused efforts. As such, investment in human resources will be critical. As such, Gender Focal Points at CRAO to RFOs to provincial and municipal levels will be either hired and/or appointed to implement the aforementioned action areas. They will be trained about gender and GESI, which may include (i) awareness and sensitivity in line with GAD policy and other related policies and programs, and (ii) the use of various data collection tools needed for GESI assessments, baselining and conducting MEL in AMIA villages. To further build their capacities, staff development funds can be allocated for scholarship opportunities and the likes in gender-related degrees or training courses. With the availability of databases and robust decision-support system and tools and capacity development program, their performance on technical delivery, community organizing, resource mobilization, and others will be enhanced. Consequently, the enhanced capacities of the Gender Focal Points will be reflected in the improved performances of the AMIA villages.

On the part of AMIA villages, a comprehensive training module will be developed that is aimed to build awareness and understanding of gender-related approaches, concepts and practices in inclusive value chain and climate change adaptation. Other capacity building activities that may be pursued will include business plan development, social enterprises, adoption of inclusive business practices, support for marketing high-value crops, livelihood enhancement skill training, and the likes. The skills that they will gain from these are important not only in increasing farm productivity but also in creating opportunities to diversify livelihood activities and increase their income. Another training area that may be included will be on how to use digital technologies to help overcome the barriers of women when it comes to limited access to information and finance. This may include the GESI-based database, database on gender responsive CRA technologies, practices and crops, CIS, early warning system, and others, which can be made available in Facebook or Tiktok, which are becoming more accessible to farmers. All training materials will be gender-and-culture sensitive and will use local dialects.

Overall, the training program will be tailored to AMIA program with consideration on regional site conditions and local contexts, as well as their priority commodities/agri-based products. The target trainees will be the RFO extensionists and identified Gender Points at regional, provincial, and municipal levels. Like earlier training events conducted regarding GESI baseline assessment, this training can be implemented at the national level or regional/provincial levels depending on the availability of resources. The same trainees will lead the continuous awareness building and facilitation, providing extension services in AMIA villages.

Figure 7 presents the recommended action areas and how they link with each to achieve the expected outputs and outcome of this gender action plan for CRA. In Output 2, an additional **Action Area 2: Enabling environment for GESI-based CRA in DA and other government agencies** will be implemented beyond Year 2 (Table 5)**.** In this Action, CRAO, GESI and DA will assume greater roles in mainstreaming GESI in CRA. This will involve institutional reforms to provide an enabling environment to facilitate the transformation of AMIA villages into gender-

responsive, value-chain supportive, climate resilient and sustainable business enterprise entities. This will be directional in two ways: (1) policies and (ii) infrastructure. For policy development, future areas for research and potential use of the GESI applying the AMIA approach are: (i) farm and fishery areas for consolidation or clustering of AMIA villages to take advantage of economies of scale and further value chain adding; (ii) programs, activities and plans of bureaus, attached corporations and banner programs; (iii) participatory guarantee system to ensure quality control and further use of labelling and tracking; and (iv) amendments on policies for gender and development in cooperatives especially in the context of vertical and horizontal coordination; (v) development of peri urban areas for organic farming; and vi) adoption of law strengthening geographic indication that enable contiguous large agriculture areas to develop value chain networks for development of commodities and agri-products of which the country has comparative edge (e.g., abaca, seaweed, pili nuts, etc.).

Infrastructure development for CRA needs to consider GESI to harness the productivity and leadership skills of gender as well as foster nutrition and sustainable food and water security. Key infrastructure that would require GESI incorporation in the design, planning and implementation so as not to exacerbate gender gaps include irrigation facilities that consider vegetable and fruit gardening, location and selection of logistics and storage facilities, as well as farm-to-market roads, training and demonstration farms, early warning systems, access to internet and mobile facilitated information, and other digital equipment and innovations.

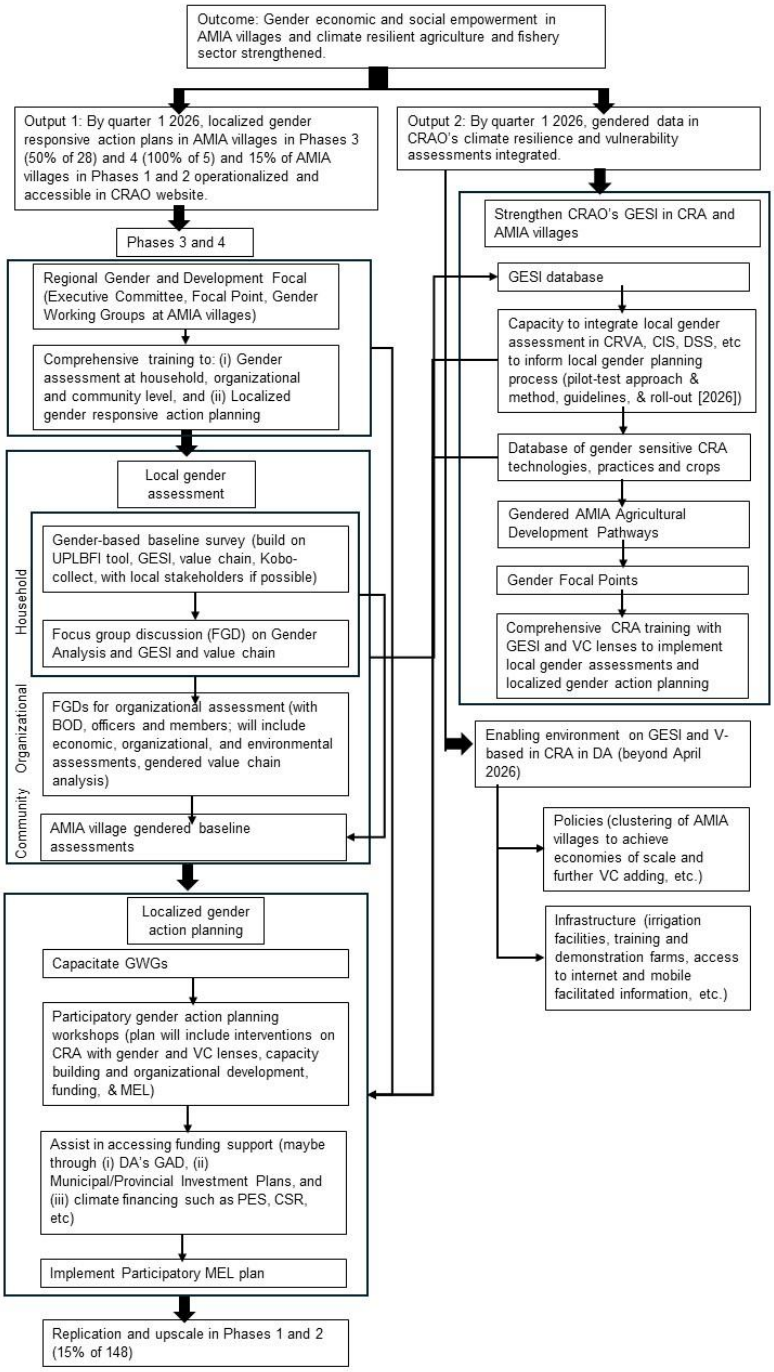


Figure 7. Flow and interconnections of action areas in the proposed gender responsive action plan for CRA and AMIA villages**.**

6 INDICATIVE GENDER ACTION PLAN FOR AMIA VILLAGES AND CLIMATE RESILIENT AGRICULTURE AND FISHERY SECTOR

Table 4. Proposed Gender Action Plan for CRA and AMIA villages (April 2024 – March 2026)

Outcome	Gender economic and social empowerment in AMIA villages and climate resilient agriculture and fishery sector strengthened.			
Outputs	1. By quarter 1 2026, localized gender responsive action plans in AMIA villages in Phases 3 (50% of 28) and 4 (100% of 5) and 15% of AMIA villages in Phases 1 and 2 operationalized and accessible in CRAO website. 2. By quarter 1 2026, gendered data in CRAO's climate resilience and vulnerability assessments integrated.			
Performance indicators:	1. Gender-based database system for gender analysis and gender responsive action plans in AMIA villages maintained and accessible in CRAO website. 2. At least 23% (41 of 181) of AMIA villages have developed their localized gender responsive action plans with GESI and value chain development lenses. 3. Integration of gender data and climate resilience and vulnerability assessments pilot tested in at least 2 regions. 4. Guidelines in the integration of gender data and climate resilience and vulnerability developed and approved by CRAO.			
Output 1: By quarter 1 2026, localized gender responsive action plans in AMIA villages in Phases 3 (50% of 28) and 4 (100% of 5) and 15% of AMIA villages in Phases 1 and 2 (22 of 148) operationalized and accessible in CRAO website.				
Action Area	**Proposed Activities**	**Target/Indicator**	**Responsibility**	**Time**

1. Regional Gender and Development Focal System (GDFS) committees for Phases 3 and 4 sites established	• Regional GDFS executive committee issues the guidelines[15] for the operationalization of GDFS at regional level • Establish Gender Working Groups (GWG) in regions with AMIA Phases 3 and 4 and 15% of AMIA in Phases 1 and 3 • Conduct a comprehensive capacitation training[16] on data collection, management, analysis, and baseline report writing for: (i) Gender assessment at household, organizational and community level, and (ii) Localized gender responsive action planning.	Guidelines are issued and disseminated; budget allocated At least 2 GWGs for the 4 AMIA CREATE established and trained At least 4 gender working groups for AMIAs in Phase 3 established and trained At least 8 gender working groups for AMIAs in Phases 1 and 2 established and trained	GDFS executive committees Regional GDFS, CRAO and GESI	May 2024 June-Aug 2024

[15] The guidelines will include survey modules, sampling methods, data collection, consolidation of data, and how to do descriptive and statistical analysis (as appropriate). Qualitative data collection methods will also be explored and used in (across levels: household, organizational, and community [AMIA village]), such as focus group discussions, stakeholder analysis, SWOT, mapping, etc.

[16] Capacitation training on the use of data collection tools for Action Areas 2 (Gender-disaggregated survey), 3 (Gender Analysis and GESI FGD) and 4 (Organizational Assessment) can be combined and implemented at the same time to save time and resources.

2.1 Conduct gender-disaggregated baseline surveys in Phases 3 and 4 AMIA villages	• Review the gender-disaggregated survey forms in pilot gender cases of UPLBFI. Do this survey including data pertaining to access, control of and opportunities for accessing productive resources; decision-making features by men and women; data that show gender responses to induced or exacerbated climate change; women and men, as well as youth and other vulnerable groups, etc. • Conduct a comprehensive gender-disaggregated data collection using Kobo-Collect app. • Integrate local gendered data with Climate Information System (CIS) to generate data and analysis on (i) actual hazards due to climate change and (ii) actual losses for instructive measures. • Integrate gender and value chain perspectives (vertical and horizontal links). • Where feasible, include non-government organizations (NGOs) and state universities and colleges (SUCs)-based in the AMIA sites especially in data collection.	Integrated GESI in the household survey tool Survey form translated in local dialects where AMIA villages are Completion of baseline surveys in Phases 3 (50% of 28) and 4 (100% of 5) Compilation, consolidation, descriptive and statistical analysis (as appropriate) completed At least 50% of the beneficiary-respondents in the survey are women. Incorporated gendered data in CRVA and CIS tools	Regional GDFS with support from GESI and CRAO	Q3, 2024

2.2 Conduct FGDs to facilitate Gender Analysis and GESI	Some questions to add in Gender Analysis: • Based on the baseline data collected (Action Area 2), what gender inequalities prevail and how are these manifested at household, community, and organizational level? • Has an analysis or study/ies been undertaken to identify existing gender inequalities, including those induced or exacerbated by climate change? • What gender gaps are shown by the surveys and qualitative research in terms of economic (division of labor, workload, and access and control of productive resources by women and men) and decision-making, governance, and leadership attributes (social inclusion)? • Who and how do women and respond to induced or exacerbated natural hazards? What are the adaptation methods? • Who, what, how, and why participate in value chain works (vertical and horizontal) Some of the questions to add for GESI analysis: • Who are stakeholders in AMIA village that have an interest in CRA, gender	Completion of FGDs in Phases 3 (50% of 28) and 4 (100% of 5) At least 50% of the participants are women in separate FGDs Transcription, compilation, consolidation, and thematic analysis of qualitative data completed Gender analysis and GESI reports completed	Regional GDFS with support from GESI and CRAO	Q3-4, 2024

	and value chain development? What are their influences and interests? • Are there any disadvantaged and/or marginalized groups within AMIA village? How are they disadvantaged and/or marginalized? What are their characteristics? • How are they affected by climate-related hazards? • What are the barriers[17] that prevent them from full access and participation to CRA? What are the ways[18] to overcome these barriers to equal participation?			
2.3 Conduct GESI-based organizational assessment through FGDs	• Organize FGDs for organizational assessment, which may include (i) Board of Directors, (ii) Officers, and (iii) members in separate discussions. • This assessment will include (i) economics, particularly inclusive value chain assessment, (ii) social inclusion, which is the organizational assessment, and (iii) environmental aspects of AMIA village.	Completed FGDs in Phases 3 (50% of 28) and 4 (100% of 5) At least 50% of the participants are women in separate FGDs	GESI, CRAO, Regional GDFS, and RFO gender focal point	Q3-4, 2024

[17] This may include their inability to avoid hazards, their tasks and roles that are influenced by inequality or high stress and needs for CRA

[18] For example, holding training events when women are not occupied with reproductive activities.

	• For the organizational assessment, discussion may include (i) governance and leadership, (ii) operations and management, (iii) human resource development, (iv) financial management, (v) business delivery, and (vi) external relations. • Develop GESI-based organizational status report of farmer organizations in AMIA villages. • Combine the following to develop the AMIA village gendered baseline assessment report: (1) integrated gender-disaggregated survey and CIS, (2) Gender Analysis, GESI and value chain, and (3) organizational assessment.	Transcription, compilation, consolidation, and thematic analysis of qualitative data completed GESI-based organizational assessment reports completed Gendered baseline assessment report of AMIA village developed		
3. Develop localized gender responsive action plans[19]	Conduct a comprehensive capacity building to develop internal capacities and facilitate Participatory Gender Action Planning Workshops at AMIA village.	At least 50% of the trained Gender Action Planning facilitators are women	GESI, CRAO, ATI, and Regional GDFS Focal	Q3-4 2024
	Facilitate establishment of local GWGs in AMIA villages to be capacitated for them to effectively participate in the Participatory	A 10-member local GESI Working Group created in every AMIA village, at least	Regional GDFS Focal and Gender	

[19] The GESI plan should address specific issues affecting women and other vulnerable groups in AMIA village and identify development indicators and targets.

	Gender Action Planning Workshops. The working groups will be tasked to develop their respective gender action plans.	30% are women, are capacitated to develop the gender action plan	working groups in AMIA villages	
	Organize Participatory Gender Action Planning Workshops at AMIA villages to develop localized gender action plans. These plans will be contextualized based on the following: (i) integrated gender-disaggregated baseline survey results, (ii) gender analysis, GESI and value chain report, (iii) GESI-based organizational assessment report, and (iv) integrated local data (i, ii and iii) and CRAO's CIS and other decision support system tools) for evidence and science-based gender action planning process. The plans will include interventions on (i) CRA technologies, practices and crops (the gender sensitive CRA database will be useful), (ii) inclusive value chain development building on local and international markets, (iii) capacity building and organizational development, (iv) financing and budget, and (v) MEL plan. Local stakeholders such as the City/Municipal Agriculture Office, SUCs, private companies and others may be invited in the planning workshops.	Localized gender action plans developed and adopted for implementation at AMIA villages At least 30% of the planning participants are women	Regional GDFS Focal and Gender working groups in AMIA villages with LGU-C/MAO, SUCs, private companies and other local stakeholders	Q4 2024, Q1 2025

	Assist AMIA villages secure funding for the implementation of their gender action plans, which may include through: (i) access DA 5% budget on Gender and Development by submitting project proposals, (ii) integrated the gender action plans in Municipal/ Provincial Investment Plans, (iii) organize local forums to encourage local investments[20] from government and non-government organization, private companies and others through payments for ecosystems services, corporate social responsibility, and others. Support can be direct (funds) or indirect (in kind, technical, etc.), promoting co-investments with DA-CRAO.	Generated commitment to cover at least 40% of the estimated budget requirement of plan implementation.	Regional GDFS, Gender Focal Point, and GWGs in AMIA villages with LGU-C/MAO, SUCs, private companies and other local stakeholders	Q2 2025
	Establish and implement a participatory gender responsive MEL system to monitor and evaluate the implementation of gender action plans, and design feedback mechanism for learning. Data collection for monitoring will use participatory methods[21],	Functional MEL system for gender action plan implementation, involving at least 30% of women.	CRAO, Regional GDFS Focal and AMIA villages	Q1-2 2025

[20] The GESI plans will be integrated into the City or Municipal Commodity Investment Plans, and consequently in the Provincial Commodity Investment Plans.

[21] This may include qualitative methods like the Most Significant Changes, Outcome Stories, and others.

	engaging the AMIA beneficiaries as well as other stakeholders involved.	Regular monitoring and reporting mechanism in place		
4. Replication and upscale preparation and implementation of gender responsive action plans in AMIA Phases 1 and 2 as performed in AMIA Phases 3 and 4	• Conduct data collection for household, community, and organizational (AMIA) levels incorporating CIS with gender and value chain perspectives. • Analyze the gender equities at local sites. • Analyze the organizational structure for AMIA villages. • Develop participatory-based gender responsive action plans in AMIA villages Phases 1 & 2 including targeted interventions from DA. • For new sites that intend to become AMIA, the same process for development of gender responsive action plans will be done.	Where possible, "big brother-small brother" approach will be employed to facilitate the development of gender responsive action plans in AMIA Phases 1 and 2 Gender-generated data using quantitative and qualitative methods developed in 15% of 148 (22) existing AMIA villages in Phases 1 & 2 Gender assessments completed in 15% of 148 (22) of AMIA villages in Phases 1 & 2 Organizational assessment reports completed for in 15% of 148 (22) of AMIA villages in Phases 1 and 2 completed Gender responsive action plans in 15% of 148 (22) of	CRAO, GESI, Regional GDFS Focal	Q3 2024-Q1 2026

		AMIA villages in Phases 1 and 2 developed		
Output 2: By quarter 1 2026, gendered data in CRAO's climate resilience and vulnerability assessments integrated.				
1. Strengthening CRAO's GESI role in CRA and AMIA villages	• Establish and manage database system on GESI. • Revisit and finalize existing data collection tools[22] used in AMIA villages Phases 3 and 4. • Capture and quantify the gender-based socio-demographic and economic profile of beneficiaries, their needs, and adaptation strategies. • Improve the qualitative questions and data generated, where needed. • Improve on the gendered value chain data relating to the economic and financial analysis on efficiency and efficacy of the vertical coordination links developed. • Improve the gendered data with climate information for better examination of effects and impacts of climate hazards by gender data.	GESI data base system and management at regional levels in the Phases 3 and 4 AMIA CREATE sites Guidelines to roll-out gendered CRVA, CIS and other DSS tools developed and approved	CRAO, GESI, Regional GDFS	Q3, 2024-Q1, 2026

[22] This household survey is the data collection tool developed, used and updated by UPLBFI on their two gender mainstreaming projects in AMIA villages from 2022-2023.

	• Establish the database system and management of gender-differentiated data at regional levels. • Provide recommendations on development of GESI based database for sector-wide development. • Local gender assessments will be integrated in computer-aided decision-making technology, climate vulnerability assessments and other climate risk management tools in AMIA existing technological and institutional innovations. • Develop guidelines to roll-out gendered CRVA, CIS and other DSS tools			
	• Develop internal capacities to integrate local GESI baseline assessments with CIS for effective decision support system for AMIA villages. • Decision support tools should include abilities to predict future impacts to develop preventive strategies and minimize the effects of climate to women and other vulnerable groups, especially their farming and other livelihood activities. • These tools will be made available to Regional GDFS and AMIA villages for evidence and science-based	At least 23% of AMIA villages (41 of 181) have used the GESI sensitive decision support system	CRAO	Jun 2025

	Participatory Gender Action Planning process			
	Develop database of gender responsive CRA technologies, practices, and crops. This will be continuously updated, including quick responses to climate change like local food basket.	User-friendly database of gender sensitive CRA technologies, practices and crops established and functional At least 23% of AMIA villages (41 of 181) have used the database	BSWM and CRAO	Q1, 2025
	Genderize the AMIA Agricultural Development Pathways by adding gender indicators in the framework. These indicators will help Regional GDFS facilitate AMIA villages to be gender responsive in both organizations and operations.	Gendered AMIA Agricultural Development Pathways approved and used as guidelines in the establishment of new AMIA villages and as they transition to Phases 2, 3 and 4.	CRAO	Q2, 2025
	Identify GESI Focal Points from CRAO to RFOs to provincial and municipal levels. They will be trained about GESI, including (i) awareness and sensitivity in line with GAD policy and other related policies and programs, and (ii) the use of various data collection tools needed for GESI assessments, baselining and conducting MEL in AMIA villages.	At least 50% of the newly appointed GESI Focal Points are women. They are trained and familiar on the use different GESI data collection tools for various purposes.	GESI, CRAO and Regional GDFS Focal	Jun 2024

	Design and roll out a comprehensive GESI training program on inclusive value chain development and CRA that is tailored for each region and based on their priority commodities. The target trainees will be the Regional GDFS Executive Committees and identified Gender Points at regional, provincial, and municipal levels. The same trainees will lead the continuous awareness building about the resulting impacts in the nexus of GESI, inclusive value chain development and climate change in AMIA villages.	At least 50% of the GESI trained participants are women	GESI, ATI and RFO extensionists	Q3, 2024

Table 5. Proposed Gender Action Plan for CRA and AMIA villages (April 2026 and beyond [March 2028])

Outcome	*Gender economic and social empowerment in AMIA villages and climate resilient agriculture and fishery sector strengthened.*
Outputs	*3.1.1 By quarter 1 2028, localized gender responsive action plans in AMIA villages in Phases 3 (remaining 50% of 28) and remaining 85% of AMIA villages in Phases 1 and 2 operationalized and accessible in CRAO website.* *3.1.2 By quarter 1 2028, gendered data in CRAO's climate resilience and vulnerability assessments integrated and used.*
Performance indicators:	1. *Gender-based database system for gender analysis and gender responsive action plans in AMIA villages maintained and accessible in CRAO website.* 2. *100% of AMIA villages have developed their localized gender responsive action plans with GESI and value chain development lenses.*

	3. Integration of gender data and climate resilience and vulnerability assessments rolled out in other regions.			
Output 1: *By quarter 1 2028, localized gender responsive action plans in AMIA villages in Phases 3 (remaining 50% of 28) and remaining 85% of AMIA villages in Phases 1 and 2 operationalized and accessible in CRAO website.*				
Action Area	**Proposed Activities**	**Target/Indicator**	**Responsibility**	**Time**
1. Replication and implementation of gender responsive action plans in the remaining AMIA Phase 3	• Conduct data collection for household, community, and organizational (AMIA) levels incorporating CIS with gender and value chain perspectives. • Analyze the gender equities at local sites. • Analyze the organizational structure for AMIA villages. • Develop participatory-based gender responsive action plans in AMIA villages Phase 3 including targeted interventions from DA.	Gender-generated data using quantitative and qualitative methods developed in remaining 50% of 28 (14) existing AMIA villages in Phase 3 Gender assessments completed in remaining 50% of 28 (14) existing AMIA villages in Phase 3 Organizational assessment reports completed in remaining 50% of 28 (14) existing AMIA villages in Phase 3 Gender responsive action plans in remaining 50% of	CRAO, GESI, Regional GDFS Focal	Q2-4, 2026

		28 (14) existing AMIA villages in Phase 3		
2. Replication and upscale preparation and implementation of gender responsive action plans in AMIA Phases 1 and 2 as performed in AMIA Phases 3 and 4	• Conduct data collection for household, community, and organizational (AMIA) levels incorporating CIS with gender and value chain perspectives. • Analyze the gender equities at local sites. • Analyze the organizational structure for AMIA villages. • Develop participatory-based gender responsive action plans in AMIA villages Phases 1 & 2 including targeted interventions from DA. • For new sites that intend to become AMIA, the same process for development of gender responsive action plans will be done.	Where possible, "big brother-small brother" approach will be employed to facilitate the development of gender responsive action plans in AMIA Phases 1 and 2 Gender-generated data using quantitative and qualitative methods developed in remaining 85% of 148 (136) existing AMIA villages in Phases 1 & 2 Local gender assessments completed Organizational assessment reports completed Gender responsive action plans developed	CRAO, GESI, Regional GDFS Focal	Q3 2024-Q1 2028
Output 2: *By quarter 1 2028, gendered data in CRAO's climate resilience and vulnerability assessments integrated and used.*				
1. Strengthening CRAO's GESI role in	• Continue management and updating of GESI database system (national and regional levels).	GESI database system and management at national	CRAO, GESI, Regional GDFS	Q2, 2026 –

CRA and AMIA villages	• Continue integrating local gender assessments in computer-aided decision-making technology, climate vulnerability assessments and other climate risk management tools in AMIA's existing technological and institutional innovations. • These tools will be made available to Regional RDFS and AMIA villages for evidence and science-based Participatory Gender Action Planning process. • Continue to develop internal capacities to integrate local GESI baseline assessments with CIS for effective decision support system for AMIA villages.	and regional levels in AMIA villages AMIA villages have used the GESI sensitive decision support system		Q1, 2028
	Continue updating of database of gender responsive CRA technologies, practices, and crops.	User-friendly database of gender sensitive CRA technologies, practices and crops established, functional and used by AMIA villages	BSWM and CRAO	Q2, 2026 – Q1, 2028
2. Enabling environment for GESI-based CRA in DA and other government agencies	Develop policies and guidelines that will create an enabling environment for economic and social empowerment in AMIA villages. Future areas for research and potential use of the GESI applying the AMIA approach are: (i) clustering of AMIA	At least one GESI responsive policy guidelines on CRA developed and approved	GESI, CRAO, DA	Q2, 2026 – Q1, 2028

	villages to achieve economies of scale and further VC adding; (ii) PAPs of bureaus, attached corporations and banner programs; (iii) participatory guarantee system to ensure quality control and further use of labelling and tracking; (iv) amendments on policies for GAD in cooperatives especially in the context of vertical and horizontal coordination; (v) development of peri urban areas for organic farming; and vi) adoption of law to develop VC networks for development of agri-products commodities			
	Implement infrastructure that is supportive to economic and social empowerment in AMIA villages. This may include (i) irrigation facilities that consider vegetable and fruit gardening, (ii) location and selection of logistics and storage facilities, farm-to-market roads, (iv) training and demonstration farms, (v) early warning systems, and (vi) access to internet and mobile facilitated information, and other digital equipment and innovations.	At least one gender responsive infrastructure development project approved and implemented benefitting AMIA villages	GESI, CRAO, DA	Q2, 2026 – Q1, 2028

REFERENCES

Agarwal, P., A. Jarvis, B. Campbell, R. Zougmore, A. Khatri-Chhetri, S. Vermeulen. A.M. Loboguerrero, S. Sebastian, J. Kinyangi, O. Bonilla-Findji, M. Radeny, J. Recha, D. Martinez-Baron, J. Ramirez-Villegas, S. Huyer, and P. Thornton. 2018. The climart-village approach: Framework of an integrative strategy for scaling up adaptation options in agriculture. *Environment and Society.* 10.5751/ES-09844-230114

Asian Development Bank. 2020. Gender Equality and Social Inclusion Diagnostic of Selected Sectors in Nepal. http://dx.doi.org/10.22617/TCS200291-2

Bowman, Kimberly and Caroline Sweetman. 2014. Introduction to Gender, Monitoring, Evaluation and Learning. *Gender and Development,* 22 (2). https://doi.org/10.1080/13552074.2014.934525

Chandra, A., K.E. McNamara, P. Dargusch, A.M. Caspe, and D. Dalabajan. 2017. Gendered vulnerabilities of smallholder farmers to climate change in conflict-prone areas: A case study from Mindanao, Philippines. *Journal of Rural Studies*, 50, pp 15-59.

Crease, R., M. Parsons, and K. Fisher. 2018. "No climate justice without gender justice": Explorations of the intersections between gender and climate injustices in climate adaptation actions in the Philippines. In: Jafry T. (Ed), *Routledge Handbook of Climate Change.* Routledge, London, pp 359-388.

Department of Agriculture (DA). (2024). *DA-Gender and Development*. Department of Agriculture. Retrieved 25 January 2024 from https://www.da.gov.ph/da-gender-and-development/.

DA. 2024. AMIA Villages. DA-AMIA. https://amia.da.gov.ph/index.php/amia-villages/

Damptey P.T.M. and Essel A.K. 2012. Gender perspectives of climate change coping and adaptive strategies in Ghana. Accra, Ghana: ABANTU for Development. https://wedo.org/wp-content/uploads/ghanagenderesearch.pdf

De la O Campos, Warring N., Brunelli C., Doss C., and Kieran C. 2015. Gender and land statistics recent developments in FAO's gender amd land rights databse. Food and Agriculture Organization of the United Nations, Rome. https://www.fao.org/3/i4862e/i4862e.pdf

Deluna R.S. Jr. 2023. Role of decision-making dynamics and farm participation in succession: The case of Philippine coffee farming households. Asia Pacific Journal of Social and Behavioral Science, 21: 1-14. https://www.researchgate.net/publication/377081655_Role_of_Decision-Making_Dynamics_and_Farm_Participation_in_Succession_The_Case_of_Philippine_Coffee_Farming_Households

Dikitanan R., Grosjean G., Nowak A., Leyte J. 2017. Climate-resilience agriculture in the Philippines. CSA Country Profile for Asia Series. International Center for Tropical Agriculture (CIAT); Department of Agriculture - Adaptation and Mitigation Initiative in Agriculture, Government of the Philippines. Manila, Philippines. 24.p. https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CRA_Profile_Philippines.pdf

Food and Agriculture Organization (FAO) of the United Nations. 2012. The State of Food and Agriculture, Rome.: https://www.fao.org/3/i2050e/i2050e00.htm

FAO. 2018. The gender gap in landright. Food and Agriculture Organization of the United Nations, Rome.: https://www.fao.org/3/I8796EN/i8796en.pdf

FAO. 2023. The status of women in agrifood systems. FAO: Rome. Retrieved on 26 January 2024 from https://doi.org/10.4060/cc5343en.

Giles J., Macandog P.B., Sova C., Digal L., Balgos C., Loquias M., Orbeta M.L., Astronomo I.J.T., Palau L.K., Balanza J.G., Hildebrand J., and Grosjena G. 2019. Climate-resilient agriculture in the Philippines: Climate Risk Profile, Mindanao. International Center for Tropical Agriculture (CIAT); Department of Agriculture - Adaptation and Mitigation Initiative in Agriculture, Government of the Philippines; The Food and Agriculture Organization of the United Nations (FAO). Manila, Philippines. 32 p. https://cgspace.cgiar.org/server/api/core/bitstreams/ac16cccb-4a2b-4ac0-86cc-66b22f7d2756/content

Javier, MEC, GRD Armercin, DJS Martinez, EP Abasolo, and CD Piñon. 2010. Gender and Natural Resources Management: Implications for Rewarding Environmental Services in the Philippines. ICRAF-SEA, Bogor, Indonesia. Unpublished Report.

Lu, Jenky Leilanie. 2010. Gender Analysis of Women in the Philippine Agriculture and Their Occupational Issues. *Journal of International Women Studies,* 11 (4). https://vc.bridgew.edu/cgi/viewcontent.cgi?article=1199&context=jiws

Lukasiewics, Adam. 2011. Migration and Gender Identity in the Rural Philippines: Households with Farming Wives and Migrant Husbands. Critical Asian Studies, 43 (4) pp 577-593. https://doi.org/10.1080/14672715.2011.623523

Malapit, H., C. Ragasa, E.M. Martinez, D. Rubin., Greg Seymour and A. Quisumbing. 2020. Empowerment in agricultural value chains: Mixed methods evidence from the Philippines. *Journal of Rural Studies,* 76, pp. 240-253.

Mishra, A., A.R. Khanal, and M. Samarendu. 2017. Gender differentials in farming efficiency and profits: The case of rice production in the Philippines. *Land Use Policy,* 63, 461-469. https://doi.org/10.1016/j.landusepol.2017.01.033

NEDA. (2023). *AmBisyon Natin 2040.* NEDA. Retrieved 15 January 2024 from https://2040.neda.gov.ph/about-ambisyon-natin-2040/.

Parks, M.H., M.E. Christie, and I.B. Bagares. 2014. Gender and conservation agriculture: constraints and opportunities in the Philippines. *GeoJournal,* 80, pp 61-77.

Pearse, Rebecca. 2017. Gender and climate change. *WIREs Climate Change.* https://doi.org/10.1002/wcc.451

Philippine Statistics Authority. 2020. Agricultural Indicators System: Employment and ages in the Agriculture Sector. Philippines: PSA. https://psa.gov.ph/system/files/main-publication/AIS%2520Employment%2520and%2520Wages_signed%25201127%2520.pdf

Pyburn, Rhiannon, Vanya Slavchevska, and Froukje Kruijssen. 2023. Gender dynamics in agrifood value chains: Advances in research and practice over the last decade. *Global Food Security,* 39, 100721.

Quisumbing, A., R. Meinzen-Dick, T.L. Raney, A. Croppenstedt, J.A. Behrman and A. Peterman. 2014. Closing the Knowledge Gap on Gender in Agriculture. In: *Gender in Agriculture: Closing the Knowledge Gap.* Pp 3-27.

Rai, K.R., L.D. Bhatta, U. Acharya, and A.P. Bhatta. 2018. Assessing climate resilient for smallholders. *Environmental Development,* 27, pp 26-33. https://doi.org/10.1016/j.envdev.2018.06.002

Rahman Md. S. 2013. Climate change, disaster and gender vulnerability: A study on two divisions of Bangladesh, American Journal of Human Ecology, 2(2): 72-82. https://www.researchgate.net/publication/275745013_Climate_Change_Disaster_and_Gender_Vulnerability_A_Study_on_Two_Divisions_of_Bangladesh

Rosimo M., Gonsalves J., and Villavicencio F. 2021. Nurturing a gender-responsive approach to climate smart agriculture in Guinayangan, Quezon. CGIAR, CCAFS. Retrieved from https://cgspace.cgiar.org/bitstream/handle/10568/115800/CCAFS%20Info%20Note_Gender%20CSA.pdf?sequence=1&isAllowed=y

Srivastav, A.R., D. Rajni, M. Ranjan, S. Madhav and M. Sillanpaa. 2021. Climate-resilient strategies for sustainable management of water resources and agriculture. *Environmental Science and Pollution,* 28, pp. 41576-41595.

Tatlonghari, Gerlie and Thelma Paris. 2014. Gendered adaptations to climate change: A case study from the Philippines. In: *Research, Action and Policy: Addressing the Gendered Impacts of Climate Change.* 10.1007/978-94-007-5518-5_17

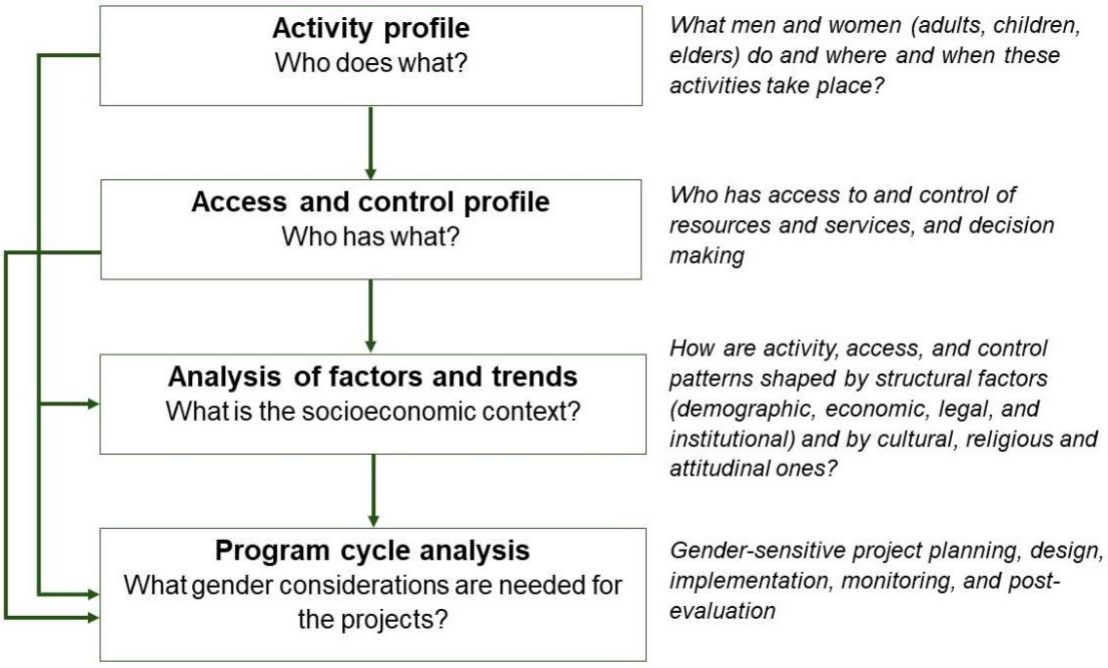
UPLBFI. 2023a. Final Report, Integrating Gender Considerations into the Development of Projects for Vulnerable Sectors in Selected AMIA Villages in the Bicol Region.

UPLBFI. 2023b. Final Report, Strengthening selected AMIA Villages through Mentorship Program, and Establishment and Implementation of Gender-Sensitive Projects.

Ureta J., Anit K., Habito C.M.D., Lasco R.D. 2016. Exploring gender preferences in farming system and tree species selection: Perspectives of smallholder farmers in Southern Philippines. Journal of Environmental Science and Management Special Issue, 1: 56-73. https://www.researchgate.net/publication/312943449_Exploring_Gender_Preferences_in_Farming_System_and_Tree_Species_Selection_Perspectives_of_Smallholder_Farmers_in_Southern_Philippines

Yadav S.S., and Lal R. 2018. Vulnerability of women to climate change in arid and semi-arid regions: The case of India and South Asia. 149: 4-17. https://www.sciencedirect.com/science/article/abs/pii/S0140196317301532

ANNEX 1: GENDER ANALYSIS FRAMEWORK FOR AGRICULTURE (ADB, 2002)



ANNEX 2: GESI ANALYSIS IN CRA AND IN AMIA VILLAGES

There are different ways to adapt GESI analysis as a framework to inform gender mainstreaming in development projects. Depending on the purpose, below is one way to adapt GESI in CRA and AMIA villages.

The objective would be to assess and understand existing rules, norms and power dynamics that might disadvantage certain groups in the association, specifically within the context of gender, value chain and climate change.

The analysis may include the following activities:

1. Conduct Stakeholders' Analysis that will identify different groups in AMIA village that have an interest in CRA within an influence and interest matrices.
2. Determine the vulnerable groups within the AMIA village and characterize them.
3. Analyze the ways in which they are affected by climate-related hazards. This may include their inability to avoid hazards, their tasks and roles that are influenced by inequality or high stress and needs for CRA.
4. Elicit barriers that prevent them from full access and participation to CRA and identify ways to overcome these barriers to equal participation. For example, holding training events when women are not occupied with reproductive activities.

The GESI analysis can be informed by the GESI Diagnostic Framework as implemented by ADB in Nepal (http://dx.doi.org/10.22617/TCS200291-2), but with necessary adaptation to the Philippine context.

ANNEX 3: PROPOSED GUIDELINES IN DEVELOPING A LOCALIZED GESI PLAN AT AMIA VILLAGES

Introduction

This guideline is intended for the extensionists at DA RFOs. These extensionists are involved in the implementation of the Adaptation and Mitigation Initiative in Agriculture (AMIA) program, which is DA's flagship program to combat the impacts of climate change. When used by an extensionist, this guideline can help an AMIA village prepare its gender responsive CRA action plan to better adapt their farming livelihood in and be resilient on the impacts of climate change with gender perspectives. This guide builds on the experience of the University of the Philippines Los Baños Foundation Inc. (UPLBFI) in integrating gender analysis and gender perspectives in the development of projects in Regions V (Bicol) and VI (Western Visayas).

Through a Localized Gender Action Plan (LGAP), the AMIA villages will be guided by a shared practical vision and a set of strategies and priorities of integrating gender in the development of CRA. The plan will guide them on how to balance the roles of women, men youth and other vulnerable groups in AMIA villages and optimize their inherent abilities in adapting their farming livelihood to climate change. As a result, the AMIA villages with the extensionists and other local stakeholders will be more effective in making their faming livelihood resilient to climate change.

Facilitating the planning process of the LGAP may consider the schedule of CRAO's call for project proposals, the Municipal Local Government Unit's annual budgeting cycle, and others. This will ensure the funding aspect of the plan for its implementation.

Depending on the strategy of the extensionist, the action planning process can be part of community organizing; such that the AMIA village is being organized from the beginning with gender lens. In case the AMIA village is already organized, the planning can still be facilitated. If the village already has an existing action plan, the gender action plan will be integrated and harmonized. With the assistance of the extensionist, this can also be mainstreamed in the Provincial Commodity Investment Plan (PCIP) for support, as appropriate.

Objectives

The LGAP aims to integrate gender in climate resilient agriculture (CRA) activities and implementation in AMIA villages. Specifically, it aims to:

1. Profile the women and men farmers of AMIA villages and their households, and describe their farming livelihoods and livelihood assets;
2. Discuss their farming livelihood needs;
3. Examine the impacts of climate-related shocks to their farming livelihood and coping strategies; and
4. Identify strategies, projects and activities that will address their needs and reduce the impacts of climate change in their farming while ensuring their livelihoods.

Developing and implementing this plan together with women and other vulnerable groups in AMIA villages will enable the farmers to better manage their resources, develop and adapt their farming

system to changing climate, and diversify economic activities for improved income and sustained livelihoods. In the process, they will be capacitated and provided with opportunities for greater involvement and collaboration towards CRA. Considering farmers' limited resources, this plan will enjoin the government, non-governmental organizations, private sector, and other local stakeholders on co-investment and co-management on gender responsive interventions in CRA.

Steps in formulating the gender action plan

The following steps are indicative; hence flexible. The extensionist can change the sequence and explore other activities to suit the site's specific biophysical and socio-economic conditions, cultural contexts, and norms.

Preparatory phase

1. *Facilitate a meeting with selected officials of an AMIA village together with concerned personnel from the barangay[23] and/or municipal/city level[24].* This meeting or a series of meetings will provide opportunities to discuss the importance of integrating gender in CRA, raise their awareness and knowledge of this process. They may talk about current efforts related to this and the issues faced, as well as the future plans and how this plan may contribute. They may also share potential partners or stakeholders with gender related initiatives. Among others, it will also be important to discuss the needed support (e.g., manpower, financial, technical, etc.) to conduct the planning and make this a collaborative multi-stakeholder process. Developing a timeframe and schedule of activities will also be agreed upon.
2. *Create a Gender working group (WG) for the LGAP.* It is important that women are part of the working group. Concerned personnel from the barangay and/or municipal/city level, partner government agencies in the AMIA village (e.g., Department of Environment and Natural Resources-Community Environment and Natural Resources Office, Municipal Agrarian Reform Office, etc.) and other stakeholders (e.g., non-government organizations) may be invited to be part of the multi-stakeholder working group. However, it is important to keep the number of working group members at a minimum for easy management.
3. *Implement capacity building activities that will enhance the working group's planning capabilities.* For example, field trips can be organized to expose them to local good practices (e.g., technologies, practices, and crops; social and institutional innovations; policy development) on mainstreaming gender in CRA. Seminars about gender, agriculture and climate can be organized, as well as team-building exercises and training on participatory planning processes, and many others. Seminars may include topics related to gender sensitivity while training may include how to do gender analysis and others.

[23] For example, the Barangay Kagawad Committee Chair on Agriculture or the Barangay Agriculture and Fishery Council Chair

[24] For example, the Agricultural Technician assigned to the village

4. *Understand the gender dimension of the AMIA village by conducting community or organizational profiling and community needs assessment.* This part will be critical as this aims to understand the current socio-demographic, economic, cultural, and political situation of the AMIA village. This can be done by the following: (i) profiling, which will be the characterization of the farmer organization's members, including their households, farming systems and livelihood assets; (ii) gender analysis; (iii) participatory needs assessment; and (iv) impacts of climate-based disasters and hazards and their coping strategies (Figure 1). The coping mechanisms here refer to their climate adaptation strategies. This data is important to inform the (i) organization's gender responsive action plan; (ii) organizational assessment based on the AMIA Agricultural Development Pathways; (iii) the Provincial Commodity Investment Plan; and (iv) CRAO's gendered Climate Risk and Vulnerability Assessment.

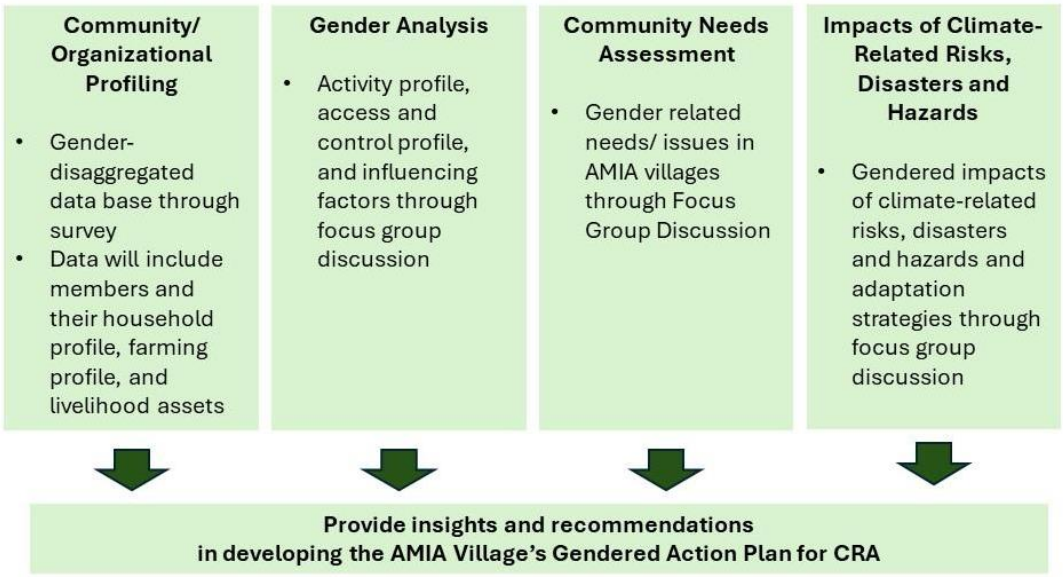


Figure 1. Important gender dimensions in AMIA villages that will inform the planning process for Gender Action Plan for CRA

In the process, sex-disaggregated data will be facilitated. Gender analysis, using the Harvard Analytical Framework, and gender perspectives will be employed. Participatory Rural Appraisal tools and methods will also be used to deepen understanding of women's situation in the village amidst changing climates. This may include participatory community mapping of resources, hazards, and others; problem tree analysis; strengths, weaknesses, opportunities and threats analysis; stakeholders' analysis; and others. The UPLBFI data collection tools (e.g., survey interview, focus group discussion) may be used.

In the community needs assessment, in case there are several needs that the participants will identify, these will be prioritized to make the plan realistic in terms of achievement.

Gender-related past and on-going interventions will be determined to know the interests of local agencies and stakeholders. Similarly, gender-related rules and policies will be listed and use these as basis, as appropriate, in forging partnerships with agencies and stakeholders. Overall, the primary data collected, and secondary information compiled can serve as the baseline of the AMIA village, which will be used as basis in the planning phase.

This part is where the proposed Action Area 1 on Research-based gender equality and social inclusion in CRA (Gender Action Plan for CRA) will be important. CRAO can develop data collection tools or use the available tools from UPLBFI that will be used in the planning process, and in return, they can use the data collected for their research work.

Planning phase

5. *Facilitate the gender action planning workshop.* Based on the understanding provided in Activity 4, this workshop will involve developing a practical vision for women and men farmers in the AMIA village, which will importantly consider their hopes and aspirations in the community. Based on the strategic gender needs previously identified (Activity 4), strategies and priorities will be set. This will be followed by developing action plans for implementation to achieve their vision.

   Facilitate the first writeshop to develop their gender action plan. They will put together their workshop outputs and write their plan in the local dialect. They will detail strategies, priorities and action plans so that implementers will understand how to operationalize the plan.

Authorization phase

6. *Validate the gender action plan with the AMIA village together with concerned personnel from the barangay and/or municipal/city level.* The working group will present their draft plan to validate, substantiate and endorse it for implementation and support. Once approved by the AMIA officials, the plan becomes an official agenda of the AMIA village or organization.
7. *Facilitate the second writeshop to integrate comments and suggestions in the final plan.* The comments and/or suggestions from the validation meeting will be integrated into the plan to finalize it.

Implementation phase

8. *Identify a focal point person who will oversee a local gender team within the AMIA village to implement the plan.* The focal point person and the local gender team will obtain support from partners and stakeholders through Memorandum of Agreements, as appropriate. Their interest and commitment to realize the plan is important.

9. *Implement activities in the plan through mentoring approach.* This is the role of the extensionist where capacitation will be critical, especially the women farmers to realize their own plan.

Monitoring, evaluation and learning phase

10. *Develop a monitoring, evaluation and learning system and make this part of the plan.* This is an integral part of the plan to ensure that its implementation is effective and on track. Simple M&E tools will be used so that women and others can take part in monitoring indicators, outputs and outcomes. Through adaptive management, learn from the findings by using these in re-strategizing to improve the implementation and ensure the successful implementation of the plan.

INSTITUTIONALIZATION OF CLIMATE RESILIENT AGRICULTURE

NDC MEASUREMENT, VERIFICATION AND REPORTING SYSTEM

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Prepared by TRTA Consultant under

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ACRONYMS

ADB	Asia Development Bank
AMIA	Adaptation and Mitigation Initiative in Agriculture
AWD	Alternate Wetting and Drying
CCA/DRR	Climate Change Adaptation / Disaster Risk Reduction
CIAT	International Centre for Tropical Agriculture
CIS	Climate Information Services
COP	Conference of the Parties
CRAO-DA	Climate Resilient Agriculture Office – Department of Agriculture
CRVA	Climate-Risk Vulnerability Assessment
DA	Department of Agriculture
DSR	Direct-Seeded Rice
GHG	Green House Gas
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change.
LGU's	Local Government Units
MRV	Monitoring, Reporting and Verification
NDC's	Nationally Determined Contributions
PA	Paris Agreement
PAPs	Prioritized Action Plans
PPP	Public Private Partnership
PSA	Philippine Statistics Authority
TNA	Training Needs Assessment
UNFCCC	United Nations Framework Convention on Climate Change
WFP	Whole Farm Planning

EXECUTIVE SUMMARY

The report on the institutionalization of Climate Resilient Agriculture through the Nationally Determined Contributions (NDC) Measurement, Verification, and Reporting System offers an in-depth examination of efforts to integrate climate resilience within the agricultural sector of the Philippines. As part of the global commitment under the Paris Agreement, the Philippines has pledged to significantly reduce greenhouse gas (GHG) emissions and implement robust climate action across various sectors, with a strong focus on agriculture.

Agriculture has been identified as a substantial contributor to the country's GHG emissions, primarily through rice cultivation and livestock rearing. To address these, the report outlines various management and technological strategies aimed at reducing emissions and enhancing sustainability.

This framework is a cornerstone of the country's strategy to address climate change impacts through agriculture. It provides a structured approach to track progress, assess the effectiveness of implemented practices, and ensure accountability in the efforts to reduce greenhouse gas emissions and enhance resilience to climate variations.

Central to the MRV framework is its comprehensive categorization of emission sources within the agriculture sector, alongside prescribed methodologies for monitoring and verification. The framework delineates specific technologies and practices that aim to reduce emissions, such as the implementation of more sustainable cultivation techniques and livestock management practices that lessen methane production. It also suggests improvements in soil management to decrease nitrous oxide emissions.

To effectively measure the progress towards achieving the NDCs, the MRV framework outlines detailed requirements for data collection, including the types of data needed, data sources, and frequency of reporting. This systematic data collection is supported by both governmental and independent agencies tasked with verifying reported data to uphold integrity and accuracy.

Moreover, the MRV framework emphasizes the importance of transparency, requiring regular updates and public sharing of progress towards emissions reduction and resilience goals. This transparency not only fosters greater accountability but also facilitates informed decision-making by stakeholders across all levels.

The report also highlights several challenges that impede progress, including limited financial resources, technological gaps, and insufficient institutional support. However, it identifies significant opportunities for international collaboration and financial aid that could propel the country towards its NDC goals.

In conclusion, the report emphasizes the need for an integrated approach that combines policy enhancement, improved resource management, and robust institutional support frameworks. These measures are essential for the Philippines to meet its international climate commitments and to foster sustainable agricultural practices that are resilient to the challenges posed by climate change. The strategic recommendations provided aim to bolster the country’s MRV system, enhance stakeholder engagement, and secure the necessary support to ensure the effective implementation of climate-resilient strategies in agriculture.

1 INTRODUCTION

The Philippines was among the 192 countries who legally bound itself on an international treaty of climate change (CC) referred to as Paris Agreement at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. Subsequent to that, the Philippines Senate unanimously ratified the "Paris Agreement on Climate Change" on March 15, 2017.

The Paris Agreement (PA) is a landmark international treaty and its primary goal is to limit global warming to well below 2 degrees Celsius above pre-industrial levels, with efforts to limit the temperature increase to 1.5 degrees Celsius. This is in recognition of the severe impacts that even a 2-degree increase could have on the planet, including more frequent and intense heat waves, rising sea levels, increasing incidence of uncharacteristic weather events, and other climate-related challenges.

Key elements of the PA include the following five considerations.

Nationally Determined Contributions (NDCs)

Central to the PA is the concept of Nationally Determined Contributions, or NDCs. Each participating country submits its NDC, which outlines its commitment to addressing CC. NDCs specify the country's goals, targets, and planned actions to reduce Green House Gas (GHG) emissions and enhance resilience to the impacts of CC. Ideally, NDC need to be recognised as being arrived at from a "cross-sectoral" perspective, one which involves all government departments, private enterprise and the civil society. It should guide the country's long-term development plan towards a climate-resilient and low carbon future, particularly the developing nations. NDCs are established independently by the parties (countries or regional groups of countries) and signatories are expected to regularly update and strengthen their NDCs over time to reflect changing circumstances or increased ambitions. As a result, NDCs can be reviewed and reset every five years and any change is registered by the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat.

Table 1: Major GHG and NDC Metrics

NDC metrics	Data available & sources;	Data not available and possible sources
Tonnes of CO2 equivalent emissions	Estimated data extrapolated from production data available from PSA Currently no data assembled in DA	Hard data from representative agro-geographic regions & specific value chains not available. Commence a pilot series of baseline data
Production and use of nitrogen fertilizers generate CO2, N2O and CH4	No available data identified.	As part of national policy, it needs to be negotiated with local N production companies that they monitor

		production process to develop baseline.
Global Warming Potential (GWP) is the emissions metric used most often to aggregate contributions from different greenhouse gases1	GWP is the relative potency as an agent of CC compared to CO2 over a specified 20, 100 & 500 year time intervals & is tabled by the IPCC.	Recognised as the benchmark against which GHG accounting is conducted.

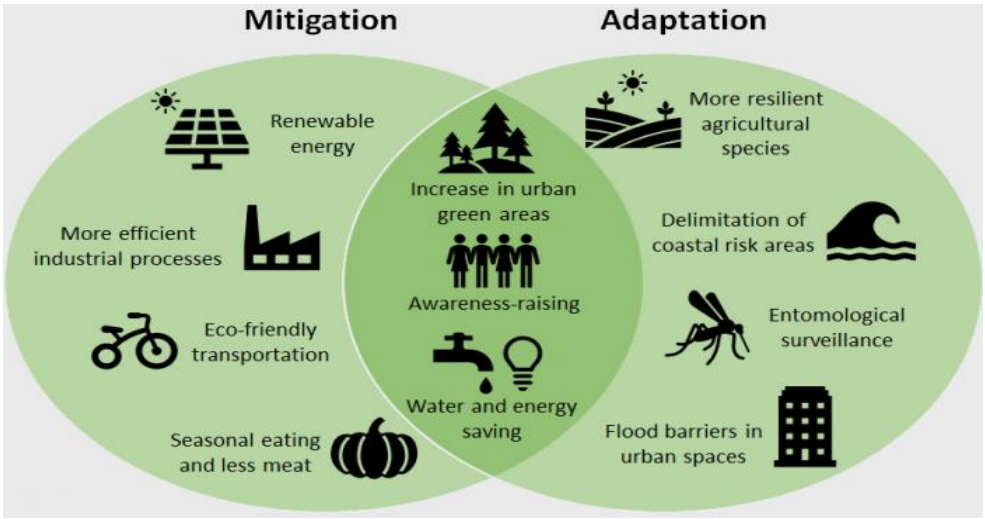
Mitigation and Adaptation

Basically, mitigation targets the reduction of GHG emissions. Signatory countries commit to reducing these emissions through various measures, such as transitioning to renewable energy sources, improving energy efficiency, and implementing sustainable land use practices. On-farm mitigation measures contribute to global efforts to reduce GHG emissions, helping to mitigate climate change impacts beyond the farm level. They can also lead to cost savings, improved efficiency, and enhanced environmental sustainability. The specific targets and strategies vary by country, reflecting their unique circumstances and capabilities.

In addition to mitigation efforts, the PA recognizes the importance of adaptation to the impacts of CC. On-farm adaptation measures help farmers cope with the impacts of climate change, reducing losses in crop yields and livestock productivity. They enhance the resilience of agricultural systems to extreme weather events and changing environmental conditions. Countries, particularly those most vulnerable to CC, outline their plans for building resilience to climate impacts, protecting communities, and adapting to changing conditions.

The distinction between adaptation on the one hand, and mitigation on the other is illustrated in Figure 1 and needs to be made in terms of NDC.

Figure 1: Adaptation Versus Mitigation: Illustrating the Difference



1 Calculated by the Intergovernmental Panel on Climate Change (IPCC)

In summary, CC adaptation and mitigation are both critical to combatting CC – but in different ways. The terms should not be seen as synonymous as they define different actions to combat CC.

Finance

The agreement emphasizes the provision of financial support by developed countries to help developing nations in their efforts to mitigate and adapt to CC. Financial assistance is crucial for technology transfer, capacity building, and supporting vulnerable communities.

Transparency and Accountability

The PA establishes a framework for transparency and accountability. Countries are required to regularly report on their progress in implementing their NDCs and achieving their climate-related goals. This transparency enhances trust among nations and helps hold them accountable for their commitments.

The PA represents a global commitment to cooperative action on CC, recognizing the shared responsibility of all nations to address this critical issue. The NDCs serve as a foundation for collective efforts to limit global temperature rise and build a more sustainable future.

2 AGRICULTURE-RELATED GHG EMISSIONS IN THE PHILIPPINES

Agriculture is a significant contributor to GHG emissions globally, and this includes emissions from activities such as enteric fermentation in livestock, rice cultivation, and the use of synthetic fertilizers. Agriculture is a crucial sector of the Philippine (PHL) economy, but it also contributes to GHG emissions albeit small in relative comparison (See Table 1).

2.1 Estimated GHG contributions of agriculture.

Though recognised as a minor GHG contributor to CC globally, the PHL GHG emissions rank in the top 25 percent among low and middle-income countries, with significant increases projected in the coming decades[2]. It was shared to the TA team that the Philippines can contribute to global mitigation efforts through an energy transition (ibid) process which would optimise renewables. The DA could be more aware of this and see it as an important part of its response to the PA.

The Philippines emits an average of 1.98 metric tons of carbon dioxide equivalent per capita in 2020, or way below the global average of four (4) metric tons of GHG) emissions per capita.[3] Globally, a significant source of GHG emission comes from the manufacture of synthetic nitrogen (N) fertilizers consumed in crop production processes. Application of synthetic N fertilizers is recognised as the most important factor contributing to direct nitrous oxide (N_2O) emissions from agricultural soils.

The Business-As-Usual (BAU) scenario of the Philippine NDC is projected from the results of the 2010 GHG as shown in Table 1. GHG covered are carbon dioxide (CO_2), methane (CH_4), N_2O, perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). The 2010 Philippine GHG Inventory was completed in 2019 and was developed by government experts in 2014 (ibid).

Table 1: 2010 National GHG Inventory Results

Sector	CO2 (in Mt CO2e)	CH4 (in Mt CO2e)	N2O (in Mt CO2e)	HFCs (in Mt CO2e)	Total (in Mt CO2e)
Agriculture	0.696	33.853	8.604	-	43.152
Waste	0.015	14.527	1.017	-	15.559
IPPU	7.564	0.009	0.019	0.771	8.363
Transport	23.718	0.125	0.331	-	24.174
FOLU	-37.016	0.007	0.002	-	-37.007
Energy	50.698	1.888	0.519	-	53.105
				Total with FOLU	107.345
				Total without FOLU	144.352

Source: Climate Change Commission

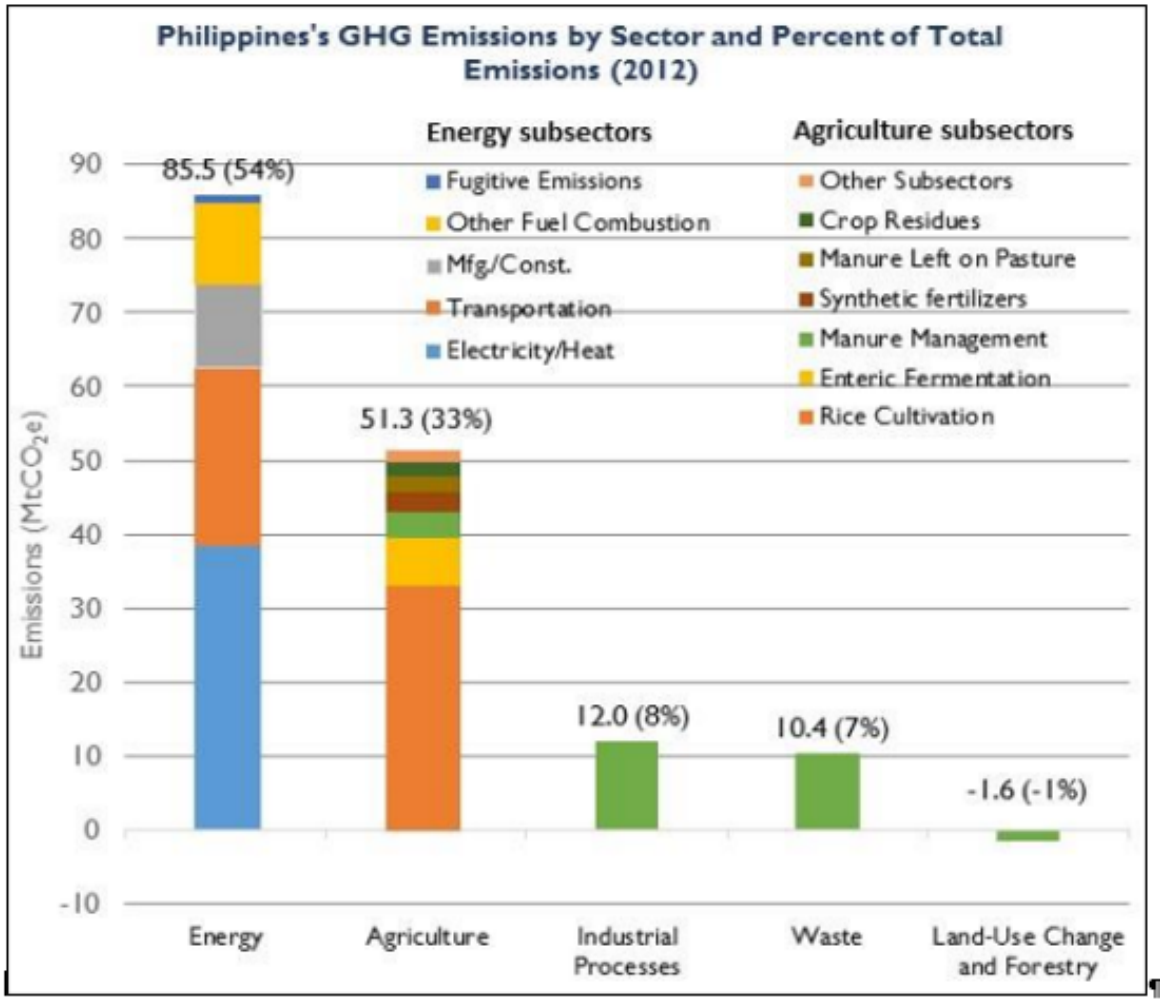
[2] World Bank https://www.worldbank.org/en/country/philippines/publication/getting-a-grip-on-climate-change-in-the-philippines#:~:text=Though%20a%20minor%20contributor%20to,projected%20in%20the%20coming%20decades.

[3] Philippine Climate Change Commission (2010) Philippines' Greenhouse Gas Inventory.

The statistics indicate that agriculture is next to energy sector in terms of the highest GHG emission level based on inventory results in 2010. Transport sector is next in the rank, while Forestry and Land Use (FOLU) is negative contributor being considered as a good mechanism for carbon sequestration.

Consistently, Figure 2 below illustrates the 2016 national inventory of GHG and highlights the relatively low national emissions rate[4] attributed to agriculture compared to the energy sector with the inclusion of transport in the latter based on the 2016 inventory.

Figure 2: Graphing GHG emissions by sector by percentages (2012)



Source: WRI CIAT 2.0 (2016) FAOSTAT, 016

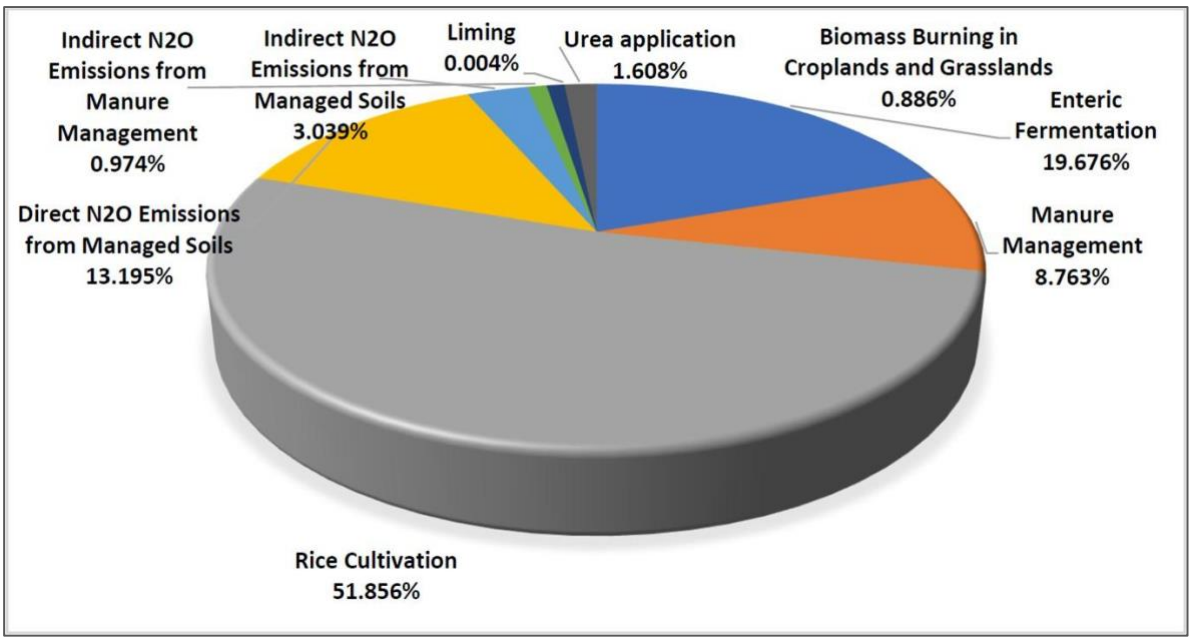
[4] Respondents within DA repeatedly offered this position with firm conviction. While this is positive it can potentially detract from institutional conviction that some farming practices could change to assist adaptation to the likely coming scenarios.

2.2 Sectoral Contribution

The Philippines has committed to an aggregate GHG reduction to approximately 990 million metric tons of carbon dioxide (mmt CO_2) towards low-carbon growth pathway. This equivalent entails a total investment cost of an estimated US $72 Billion. Of this total targeted reduction figure, 21% or 211 mmt CO_2 is directed at curbing GHG emission in the agriculture sector requiring approximately US$ 1 Billion. The highest emission reduction target goes to the energy sector at 587 mmt CO_2 (59%) with investment cost of US$ 36.5 Billion. The other sectors' targets and their corresponding investment costs are follows: *Waste*: 66 mmt CO_2 (7%)-US$ 1.6; *Transport:* 67 mmt CO_2 (7%)-US$ 32.8 Billion, and *Industry:* 59 mmt CO_2 (6%)-US$ 194 Million. Figure 3 shows each sector's component contribution to the overall GHG reduction target.

It should be noted that in terms of investment allocation, apparently there seems to be a glaring discrepancy for agriculture sector with reference to the other sectors, except for the *industry* considering its target as against its cost of making it happen. Predominant the financing requirements are identified in the energy sector (about $36.5 billion or ₱2.1 trillion) followed by the transport sector (around $33 billion or ₱1.9 trillion).

Figure 3: Emission shares of agriculture subsectors, 2010 national GHGI



Source: Department of Agriculture 2023

The above figure illustrates that in terms of percentage breakdown of the various emission sources in agriculture, rice cultivation comprises more than half (51.86%) of the combined contributions compared to other common agricultural produce. The figure illustrates clearly the significance of rice cultivation within the sectoral total of 51.86%.

2.2.1 Rice Cultivation

The cultivation of rice, a staple PHL crop, is a source of methane (CH_4) emissions[5]. CH_4 is produced in flooded rice paddies through anaerobic conditions that promote the activity of methane-producing microorganisms[6]. Improvement in the management of water within rice production systems has been promoted as presenting the major opportunity to cut CH_4 emissions. Where rice is growing in permanently flooded conditions, methane is produced as organic matter decays with little access to oxygen. Subsequently, the methodology requires changing the water regime during the cultivation period from continuous to intermittently flooded conditions and/or a shortened period of flooded conditions. The alternate wetting and drying (AWD) method is also combined with switching from transplanted to direct-seeded rice (DSR). AWD water management allows rice fields to be periodically dried.

2.2.2 Livestock

Enteric fermentation from livestock, (particularly from ruminant animals e.g. cattle, water buffalo), whereby CH_4 is produced during the digestive process in these animals, and is thus another source of GHG emissions. Successful research and application of both seaweed and charcoal has been used to mitigate GHG in livestock. Use of this technology in the Philippines would not require a huge up-front cost and deliver immediate results. The practice falls into the category of mitigation, a status which has yet to be vigorously pursued by the DA.

2.2.3 Land Use Change

Changes in land use, such as deforestation for agricultural expansion, can also contribute to GHG emissions. Deforestation releases stored carbon in trees and vegetation and can result in the loss of carbon sinks.

2.3 Philippines Mitigation, Adaptation and Compliance

The Philippines, like many other countries, has been engaged in efforts related to CC mitigation and adaptation, as a practical compliance with international agreements. In what has been interpreted by some respondents as a very optimistic commitment to NDC, there is a pledge to reduce GHG emissions by 75% for the period of 2020–2030, of which 2.71 percent is unconditional and 72.29 percent is conditional. This commitment involves efforts across various sectors, including energy, transport, industry, forestry, and waste. The conditionality of this pledge assumes expected support and collaboration from multiple donors in the way of dedicated programs.

2.3.1 Existing Mitigation Measures

Currently it is estimated that existing coconut plantations totalling 3.6 million Hectares (Ha) in area annually stores about twice the total GHG emission from PHL agriculture[7]. This theme of revegetation is clearly a very attractive first stope but in a holist way, the question needs to be asked “what is DA institutionally doing about mitigation? At the national level, the Philippines has been working on implementing measures to reduce greenhouse gas emissions. This includes promoting renewable energy sources, improving energy efficiency, and addressing deforestation and land-use changes. However, this mission could find no in-

[5] Globally, around 8% of agricultural greenhouse gas emissions are produced by growing rice.
[6] The Global Methane Pledge, launched at COP26 in November 2021 to catalyse action to reduce methane emissions, has set a commitment to reduce methane emissions by at least 30% below 2020 levels by 2030.
[7] CRAO – DA presentation

house DA program to evaluate energy usage and, as a result, incremental movement to a trajectory of lower (for example) energy usage and thus less GHG emissions?

2.3.2 Existing Adaptation Measures

Adaptation efforts in the Philippines focus on building resilience to the impacts of CC, considering factors such as rising sea levels particularly at the farm and settlement levels, extreme weather events, and changes in precipitation patterns. Adaptation strategies may include improving infrastructure, developing early warning systems, implementing sustainable agriculture practices, and enhancing the capacity of communities to cope with climate-related challenges.

2.3.3 Existing Compliance Mechanism

The Philippines, like other signatories of the Paris Agreement, is committed to fulfilling its obligations under the accord. This involves regular reporting on its progress in implementing climate actions and achieving its NDC targets. Compliance also includes participating in international discussions and negotiations related to CC, as well as contributing to the global effort to limit global temperature increases.

3 FRAMEWORK FOR MRV OF NDC IN THE AGRI-FISHERY SECTOR

The primary objective of the MRV framework is to establish a comprehensive system for tracking, assessing, and reporting on metrics that indicate progress towards achieving the Nationally Determined Contributions (NDCs) in the agri-fishery sector. This framework aims to provide stakeholders with clear guidelines on how to measure and report greenhouse gas (GHG) emissions reductions, utilizing technology, setting clear targets, and utilizing accurate data gathering methods.

The MRV framework categorizes the sources of GHG emissions in the agri-fishery sector and outlines specific methodologies and technologies to be employed to achieve these reductions.

3.1 MRV for Apiculture Sector

The MRV (Measurement, Reporting, and Verification) Framework for the Agriculture Sector is a structured approach aimed at reducing greenhouse gas (GHG) emissions within the sector, particularly in paddy rice cultivation, livestock management, and soil management. This framework sets forth comprehensive strategies for tracking progress, assessing technological impacts, and reporting on the effectiveness of these interventions annually or as needed.

In paddy rice cultivation, the adoption of Alternate Wetting and Drying (AWD) technology, combined with cropland management and renewable energy solutions for water management, is targeted to reach 100% adoption across 3.21 million hectares of irrigated paddy rice. This practice is split into two seasons—dry and wet—with specific hectares under AWD reported by region and province. The DA Rice Banner Program Directorate oversees the implementation and reporting, supported by sample surveys from the Crop Research and Applied Operations (CRAO) and the DA Planning & Monitoring Service (PMS).

For livestock, the focus is on reducing enteric fermentation through nature-based solutions and breeding interventions, targeting a 50% reduction per animal. This initiative is monitored by the DA Livestock Banner Program Directorate, which collects data on livestock numbers and fermentation reduction rates across different regions and provinces. The data collection process is supplemented with joint surveys by CRAO and DA PMS.

Soil management involves decreasing nitrous oxide (N2O) emissions from cultivated soils by 25% through the adoption of cropland management, precision agriculture, and biotechnological crops. This sector's emissions data are gathered from an 8.017 million hectare area, with annual surveys commissioned to evaluate progress.

Manure management strategies include implementing biodigester and other nature-based solutions across the livestock sector, aiming for 100% adoption. This is tracked through surveys, with data collection responsibilities assigned to specific directorates and supported by CRAO.

Urea application is another critical area, where a 50% reduction is sought through precision agriculture and improved cropland management. Data on urea application rates are collected through the Registry System for the Basic Sectors in Agriculture (RSBSA) and supplemented by surveys.

Finally, emissions from biomass burning are addressed through the adoption of circular bioeconomy solutions, with progress assessed through independently commissioned surveys by CRAO.

Table 2: MRV Framework for Agriculture Sector

Metrics (sources of GHG emission in the sector)	Technology to be used	Targets		Data Required	Baseline Values		Data Sources and Generation Tools	Data Tables/ Templates	Responsible Unit/Position	Frequency of Reporting
		Year	Value		Year	Value				
Adoption of Alternate wetting and drying (AWD) technology + cropland management + renewable energy for water management in Paddy Rice cultivation (51.97% share in total emission)	Dry Season: AWD + cropland management + renewable energy (RE) for water management	20xx	100% adoption in total irrigated paddy rice areas = 3.21mln Ha (Source: xxx)	Dry Season: Ha. under AWD (by region, by province)	20xx	x%	DA Rice Banner Program Directorate reports Sample survey jointly by CRAO, DA Planning & Monitoring Service (PMS)	Form/s No. xx and Title	(from CRAO/ DA PMS, DA Rice Banner Program)	Annual
	Wet Season: AWD + cropland management + RE-powered flood control and water management systems			Wet Season: Ha. under AWD (by region, by province)	20xx	x%		Form/s No. xx and Title		Annual
Reduction in Livestock Enteric Fermentation (9.65% share in total emission)	Nature based solutions + breeding interventions.	20xx	50% reduction in enteric fermentation per animal (Source: xxx)	Number of livestock by type, region, province	20xx	x%	DA Livestock Banner Program Directorate reports Sample survey jointly by CRAO, DA Planning & Monitoring	Form/s No. xx and Title	(from CRAO/ DA PMS, DA Livestock Banner Program)	???

Metrics (sources of GHG emission in the sector)	Technology to be used	Targets		Data Required	Baseline Values		Data Sources and Generation Tools	Data Tables/ Templates	Responsible Unit/Position	Frequency of Reporting
		Year	Value		Year	Value				
							Service (PMS)			
Nitrous oxide (N_2O) emission from cultivated soils (16.2% share in total emission)	Cropland management + precision agriculture + biotech crops.	20xx	25% reduction in total) N2O emission (total annually cultivated area = 8.017 million Ha	N_2O	20xx	x%	Survey to be commissioned by CRAO	Form/s No. xx and Title	(from CRAO/ DA PMS, other concerned DA unit/s	Annual
Livestock Manure management (9.7%)	Biodigester nature-based solutions.	20xx	100% adoption by livestock sector		20xx	x%	Survey to be commissioned by CRAO	Form/s No. xx and Title	(from CRAO/ DA PMS, DA Livestock Banner Program)	
Urea application (1.6% share in total emission)	Precision agriculture + cropland management	20xx	50% reduction in urea application		20xx	x%	Registry System for the Basic Sectors in Agriculture (RSBSA) Sample survey jointly by CRAO, DA Planning & Monitoring	Form/s No. xx and Title	(from CRAO/ DA PMS, other concerned DA unit/s)	Annual

Metrics (sources of GHG emission in the sector)	Technology to be used	Targets		Data Required	Baseline Values		Data Sources and Generation Tools	Data Tables/ Templates	Responsible Unit/Position	Frequency of Reporting
		Year	Value		Year	Value				
							Service (PMS)			
Emissions from biomass burning (0.88% share in total emission)	Nature-based solutions – circular bioeconomy	20xx			20xx	x%	Independent survey to be commissioned by CRAO	Form/s No. xx and Title	(from CRAO/ DA PMS, other concerned DA unit/s)	

3.2 MRV Framework for Capture Fish Sector

The MRV (Measurement, Reporting, and Verification) Framework for the Capture Fish Sector in the Philippines outlines a comprehensive approach to reducing greenhouse gas (GHG) emissions associated with marine and freshwater fisheries. This framework targets the main sources of emissions within the sector: motorized fishing boats, the transport of fish to markets, and the fish processing stages.

For motorized fishing boats, the strategy is to improve fuel efficiency and shift towards less carbon-intensive fuels. The goal is to increase fuel efficiency by 10% in half of all boats and convert 20% of diesel-fueled boats to alternative fuels such as biofuels. This requires data on the number, age, and fuel consumption efficiency of the boats, which will be collected through independent surveys commissioned by relevant governmental bodies. However, the framework does not specify the frequency of reporting, suggesting a need for a defined schedule to monitor progress effectively.

Transportation emissions are addressed by enhancing the efficiency of engines used in transporting fish from farms to markets and ensuring that refrigerated transport systems are leak-free. The framework aims for 10% of diesel-powered transport vehicles to switch to more efficient engines, and for all refrigerated vehicles to be leak-proof, thus reducing their environmental impact. Detailed information on the vehicles, including age, fuel type, and maintenance of refrigeration systems, will be crucial for this initiative, though specific reporting guidelines need further clarification.

In the area of fish processing, the framework promotes the adoption of solar drying technologies and other renewable energy solutions to replace traditional fuels like charcoal and wood. This transition not only aims to reduce emissions but also enhances the sustainability of fish processing practices. The implementation will be monitored through data on processing methods and energy sources, though again, the framework would benefit from clear directives on how this data should be collected and reported.

Overall, the MRV framework for the capture fisheries sector is geared towards significant emission reductions through technological upgrades and efficient practices. Establishing and adhering to a regular reporting schedule will be essential for assessing progress and ensuring that the fisheries sector contributes effectively to national and global environmental goals.

Table 3: MRV Framework for Capture Fish Sector

Metrics (sources of GHG emission in the sector)	Technology to be used	Targets		Data Required	Baseline Values		Data Sources and Generation Tools	Data Tables/ Templates	Responsible Unit/Position	Frequency of Reporting
		Year	Value		Year	Value				
1) Emissions from motorized fishing boats (fishing in Philippine EEZ and freshwater bodies)	Improve fuel efficiency with more efficient engines Reduce GHG emission by switching to fuels that emit less CO2 than currently being used	20xx	50% of all boats fishing in narine and freshwater improve fuel efficiency by 10% 20% of diesel fuelled boats convert to bio-fuel other less carbon generating fuels	(No. and age of moto- rized boats and average fuel consum- ption efficiency Type of fuels being used	20xx	x%	Independent survey to be commissioned by CRAO	Form/s No. xx and Title	(from CRAO/ DA PMS, other concerned DA unit/s)	???
2) Emissions from transport of fish to markets	Improve fuel efficiency with more efficient engines Reduce GHG emission by i. switching to fuels that emit less CO2 ii. fixing leakages in refrigerated transports		10% of diesel powered vehicles switch to less carbon generating engines. All refrigerated vans are certified without leaks	No. and age of vans, trucks used for transporting fish to from farm to major markets Types of fuels used						

Metrics (sources of GHG emission in the sector)	Technology to be used	Targets		Data Required	Baseline Values		Data Sources and Generation Tools	Data Tables/ Templates	Responsible Unit/Position	Frequency of Reporting
		Year	Value		Year	Value				
3) Emissions from fish processing	Improved solar drying technology Use of energy efficient/renewable energy for processing technology		Zero use of charcoal and wood	Processing methods practiced Source of energy for processing						

3.3 MRV Framework for Aquaculture Sector

The MRV (Measurement, Reporting, and Verification) Framework for the Aquaculture Sector in the Philippines is designed to reduce greenhouse gas (GHG) emissions through a variety of targeted strategies focused on technology upgrades and improved management practices across different aspects of the sector.

In the realm of aquaculture, the first significant area of focus is the motors used to power pond aerators. The framework proposes improving fuel efficiency and adopting cleaner energy sources, such as solar-powered generators, to achieve a 50% increase in power efficiency. Additionally, it sets a target for 10% of aquaculture farms to use solar power for running pumps and aerators. To monitor progress, data on the number and total horsepower of all power generators used, as well as their source of power, will be collected through independent surveys.

Transport of fish from farms to markets is another critical area. The framework aims to improve the fuel efficiency of vehicles and reduce GHG emissions by switching to fuels that emit less CO2 and ensuring that all refrigerated transports are leak-free. The objective is for 10% of diesel-powered vehicles to switch to more efficient engines, and for all refrigerated vans to be certified leak-free. This will require detailed data on the number, age, and type of fuels used by the transport vehicles.

Fish processing emissions are addressed through the adoption of improved solar drying technology and other renewable energy-based processing technologies. The framework targets the elimination of the use of traditional fuels like charcoal and wood, shifting instead to energy sources that have a lower environmental impact. This will necessitate data on the processing methods practiced and the sources of energy used, ensuring that all processing facilities comply with the new standards.

Lastly, the framework tackles the issue of hydrogen sulfide and nitrous oxide (N2O) emissions resulting from uneaten fish feed in aquaculture operations. The strategy here includes promoting more efficient feed conversion rates (FCRs), better feeding practices, and the use of high-quality commercial feeds alongside improved water quality management. The target is for all intensive farms to adopt these improved practices and for the FCRs of these farms to align with the manufacturers' ratings for their feeds. Data will be collected from farm surveys, which will record the rated and actual FCRs for various fish species such as milkfish, tilapia, shrimp, and grouper.

Overall, the MRV framework for the aquaculture sector aims to significantly reduce GHG emissions through technological improvements and more sustainable management practices. This comprehensive approach will not only contribute to environmental sustainability but also enhance the efficiency and productivity of aquaculture operations in the Philippines.

Table 4: MRV Framework for Aquaculture Sector

Metrics (sources of GHG emission in the sector)	Technology to be used	Targets		Data Required	Baseline Values		Data Sources and Generation Tools	Data Tables/ Templates	Responsible Unit/Position	Frequency of Reporting
		Year	Value		Year	Value				
1) Emissions from motors that power pond aerators	Improve fuel efficiency with more efficient engines Reduce GHG emission by switching to fuels that emit less CO2 than currently being used (i.e. Solar powered generators)	20xx	50% increase in power efficiency 10% of farms use solar power to run pumps and aerators	No. and total horsepower of all power generators used in pond aeration and water pumping. Source of power.	20xx	x%	Independent survey to be commissioned by CRAO	Form/s No. xx and Title	(from CRAO/ DA PMS, other concerned DA unit/s)	???
2) Emissions from transport of fish to markets	Improve fuel efficiency with more efficient engines Reduce GHG emission by: i. switching to fuels that emit less CO2 ii. fixing leakages in refrigerated transports		10% of diesel powered vehicles switch to less carbon generating engines. All refrigerated vans are certified without leaks	No. and age of vans, trucks used for transporting fish to from farm to major markets Types of fuels used						
3) Emissions from fish processing	Improved solar drying technology Use of energy efficient/renewable ebergy processing technology		Zero use of charcoal and wood	Processing methods practiced Source of energy						

Metrics (sources of GHG emission in the sector)	Technology to be used	Targets		Data Required	Baseline Values		Data Sources and Generation Tools	Data Tables/ Templates	Responsible Unit/Position	Frequency of Reporting
		Year	Value		Year	Value				
4) Hydrogen sulfide and N2O generation from uneaten fish feed	More efficient feed conversion (better/lower FCR): Better feeding practices in cage and pond culture; Use of high quality commercial feed Improved pond water quality management Use of higher quality/certified fry.fingerlings		100% of intensive farms adopt better feed management and feeding practices, better farm management practices and certified quality fry or fingerlings. FCRs of surveyed farms conform with manufacturers' ratings for their feeds.	Rated FCRs of various feeds for major species (milkfish, tilapia, shrimp, grouper) from feed manufacturers Average FCRs from farm surveys of milkfish, tilapia, shrimp and grouper farms						

4 APPROACHES, MEASURES AND GAPS IN NDC COMPLIANCE AND MRV

4.1 Nationally Determined Contributions (NDCs)

NDCs constitute the pledges made by individual countries as part of international climate agreements associated with the Paris Agreement. They outline the country's climate actions, goals, and contributions to global efforts to mitigate CC. The terms "NDC Compliance" and "MRV" refer to key elements of international CC agreements, specifically related to NDC and Measurement, Reporting, and Verification (MRV) processes. A pertinent summary these concepts and some considerations for approaches, measures, and potential gaps follow.

4.2 Approaches to NDC Compliance

Logically and generically, there are three major trajectories which can be interpreted as contributing approaches to foster NDC compliance. These trajectories include, but are not limited to, the following approaches.

a) **Legislative and Policy Frameworks:** Countries may adopt and implement specific laws and policies to achieve the targets set in their NDCs.
b) **Technology Deployment:** Utilizing and investing in climate-friendly technologies and practices to meet emission reduction goals.
c) **International Collaboration:** Collaborative efforts with other nations, sharing expertise, technologies and financial resources.

It is relevant to understand the brief historical footprint regarding the NDC compliance by the PHL government to the Paris agreement. Approach to this compliance can now be interpreted across three Presidential regimes. The original signing in 2015 was under President Aquino who committed to what some see as a generous figure of a reduction in GHG emissions by conveyed a conditional 70 percent GHG reduction target.

The approach by President Duterte (2016-2022) was to ratify the previous agreement, but to qualify the commitment to one where it was 75% by 2030, with 72.29% being conditional and the balance 2.71% being non-conditional[8]. The conditionality clause anticipated external (e.g. bilateral and multi-lateral donor) support, along with the expectation that programs and projects would strategically improve the plight of farmers such that they could benefit positively from the NDC through improved productivity and thus livelihoods.

> *"The Philippines is submitting an ambitious NDC target of 75% reduction of GHG emissions by 2030 in the name of climate justice. The NDC will be our tool to upgrade our economy by adopting modern and low carbon technologies and approaches that would help mitigate the climate crisis and make our economy more resilient and our growth sustainable,"* [9]

The current President Marcos (2022 – 2027) has indicated obligation to the Paris Agreement commitments while identifying the need for ASEAN unity in tackling CC. In doing this, he has further underlined the need for collaboration and support by the "developed countries".

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[8] https://www.dof.gov.ph/president-duterte-approves-phl-commitment-of-75-percent-emissions-reduction-target-by-2030/

[9] Finance Secretary Carlos Dominguez III, Chairman-designate to Climate Change Commission (CCC), which facilitated the NDC formulation process.

"Developed countries have a moral obligation to support adaptation and mitigation efforts of the most vulnerable countries through technology transfer, capacity building, and climate financing, this to address loss and damage, and to achieve necessary breakthroughs for climate action at a global scale."[10]

4.2.1 Philippine Statistics Authority (PSA)

The Philippine Statistics Authority (PSA) is the office officially mandated to assemble the national GHG inventory, a critical component of the NDC compliance. The PSA operates under a number of discrete departments. The operating unit in-charge regarding computation of GHG inventory in the agriculture sector is the Environment and Natural Resources Accounts Division (ENRAD) of the PSA. In addition, the Livestock and Poultry Statistics Division of the PSA is responsible for the collection and generation of data on animal inventory, production, slaughter and farmgate prices. The GHG data that the PSA generate appears to be extrapolated from a rounded out generalised GHG unit linked to national annual production.[11]

4.2.2 Climate Resilient Agriculture Office (CRAO)

Around 2015 the DA established what is known as the Climate Resilient Agriculture Office (CRAO). The mandate of this office was to draw together and extend to farmers improved farming practices such that they could adapt to the expected impacts of CC. The office has a staff of 11 (this number fluctuates) with only one a permanent DA employee and the balance on short-term six-monthly contracts.

The activity footprint of the CRAO over the last 12 years has met with many challenges, many of which have been well documented in a recent study by the ADB.[12] These challenges include a clarity of the office mandate across the entire DA, a need for long-term dedicated staffing with specialist skills, resources to rigorously evaluate the achievements of the AMIA program and to re-calibrate as needed. Efforts led by the CRAO office to address and reduce agricultural-related GHG emissions in PHL have involved the promotion and thus adoption of more sustainable farming practices, improved rice cultivation techniques, and the promotion of climate-smart agriculture at the village level. Unfortunately, there has been no baseline information developed as a part of the work and thus it is difficult to verify the efficacy of any initiatives. Government, non-governmental organizations, and international agencies may collaborate on initiatives to enhance agricultural productivity while minimizing environmental impacts but it is an imperative step to assemble base-line data as a starting point of any initiative.

What is perhaps not explicitly dealt with are the challenges within any institution where a new office with anticipated activities of a "cross sub-sectoral" character is introduced into an existing sub-sectoral hierarchy. The feedback offered by respondents to this report is that the sub-sectoral nature of the DA, whereby there are technical specialists working in discrete units dealing with the diversity of farming activities (i.e. cropping / rice, livestock, forestry, etc) can present challenges to any initiative which aims to work across these sub-sectors. Due to its "cross-sectoral impacts", successful CC adaptation at the farm level needs to be accompanied by vigorous and enthusiastic adaptation within the DA hierarchy. There is an essential multi-

[10] https://pia.gov.ph/news/2023/05/10/president-marcos-urges-asean-unity-in-tackling-climate-change

[11] We await feedback to direct questions regarding the field work / methodology the PSA use for data collection and assembly.

[12] Deepening Climate-Related Da Organizational Reforms To Sharpen And Better Harmonize Climate Action, (2023) Institutional Study Team, ADB

disciplinary dimension required for adaptation (and mitigation) to be successful, incorporating both the 'hard' and 'soft' sciences. The CRAO office is seen as being deficient of hard science technicians. While this can be overcome through sound cooperation with sub-sectoral technicians within DA, the feedback offered to this report indicates that attempts to foster cooperation has not been as fruitful as it could be.

CRAO and DA respondents to this report were unified in qualifying the need for interventions with the understanding that the Philippine GHG emissions are not globally significant, and that the signing of the Paris agreement was interpreted as an opportunity for farmers to benefit from NDC actions through both enhanced resilience to CC while enjoying anticipated increases in productivity.

4.2.3 Unit price and regulation of irrigation water

Alternate wetting and drying (AWD) is a management practice in irrigated lowland rice paddy that reduces considerably GHG emissions (CH_4 in particular), and saves water while maintaining yields. Under the best management practice developed by International Rice Research Institute (IRRI) water scientists, the AWD water regime starts two weeks after transplanting.

A major hurdle in the adoption of AWD in the Philippines is the price and regulation of irrigation water. The implementation of AWD in paddy rice systems means that the 'set and forget' process associated with 'permanently flood irrigated' paddy would need to change. Such a change implies or would require greater work by farmers over the life of the crop. Therefore, AWD will only be attractive to farming communities if there are management incentives to implement the practice. At the current time water derived from national irrigation systems which is used for irrigation to farms of eight (8) hectares and below are exempted from paying irrigation service fees.

Statistics from 2016 indicate that the average farm size in the Philippines is 1.54 Ha.[13] The change in water pricing was introduced in February 2018 and introduced by the President Duterte. The result of this policy of exemption is that for the greater number of farmers there is more work involved in adoption of and application of AWD, and no incentive.

4.3 Measures for NDC Compliance

The vehicle which has been facilitated to promote the CRAO measures has been aiming at improving the resilience of individual farmers at the village level and is known as the Adaptation and Mitigation Initiative in Agriculture (AMIA) program. AMIA *"envisions the Philippines where all rural communities, especially those dependent on agriculture and fisheries, would become resilient to the increasing adverse effects of climate change"* [14]. To date, the AMIA program has been seen as very successful initiative with 152 villages having been volunteered into an adoption of improved cultivation and husbandry practices. The AMIA program promotes:

1. Timely, relevant, and site-specific climate information via Climate Information Services (CIS)
2. Easy access to credit and affordable insurance

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[13] Farm Size and Ownership (philrice.gov.ph

[14] DA – CRAO promotional material.

3. Computer-aided decision-making technology
4. Training on CCA/DRR (Climate Change Adaptation / Disaster Risk Reduction) productivity-enhancing practices/technologies
5. Improved links to markets

Selection of AMIA villages has been based upon (i) a Climate-Risk Vulnerability Assessment (CRVA), (ii) the presence of farmers' organizations, (iii) presence of financial institutions (banks, lending/credit, risk transfer facility), (iv) presence of Agricultural Extension Workers (AEWs), (v) Active participation & support of LGU and (vi) the potential for out-scaling. As a result, the program has strategically targeted farmers that have been identified as being motivated but also needing support. It is acknowledged that the strategy behind the village selection is sound.

As of 2017, achievements include a mobilized program across Provinces with completed CRVA establishing 10 AMIA Village Sites covering 26 barangays, 294 LGUs with Climate-Risk Vulnerability Assessment, 45 discrete Project initiatives and 54 trained weather observers from participating LGUs and DA-RFOs in partnership with Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) and Rice Watch Action Network.[15]

Theoretically the AMIA approach could be improved through the addition of a whole farm planning (WFP) process whereby farming systems are surveyed and linked with land capability, crop diversity explored, and efficacy of irrigation systems assessed. As a component of the AMIA program, a climate risk vulnerability assessment (CRVA) for 10 selected provinces in the Philippines has been completed in collaboration with CIAT. In a broad province based the information gained from this CRVA can inform the village-based program at the province level, and thus inform future potential NDC's. The figure below illustrates the framework used for CRVA and the operational definition of the three key components for the agricultural sector.

[15] https://amia.da.gov.ph/index.php/amia-villages/

Figure 4: The CRVA Framework and three key components; Source CIAT

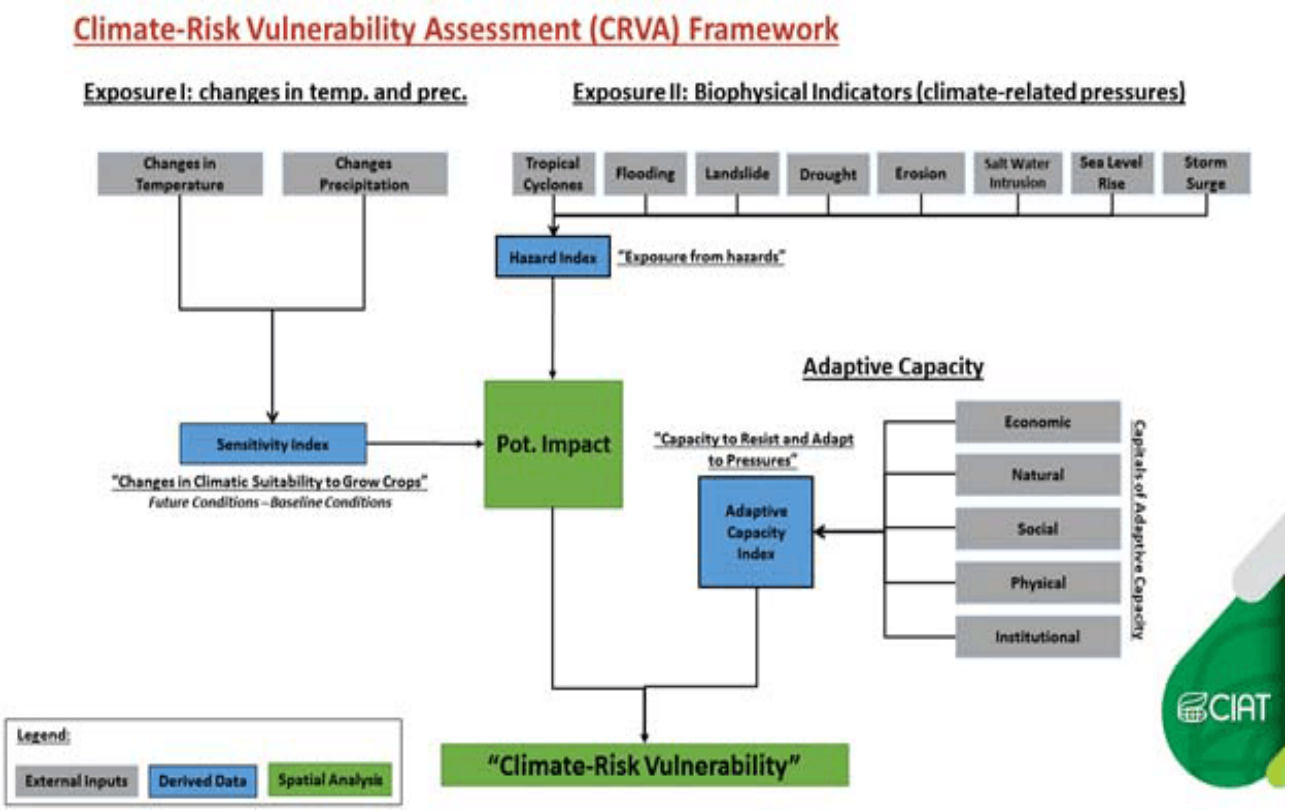
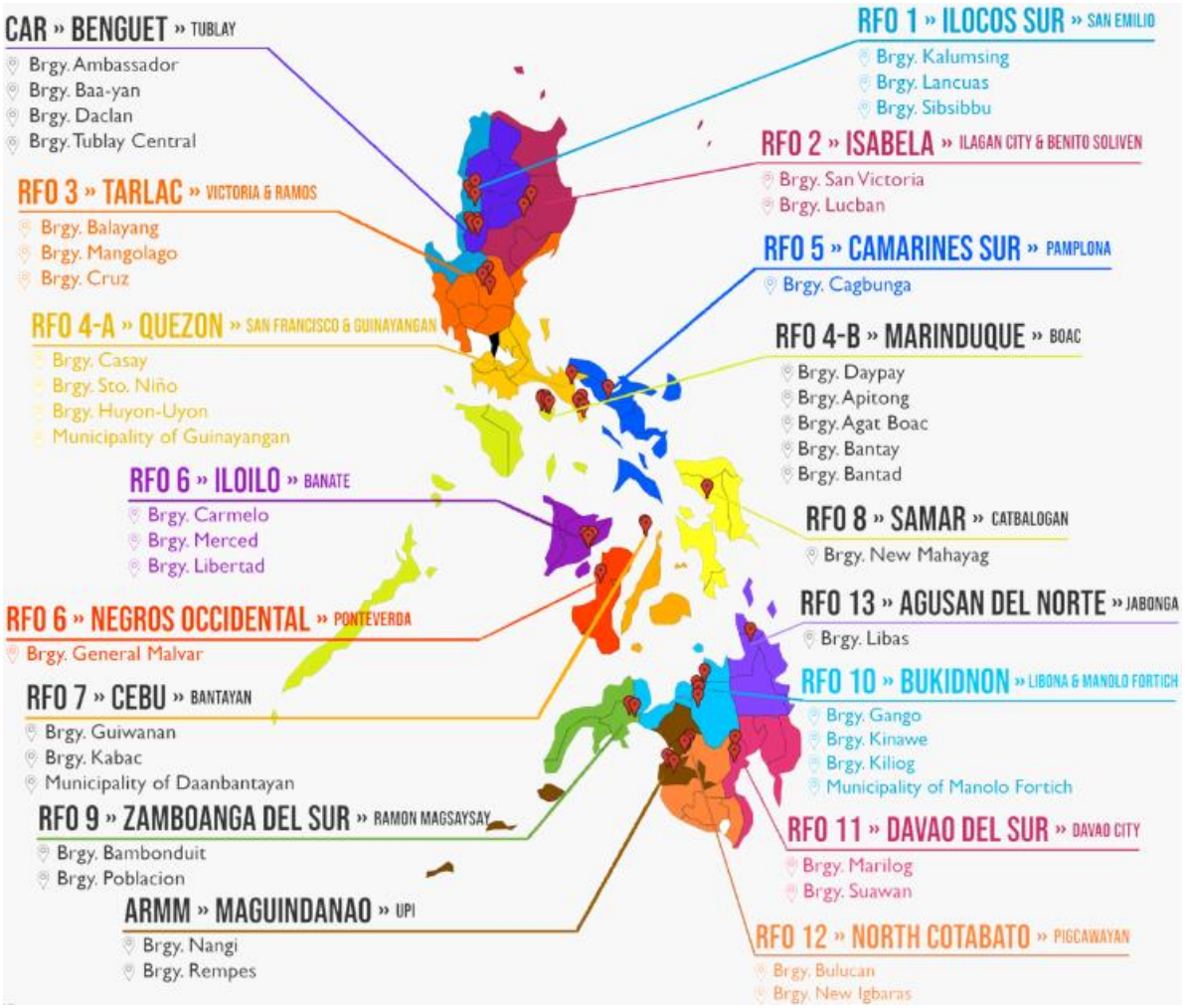


Figure 4 illustrates the three components which are core to the vulnerability. The three components are:

- **Sensitivity Index** – changes in climatic suitability to grow crops. The crop sensitivity was assessed by changes in climatic suitability to grow crops by the year 2050 in comparison with the baseline crop suitability. The sensitivity (changes in climatic suitability) of crops to CC was derived from changes in temperature and precipitation using the ensemble of 33 GCM models. For baseline condition, the climate data was acquired from www.worldclim.org. The maximum entropy (Maxent) model to perform crop suitability analysis. Twenty (20) Bioclimatic variables (http://www.worldclim.org/bioclim + Number of consecutive dry days) was used to assess crop suitability in baseline vs future conditions. The modelled crops include rice, maize/corn, vegetables (squash, eggplant, tomato), and integrated farming combinations (cacao, coffee, mango banana). Higher losses of crop suitability are projected to occur in low-lying areas (0-500m ASL) in the Philippines. However, there are also opportunity areas, especially in Mindanao areas, that are projected to become more beneficial for some commodities.
- **Hazard Index** – exposure from hazards - A list of eight recurrent hazards were assembled as a checklist against which each village was also assessed.
- **Adaptive Capacity Index** – Capacity to resist and adapt to pressure. Adaptive capacity forms one of the three pillars of the vulnerability assessment in addition to exposure and sensitivity to climate change. For example, within the AMIA village

program there is increasing availability and promotion of the need for drought tolerant varieties. Adaptive capacity is also one of the three components when measuring resilience, in addition to absorptive coping capacity and transformative capacity. Both are integrated concepts in a coupled human-environment system (Lei et al. 2014).

Figure 5: The AMIA villages sites as per 2017. Source DA-CRAO



Respondents from CRAO were keen to promote the message that GHG emissions from agriculture in the country were counterbalanced by the carbon capture from large coconut plantations. There is a follow-on conviction from CRAO that the resultant carbon credits from these plantations were double to that of small holder farmer emissions. So, from the CRAO perspective, the AMIA village strategy aims to strengthen the resilience of farms and farmers rather than focus upon rigorous data gathering of GHG at the farm level. This includes promotion of adaptation measures through a village and farmer group focus upon capacity building.

One respondent pointed out that as the AMIA village-based model has incorporated participatory rural Appraisal (PRA) methodologies for the establishment of vulnerability and risk analysis, it is predicted that there will be an easy adoption of support for the MRV if

required. However, there is also conviction that if data is to be collected at the AMIA level, then appropriately skilled consultants should be used.

4.4 Gaps in NDC Compliance

From the perspective of DA and the CRAO, the existing gaps in the NDC compliance are associated with:

(a) the previous explicit strategy behind the CRAO office towards adaption rather than adaptation and mitigation. The WFP approach previously mentioned would aim to engage a rigorous methodology with thorough outcomes combining both adaptation and mitigation. It is necessary to point out and emphasise that vigorous application of adaptation measures will have a fraction of the impact on reducing GHG emissions as opposed to a program which embraces simple mitigatory practices (or a combination of both) as well.
(b) lack of dedicated long-term resources to support rigorous CRAO led field work.
(c) institutional ownership of the data gathering and reporting processes associated with NDC in the mandated hands of the PSA.

4.5 Previous Explicit CRAO Strategy

It is well acknowledged by the TA consulting team that the CRAO office has been responsible for many positive initiatives incorporated over the period of time since its commencement. Assuming that there have been positive changes for farmers, theoretically the AMIA initiative is well conceived and intended. AMIA has indeed been the principal action in a strategy which recognised that CC would increase the likelihood of uncharacteristic weather events, a scenario which would add to the livelihood challenges faced by farmers, particularly small holder farming communities.

Several observations concerning AMIA became clear when the TA team visited AMIA farmers and LGU support staff including that:

- Successful interventions at AMIA level have not been well documented, nor have
- mitigation opportunities of the “low hanging fruit” variety been explored with enough stealth and diligence,
- program design has been shy in understanding recognising that when farmer productivity increases, then it is imperative to have a marketing strategy in place to ensure that farmers don’t become victims of a commodity price collapse.

These sad realities and are perhaps well recognised thru the CRAO monitoring and evaluation processes, but perhaps have not been acted upon in a pro-active manner.

4.6 Resources Gap

An observation shared from respondents and verified by the ADB report (July 2023) is that the CRAO office has been without bureaucratic imprimatur. This is manifest by the fact that apart from the CRAO Director, all of the other 10 staff are on 6 monthly contracts. Staff will and understandably do leave the CRAO if they are successful in applying for and being offered a permanent role elsewhere within DA. The staff impermanence means that there are routinely many systemic and important building blocks of positive institutional delivery absent including (i) a dynamic corporate and collegiate memory of previous activities, (b) commitment and understanding of staff concerning appropriate follow up, (c) loss of staff who have gained important technical experience as positions become available elsewhere. The non-

permanence of staff runs in parallel with the lack of dedicated budget and thus there has been an ad-hoc characteristic to funding and resources.

Recognizing the need for external support to actualize the NDC Prioritized Action Plans (PAPs), the DA sector seeks a comprehensive support system. Many developing nations, including the Philippines, face significant challenges in mobilizing a suitable approach to the needs. Financial support is deemed crucial for the successful implementation of appropriate plans and programs towards enabling the agriculture sector to meet its climate-related needs and targets. Additional support required may encompass technological assistance including hardware and software, capacity-building initiatives to improve understanding of staff and thus ownership and commitment, or other essential resources which become apparent over time and are vital for the sector's contribution to the broader national climate objectives.

CRAO has basically been seen as a small policy and research unit but what is needed is action to mainstream, to contribute to the building of understanding and capacity across the entire DA. Its current status leaves it with a limited profile within the Department.

4.7 Institutional Ownership and gaps in Data Gathering

As previously noted, the PSA is the agency given responsibility for GHG data relevant to the NDC and thus the PA. Feedback from CRAO indicates that DA provide secondary data to the PSA. Determination of the source and specifics of this secondary data is not clear but what is clear is that PSA is recognised and mandated as the lead agency concerning NDC data. As a result, CRAO does not have ownership and appears not to be a stakeholder in systematic NDC data collection.

A second major and significant gap in the current NDC compliance is that there is no baseline data collated pre-commencement of the AMIA initiatives. It is very difficult to assemble data associated with changes in GHG emissions if there is no baseline to compare subsequent performance. At the same time, it needs to be recognised that if a program of adaptation is being pursued as opposed to one where it is hand in glove with mitigation, then the contribution to NDC will be, over the short to intermediate term, tiny and inconsequential.

The gap in data gathering, one which is well acknowledged by the CRAO team, is significant and needs to be rectified as part of a vigorous future plan of action. At the same time, mitigatory measures need to be embraced if there is any expectation that there will be a contribution to the NDC. The need for baseline data, recognition of the importance of combining adaptation and mitigatory practices, understanding of cost-benefit analysis as well as deploying resources to gauge any important changes in GHG emissions of proposed NDC PAPs in the agricultural sector is basic for GHG MRV.

4.8 Status and Way ahead

Observations from the Niras-ICEM TA Team consultation with the CRAO-DA (November 2023) it was found out that the CRAO contribution to NDC implementation within the agricultural sectors compliance to the PA has limited accomplishments to date. The sector's commitment to climate action currently hinges on conditional objectives, indicating that most of its goals are contingent on actions to be met by outside assistance. As a result, the CRAO requires;

a) **Finance** - securing the necessary funds to implement climate actions outlined in the NDCs. There are numerous dedicated CC finance opportunities including the three below

Table 5: Range of potentially supportive external funding sources

Name	Description	Status
ADB	NDC Advance is a technical assistance platform established by the Asian Development Bank (ADB) to help its developing member countries (DMCs) mobilize finance, build capacity, and provide knowledge and other support to implement their nationally determined contributions (NDCs).	Already a major supporter with the GoP.
GCF	The Green Climate Fund (GCF) is the world's largest dedicated climate fund, with a mandate to foster a paradigm shift towards low emission, climate-resilient development pathways in developing countries. GCF has a portfolio of USD 13.5 billion (USD 51.9 billion including co-financing) delivering transformative climate action in more than 120 countries.	GCF will support programmes that build capacity and helps countries develop long-term plans to fight CC. GCF is an operating entity of the financial mechanism of UNFCCC and serves the 2015 Paris Agreement, supporting the goal of keeping average global temperature rise well below 2°C.
WB	Climate Support Facility: is a multi-donor trust fund administered by the World Bank which supports developing countries to implement their NDCs, develop long-term climate strategies and achieve a green economic recovery from the impacts of COVID-19.	WB active in Philippines.
Bilateral	Government to government support.	The Japanese JIKA was sited as a donor that was particularly interested in supporting the MRV of GHG emissions. There are certainly other possible players in this space.
Private & Crowd Source	Globally, there are philanthropic organisations which could be very interested in supporting the AMIA model. This could take for example support to help support a "free trade" market model for AMIA rice, or donate such that farmers can go solar for energy.	This possibility had not been explored as far as the TA Consultancy team were aware.

b) **Strategic design** of farmer programs needs to embrace mitigation and adaption.
c) **Technological Gaps:** Technical enhancement through hiring of dedicated staff as well as hardware and software.

d) **Policy Implementation Gaps:** Inconsistent or insufficient policies and regulations hinder effective NDC implementation.

4.9 Snapshot of AMIA activity

TA colleagues within the Output 1.1 section of the TA have visited up to six AMIA village sites to gauge the impact of the program and to see how it may be assisted to greater achievement. The fieldwork methodology included interviews with farmers and attempts to meet with the responsible liaison persons within the LGU. As previously outlined and verified by the interviews, there is a need for baseline data to be gathered.[16]

The next step is to develop a comprehensive and rigorous system of implementation of climate smart farming which adopts a holist approach needs to be collaboratively applied with farmers. Such a step implies a greater profile of appropriate agricultural extension and would include farmers being involved in regular verification and testing, routine tweaking to respond to findings, and acknowledgement that without dedicated collaboration between farmers and technicians, production and marketing there will be limited change at the farm level to be resilient towards CC.

Without agreement of what is possible and how to achieve, then programs with the best intentions will and do faulter. So, the Output 1 colleagues found that AMIA could do with improvements. For a start, the name of the program is Adaptation and Mitigation Initiative in Agriculture and this name explicitly states that mitigation is an equal part of the implementation approach. Currently the CRAO office is only supporting adaption practices.

An overall revamp of the AMIA system should be seen as a logical building and enhancement step. Similar programs elsewhere have dramatically benefited from incorporating a “Whole Farm Planning” approach, whereby the village farms are surveyed with farmers using PRA, the efficacy of farming systems are assessed and questioned, the potential impacts of CC and the need for adaptation practices are explored with farmers and the potential for resilience, potential changes in approaches to marketing etc are all explored. There is no evidence that this last critical step has been explored and to make any appropriate impacts it needs to be both adopted and rolled out. To do so requires a marriage of both soft and hard skills at the AMIA village level.

4.10 Measurement, Reporting, and Verification (MRV)

The planning, delivery, and MRV processes are crucial components of the NDC implementation. MRV is a process to track and assess the progress in implementing the NDCs. The outputs of this process involve measuring emissions, reporting on national climate actions, and verifying the accuracy of the reported information. There are a number of differing dimensions and approaches to the MRV, process including the development of “National Inventories” whereby signatory countries develop and maintain inventories of their GHG emissions.

One particular interest of the DA in the NDC MRV is the potential monetization of GHG reduction, thus there is the need to put up a functional carbon credit mechanism. Such system is required for benchmarking as what other countries are doing. By incentivising GHG reduction this will be advantageous first and foremost to the Philippine government as it anticipates that infusion of the Green Climate Funding support from developed countries. This

[16] Personnel Communication with David Moles (Value Chain Specialist)

will ultimately trickle down to farming communities and at the household levels in the form of subsidies and other free production inputs provision.

4.10.1Approaches to MRV:

Orthodox approach and techniques for MRV would ideally include the following specific actions and qualification:

a) **National Inventories:** A GHG inventory which will be unique to each country reflects the impact of a country's economic activities and its domestic carbon footprint.
b) **Technology-Based Monitoring:** Portable and dedicated GHG reading equipment is readily available and could be utilized as a part of the AMIA program. GHG can be augmented with the use of satellite imagery and remote sensing. Farmers should be offered opportunity to be involved in such monitoring. Rigorous, systematic, transparent and repeatable monitoring will achieve the best results.
c) **Third-Party Verification:** Involvement of independent entities to verify reported data for accuracy. This step is important and some respondents have suggested the potentially important role that privatization or PPP (Public, Private, Privatization) could achieve.

4.10.2Measures for MRV

The need for the MRV, the adoption of a rigorous process, one which is familiar with the characteristics and specific needs associated with agriculture could currently be compromised as the DA is not a significant player nor is it responsible for the collection of GHG data in agriculture. While it can be of great value to have an independent agency monitoring and reporting, and the PSA maybe fully capable of surveying production figures, prices and exporting extrapolated GHG numbers, the monitoring of GHG, including the establishment of baseline data and the verification of the whole process, may not be their forte. Respondents report that the PSA is working in a collaborative way, is part of the NDC working group and that if improvements are made the PSA will be part of any plan of action. There is a need to emphasise again that if DA-CRAO are to make any contribution to the NDC, then there needs to be a firm and explicit embrace of mitigation and adaption at the AMIA level.

4.10.3Gaps in MRV

Unconditional and conditional response to the NDC. The conditionality revolves around the fact that GoP saw that to achieve the NDC goals there was a need for outside support from external donor sources (e.g. multilateral development agencies and bilateral), and support from those countries responsible for the greatest share of carbon emissions. However, there is no comprehensive donor supported program to bring rigor and thoroughness to CRAO involvement at the farm level.

Data Availability and Quality: The PSA produces a comprehensive range of data concerning agricultural production but there are obvious data gaps associated with the CRAO program of promoting change at the on-farm and AMIA level if no known baseline is available.

Capacity Gaps: The CRAO may currently lack the technical capacity and resources to establish an effective MRV system for the NDC. However, it is simply a matter of adopting a system of protocols and putting a system in place. No doubt there are personal who can be trained but any such personnel need to be offered some longer contractual status.

Consistency in reporting: There is a need to establish firm protocols to ensure that reporting standards and methodologies used are consistent and assist a range of stakeholders including groups like AMIA.

Need to commence: As per the conditionality of the GoP's NDC, addressing these gaps may require international cooperation, financial support, and ongoing commitment from all in-country parties involved in CC mitigation and adaptation efforts with agriculture. However, to get a simple "pilot" system moving forward should not present great difficulties. Such a system is not beyond existing skills and should be commenced. Subsequently, the pilot system can be built upon and improved with regular assessments and updates to NDCs, along with improvements in any MRV processes, are essential for tracking progress and enhancing global climate action. Currently, a dedicated program is required to be established.

5 Planning and Delivery of MRV for Philippines NDC

NDCs outline a country's climate action plan, including its mitigation and adaptation goals. The following outlines current achievements and indicates further necessary steps to take.

5.1 CRAO, AMIA, PSA, LGU's, NGO's

Potentially there are many players in any comprehensive NDC. Each of these players can bring a positive set of skills to enhance the MRV process, but there is a need for coordinating body focused upon agricultural GHG. The following table (developed by the CRAO) outlines a simple strategy they have produced to commence and the target reduction from major sources of GHG emission in the agriculture sector.

Figure 6: Outline of the CRAO plan of action.

Source of GHGs (% total emission)	Targets	Technology to be used	Needed activity
Paddy Rice cultivation (51.97%)	100% adoption in total irrigated paddy rice area = 3.21m Ha		
	Dry Season	AWD + cropland management + renewable energy for water management	Technology development plus
	Wet Season	AWD + RE-powered flood control and water management systems + cropland management	Technology development plus promotion.
Livestock Enteric Fermentation (9.65%)	50% reduction in enteric fermentation / animal	Nature based solutions + breeding interventions.	Technology development plus promotion.
N2O emission from annually cultivated soils (16.2%)	25% reduction in total) N2O emission (total annually cultivated	Cropland management + precision agriculture + biotech crops.	Technology development plus promotion.

Source of GHGs (% total emission)	Targets	Technology to be used	Needed activity
	area = 8.017 million Ha		
Livestock Manure management (9.7%)	100% adoption by livestock sector	Biodigester nature-based solutions.	Technology development plus promotion.
Urea application (1.6%)	50% reduction in urea application	Precision agriculture +cropland management	Technology development plus promotion.
Emissions from biomass burning (.88%)		Nature-based solutions – circular bioeconomy	Technology development plus promotion.

Source CRAO

Table 8 illustrates the position that there is plan to roll out mitigatory and adaptive measures but so far it has not been successfully implemented and monitored. However, the promotion of AMIA appears to recommend that all activity is focused upon adaptation at the farm level. Mitigation appears to be over-looked, as is any potential change within the institutions of CRAO or DA. For example, one return journey from Manila to the AMIA Cruz in a comfortable diesel Toyota by the TA team generates a significant levels of CO_2, and the question arises should there be a strategy to minimise and rationalise such movement?

AMIA

The focus and trajectory of the AMIA strategy has been both appropriate and significant as it provides and promotes improved technologies for farmers while providing the CRAO office with a network to commence putting in place climate smart and resilient farming practices against which the NDC processes can be measured. However, as previously indicated, efforts at mitigation will deliver far greater and significant declines in GHG emissions, and should be vigorously promoted and implemented. The ANCP TA team found that if there has been any significant developments and effective changes and achievements of AMIA in the NDC space, any data is yet to be documented. When offered two tables to outline the rigor required to both (a) quantify GHG emissions in small scale agriculture and (b) doing the same for carbon trading purposes (See Appendix 3) there was a negative response. In fact the CRAO team indicated that collection of such data should be left to an independent body or a team of experts.

In January 2024 the TA Consultancy met with approximately 20 farmers at the AMIA Cruz offices (see Appendix 2). In attendance as well were LGU agriculture extension agents accompanied by three support staff from the DA-CRAO office.

The conversation with the farmers was revealing. The TA Consultancy outlined the context of our visit (NDC, Paris Agreement, CC and the need for data). It was clear that although the AMIA Cruz was set up in 2017, there were no baseline data assembled. This is not unique – there is a concerning absence of such data! We discussed what baseline data might look like and all were very excited to potentially have a template to work by, and an approach which they could follow.

We had a question time and one farmer in particular wanted to share some very rational grievances. Only about 7% of the groundwater extraction in the AMIA Cruz uses solar driven pumps, the rest are of the diesel-powered mechanical variety. So, as a project aligned with

addressing CC and with our visit to the project focusing upon the importance of GHG monitoring reporting and verification, he asked why we could not get solar panels – thus explicitly requesting key elements of a mitigatory practices. So, there is certainly a case to rethink such dimensions of AMIA. NDC data from fossil fuel substitution would be substantial.

Another question and discussion from farmers concerned the fact that when farm production was increased (which was seen as a core attribute of AMIA) the prices farmers were attaining collapsed. This highlights the issue that AMIA should be exploring with the LGU's issues of "marketing" – maybe all AMIA villages across the PHILS could graduate to (for example) long grain fragrant varieties which could offer a great ROI? Alternatively, AMIA rice could be sold under a "Fair Trade" label. With some creativity, sourcing funding to transfer the entire management and movement of water within the AMIA program from diesel-powered to solar should be highly achievable. As a result, there would be immediate positive and easily measurable contribution to the NDC.

5.2 Planning

Generically there are three important steps to take in commencing the MRV for the NCD. The first of these have been commenced and will need to be constantly reinforced.

1. **Stakeholder Engagement:** Any planning process typically involves extensive consultation with various stakeholders, including government agencies, local communities, non-governmental organizations (NGOs), and the private sector. It should be emphasised that the social dimensions whereby establishment of the process needs the recognition and support of many needs to involve numerous players. This inclusive approach will help ensure that the NDC reflects a broad spectrum of perspectives and priorities. The evidence is clear that this process has begun through the various workshops and conferences staged and witnessed by the consultants during November 2023[17]
2. **Baseline Assessment:** A comprehensive assessment of the country's current emissions, vulnerabilities, and existing climate policies needs to be conducted. This baseline information serves as the foundation for setting ambitious yet realistic targets as a starting point. As of January 2024 there have been no energy put into this.
3. **Setting Targets:** The NDC already outlines specific targets for reducing GHG emissions, and so it is simply a matter of identifying and moving in the direction of stated goals. Such targets can be expressed as a percentage reduction from a baseline year. increasing renewable energy capacity, enhancing resilience to climate impacts, and other relevant goals.

5.3 Delivery

Policy Implementation: CRAO and the AMIA approach can be strengthened and supported through adoption of government-wide policies and measures to achieve outlined targets. (See Policy Brief specifically related to NDC as Appendix 2). This may involve enacting new laws, regulations, and incentives, as well as revising existing ones.

Capacity Building: Building the capacity of relevant institutions, agencies, and communities is crucial for successful NDC delivery. This includes providing training, resources, and technical

[17] For example, the "16th Annual Global Warming & Climate Change Consciousness Week", 19-25th Nov, Manila.

support to ensure that all stakeholders can contribute effectively to the NDC's implementation. This should not rule out institutional change as well.

International Cooperation: GoP may seek financial and technical support from the international community to help fund and implement the NDC. This can involve collaborations with international organizations, donor countries, and climate finance mechanisms.

5.4 MRV

Monitoring: Establishing a robust monitoring system is essential to track progress toward NDC goals. This involves collecting and analysing data related to emissions, adaptation efforts, and other relevant indicators.

Reporting: Countries are required to regularly submit reports on their progress toward NDC targets. These reports should be transparent and include comprehensive data to facilitate international assessment.

Verification: Independent verification processes, often involving international review, help ensure the accuracy and reliability of reported data. Verification enhances accountability and builds trust among the global community.

As cited by the Senior Technical Officer of CRAO-DA during the consultation (November 2023), research institutions and academies can actively contribute to MRV of GHG metrics in agriculture through the following key roles:

- Conducting Comparative Analyses. Research institutions can undertake in-depth comparative analyses of existing MRV frameworks, both within the country and globally. This involves evaluating the effectiveness, efficiency, and applicability of different systems to the unique conditions of Philippine agriculture.
- Adapting MRV Systems for Agriculture. Based on the analyses, research institutions can collaborate with academics and stakeholders to adapt or develop MRV systems specifically tailored to the nuances of agricultural practices in the Philippines. This involves incorporating relevant indicators, methodologies, and technologies.
- Pilot Testing and Validation. Academics, in collaboration with research institutions, can conduct pilot testing of the adapted or developed MRV systems in real-world agricultural settings. This phase allows for validation of the systems' accuracy, reliability, and practicality.
- Capacity Building and Training. Research institutions and academics can play a crucial role in capacity building by organizing training programs and workshops. These initiatives aim to enhance the knowledge and skills of farmers, extension workers, and other stakeholders in utilizing MRV systems effectively.
- Knowledge Dissemination. Disseminating research findings and best practices is essential. Research institutions can contribute by publishing research papers, organizing conferences, and collaborating with academics to integrate MRV-related topics into agricultural curricula.
- Participatory Research and Stakeholder Engagement. Engaging stakeholders, including farmers, policymakers, and local communities, is crucial. Research institutions can conduct participatory research to ensure the inclusion of diverse perspectives in developing MRV systems and fostering a sense of ownership among stakeholders.
- Policy Advocacy and Integration. Research institutions can advocate for the integration of effective MRV systems into agricultural policies. By collaborating with policymakers,

they can contribute to the development of regulatory frameworks that support the widespread adoption of MRV practices.

- Continuous Monitoring and Improvement. Establishing a feedback loop for continuous monitoring and improvement is key. Research institutions can engage in ongoing assessments of MRV systems, incorporating technological advancements and addressing emerging challenges in the agricultural sector.

In summary, the effective planning, delivery, and MRV of the GoP NDC will involve inclusive planning processes, policy implementation, capacity building, and transparent monitoring and reporting mechanisms. International collaboration and support may also play a crucial role in achieving the country's climate goals.

6 INSTITUTIONAL FRAMEWORK, ARRANGEMENTS AND ISSUES

As of 2022, the Philippines has been actively engaged in addressing CC and has committed to reducing its GHG emissions and enhancing resilience to climate impacts. Here is a general overview of the institutional framework, arrangements, and issues related to the delivery of NDC in the Philippines

6.1 Institutional Framework

The Climate Change Commission (CCC): The CCC is the lead agency mandated to coordinate, monitor, and evaluate government programs and ensure the mainstreaming of CC considerations into national, local, and sectoral plans. The CCC is responsible for overseeing the development and implementation of the country's NDC.

LGUs: The LGU's are an important stakeholder at the AMIA / farm level, delivering agricultural extension in collaboration with DA While the model has merit, this TA found that there are opportunities to improve the CC and NDC contributions..

Other relevant Government Agencies: Various government agencies are involved in implementing specific actions outlined in the NDC. These may include the DA / CRAO, Department of Environment and Natural Resources (DENR), Department of Energy (DOE), and others, depending on the nature of the commitments.

6.2 Issues for NDC Delivery

Capacity Building: Building institutional and human capacity is crucial for effective NDC delivery. The government may collaborate with international partners and organizations to enhance technical and financial capacities

Financial Resources: Adequate funding is essential for implementing NDC commitments. Access to climate finance, both domestic and international, may be a challenge for the Philippines.

Technological Support: Some NDC commitments may require access to new technologies. Collaborations and partnerships for technology transfer may be necessary.

Policy Coherence: Ensuring that CC considerations are integrated into various policies and plans at the national and local levels is critical for effective NDC implementation.

Stakeholder Engagement: Engaging various stakeholders, including local communities, NGOs, and the private sector, is crucial for the success of NDC implementation.

6.3 NDC Partnership

The NDC Partnership is a global initiative to help countries achieve their national climate commitments and ensure financial and technical assistance is delivered as efficiently as possible. The NDC Partnership is part of World Resources Institute (WRI) Climate Program.[18] The Philippines has been a member of the NDC Partnership since 2017, and has adopted a whole-of-government approach ensuring its Partnership Plan includes cross-sectoral targets and priority actions, aligning with the country's national development plan.

[18] This consultancy met with the Philippines NDC Partnership coordinator.

7 ASSESSMENT OF THE CURRENT SITUATION

The following table highlights significant challenges and gaps in data collection and management within various agricultural and environmental units, focusing primarily on the need for baseline data to monitor and adapt to climate change effectively. There is a universal absence of baseline data across all units, including DA, CRAO, and AMIA, which hinders effective project planning and evaluation. This lack of data also impacts the ability to adopt methodologies for systematic data gathering for Nationally Determined Contributions (NDCs) and other critical data categories.

CRAO, while focused on adaptation over mitigation, lacks a systematic method to measure progress, with no baseline data, tools, or dedicated personnel for effective monitoring. This gap is exacerbated by a reliance on anecdotal rather than systematically collected data to showcase achievements.

Additionally, there is a little understanding of relevant data needs and capacity-building requirements across units. This limits the potential to leverage climate financing effectively, as there is no robust system to argue needs at various levels. Moreover, the private sector's role in stimulating investment and optimizing value chains remains underutilized.

Policy briefs have been developed to address these gaps, emphasizing the need for ownership and improvement in data collection practices that are relevant to agricultural needs and climate change metrics. However, a lack of institutional credibility and standardization in data collection practices further complicates the situation.

Figure 7: Current situation related to MRV and NDC

Issues / Aspect	Current Situation
MRV database gaps	● Universally across all units in DA, in CRAO and at the AMIA level, (as well as the Global Climate fund!) – we have found a lack of 'Baseline data' is the most recurring issue. Projects, Planning, CRAO, AMIA etc, no one appears to collect baseline data. There is no demand, and subsequently no data available. Anecdotal data may be used at a promotion level by CRAO to endorse the success of AMIA, but it is not the product of a system and is more commonly linked to trumpeting increase in production figures rather than comprehensive systemic type data. ● Subsequently – there is no identified methodology for data gathering for NDC (nor any other potential data categories). There is a need for this gap to be emphasized across all DA units / activities. CRAO are not alone. ● CRAO maintain they are focused (or locked in) on adaptation not mitigation so the importance of data gathering associated with NDC has been overlooked. It is only with review and need for NDC data that the topic has arisen. ● If data collection is to be done, CRAO has preference to rely on 'experts' to complete data collection and analysis. On the one hand, this is understandable as taking for example carbon (C) readings from soil requires laboratory work and will be expensive per test. However, to pinpoint any "progress" in soil development will require the establishment of baseline figures. ● The role to complete collection of data is currently seen to be the business of PSA – an office which delivers very generic and indicative outputs, not specifically oriented towards the rigor required for NDC nor relevant agricultural dimensions thereof.

Issues / Aspect	Current Situation
	● As far as we have been able to gauge, the CCC has distributed numerous manuals on the need for data gathering but no graduation towards sectoral nor sub-sectoral specifics.
Gaps in CRAO NDC monitoring ability	● *Background - When dealing with numerical data, you can't manage what you can't measure, and approximately right is better than precisely wrong! Standards and procedures are needed to aim for approximately right. Without a standard there is no logical basis for making a decision or taking action. In other words, you get what you measure!* ● There is currently no systematic ability to measure progress in CRAO; no baseline, no tools, no dedicated people, no benchmarking system, nor is there an acknowledged matrix of metrics associated with NDC. ● Although there is an M&E component in CRAO, we could not establish how they monitor without any baseline body of work. ● There are numerous documents highlighting the achievements of CRAO // AMIA farmers, but this appears to be anecdotal and incidental and not based upon a rigorously developed system.
Development & implementation of capacity building plan	● There is a shallow understanding across CRAO, DA units and at the AMIA level of what specific data could be relevant. ● Feedback from presentation of two matrix (tabled as an appendix in our report) highlighted to the NIRAS team a lack of interest at this stage to go to worlds best practice (WBP). WBP is too complex and difficult given current limitations. ● There is currently no capacity to match financing modalities required by some donors for say, consideration of benefitting from any C financing initiatives. ● There is also a limited understanding of CBA. There is no connection, understanding nor conviction regarding the need for an 'enterprise' approach for the farmers that AMIA is specifically working with. While it is OK to double production for example, if farmers receive no incentive to do that (a point which the farmers at AMIA Cruz made very clearly), there is a collapse in the relevance of the AMIA model. Such a situation reveals that there is a need for capacity building in enterprise thinking, particularly as this is then linked to data gathering. This is a problem as "enterprise thinking" is not a quality that is front and centre for your average civil servant – it is not their skill base. BUT – such skills are required if "extension programs" like AMIA increase production and farmers are disappointed and angry when they see prices collapse at harvest.
Mechanisms to leverage climate financing	● Collection of rigorous baseline database is required to argue needs at the farming, institutional, and policy level. ● Private sector - - this should be interpreted as a **market force** but also a **private production force**. There is no incentive nor promotion to accelerate private investment, and nor is there an overt stimulus in the market to optimize a potential AMIA value chain. ● Leverage for financing – there is no accreditation nor checks and balancing to attest that what the seller is quoting – there needs to be a third party to accredit, a need which can require a statute body, or alternatively, a private enterprise body. ● Climate Change (CC) - the Relevance and credibility of government departments is really challenged by the onset of CC – Understanding that

Issues / Aspect	Current Situation
	there are very positive opportunities to gain funding and what is needed to do that is currently lacking.
Policy brief on best practices	● The structure and scope of the draft policy brief we have developed is succinct and to the point. ● The problem identified is that there is no specific data available right now and this needs to change. The PSA develops generic data with values extrapolated from production figures. This is indicative and not accurate, but is globally acceptable. ● Ownership of relevant CC data needs to be executed across DA and specifically at the project level, producing data which is cognizant and relevant to agriculture. ● Acknowledging that it will take time, adoption of this data collection could be then implemented from an established date moving forward as capacity is built and data components and methodologies are improved at the field level. For example, if Bureau of Animal Industry had an initiative, bolted onto the proposed project activities is the question – *"what influence does this have on the NDC figures and what data should be identified for collection"?* Etc. ● From our understanding, the Climate Change Commission currently does not promote quality control in data development. This should be altered. All data collection processes will benefit from a standardization of collection practices. ● Due to its ad-hoc nature, CRAO appears to suffer from a lack of institutional credibility from DA peers, and as a result, issues related to CC are likewise seen as "someone else's business". All units in DA need to be given the opportunity to ask – (a) "What should our contribution to CC and NDC look like, and (b) How do we respond to the need?" (This could be assuming a collaborative role for CRAO as well.) ● CRAO does not currently have any best practice policy nor procedure on data gathering from the different units. **There is a view that all data collection is associated with C trading and credit, and the very need for baseline data and then subsequent graduation is therefore lost. There is a myriad of 'other' data which could have been assembled but has not.** ● Cost Benefit Analysis (CBA) – there is a limited understanding of CBA and it should be part of a policy – currently there is a shortfall in basic research procedures to understand the comprehensive benefits of CBA. The AMIA field-based feedback reveals the gap in added values associated with AMIA. Enterprise in particular is not a feature of the current thinking. Expectations are not wholistically exploratory of CBA. (e.g. As previously noted above, if a project helps farmers double production, it should also be thinking – "so what do we do with the added production?". AMIA has failed in this area and this is part of a rigorous data gathering and subsequent analysis of data – and the realities faced by the farmers! Feedback from farmers revealed that prices collapsed when they doubled production! So, while they might be grateful for the AMIA model, farmers see no benefit in that particular element in the process! Enterprise development and what that might look like for NDC is highly relevant data to be collecting with the implication that the LGU / AMIA & CRAO UNIT has the capacity and capability to look at the entire value chain.

Issues / Aspect	Current Situation
Adaptation V's Mitigation	● At the directive sent to CRAO by the DA leadership, it was pre-determined that Adaptation should become their area of focus. Gathering data from the impact of adaptation will, given the current extent of the AMIA activities, be almost futile. ● Were the CRAO office, in association with LGU agriculture extension team, to promote and measure impacts of 'Mitigation' at farm level (which ironically is part of the AMIA title), they would immediately have something tangible to measure. (Farmers pointed this piece of logic out at our sessions with them!) ● There is a very low understanding of the growing importance of taking the 'organic' pathway as a significant 'impact' component. Our brief desk research indicates that over the last two years, synthetic fertilizer prices have risen over 30% in the Philippines. How should this reality impact upon CRAO and DA! ● The combination of global trends and of course CC means that it will be strategically prime time to rapidly consider a change of course for the AMIA program. Prices for synthetics will keep increasing, and the slow impacts upon soils means that there will be an impasse. ● Staff need to gain an understanding and conviction of soil science fundamentals to know that building of C in soil takes time, but continued use of synthetics will cause deterioration of C numbers.

8 RECOMMENDATIONS TO ENHANCE THE DA CRAO NDC MRV SYSTEM

Capacity Building and Training

There is a need to conduct regular capacity-building programs and training sessions for relevant stakeholders involved in data collection, reporting, and verification. This includes farmers, extension workers, and government officials. Successful training and collaboration will ensure that they are well-versed in using the MRV system, understand the importance of accurate data, and can contribute effectively to the reporting process. It is important to adopt the mantra that “learning by doing” is the process by which adults more commonly learn.

Integrated Data Management System

Implement an integrated data management system that consolidates data from various sources, including satellite imagery, weather stations, and on-the-ground observations. This system should provide a comprehensive and real-time overview of climate-related variables affecting agriculture. Integration can improve data accuracy, reduce redundancy, and facilitate efficient analysis.

Incorporate Remote Sensing Technologies

Leverage remote sensing technologies, such as satellite imagery and drones, to enhance the monitoring and reporting of climate-related changes in agriculture. These technologies can provide near real-time data on land use, crop health, and climate conditions, contributing to more accurate and timely reporting of NDC targets.

Stakeholder Engagement and Collaboration

Foster collaboration with relevant stakeholders, including academia, non-governmental organizations (NGOs), and private sector entities. Establish partnerships to share data, resources, and expertise. Engage farmers and local communities in the MRV process, ensuring that their traditional knowledge is integrated with modern technological solutions for a holistic understanding of climate resilience in agriculture.

Regular Review and Adaptation

Establish a mechanism for regular review and adaptation of the MRV system. Given the dynamic nature of CC and agriculture, it is crucial to periodically assess the effectiveness of the system and make necessary adjustments. This includes incorporating new technologies, updating methodologies, and aligning the MRV system with evolving national and international standards.

Organizational Arrangements, Staffing and Training

Reform and reconstitution of the CRAO office –

- Give the new CRAO the capacity, strength of staff to mainstream the CC across the department
- Target the data AMIA village as the primary – PRA, link the climate resilient technologies with the NDC
- Steer away from demonstration pilots and upscale what is known at the LGU / AMIA level.

9 CAPACITY BUILDING IMPLEMENTATION IN THREE SELECTED DA OFFICES & LGUS

Based on the results of the interviews with key actors and informants in the agriculture sector, it appears there is a big need for continuous capacity building, specifically on the aspect of GHG reduction, and MRV within the agriculture sector. Two levels of interventions were initially set to be carried out either as stand-alone activity for each or could be simultaneously be taken up under one package of training course. Institutionally there appears to be a lack of conviction within units other than CRAO that they have any need nor responsibility to respond to CC. Indeed, DA would benefit from a greater understanding that all are responsible for rolling-out a response to the PA and the NDC's, and also begin to explore at the institutional level what their own contribution to NDC could look like.

Level 1: Awareness Building on CC Impacts, the Paris Agreement and the Philippine Nationally Determined Contributions to GHG Reduction.

The main objective of this course is for the participants to recognize the grave dangers of CC and impacts. This is to enable them to realize the importance of the Paris Agreement and the Philippines Nationally Determined Contribution to GHG reduction.

Level 2: Skill Training on GHG Reduction Monitoring, Reporting and Verification

The main objective of this course is for participants to gain knowledge, skills and mastery of how to estimate, measure, report and verify GHG reduction rate in the agriculture sector. It is recognised that the collation of these metrics will need to involve and incorporate all the relevant PHP government departments, plus the private sector where applicable. In this regard, GoP may adopt a PPP approach to the data collection.

9.1 Results of the Training Need Assessment

Key Respondents: There were 16 Key Respondents taken for the study: six (6) from DA-CRAO, five (5) from DA Regional 3 Office, and five (5) from the AMIA LGU of Victoria, Tarlac. The selection of Key Respondents was based on staff's direct involvement in the DA-AMIA Program.

Training Background: Table 6 presents the list of training courses and seminars the six (6) staff of CRAO (who participated in the TNA) had in the past four (4) years

Table 6: List of training courses the DA-CRAO staff had attended in the past

TRAINING WORKSHOP/CONFERENCE/SEMINAR TITLE	YEAR	DAYS	PROVIDER
1. Climate, Land, Energy, and Water Systems (CLEWS) Modelling Asia Pacific Training Course, Part 1: Introductory Training	2020	8	UNDP
2. Establishing Climate Resilient Agriculture and Fisheries Villages	2021	5	DA
3. Climate-Smart Agriculture Techniques and Practices	2022	3	DAP
4. Climate Information Services (CIS) Towards Resilient Agriculture and Safe Rural Communities	2022	2	DA

TRAINING WORKSHOP/CONFERENCE/SEMINAR TITLE	YEAR	DAYS	PROVIDER
5. Use of Climate Services for Agriculture	2022	2	DOST-PAGASA
6. Community Preparedness and Resilience to The Challenges of Climate Change	2022	5	UPLB
7. Training on Climate and Disaster Risk Assessment (CDRA)	2023	5	DA
AMIA Decision Support Tools and Development Pathway	2023	5	DA
4. Roll-Out of Agro-Climatic Advisory Portal	2023	5	ADB-NIRAS

Most of the past trainings taken by the CRAO staff were not much related to GHG inventory and MRV. This is quite understandable because the main emphasis of AMIA at the beginning of the program was more on climate adaptation measures dealing with flood and droughts hazards in the agriculture sector

Level of Awareness: A summary result of TNA revealed that consistently, there is medium awareness on the topics of The Science of Climate Change and Climate Disaster and Risk Management among the three (3) targeted audience of the capacity building activity (Table 7). Further, there is low awareness of the topics: 1) GHG Reduction Adaptation and Mitigation, 2) Climate Change International Agreements and Local Enactments, and 3) Carbon Trading and Climate Financing.

Table 7: Summary results of the TNA conducted at DA-CRAO, DA-R3O and AMIA-LGU

SUBJECT MATTER MAIN THEME	LEVEL OF AWARENESS[19]		
	CRAO	DA-R3O	AMIA-LGU
1. The Science of Climate Change	Medium	Medium	Medium
2. Climate Disaster and Risk Management	Medium	Medium	Medium-High
3. GHG Reduction Adaptation and Mitigation	Low	Low	Low
4. CC International Agreements and Local Enactments	Low	Low	Low
5. Carbon Trading and Climate Financing	Low	Low	Low

For more details on the results of the TNA, refer to Appendix 2

9.2 Briefing/Orientation Seminar Design and Highlights

Target Audience: Based on the results of two (2) consultation meetings conducted with the DA-CRAO staff on November 13, 2023 and January 19, 2024, and substantiated by the TNA survey outcome, certain adjustments in the capacity building focus (that was initially designed supposedly on NDC compliance and GHG emission MRV) were made. This is in response to the real current felt needs of the targeted clients.

1. [19] The awareness level comprised of three categorical degrees with the following equivalents:
LOW: *Not Familiar*, **MEDIUM:** *Familiar On The Concept*, **HIGH:** *Understand of the Concept with the Methodology*

Table 8: Nature and scope of the orientation seminars conducted according to the type of client

CLIENT	CURRENT FELT NEED	PROPOSED ACTIVITY
1. CRAO Staff	1. How to conduct baseline study on the GHG emission metrics? 2. Understanding the importance of Benefit-Cost Analysis in every NDC measure towards Low carbon emission in agriculture. 3. Concept on Carbon Credit, Trading and Climate Financing	Two (2)-Hour Orientation Seminar on the data requirements for NDC compliance in the agriculture sector as well as protocols and mechanisms on Carbon Credit, Trading and Climate Financing
2. Planning Unit Staff	Background about the Paris Agreement, National Determined Contribution (NDC) and the importance of GHG emission Measurement, Monitoring, Reporting, and Verification for climate financing	Two (2)-Hour Orientation Seminar on the Paris Agreement, NDC, GHG MRV and Climate Financing Mechanisms
3. AMIA LGU & Farmers	Background of the Paris Agreement, NDC, GHG emission reduction MRV and how farmers can benefit from Carbon Trading through climate financing mechanisms.	Three (3)-Hour Orientation Seminar on the Paris Agreement, NDC, GHG MRV and Climate Financing Mechanisms

Objective of Orientation Seminar: For the CRAO staff the Orientation Seminar was primarily designed to feedback the institutional and technical gaps and needs of the said office, particularly, in carrying out the GHG reduction MRV for NDC compliance in the agriculture sector. Likewise, it was meant to introduce the prevailing practices in establishing the metrics associated with the NDC with certain guidelines. For the DA-Planning Unit, the Orientation Seminar was mainly intended to provide a forum to discuss policy measures and mechanisms needed for efficient GHG reduction MRV in compliance to the NDC target of the agriculture sector. (Refer to Appendix 5 for the PPT slides used) For the DA-Region 3 Office and the AMIA LGU, the Orientation Seminar was meant to introduce to the participants the background of the Paris Agreement, the NDC and the Agriculture Sector's commitment to the NDC. But most importantly, the activity was conceived to elicit AMIA farmers' response to the issue of involving them to take part in the GHG emission reduction MRV in terms of incentives and capacity building needs it entails for them. (Refer to Appendix 6 for the PPT slides used)

Table 9: Summary highlights of the three (3) briefing and orientation seminars

CONCERN	CLIENTS' PERSPECTIVE ON KEY ISSUES RELATED TO THE NDC		
	DA-CRAO	DA-Planning Unit	AMIA LGU
Paris Agreement	● Philippine agriculture sector's contribution to global GHG emission is relatively insignificant compared to the advanced developed economies. ● If the agriculture sector pursues the low carbon pathway as mitigation measure which is rather expensive and low yield, much leverage and negotiation for climate funding is needed to	● DA is committed to pursuing its sectoral target on GHG emission reduction. ● It just have to put in place the necessary mechanisms and processes to make it happen at the department level. ● Pathway to low Carbon agriculture is expensive that it requires support from outside (international community) to meet the NDC target.	● Paris Agreement could be a good source of incentive for smallholder farmers to go into low carbon agriculture. ● The mechanism on how to avail of the climate financing is a big challenge to the government, and to DA in particular,

	finance the 72.29% conditional commitment ● In some projects in the country, both adaptation and mitigation can simultaneously be achieved. A system to account our Carbon credits for trading is needed	● Thus, much international cooperation and partnership is needed in the process	● How individual farm household would really benefit from climate financing is a big operational issue
GHG Metrics	● AMIA outreach is on the road to upscaling, but GHG metrics have not been given much attention at the start because of the program's overly concern on adaptation rather than in mitigation measures. ● In terms of capacity building, AMIA farmers can provide the baseline data. On the other hand. the technical experts will do the GHG emission reduction measurements, analysis and MRV	● DA Secretary has to issue a memorandum calling all the 41 organic units and offices to do their GHG emission data collection for CRAO to consolidate and submit to CCC for reporting, ● Supports the institutionalization of CRAO to become an organic unit of DA as the focal office for the NDC provided it has a clearly defined mandate and interoffice coordinative function	● AMIA farmers can participate in the GHG emission reduction MRV for as long as they will be capacitated, ● GHG metrics should be introduced to them ● Need a sample Baseline Template as a guide.
Carbon Credit, Trading & Climate Financing	● To attain the 72.29% conditional target in the NDC, there are still a number of systems and mechanisms to be put in place in order to avail of the global climate funding. ● The coming in of the private sector and multi-lateral international groups is crucial	● There is a need for capacity building at all levels in the agriculture sector, i.e. from project research, feasibility study, designing, implementation & monitoring down to farmers' level. ● Tools and mechanisms are need to be in placed	● Farmers will assist in the GHG emission reduction MRV but will leave the task of negotiating, leveraging and applying for Carbon, trading to the government agencies.

Each client-respondent type has its own political view and means to meet the NDC target of the agricultural sector. The higher the responsibility attached to the unit, the NDC tends to be perceived as a pressure more than an incentive.

The CRAO being the focal point for the NDC compliance in agriculture sensed the urgency of putting in place the necessary conditions, mechanisms and instruments prior to getting climate support funding which is tedious and long process from the technical standpoint. Whereas in simplistic terms, the Planning Unit and AMIA LGU farmers merely see the whole thing as a matter of improved policy measures and mundane operational adjustments. Hence, in this context, capacity building design should be tailored fit according to the type of responsibility and function certain actor category has in the NDC target compliance.

9.2.1 Proposed Training Courses in the Future

Figure 9 presents the capacity building framework in carrying out NDC awareness building as well as MRV knowledge, skill and mastery acquisition.

Table 10: Capacity Building Plan Framework: NDC Awareness Raising and MRV Skill Development

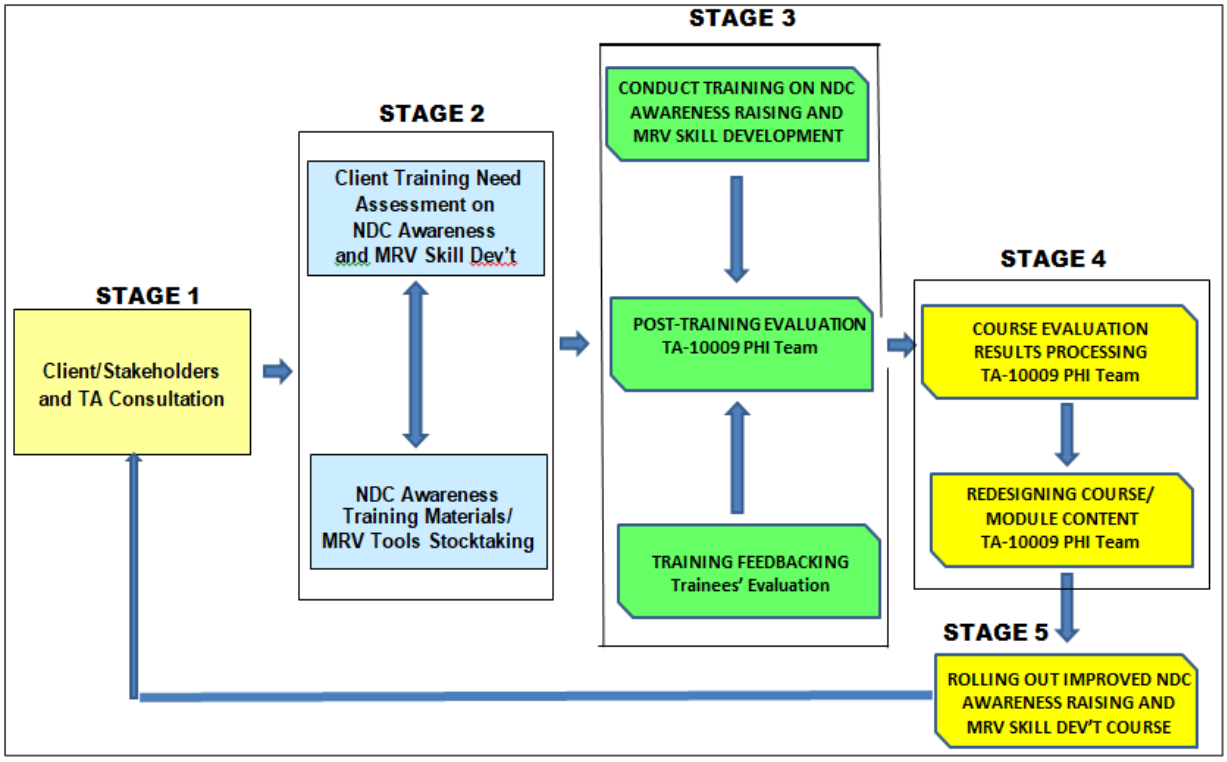


Table 11: Stages of the Capacity Building Plan for NDC Awareness Campaign and Mainstreaming

STAGE	OBJECTIVE	ACTIVITIES	EXPECTED OUTPUT
Stage 1: Levelling Off- Session	❖ Define training output, procedure and logistic requirements	1. Coordinate with the CRAO, DA for the conduct of client-stakeholders' consultative levelling-off meeting, 2. Consult CRAO to identify focal persons, officers, key respondents who will be later on potential participants for the training course, 3. Come up with "do list" and tasking arrangements.	Training Implementation Plan
Stage 2: Diagnostic Survey	❖ Assess training need, skills and level of competence the target trainees have	1. Carry out Training Need Assessment 2. Conduct Stocktaking of NDC Awareness Campaign modules and MRV tools and techniques 3. Create a Study Work Group to be spearheaded by the TA to	1. Training Need Assessment Report 2. Stocktaking Report of existing course

STAGE	OBJECTIVE	ACTIVITIES	EXPECTED OUTPUT
	❖ Inventory existing training modules, tools and courses	review, analyze and streamline training materials on MRV tools and techniques 4. Identify appropriate trainors and modules for the training course	modules and tools
Stage 3: Training and Post-Training Assessment	❖ Transfer knowledge and skills to future trainors ❖ Assess training delivery effectiveness ❖ Solicit trainees' feedback in terms of extent of knowledge and skill transfer	1. Conduct the training course by training provider 2. Assess training delivery performance, in terms of effectiveness in building knowledge, skills and competence among the trainees, and 3. Assist trainees to make critical evaluation on the extent of knowledge, skill and competence built on them towards appreciating the NDC and capturing a user-friendly MRV tools and techniques.	Post-Training Assessment Report
Stage 4: Training Course/ Materials Revision and Improvement	❖ Process TA and trainees' post-training evaluation results ❖ Develop improved course/module and MRV tools/techniques	1. Consolidate and analyze TA assessment and trainees feedback results, 2. Institute appropriate revisions and improvements on course content, delivery and impact monitoring towards a user-friendly MRV tools and techniques, and 3. Conduct Writeshop for new module preparation	Revised and Improved Training Modules and Curriculum
Stage 5: Mainstream an improved awareness raising course/ module MRV & tools/techniques	❖ Field-test the improved awareness campaign course/ module and MRV tools and techniques	1. Field-test the improved NDC awareness campaign course and MRV tools and techniques 2. Roll Out the Improved Training Course/ MRV Tools/Techniques to other provinces 3. Conduct Post-Training Assessment	Post-Training Assessment Report

There has never been any specialized training specifically for MRV of GHG reduction, although GHG inventory has been done by many assisting organizations of various CC-related projects in the past. Thus, the focus of future capacity building should be more on instrumentation and the use of digital technology in gathering data, results dissemination and field verification.

9.3 TNA and Training Design

Training Need Assessment (TNA) will be carried out at CRAO-DA and the Provincial and Local Government Agricultural Officers of the three (3) selected pilot areas. An interview questionnaire will be used for baseline survey to determine prospective trainees' initial awareness, knowledge and competence level.

A total of 50 respondents from CRAO-DA, provincial and local government units will be selected for interview using survey instrument. The purpose of this survey is to get the profile of the incoming trainees in terms of the following attributes:

- nature of work and designation in the DA
- level of initial awareness, understanding, and mastery of the subject matter to be lectured,
- inventory of past training attended, i.e. similar or related to the subject matter,
- topic or course preference (which they marginally know or do not have any knowledge or information about it yet)
- mode of transfer of learning
- training schedule

The results of the TNA alongside with the outcome and inputs of the technical experts of CRAO-DA shall be the basis in designing the training curriculum.

For those topics that require field exercise or "hands on" practice, the use of more manageable settings, facilities and gadgets is recommended. The choice of site to visit depends greatly on the budget available for travel as well as the significance and uniqueness of the place to visit in relation to the subject matter to be learned.

10 WAY FORWARD

10.1 Leveraging Climate Financing

Leveraging climate financing to facilitate NDCs involves strategically utilizing financial resources to support the country's efforts in meeting its climate goals. Below are several steps and strategies that the Philippines can consider:

Assessment of Financial Needs:

a) **Conduct a comprehensive assessment** of the financial requirements for implementing the NDCs. This includes identifying mitigation and adaptation projects, assessing their costs, and determining the financial gap that needs to be filled.

b) **Engage in International Climate Funds**:

Explore and engage with international climate funds such as the Green Climate Fund (GCF), Adaptation Fund, and Climate Investment Funds. These funds provide financial support to developing countries for climate-related projects. The Philippines can submit project proposals aligned with its NDC goals.

c) **Public-Private Partnerships** (PPPs):

Foster collaboration between the public and private sectors to attract additional funding and expertise. Private sector involvement can bring innovation, technology, and additional financial resources to climate projects.

d) **Domestic Climate Finance Mechanisms**:

Establish and strengthen domestic climate finance mechanisms. This may include setting up a national climate fund or enhancing existing financial instruments to mobilize resources within the country.

e) **Mainstreaming Climate into the national budget**:

Integrate climate considerations into national budgeting processes. This involves allocating a portion of the national budget to finance climate-related projects and initiatives.

f) **Policy and Regulatory Reforms**:

Implement policies and regulatory reforms that create an enabling environment for climate finance. This may include providing incentives for private investment in climate-resilient and low-carbon projects.

g) Capacity Building:

Build the capacity of relevant government agencies, local governments, and other stakeholders to effectively access and manage climate finance. This includes developing skills in project design, implementation, and monitoring.

h) **Project Bank and Pipeline Development**:

Develop a robust pipeline of bankable climate projects. A well-prepared project bank can attract interest from various sources of climate finance, making it easier to secure funding.

i) Monitoring and Reporting:

Implement robust monitoring and reporting systems to track the effectiveness of climate finance in achieving NDC targets. Transparency and accountability are crucial for maintaining trust and attracting further investments.

j) **Regional and Global Partnerships:**

Collaborate with regional and global partners to leverage additional resources and share best practices. Participate in international forums and networks to access knowledge and financial support.

By implementing these strategies, CRAO can optimize the use of climate financing to fulfill its NDC commitments and contribute to global climate action. It requires a coordinated effort involving government agencies, the private sector, and civil society to ensure successful implementation.

10.2 Inter-Government Collaboration

10.2.1 Inter-Government Collaboration to deliver on the NDC in the Philippines

NDCs are commitments to outline their climate action plans and goals. Collaborative efforts between governments play a crucial role in successfully delivering on these commitments. In the case of the Philippines, inter-government collaboration for NDC implementation involves various stakeholders at different levels, including national, regional, and local governments. Here are some key considerations:

Policy Coordination:

a) Establish clear lines of communication and coordination among relevant government agencies responsible for climate action and NDC implementation.
b) Develop a comprehensive national climate policy that aligns with the NDC and involves input from various government departments.
c) Capacity Building:
d) Invest in building the capacity of government officials at all levels to understand and effectively implement climate actions outlined in the NDC.
e) Provide training programs, workshops, and resources to enhance technical skills related to CC mitigation and adaptation.

Data and Monitoring:

a) Establish a robust monitoring and evaluation system to track progress in NDC implementation.
b) Ensure data sharing and collaboration among government agencies for collecting and analysing relevant climate and environmental data.

Financial Mechanisms:

a) Collaborate on developing and implementing financial mechanisms to support NDC goals.
b) Explore partnerships with international organizations, development banks, and other countries to secure funding for climate projects.

Multi-stakeholder Engagement:

a) Foster collaboration with non-governmental organizations (NGOs), the private sector, academia, and local communities to enhance the effectiveness of climate actions.
b) Engage civil society in the development and monitoring of NDC-related policies to ensure inclusivity and transparency.

Technology Transfer:

a) Facilitate the transfer of climate-friendly technologies through international collaborations, partnerships, and knowledge-sharing initiatives.

Legal Frameworks:

a) Ensure that the legal framework supports NDC implementation and provides a basis for collaborative efforts.
b) Develop and strengthen laws and regulations that promote climate resilience and sustainable development.

International Collaboration:

a) Actively participate in international climate forums and collaborate with other countries to share experiences, best practices, and challenges in NDC implementation.
b) Leverage international partnerships for technical assistance and capacity building.

Public Awareness and Participation:

a) Promote public awareness and participation in climate action efforts.
b) Involve citizens in decision-making processes related to NDC implementation to ensure that policies reflect the needs and priorities of the population.

Adaptation and Resilience:

a) Collaborate on developing and implementing adaptation strategies that address the specific climate challenges faced by the Philippines.
b) Foster partnerships for building climate-resilient infrastructure and communities.

Inter-government collaboration is essential for the Philippines to effectively address CC and meet its NDC commitments. This collaborative approach ensures a holistic and coordinated effort that considers the diverse needs and challenges across different levels of government and sectors within the country.

10.2.2 The NDC Partnership

The NDC Partnership refers to the "Nationally Determined Contributions Partnership." The NDC Partnership is a global initiative that was established to support countries in their efforts to implement and enhance their Nationally Determined Contributions (NDCs) under the Paris Agreement on CC.

NDCs are the commitments that countries make under the Paris Agreement, outlining their climate action plans and goals to address CC. The NDC Partnership facilitates collaboration and coordination among governments, international organizations, the private sector, and other stakeholders to help countries achieve their climate targets.

The partnership provides technical and financial support, facilitates knowledge sharing, and assists countries in accessing resources to implement their NDCs effectively. It aims to strengthen the capacity of countries to design and implement climate actions and encourages the integration of climate objectives into broader sustainable development strategies.

10.3 Work Plan

Developing a workplan to deliver NDCs in the Philippines involves a comprehensive and collaborative approach. This workplan provides a holistic approach to NDC implementation, covering various aspects of mitigation, adaptation, and sustainable development. Customizing it to the specific context and priorities of the Philippines will enhance its effectiveness. Below is the skeleton of a generic workplan outline that can be customized based on the specific needs and context.

- Stakeholder Engagement and Capacity Building:
    - Identify and engage relevant stakeholders, including government agencies, local communities, NGOs, and private sector partners.
    - Conduct workshops and training sessions to build capacity and awareness about NDC goals and strategies.
- Baseline Assessment:
    - Evaluate the current status of greenhouse gas emissions, vulnerability, and adaptation measures in various sectors.
    - Identify key sectors contributing to emissions and assess their potential for mitigation.
- NDC Goal Setting:
    - Establish clear and measurable targets for emission reductions and adaptation efforts, taking into account the country's sustainable development goals.
- Align NDC goals with national policies and priorities.
- Policy and Regulatory Framework:
    - Review and update existing policies to align with NDC goals.
    - Develop new regulations and incentives to support the implementation of NDC strategies.
- Financial Planning and Resource Mobilization:
    - Assess the financial requirements for implementing NDC goals.
    - Explore domestic and international funding sources, including climate finance mechanisms and partnerships.
- Technology Transfer and Innovation:
    - Identify and promote the adoption of clean and sustainable technologies.
    - Facilitate technology transfer through partnerships and collaboration.
- Monitoring, Reporting, and Verification (MRV) System:
    - Establish an MRV system to track progress towards NDC goals.
    - Develop standardized reporting mechanisms and ensure transparency in data collection and reporting.
- Adaptation Planning:
    - Assess vulnerability to climate impacts and develop adaptation strategies.
    - Integrate adaptation measures into national and sectoral policies.
- Implementation Roadmap:
    - Develop a detailed roadmap outlining specific actions, responsibilities, and timelines for NDC implementation.
    - Foster inter-agency coordination and collaboration.
- Public Awareness and Communication:
    - Implement a communication strategy to raise awareness about the importance of NDCs and engage the public.
    - Encourage public participation in climate action initiatives.
- Review and Evaluation:
    - Establish a regular review process to evaluate the effectiveness of NDC implementation.
    - Adjust strategies and actions based on feedback and changing circumstances.
- International Collaboration:
    - Engage in international forums to share experiences and best practices.
    - Collaborate with other countries and organizations to enhance capacity and knowledge exchange.

- Legislation at National level.
    - Seek legislative support for NDC implementation through the enactment of supportive laws and policies.

ANNEX

Annex 1: Policy briefing regarding best practices in MVR on agriculture sector adaptation related NDC commitments

Introduction

This policy brief aims to relate to the motherhood framework of the ANRE project to the national NDC commitments. The goal of ANRE is to support the GoP to move forward on the climate resilience reform agenda of the Philippines Climate Change Action Program (CCAP), covering agriculture, natural resources, and the environment. Given the critical role of agriculture in CC adaptation, effective MVR mechanisms are crucial for ensuring transparency, accountability, and successful implementation of NDC commitments. Climate Change (CC) Action needs to be viewed through an understanding which encompasses holist planning and strategic programming established on sound policy, appropriate program and project activity development, subsequent investment budgeting supported by government and donor inputs, monitoring, evaluation and effective cumulative response to lessons learnt.

To be successful, the NDC requires data. Currently little verifiable data appears to exist. To achieve the goal of collecting data and verifying its validity requires a shit in practices including a greater institution-wide understanding of CC, adoption of a proactive response and an adoption of processes which will promote the flow of accurate and verifiable data.

The Problem

There are three dimensions to the current problem. (A) An institution-wide lack of a data gather culture to NDC and baseline information, (B) a consolidated trajectory towards seeing the value of promoting adaptation measure only and ruling out the legitimacy of influencing mitigatory actions and contributing that data to the NDC, (C) the institutional status of DA-CRAO.

- There is a currently an absence within the DA regarding the collection of baseline data. Although short in time, this mission has found that a data gathering culture appears to be absent and its absence is universal, with a glaring shortfall in the systematic collection of baseline data either associated with specific projects or otherwise. This is a lost opportunity, one which should be an integral component in any activity or project aiming to promote, accelerate or cultivate changes in farming practices and farming outcomes specifically within the context of CC, but also from a general perspective.

- At the field level, the high profile AMIA program appears to have no protocols for the development of baseline at the commencement of each initiative. This is a problem. As an example of how profound the problem is, it was revealed that the Project Development unit within DA-Planning, (a group which has responsibility for the development and documentation of international donor projects), has just been successful in the finalization of a project formulated in collaboration with the Global Climate fund, a process which has taken six years to identify, formulate, document and recently successfully achieve funding. According to the respondents to the current research, at no point in that six-year period of project identification and development has the explicit need to assemble relevant baseline data been identified or discussed.

- The PA creates the expectation that signatories to the agreement will be able to verify their anticipated success in curbing GHG emissions, systematically achieved through the tabling of hard data which proves a decline in GHG. To successfully achieve a decline in emissions, there is a need to promote both mitigation and adaption practices and procedures.

- Strategically, DA-CRAO have anticipated that successful compliance with the PA creates an opportunity for the Philippines to make positive strides in assisting farmers to be more resilient towards the impacts of CC. The pathway adopted promotes adaptation over mitigation. While this trajectory has merit, it rules out the "low-hanging-fruit" offered by mitigation. Expecting to record changes in GHG emissions as a result of adaptation will reap minimal change. For example, when interviewed, AMIA farmers themselves identified the need to "solarize" their water managements which could very rapidly cause measurable decline in GHG emission.

- subset of the problem is that currently DA CRAO is currently seen as the "go-to" place should any issue regarding CC be on the agenda. This can be interpreted that all CC issues requiring the attention of DA belong in CRAO. The current situation indicates a lack of understanding regarding the PA and the holist contribution required to respond both institutionally, and as well, in relation to farmers. In fact, successfully responding to CC requires a highly geared "philosophical and action-based change" across the entire DA institution. And, given the uncertain institutional status of DA-CRAO (a situation well documented in the ADB July 2023 report), the tenuous status of pro-activity to CC and the PA is highlighted even more.

Policy Options

a. Instigation of a DA wide approach which foresees adoption of both mitigation and adaptation measures within the AMIA programme as being the building blocks for rapid decline in GHG emissions. Such a step would envisage all units becoming individually responsible for metric development associated with the NDC, both within the institution (monitored internally within each office) and as a core component in extension activities. Such a move would require the development of a DA action plan with directive from the Secretary for involvement of the entire department by adoption of mitigatory emissions cutting as part of all activity.
b. Development and application of a user-friendly baseline data framework for a generic data gathering system for agriculture which can be applied at representative agro-geographic regions and specific project sites across the county. This option would emphasize the need at the resource and client/farmer level through 'extension' style initiatives and see GHG data as included within a wider framework.
c. The reinstatement of a dedicated agricultural statistics bureau whereby a team of officers extrapolate from production data across the organization to establish broad bench-line data sets and include GHG data.
d. Institutionalization of CRAO as a dedicated unit with power to take assemble all GHG data across DA and contribute to the NDC. This option would promote DA-CRAO as the unit responsible for an issue which should be universally adopted by all.

Decision-making

- It is recommended that from the policy options stated above, that options A, B and D be adopted.

Agenda Setting

- The Secretary of DA send a directive to all divisions (e.g. Planning, Projects, Finance, Operations, etc) (and specific projects) whereby they are all involved in recognizing the need for NDC data.
- Capacity building program fostering “institutional change” in understanding the issues, development of actions to both mitigate and adapt both at an institutional level, but also inculcated with any interactions with farmers via extension activities.
- Adoption of a baseline proforma approach applied across the institution and at project level activities.
- ADB report from July 2023 be mobilized incorporating all considerations and recommendations,

Implementation

- Establish what CRAO and then each relevant department can do to contribute to the need for data.
- Agree on the metrics, the breadth of mitigation and adaptation possibilities at institutional and project level, and then have an understanding of alignment of relevant departments to the needs.

Evaluation.

- Establish a time line and estimate what can be achieved within CRAO and other units over incremental periods; three months, for six months and then 1 year.

Annex 2: Theoretic methodology to quantify GHG emissions in small scale agriculture & Steps in development of a Carbon Trading Mechanism

Quantifying greenhouse gas (GHG) emissions in small-scale agriculture requires a systematic approach that considers specific characteristics of any agricultural system in question. Below is a theoretical / general methodology which would need to be adapted to the context and available resources. Assumption should be that the following steps comprise a longitudinal study with a rigorous process put in place.

	Steps	Systems, Processes, and Requirements
1	Scope Definition	Identify study boundaries (village / farm). Determine GHGs to measure e.g. (carbon dioxide (CO2), methane (CH4), & nitrous oxide (N2O) Decide on scope of study: e.g. does it include only on-farm activities, or does it also consider upstream & downstream processes (e.g., fertilizer production, transportation.
2	Activity Inventory	Create a detailed inventory of all relevant activities on the farm. E.g. crop cultivation, livestock management, fertilizer use, energy consumption, & waste management.
3	Data Collection	Gather inputs & outputs data for each activity. This may involve direct measurements, surveys, & existing data sources. SOC is important in small scale cropping systems. Use emission factors: Emission factors are coefficients that convert activity data into GHG emissions. Numerous databases provide emission factors for various agricultural practices.
4	Calculate GHG emission	Use the collected data and emission factors to calculate GHG emissions for each activity. The formula generally used is: Emissions = Activity Data × Emission Factor
5	Soil Carbon Sequestration considerations	Small-scale agricultural practices can influence soil carbon sequestration. Consider changes in soil carbon stocks when assessing the net carbon balance. SOC
6	Time Frame & Metrics	Decide on time frame for the assessment (e.g., annual, per crop cycle) and express results in common metrics (e.g., CO2 equivalent) for easier comparison.
7	Quality Assurance	Implement quality assurance and quality control measures to ensure data accuracy and reliability. Document sources and assumptions made in the calculations.
8	Sensitivity Analysis	Conduct sensitivity analyses to identify key variables influencing emissions. This helps to understand the uncertainties in your calculations.
9	Mitigation Strategy	Identify opportunities for reducing emissions through mitigation strategies. This could involve changes in management practices, technology adoption, or alternative approaches.
10	Reporting and Communication	Summarize your findings in a clear and concise manner. If applicable, compare emissions per unit of production (e.g., emissions per kilogram of product)
11	Continuous Improvement	Agriculture is dynamic, and practices may change over time. Consider revisiting your assessment periodically to incorporate updated data and refined methodologies.

Source: After World Bank, Greenhouse Gas Assessment Handbook & (After) Rotz, Modelling greenhouse gas emissions from dairy farms in Journal of Dairy Science, Volume 101, Issue 7, July 2018, Pages 6675-6690

Annex 3: Carbon Trading Mechanism (CTM) [20]

Establishing a carbon trading mechanism involves creating a framework to enable the buying and selling of carbon credits, with the goal of reducing GHG emissions. The below table summarizes the key systems, processes, and requirements typically involved in setting up a carbon trading mechanism (CTM).

A CTM is a complex process that requires careful planning, collaboration, and ongoing monitoring. The success of such a system depends on the effectiveness of its design, implementation, and adaptability to changing environmental and economic conditions. A primary assumption should be that the following steps comprise a longitudinal study with a rigorous a approach established such that it can be replicated across the country, including a variety of farming systems.

Table 12: Establishing a Carbon Trading Mechanism (after Guigon 2016)

	Steps	Systems, Processes, and Requirements
1	Regulatory Framework	Develop legal and regulatory framework that governs a carbon trading system. Framework should define the rights and responsibilities of participants, set emission reduction targets, and establish the overall structure of the market.
2	Emission Inventory	Establish robust system for measuring & reporting greenhouse gas emissions. This involves creating standardized methods for calculating emissions & monitoring compliance with emission reduction targets
3	Baseline Determination	Define baseline against which emission reductions can be measured. Baseline represents expected level of emissions without any intervention & serves as reference point for calculating emission reduction.
4	Carbon Credits Allocation	Determine initial allocation of carbon credits to participants. This could be based on historical emissions, sector-specific benchmarks, or other criteria. The allocation process should be transparent and fair.
5	Verification & Certification	Implement rigorous system for verifying & certifying emission reduction. Third-party auditors or government agencies may be involved to ensure accuracy & credibility of reported reductions.
6	Market Infrastructure	Implement rigorous system for verifying & certifying emission reduction. Third-party auditors or government agencies may be involved to ensure accuracy & credibility of reported reductions.
7	Market Participants	Define types of entities eligible to participate in carbon market, such as companies, industries, or even individual projects. Ensure that there are clear rules for entry and exit from the market.
8	Monitoring & Enforcement	Establish a monitoring and enforcement system to track compliance with emission reduction targets. Penalties for non-compliance should be clearly defined to ensure effectiveness of the trading mechanism.
9	Market Oversight	Assign a regulatory body or authority to oversee & regulate the carbon trading market. The entity needs the power to enforce rules, resolve disputes, & adapt the system to changing circumstances
10	Market transparency	Ensure transparency in the market by providing accessible information on carbon prices, trading volumes, and overall market performance. Transparency fosters trust & confidence among market participants.
11	International collaboration	Consider international collaboration and alignment with global standards to enhance the effectiveness of carbon trading mechanism. This may involve linking with other carbon markets or adopting common methodologies

[20] Pierre Guigon , **(2016)** 10 practical steps to create an Emissions Trading System (Worldbank.org)

12	Stakeholder Engagement	Engage with various stakeholders, including businesses, environmental groups & local communities, to gather input & address concerns. Building consensus & support is crucial for success of the carbon trading mechanism.
13	Education & Outreach	Conduct educational programs to raise awareness about benefits & requirements of participation in a carbon market. This includes training for market participants and outreach to the public

INSTITUTIONALIZATION OF CLIMATE RESILIENT AGRICULTURE

SCALE UP VALUE CHAIN LINKAGES FOR CLIMATE RESILIENT AGRICULTURE VILLAGES (AMIA)

2024

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2024

Prepared by TRTA Consultant under

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ACRONYMS

AMIA	Adaptation and Mitigation Initiative in Agriculture
AVC	Agricultural Value Chain
CIS	Climate Information Services
CR	Climate Resilience
CRA	Climate Resilient Agriculture
CRAO	Climate Resilient Agriculture Office
CRVA	Climate Risk Vulnerability Assessment
CSO	Civil Society Organization
DA	Department of Agriculture
LDIP	Local Development Investment Program
LGU	Local Government Unit
NGO	Non-Governmental Organization
PCIP	Provincial Commodity Investment Plan
PCRVA	Participatory Climate Risk and Vulnerability Assessment
PDPFP	Provincial Development and Physical Framework Plan

EXECUTIVE SUMMARY

There are currently 175 AMIA villages located in 248 barangays nationwide. These villages benefit from four program areas: (i) increasing adaptive capacity and productivity potential; (ii) redefining the Strategic Agricultural and Fisheries Development Zones; (iii) redefining the Agricultural Development Planning Framework; and (iv) Developing a new framework and plan for the provision of a "new" government agricultural service.

The AMIA development pathway has four phases and 28 villages have been selected by DA for graduation to Phase 3, i.e., scaling-up using an agribusiness approach. The AMIA-CREATE framework is guiding the expansion of the AMIA program from the current pilot scale to municipal/ provincial CRA actions. The AMIA program introduced Decision Support Tools including national color-coded agricultural guide maps, climate risk vulnerability assessment maps, typhoon risk information, and climate information services.

The AMIA villages visited remain highly dependent on government support and subsidies. As none of the villages has attempted to prepare a longer-term strategic plan, there is little information on total production potential. There has also been no attempt to manage collective marketing of their primary products even in the case of one cooperative that had been in existence for 20 years. Given this situation, it was difficult to rationalize why these village had been selected as being ready for Phase 3.

There had been investments in equipment and/or facilities that were either inappropriate or impossible to replicate by other farmers because of the high cost. For these AMIA villages to progress and transition towards entrepreneurship, they need support from professional agribusiness managers to prepare feasibility studies and business plans. Opportunities to be considered include: (i) farm clustering under the DA F2C2 program; (ii) Participatory Guarantee Scheme (PGS) for organic agriculture; (iii) creation of an organic hub; (iv) Geographic Labelling (GI) of products – all of which feed into niche marketing.

Major commodities in AMIA villages are rice (52%), corn (37%), vegetables (30%), and coconuts (28%) – with some double-counting since most villages listed more than one primary commodity. The study focuses on three priority crops: Rice, Corn and Coconuts; and on impact and adaptation measures vis-v-vis drought/ temperature rise and typhoons and increased rainfall.

Value Chain Studies and PCIP

The study assessed 12 value chain studies, but these were found in general to have made relatively little mention of the impacts of climate change although most made a passing reference to greater risks, but did not discuss mitigation actions. In any case, Climate Risk Vulnerability Assessments (CRVAs) are being prepared and updated as input to the preparation of Provincial Commodity Investment Plans (PCIPs) under the World Bank-funded Philppine Rural Developmet Project (PRDP)

The study offers guidance on key aspects that should be considered during the preparation of future value chain studies; these include an assessment of climate change risks, measures for improving crop varieties and livestock breeds, opportunities for diversification of production sub-system, climate smart practices, improvements in the efficiency of water management, green financing, insurance, and risk management and upgrading of farm infrastructure. The relevance of a refocus on agricultural transformation is discussed focusing on a move away from single commodity and production-centric plans that have failed to sustainably improve productivity and incomes for smallholders.

Out of the 81 Provincial Commodity Investment Plans (PCIPs) prepared so far, 54 had been updated as of Jan. 2024, while 23 were being updated. The sample of PCIPs reviewed evidences significant progress towards a comprehensive consideration of climate resilience within the value chain framework.

The study examined 28 development partners-funded projects and identified the proportion of funding allocated to particular segments of the value chain: (i) Marketing (32%); (ii) Trade & Logistics (25%); (iii) Inputs (19%); (iv) Production (18%); and (v) post-harvest/ processing (6%). Neither the ADB Philippines Country Partnership Strategy (2018-2023) nor the World Bank Group Country Partnership Framework for the Philippines (2020-2023)

mentioned the need for direct support to agriculture that will strengthen governance and responses to climate change impacts.

Recommendations

Based on its findings, the TA Team recommends: (i) full institutionalization of CRAO including office restructuring, augmentation of qualified permanent staff, and re-direction away from the role of benefactor towards supporting a process of mainstreaming climate resilience into all DA Banner Programs; (ii) creation of a Climate Resilient Agriculture Unit (CRAU) in each DA RFO, and the deployment of a CRA Specialist responsible for the provincial level; (iii) roll-out of comprehensive training program on CRA for sub-national extension staff to better understand climate change causes and mitigation measures; (iv) continuation of PCIP updating, with further elaboration of the CR Agro-Industrialization Oriented Value Chain Analysis and expanded coverage of the AMIA Program; (v) greater awareness-raising for AMIA villages on the range of support available through the DA Banner Programs; (vi) support to AMIA villages to prepare business plans including consideration of farm clustering and deployment of salaried farm managers; (vii) introduction of contract farming and marketing agreements between AMIA villages and larger buyers; and (viii) exploration of eco-tourism in AMIA villages to generate additional revenue and raise awareness on climate impacts and mitigation.

1 INTRODUCTION

The AMIA, which is the DA flagship program on climate change, envisions that all communities, especially those dependent on agriculture and fisheries, would become resilient to the increasingly adverse effects of climate change. In pursuit of this vision, the on-going program aims to set up model communities that are called AMIA villages, that can serve as lighthouses and go-to-places for other communities to learn from and emulate, and where technological and institutional innovations are introduced so that these villages may have access to climate-relevant support services.[1] The four key program area under the AIMA are:

- Increasing adaptive capacity and productivity potential of agricultural and fisheries livelihoods by modifying commodity combinations to better meet weather issues and natural resources endowments.
- Redefining the Strategic Agricultural Fisheries Development Zones including climate change vulnerabilities as part of mapping variables.
- Redefining the Agricultural Development Planning Framework as the basis for agricultural planning by including key factors/variables associated with climate change.
- Developing a new framework and plan for the provision of a "new" government agricultural service towards the accelerated development of climate smart agriculture and fisheries industries.

The AMIA village approach is founded on the adoption of a novel mode of extension approach and based on a unit assistance that is related to a group of farmers tilling adjacent farms, with an area of approximately 100 hectares, who are facing the same climate risks and are organized into an AMIA village. The farmers within this grouping are assisted to identify their climate risks and select common adaptation strategies to increase productivity and incomes of farmers/fisherfolk with a particular emphasis on poverty that is known to increase vulnerability to climate change. The common adaptation measure adopted is achieving crop diversification and active participation in the AVC alongside the delivery of integrated and tailored support services. The aim is to enable the AMIA villages to graduate into climate-resilient enterprises based on climate-resilient production systems through the AMIA-Climate Resilient Agriculture Technology-based Enterprise (CREATE) framework.

The integrated and tailored extension and support services that are provided include the following aspects:

- Community-level climate-resilient agri-fisheries technologies.
- Climate Information Services.
- Computer-aided decision-making technologies.
- Links to market

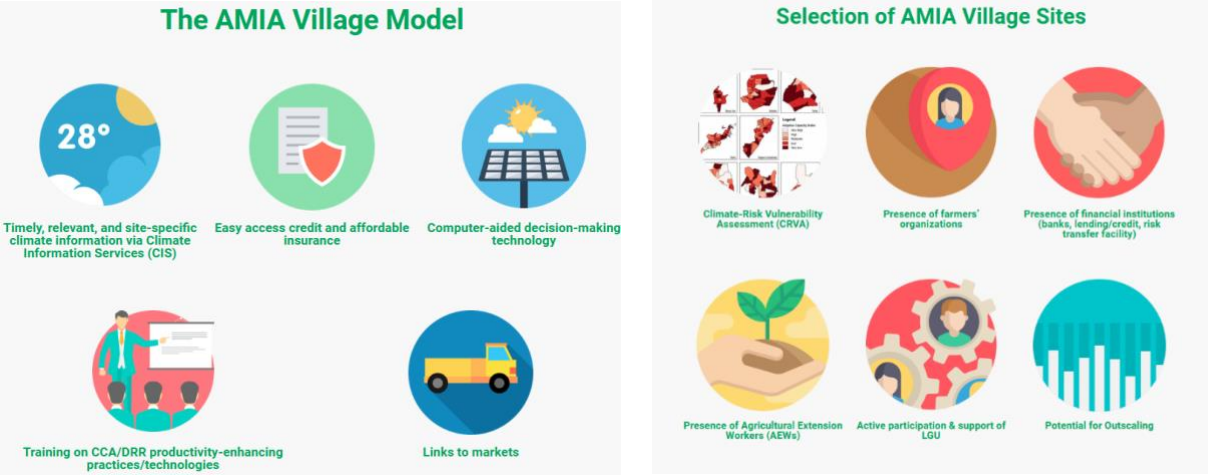
[1] AMIA Villages | Systems-Wide Climate Change Office (da.gov.ph) *(Accessed 1-Oct-23)*

- Training on CCA and disaster risk reduction productivity enhancing practices and technology.
- Easy access to credit and affordable insurance.

An important element of the solution is enabling greater empowerment of the farmers through the establishment and building of the AMIA villages, which has the following elements:

- Enabling farmers to identify and understand their vulnerability to climate change through Participatory Climate Risk and Vulnerability Assessments (PCRVA).
- Providing guidance in the use of climate- and weather-informed farm and fishing advisories to identify that to plant, when to plant, and what cultural management practices to adopt including the application of 10-day weather=based farm/fishing advisories to guide their day-to-day farming activities; seasonal climate based farm-fishing advisories as a guide to six month planning periods for farming/fishing; and special weather farm/fishing advisories as a guide to avoid damage during typhoons as well as recover after typhoons.
- Testing and adopting CRA practices, technologies, and tools that address their climate risks to produce that they sell and not just sell what they produce.
- Identification of support services that are needed and partner with the DA, LGUs, CSOs and NGOs to practice CRA.

Figure 1 AMIA village Model and Site Selection Criteria



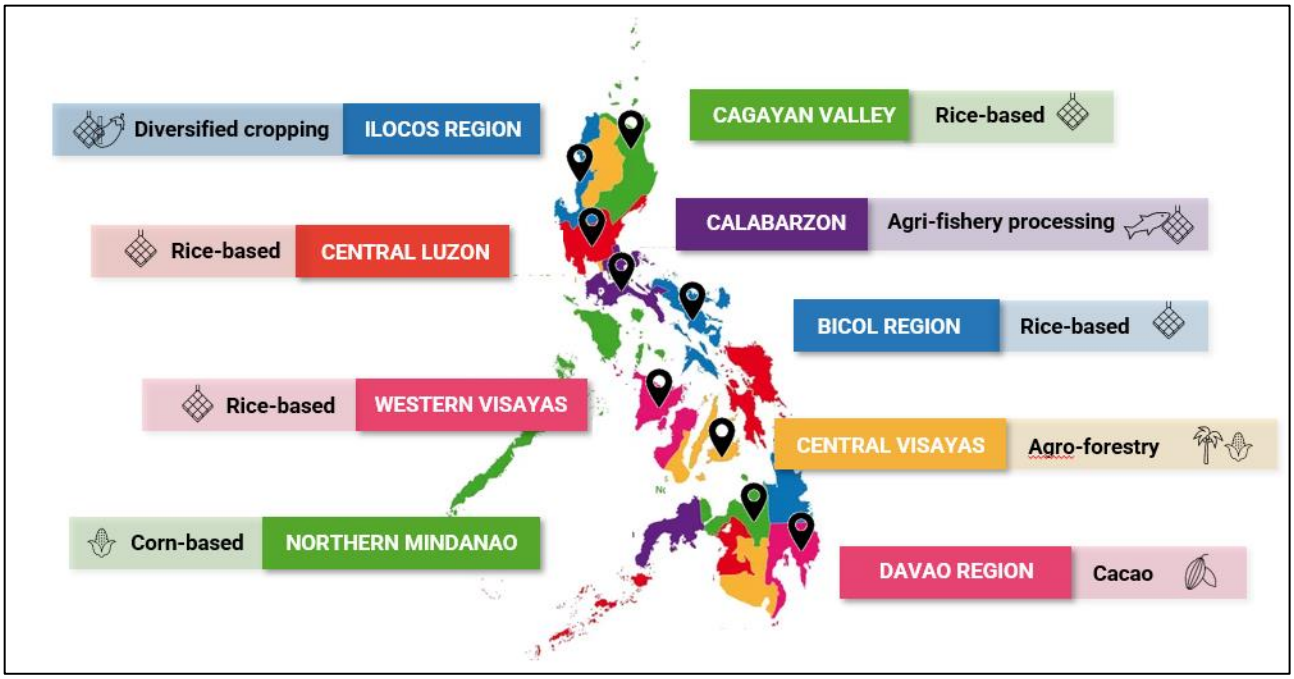
The aim is to enable graduation of the AMIA villages into climate resilient enterprises through the AMIA-Climate Resilient Agricultural Technology-based Enterprises (AMIA-CREATE) framework that expands the AMIA villages from the current pilot scale to town/provincial level CRA actions

with the aim of transforming them into market-oriented CRA enterprises while levelling up the efforts to ensure that agri-fishery communities are climate resilient.[2]

The actions that are needed comprise the following:

- The CRAO, in cooperation with the respective RFO, assess the existing AMIA villages and identify the initial areas as proof of concept for crops, livestock, aquaculture and fisheries-based expansion.
- Each RFO will make adjustments to their current budgets to support the implementation of the AMIA-CREATE networks.
- The AMIA-CREATE proof-of-concept shall include farm clustering/consolidation and professional management/business service provider to support the enterprise development approach that will be introduced.
- To ensure the transformation of AMIA villages, the DA-CRAO in collaboration with AMAS and ACPC, PCIC, the DA Banner Programs and all other programs will continue to strengthen their engagement with business service providers and professional managers to provide communities with integrated and support services.
- The RFOs will also strengthen their partnerships with the LGUs to integrate the AMIA-CREATE network in the LGU Climate Change Action Plans (CCAPs).

Figure 2: Distribution of agricultural production for regions transitioning to AMIA-CREATE



[2] https://www.da.gov.ph/wp-content/uploads/2020/03/mc04_s2020.pdf

The AMIA program has also included the introduction of a series of Decision Support Tools (DSTs) as follows:

- **National, Color-coded Agricultural Guide Maps** that comprise an overlay of 29 maps from different source agencies to serve as tool and investment guide for various sectors particularly agriculture and also features the natural suitability of 20 economically important crops which are key to food security and eight major and climate change-induced hazards that largely affect the agri-fishery sector.3
- **Climate Risk Vulnerability Assessment (CRVA)** Maps that provide a tool that analyzes three main factors namely, exposure to hazards (exposure to significant climate variation), sensitivity (climate suitability of crops), and adaptive capacity that also support DA resilience-building initiatives for better and longer-term geographic targeting.
- **Typhoon Risk Information** that shows the monthly typhoon incidence in each province and provides a useful guide for adjusting planting calendars to ensure that production losses and damage losses are minimized. The patterns indicate that most super typhoons occur in the 3rd and 4th quarters of the year which is a critical period for the harvesting of crops.
- **Climate Information Services (CIS)** though which the RFOs of the DA provide weather information and corresponding advisories including climate resilient approaches to assist farmers and fisherfolk in better decision making during extreme weather events. The CIS Decision support tool helps farmers to decide when to plant, harvest and use the most appropriate CRA practice to build resilience and improve their livelihoods.

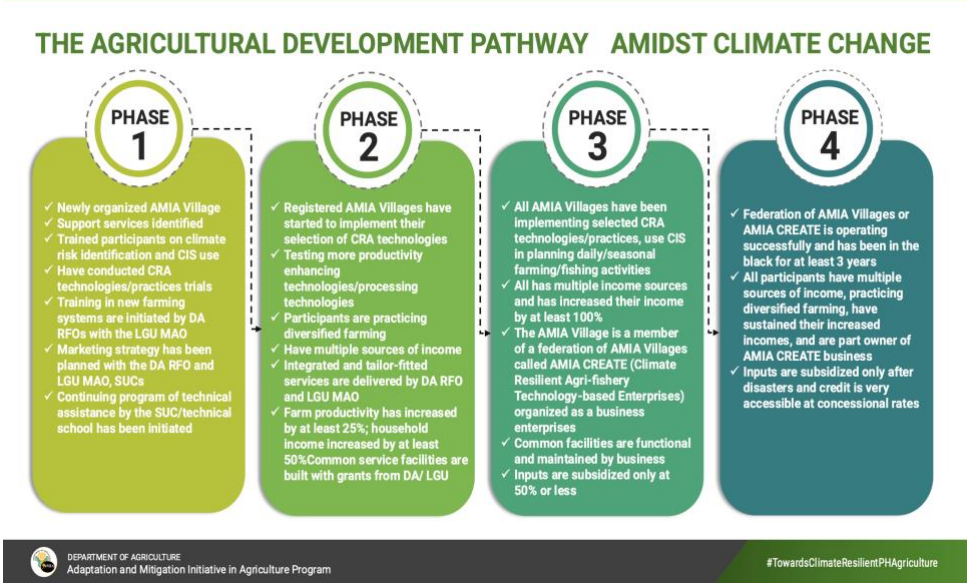
The pathway for development of the AMIA villages takes place through four phases that are designed to enable the graduation of the AMIA villages from being mere production units to Climate Resilient Agri-Fishery Technology-based Enterprises (AMIA-CREATE). This is based on the presumption that CRA needs to be promoted on a wide scale, so the AMIA villages need to be transformed from pilot scale to municipal/province level CRA actions; and transition from production based to market-oriented CRA enterprises so that agri-fisheries communities can achieve increased climate resilient in terms of their livelihoods.

For the 175 AMIA villages (that includes 248 barangays) that are listed only 28 have reached the stage of being eligible to graduate to Stage 3.[4]

[3] Available as an on-line version: >>>>>>>>>>>>>

[4] The numbers of AMIA sites: Phase 1 (49); Phase 2 (98); Phase 3 (28); Phase 4 (0).

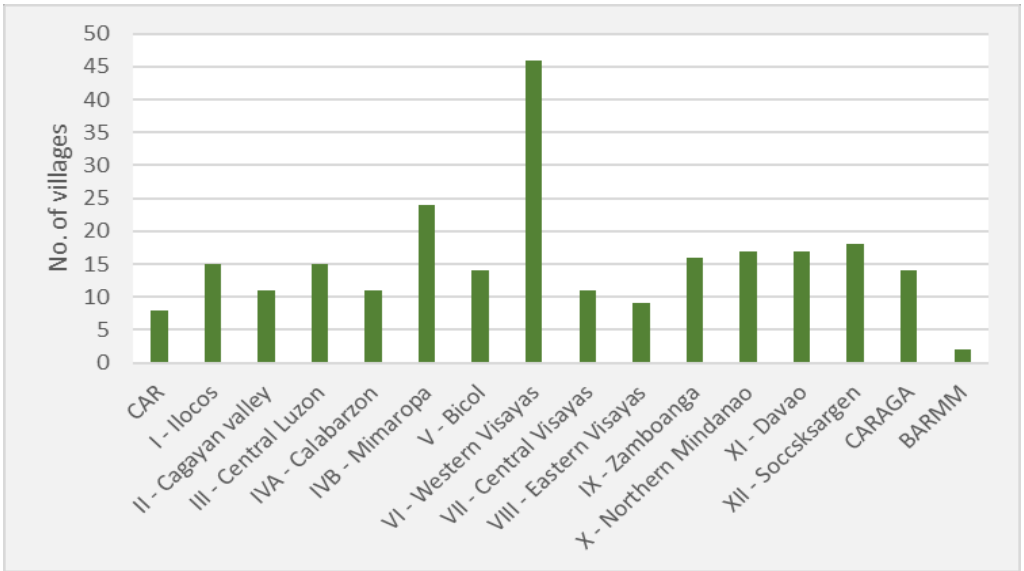
Figure 3: Agricultural development pathway amidst climate change



2 ANALYSIS OF AMIA PROGRAM AND VILLAGES

The 175 AMIA villages are located within 131 municipalities/cities across the entire country although there some differences in the frequencies of occurrence between regions with Region VI Western Visayas have established noticeably more AMIA villages than all other regions.

Figure 4: Distribution of AMIA villages by region



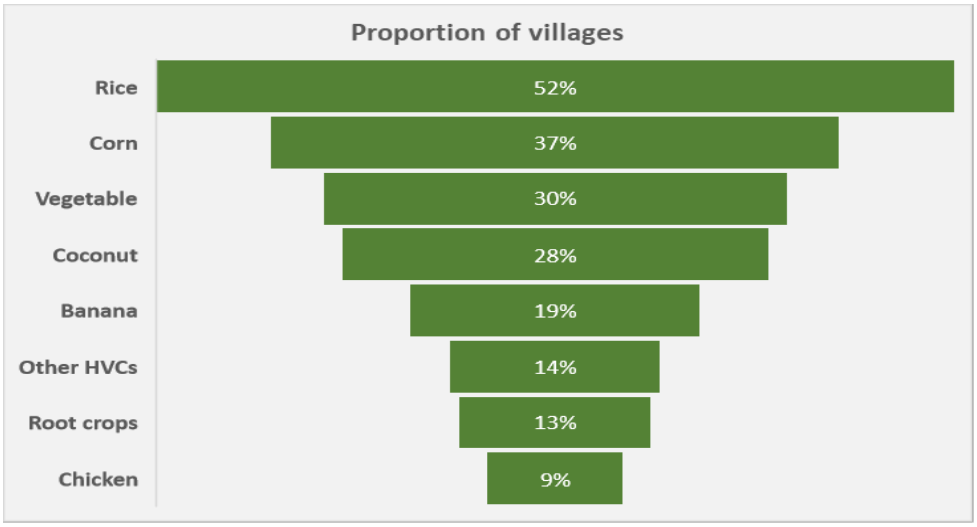
For each AMIA village there are various parameters identified that characterize their situation in respect of climate related risks, CRA practices/interventions and the major commodities/products.

- **Climate related risks:** The most frequently noted climate related risks concern increased frequencies of severe typhoons together with the associated wind and flood damage. The severity of these risks is not clearly quantified but there is certainly anecdotal evidence of an increase in the severity of flask flooding and the impact that this has on standing crops. Secondary factors of increased risk of landslides and soil erosion as well as storm surge are also noted that result from the increased intensity of storms. The increased frequency of drought is also noted as well as the increased unpredictability of rainfall that impacts directly on the timing of planting and risk of crop failure. There are some instances of earthquake being included although this is not a climate related risk.
- **CRA practices/interventions:** There are an enormous range of options or strategies identified that include not only measures to introduce climate resilience into existing production practices, but also a very large number of new initiatives some of which appear to have a strong element of transformational change in production with, in many cases, an expressed need for technical assistance and further training to enable the shift to new commodities. However, the support required for these transformational changes does appear in many cases to be a shopping list of physical support required with some of these requests relating simply to the need for mechanisation of production with the provision of machinery through direct government support. The range of options varies greatly

between AMIA villages suggesting that more technical assistance may be needed in some cases to enable farmers to gain a better understanding of CRA approaches that could be relevant to their own situation.

- **Major commodities/products:** For each municipality/city there is also an indication of the major commodities that and/or products that should be the focus on the expansion of production within the AMIA villages. The commodities that have been identified do not always include the other commodities that have been identified for CRA practices/interventions but tend to relate only to the main commodities that are currently being produced. Nevertheless, there is a very wide range of commodities included (23 in total) but rice and corn continue to predominate. This is of some concern since it shows little change away from the existing structure of the Philippines agriculture sector, that has not changed over the past 50 years, wherein the 74% of the arable land is used for the production of the three primary commodities of rice, corn and coconuts, that in turn continue to receive the majority of the government support.

Figure 5: Distribution of main commodities for all AMIA villages[5]



During the course of the assignment there were field visits conducted to four AMIA villages located in regions 3, 6, 10 and 11.6 The field visits that were conducted included at least half-day focus group discussions with community residents who were members of the associated cooperative of farmers groups, followed by field visit to the production areas for visual inspection. In each case the field visits to the AMIA villages were facilitated by CRAO staff from the respective DA Regional Office, whose assistance in each case is gratefully acknowledged.

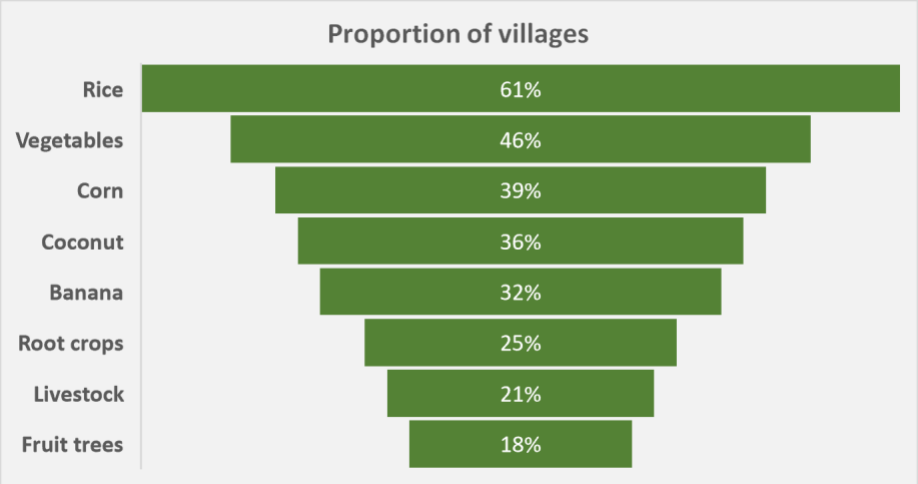
[5] Multiple commodities have been identified for some AMIA villages.

[6] It had been intended to include field visits to more AMIA villages, but the very short duration of input and the extended travel time required for the visits posed a severe constraint on the number that could be covered.

The transition to Phase 3 in the AMIA village model is premised on the achievement of specific achievements in respect of (i) the adoption of CSA practices and use of CIS in planning daily/seasonal farming and fishing activities; (ii) farmers have multiple income sources and their income has increased 100%; (iii) the village(s) are a part of the AMIA CREATE network and is organized as a business enterprise; (iv) common facilities are functional and maintained by business; and (v) inputs are subsided only at 50% or less. The final Phase 4 is reached when (i) the AMIA CREATE network of villages has been profitable for at least 3 years; (ii) all farmers have multiple sources of income, practice diversified farming; (iii) all farmers have increased their incomes and are part owners of the AMIA CREATE business; and (iv) inputs are only subsidized after disasters and credit is easily accessible at concessional interest rates.

There are 28 AMIA villages that have been categorized as reaching Stage 3 the distribution of the commodities is broadly similar.

Figure 6: Distribution of main commodities for Stage 3 AMIA villages



The AMIA villages that were visited had been selected from amongst the 28 villages that were categorized as having reached a satisfactory stage of development to be eligible to graduate to Phase 3. However, there was a lack of information on how this decision had been taken and based on the observations during the field visits it appeared that there was a need for considerable further strengthening of the management capacity of these organizations/cooperatives before they might be capable of moving forward to the scaling up of agribusinesses.

It is acknowledged that the sample of villages visited was rather small and it is conceivable they may not be fully representative of those that have reached this stage of development. But the overall impression from these visits is that the graduation to Phase 3 will require significant effort on the part of the CRAO as well as from those supporting at the local level. As noted above one of the most serious deficiencies found is the lack of business acumen, the limited extent of cooperation between the farmers who are involved with the AMIA village, and the continuing mindset that the planning of their future activities was based on the need for government support with no serious consideration given to moving towards greater self-reliance and seeking sources of financing to support an expansion of their production potential.

Table 1: Overview of Caut FFS Marketing Cooperative

Name of AMIA village	Caut FFS Marketing Cooperative		
Location	Bgy Caut, Lapaz municipality, Tarlac Province		
Date of Registration	2011	Area (ha)	450
Membership	180 members	Men	123
		Women	57
		Active	
Commodities	Rice and Mungbean		
AMIA selection criteria	Active cooperative registered with CDA and RSBSA. Good accessibility		
AMIA support	(a) Warehouse, (b) Farm machinery, (c) Small scale rice mill (1.5 t/ha capacity]		
DA/LGU support	• Solar powered fertigation system • Rice transplanter • Small scale dryer (planned) • Water impounding project		
Climate risks	Flooding has become more frequent and severity of drought during the dry season.		
CRA practices	• Climate adaptive rice varieties • Crop diversification (crop rotational with rice-mungbean) • Use of organic manure • Solar powered fertigation system (2022).		
Enterprise development opportunities	Establishment of mechanized rice processing system (drying, milling, packaging) provided this can be demonstrated as a viable investment and can be operated effectively by the cooperative members and the group has rice trading capital available. Increased warehouse storage capacity could support better marketing arrangements, providing drying facilities are available, to that farmers are not compelled to sell palay immediately after harvest. More active engagement in okra production as a nigh value crop and given the presence of international buyers in the municipality this should be a real opportunity for the farmers to exploit.		
Overall assessment	The cooperative has a committed management team, but they lack direction in managing their products, which is still done individually by farmers. Machinery has been provided from various sources. The cooperative has no business plan and proposes the construction of storage warehouse and rice mill that is excepted be provided through government support. Solar powered fertigation system provided is not a viable option for other farmers to adopt. Despite the presence of international buyers of Okra that is being grown within the municipality the cooperative has not taken up this opportunity to any extent.		

Table 2: Overview of Binujasan Farmers Association

Name of AMIA village	Binujasan Farmers Association		
Location	Brgys. Binuncutan, Jalongajog, San Pedro & Guba Pontevedra municipality. Capiz province		
Date of Registration	May 2021	Area (ha)	130 ha
Membership	105 farmers	Men	43
		Women	62
		Active	31
Commodities	Rice (inbred), Coconuts, Sugarcane, Corn (yellow), Tropical vegetables, Oher HVCs (20% of members)		
AMIA selection criteria	(a) Active organization, (b) Registered RSBSA, (c) Accessibility		
AMIA support	Warehouse with bays for Bokashi production Chopping machine		
DA/LGU support	Technical assistance to cooperative (through MAO)		
Climate risks	• Continuous rain and flash flooding is adversely affecting HVCs, whilst droughts during extended dry season. • More unpredictable rain is expected with the rains extending into November. • Prolonged rains and flooding has exacerbated rat infestation. • Inter-cropping is proposed as a response to the unpredictable rainfall and increased diversification into native chicken and swine production. • Lack of clear understanding of the causes of climate change and belief that the damage to the ozone layer may be one result.		
CRA practices	Focus is on the production of Bokasi as a soil conditioner		
Enterprise development	Small-scale production of Bokashi production that can be further scaled up to semi-commercial operation.		
Overall assessment	The association has been focusing on producing Bokashi, a process that converts farm wastes and other organic matter into the soil to improve soil quality. The Association has used the availability of agro-industrial wastes in Ponteverde such as mud press from the Capiz Sugar Central, carabao manure from a cattle ranch within Capiz, carbonized rice hulls and rice bran from the rill mills. Other raw materials for commercial production of Bokashi are also available. The association has been to manually produce one batch of 70 sacks of finished product in 15 days (about 2 weeks). The process includes fermentation, mixing and shredding. AMIA introduced the technology to AMIA and initially provided capacity development assistance such as trainings, initial starter equipment such as mixer and shredder. Field trials will be conducted to determine the benefits of bokashi on soil and yield of different commodities. The results of the field trials will also be used for promotion and campaign on benefits of bokashi in the agro-ecosystem, crops and improve family income. Laboratory tests on nutrient analysis were facilitate by DA-AMIA		

Table 3: Overview of BLISS Cooperative

Name of AMIA village	BLISS Cooperative		
Location	Brgy. Lingion, Manolo Fortich municipality, Bukidnon Province		
Date of Registration	1994 (registration with CDA 1996)	Area (ha)	5,000 ha within barangay of which 540 ha arable land
Membership	363 farmers	Men	100
		Women	263
		Active	All
Commodities	(a) Corn, (b) Cassava, (c) Livestock		
AMIA selection criteria	Active cooperative, registered with CDA and RSBSA. Good accessibility and supporting the corn and cassava sectors.		
AMIA support	• Inputs/seeds • Livelihood starter - cattle (31 head), goats (33 head), ready to lay chicken (8 batches x 45 head/batch). • 10-weather forecast provides an important decision-making tool for farmers on scheduling of different farm activities. • (In pipeline) Storage and all-weather dryer (valued at PNP 2 million).		
LGU support	Technical assistance to cooperative (through MAO) Farm mechanization Administrative assistance to the coop (document processing)		
Climate risks	Rainfall less reliable but group members have been using CIS advisories that are available through the AMIA program		
CRA practices	• Crop rotation being practiced in using corn - cassava - corn • Crop insurance through the RSBSA • Commodity diversification - crops and livestock production (native chicken, native pigs)		
Enterprise development	• Common service facility - the existing equipment (tractors, corn shellers, and hauling truck) can be income sources for the cooperative and provide equity to support additional financing through commercial loans. • Consolidation and trading - Improved and enlarged storage facilities needed and capital for the purchase of farmers' products stored and sold by the cooperative. • Supply of cassava to new Korean starch company based in Tagoloan, Misamis Oriental. The company will buy fresh cassava, as well as chips and granules. Daily demand for processing will be 400 metric tons of fresh cassava.		

Overall assessment	• The cooperative has existed for almost 30 years but has still not been fully developed in coordination of production and marketing systems for the main commodities. Sales of produce comprise random spot transactions arranged by individual farmers with middlemen or direct sales to processors. There is no collective purchase of inputs for the cooperative members. Although the cooperative has secured a significant loan for the purchase of a large truck, this is only being fully utilized during the harvest season and at other times is mainly idle. It has represented a large investment for the cooperative, that was in response to the difficulties that they experience in securing transportation logistics for the transport of corn and cassava, and because of its age will incur increasingly higher repair and maintenance costs. • The cooperative does not have a business plan and even lacks basic information on the total overall levels of production of the main commodities. • There was no attempt to enter production agreements with larger buyers for the main commodities. • Proposals for enterprise development at present are largely based on expectations of further AMIA or DA grant funded support.

Table 4: Jose Rizal Indigenous Peoples Association (JIPAS)

Name of AMIA village	Jose Rizal Indigenous Peoples Association (JIPAS)		
Brgy. Profile	• Brgy. Jose Rizal is wholly within the Mt Apo Natural Park Protected Area • 480 households and 5 associations including JIPAS.		
Location	Brgy Jose Rizal, Sta. Cruz municipality, Davao del Sur province		
Date of Registration of organization	3 June 2019 (DoLE)	Area (ha)	47,000 ha7 (Each farmer has about 2 hectares)
Date of AMIA creation	October 2021		
Membership	125 farmers (40 households)	Men	50%
		Women	50%
		Active	All
Commodities	Coconut, Banana, Coffee, Cacao, Abaca, Rubber, Rice, Corn, Root crops		
AMIA selection criteria	• CRVA results (flashflood prone area) • PAGRO and MLGU recommended • Accessibility		
AMIA support	• Fertilizer for coffee • Farm tools • Post-harvest tools (flotation drums, nets, plastic drums) • Trainings (coffee farm rejuvenation, banana GAP • Horse for transportation logistics		
LGU support	• Technical assistance to the association • Link the association to other project support (RAPID growth project)		
Climate risks	• Temperature increase attributed to loss of forest cover in Mt Apo • Unpredictable weather and changes in wet and dry season timing and duration		
CRA practices	• CRA has been practiced since their farms are in a Protect Area where farm practices should not affect biodiversity and natural forest growth. • Minimal use or zero use of synthetic pesticides and fertilizers depending on commodity. • Intercropping of perennial crops • Value addition of products • Crop insurance through RSBSA program		
Enterprise development	• Improvement of product quality and value adding of existing commodities. Existing products (coffee, cacao, abaca) may be improved through post-harvest facilities such as all-weather driers,		

[7] Certificate of Ancestral Domain Title (CDAT) that is part of the Mt. Apo Natural Park. The CDAT also covers areas in Makilala, Vabsalan, Digos, Sta. Cruz, Sibulan and Davao City. The group belongs to Bagobo - Tagbawa tribe and the farm areas of the tribal members as part of the economic/multi-zone of the Ancestral Domain Sustainable and Protection Plan.

Name of AMIA village	Jose Rizal Indigenous Peoples Association (JIPAS)
	stripping machines (manual or mechanized). Coffee quality can be further improved through quality improvement farming practice (e.g. red pick harvesting). Furthermore, marketing and promotion of locally produced coffee through participation in local, national, and international coffee quality competition. • Ecotourism-Bamboo Park. JIPAS is working with Municipal Tourism Office to promote Bamboo Peak as one of the Municipality's ecotourism sites. Target tourists are mountaineers and adventure/nature tourists and marketing of their local products such as fruits, coffee, sikwate (from cacao), coconuts, and other indigenous crafts • Rope making for local market. This is a potential source of income generation with a high demand for different industries such as fishing industry, furniture, gifts, toys and hobbies (GTH) products. Farmers themselves also require abaca ropes for their farming activities and confirm that ropes made of abaca are more durable than nylon ropes.
Overall assessment	JIPAS is supporting members in terms of marketing their products. JIPAS consolidates products (abaca fiber, coffee beans, cacao etc) and delivers products (in bulk) to specific buyers. This indicates the increased participation of JIPAS in the value chain through trading and consolidation of the commodities. Consolidation is more of a support service of JIPAS to provide farmer-members access to market, and not operated as a business activity of the association. Other activities of the association can be developed into full blown business such as processing of coffee and cacao (sikwate). Series of trainings, coaching sessions and internship programs on product development and business development could further support the association and its members

3 FUTURE DEVELOPMENT PATHWAYS FOR AMIA VILLAGES

Based upon the findings from the field visits to four AMIA villages a number of overall general conclusions can be drawn.[8]

- There was observed to be a strong commitment amongst the farmers in each of the AMIA villages that were visited to advance their organisation/cooperative and to increase the response to achieving greater climate resilience in their production systems. However, the strategies for achieving this objective were less clearly understood.
- There has been relatively little progress towards significant diversification of the production models and commodities and the focus of their attention remains on the primary commodities that they have been producing. However, the adoption of rotational practices was more evident.
- The progress that has been made in the AMIA villages so far has been largely the result of a wide range of government support and subsidy programs and there has been minimal effort exerted to source external funding through loans to support improvements in equipment or facilities. Indeed, the expectation and reliance on continuing government direct support continues to constrain the planning process for the AMIA villages. Some of the support received had consisted of supplies of seed and planting materials as well as livestock dispersal programs.
- None of the AMIA villages visited had a business plan and furthermore had only very vague knowledge of the overall annual production capacity of the members of the association/cooperative. There seemed to be little understanding of using an agribusiness-based approach to the further development in these AMIA villages and how to go about the preparation of a business plan that could form the basis for further negotiations with buyers/processors as well as applications for loans. Overall, there had been little engagement with the private sector other than the buyers/traders who have purchased from individual farmers.
- There was found to no evidence of collective purchasing of inputs by the association/cooperative on behalf of the members to secure advantageous prices for inputs that are being used. This should be a very basic function of any farmers organisation to provide the members with more incentive to become members of the to the group.
- Similarly, marketing is done almost exclusively by individual farmers selling to buyers and middlemen through a series of random spot transactions at negotiated prices that often put the farmer at a disadvantage. There seemed to be little knowledge or understanding of the concept of contract farming supporting buying agreements with traders/processors, and the concept seems to have been little applied.

[8] See Annex 2 for detailed analysis of selected value chains.

- Some of the proposals for local storage and post-harvest (e.g., drying) had been identified but they were prepared with the expectation of government support and there had been no consideration of the viability of such investments and whether they were worthwhile.
- Financial management capacity within the AMIA villages was not well developed and the amount of capital accumulation within the group was very limited, without formal savings programs or purchase of shares in the cooperative by members nor payment of dividends.

To enable these AMIA villages to develop further and evolve into AMIA-CREATE networks there will be a need for considerable support from professional managers as well as business service providers (as is noted earlier in the DA circular Memo Circular 04, 2020) who possess adequate knowledge and experience of operating agribusinesses in a commercial environment. This assistance can enable the AMIA villages to engage in more strategic planning including the conduct of feasibility studies to examine their current production models and identify the best opportunities for increasing and expanding the scope in terms of commodities that are produced and considering the possible need to a refocus of their production mix in response to potential climate risks. Once viable production models have been identified then this can lead into the preparation of sound business plans for the AMIA villages to confirm and validate the viable production models that have been identified and this can provide the basis for seeking external financing for investment in these plans. In fact, one recommendation for consideration is that the graduation of the AMIA village to Phase 3 should be linked to the completion of a feasibility study and the formulation of a viable business plan that provides the strategy for achieving the scaling up and shift towards an agribusiness-based mode of operation.

One of the strategies that has been identified for the establishment of the AMIA/CREATE network relates to the concept of **farm clustering**. The concept of farm clustering is gaining attention in the Philippines as a strategy to enhance agricultural productivity, and promote sustainable practices, as well as improve the livelihoods of farmers and fishers. It also features in the eight point paradigm of the DA for the modernization and development of the Philippine agriculture sector by consolidation of small- and medium- sized farms. Although there are no large-scale nationwide farm clustering initiatives yet listed below are some notable examples of successful farm clustering in specific provinces:

- **Benguet Vegetable Trading Post:** Located in La Trinidad, Benguet province, this trading post is serving as a clustering hub for vegetable farmers in the region. Farmers have been able to bring their produce to the trading post, where they can aggregate their harvests, negotiate prices with traders, and access buyers more efficiently. The clustering has helped them to reduce their transportation costs, improve their market access, and strengthened the bargaining power of the farmers.
- **La Granja Agri-Eco Village:** Situated in the La Carlotts City, Negros Occidental is an agri-eco village that promote farm clustering and sustainable agriculture. The village has integrated small farms, research facilities, and training centers within a designated area. The farm clustering facilitates knowledge sharing, the adoption of eco-friendly practices and the marketing of organic production.
- **Rice clustering in Nueva Ecija:** In one of the major rice producing provinces in the country, farm clustering initiatives have been implemented to enhance rice production and

promote efficient resource utilization. Clustering has helped to optimize the use of irrigation systems, machinery, and other resources leading to increased productivity and cost savings for farmers.

- **Mango Farm Clustering in Guimaras:** Guimaras is known for its high-quality mangoes. The local government has initiated mango farm clustering projects to strengthen the mango industry. Clustering allows farmers to pool resources for processing and marketing, and it is promoting adherence to quality standards and sustainable practices.
- **Vegetable cluster farming in Mindanao:** The Northern Mindanao Vegetable Producers Association (Normin Veggies) was originally organized in 1999 by 15 independent growers, corporate farms with support from a local NGO. Subsequently support was provided through the USAID Growth with Equity Program (GEM) and the DA and is now recognized as one of the world's innovative pro-poor value chain development models.

Although the outcomes and impact of farm clustering initiatives in the Philippines have varied, significant numbers of farmers have reported positive experiences and benefits from participating in the farm clustering, but others have faced challenges or have not seen their expectations fully met In the cluster farming initiatives attempted. Although farmers may not be financially better off, most of the cluster members' expectations do appear to have been met after joining the clusters.[9] Some of the key factors that may influence famers' experiences have included the following:

- One of the primary goals of farm clustering is to achieve consolidation of production and facilitation of better access to markets. By clustering together farmers and/or fisherfolk can collectively negotiate better prices, access larger markets, and attract buyers more effectively. In successful cases, farmers indeed have reported increased sales, better market linkages, and improved profitability. However, the effectiveness of market access may depend on factors such as product quality, demand, transportation infrastructure, and the availability of market support.
- Farm clustering also enables the planning and synchronizing of production schedules, consolidation of input purchases thus enabling greater strength in negotiating prices, and the ability to ensure that production timing is synchronized with periods of greater demand when prices are higher.
- Enhanced delivery of technical support can be facilitated through farm clustering achieving greater efficiency in the training programs, knowledge sharing platform, and technical advice for farmers and fisherfolk. These activities aim to enhance farmers' and fisherfolks' skills, introduce sustainable practices, and improve productivity. When farmers or fisherfolk actively engage in these programs and apply the knowledge gained, they also experience positive changes in their farming or fishing techniques, production, and profitability.
- Another advantage of cluster farming is the sharing of resources such as machinery, equipment, storage facilities and irrigation facilities that leads to reduced costs, increased

[9] Mintoflor, M, Batt, P & Murray-Prior R (2008). Cluster farms in Mindanao: Are smallholder farmers expectations being fulfilled.

operational efficiency and improved access to essential resources, all of which result in cost savings and enhanced productivity.

- Farm clustering provides opportunities for farmers or fisherfolk to have greater interaction and collaboration and to learn from each other. This can foster a sense of community, promote social cohesion, and facilitate the exchange of ideas and experiences that brings benefits in terms of the increased sharing of knowledge, mutual support and increased networking within the cluster.
- Whilst farm clustering projects have the potential to being benefits, there are some challenges that may arise, of which the most common are the lack of support for infrastructure development, insufficient market support, disparities in farmer capacities and commitment, conflicts of interest, and uneven distribution of project benefits.

The earlier cluster farming initiatives that have been attempted have focused mainly on consolidation of production and facilitation of better access to markets, although as explained above there are in fact many other opportunities that can be tapped into including the pooled use of resources through planning and synchronizing of production schedules, consolidation of input purchasing, and enhanced delivery of technical advice to the farmers.

There is another element to farm clustering that may also be considered and that concerns the use of a hub farm as the focus for the establishment of the cluster, that is also known as a nucleus agro-enterprise. In this case the hub farm is usually a larger-scale farm or agribusiness that serves as a model farm or a demonstration site for innovative farming practices for the cultivation of similar crops and engaging in related agricultural activities. Thus, the hub farm can act as a training and knowledge sharing center disseminating modern farming techniques, best practices, and innovative technologies to the farmers in the cluster. There are other functions that the hub farm can fulfil such as facilitating the bulk procurement of inputs such as seeds and fertilizers and enabling access to farm machinery for mechanization of land preparation and harvesting. Hub farms can also act as the primary buyers of smallholder farmers' production from within the cluster as well as providing credit to the farmers that is repaid when produce is sold to the hub farm. This model is particularly relevant where there are processing requirements for the raw product before it can be marketed, which smallholder farmers are unable to achieve, and it has been adopted successfully for perennial tree crops such as coffee, cacao, oil palm, etc.,

The DA's Farm and Fisheries Clustering and Consolidation (F2C2) Program was initiated on 5 August 2020 with the issuance of the DA Administrative Order No. 27 that provided the guidelines for implementation, with the objective of adopting farm and fishery clustering to increase food production levels, improve famers and fishers' incomes, and provide better access to resources, technologies, and markets for farmers and fisherfolks. The program focusses on grouping together of crops, livestock and/or fish producers within a community or adjacent communities on the basis of the proximity of their production areas, similarity of inputs, shared production activities/processes and or common final products, where there is potential for unified management of production activities, sourcing of inputs, access to financing, processing, logistics, storage, marketing, and enhanced quality of production. The aim is to achieve economies of scale, and thus achieve cost effective production, harvesting, processing, and marketing operations and subsequently increase farmers' and fishers' incomes. It enables the government to channel assistance such as credit, modern production methods, farm machinery, post-harvest and

program facilities, transport and logistics, packaging support, as well as information and communication technologies (ICTs) to farm and fisher clusters. Furthermore, the program gives priority focus to community production and processing, projects that promote coordination and organized production and value chain systems towards increased productivity compared to the stand alone traditional farming and fishing practices.[10] Thus, there are certainly many aspects of the farm clustering approach that are highly relevant to the scaling up of the activities within the AMIA-CREATE networks and could be given further consideration as a part of the evolving strategies that are adopted.

An opportunity may exist through the introduction of organic certifications procedures for AMIA villages. The concept of organic agriculture is closely related to climate resilience, and this represents a significant opportunity to leverage the introduction of practices that are focused on building healthy soils, increasing biodiversity, and reducing dependence on synthetic inputs that will help to create more resilient farming systems that can better withstand the impacts of climate change, such as droughts, floods, and extreme weather events.

The National Organic Agriculture Program (NOAP) is led by the National Organic Agriculture Board under the DA and in cooperation with various stakeholders in the organic industry, relevant national government agencies, NGOs, and civic society. Overall, the NOAP aims to promote, propagate, further develop, and implement the practice of organic agriculture in the Philippines towards a competitive and sustainable organic industry that contributes to:

- **Better incomes and sustainable livelihoods:** increased farm productivity, reduced expenses on farm inputs, better incomes for farmers and reduction of poverty in the rural sector.
- **Improved health:** Protected health of farmers, consumers and the public in general.
- **Environmental protection:** Enhanced soil fertility and farm biodiversity, reduction in pollution and destruction of the environment as well as prevention of further depletion of natural resources.
- **Disaster Risk Reduction and resilience to climate change:** Improved resiliency to disaster risks and climate change vulnerabilities caused by human interventions and naturally induced hazards.
- **Social justice:** Meeting the basic material needs and improving standards of living for all, upholding human rights gender equality, labour standards and the right to self-determination.

The Organic Agriculture Act that was passed in 2010 included a compilation of a range of previous implementation guidelines that covered such items as (i) the designation of the Bureau of Agriculture and Fisheries Product Standards (BAFPS) to grant accreditation to organic certification bodies as well as being responsible for the formulation and enforcement of standards of quality and the processing, preservation, packaging, labelling, import, export, distribution and advertising of agriculture and fisheries products. There were also guidelines and AOs issued in

[10] The DA F2C2 program benefits from a wide range of DA Banner Programs that are listed in Annex 5.

2012 relating to the DA granting of subsidies for organic certification, facilitating the establishment of organic farming demonstration farms and procedures for the accreditation of organic agriculture extension service providers. However, organic agriculture in the Philippines is still in its infancy with relatively few farmers overall that are practicing it. However, there are a few schemes in place to promote organic agriculture that include (i) Organic Farm Business Plan (OFBP) under the DA that provides financial and technical assistance to farmers who want to transition to organic farming that requires farmers to undergo training in organic farming practices; (ii) Organic Agriculture Program (OAP) of the Bureau of Water and Soils Management (BSWM) that promotes organic agriculture through research, extension and education and also provides financial assistance to farmers interested to adopt organic farming practices; and (iii) the Philippine Centre for Postharvest Development and Mechanization (PhilMeD) also has an organic farming program to develop appropriate organic agriculture techniques and provides training, demonstration farms, and technical assistance to farmers wanting to practice organic farming.

Based on the latest data that could be accessed there are reported to be about 40,000 farmers across the entire country that are now practising organic agriculture, but the uptake of organic farming has been constrained by a lack of infrastructure. Farmers generally have to use manual labour rather than machinery and there is a lack of satisfactory storage facilities for organic produce leading to higher spoilage rates. In addition, farmers lack market access since there is currently limited domestic demand for organically certified products that are generally sold at a higher price than uncertified products. but this situation is changing with a growing awareness of the importance of consuming safe food items that have a known origin. However, there appear to be no existing or functional organic hubs that are yet established and the AMIA villages could potentially provide sites for the wide introduction of organic agriculture.

One further consideration is the adoption of the Participatory Guarantee Scheme (PGS) that refers to a locally focussed quality assurance system that is developed and practiced by farmers who are engaged in organic agriculture and is built on a foundation of trust, social networks and knowledge exchange, which provides an alternative and complementary tool to third party certification in the organic agriculture sector. This is particularly relevant for small-scale farmers who cannot afford the pay the cost of the service of third-party certifiers, in order to label and sell their produce as guaranteed organic, in local markets. Consumers, in turn, have the assurance that the food they are eating has been produced organically, and they can even participate in the verification progress through PGS. The PGS are recognised by the International Federation of Organic Agriculture Movements (IFOAM) and are especially adapted to local markets and short supply chains and there are reported to be now over 100 PGS initiatives that have commenced across the entire country.11

Although the update of PGS in the Philippines is still limited, the government can play an important role in its further promotion through the introduction of pro-organic policy measures that include “push measures” to encourage the production and supply of organic products, “pull measures”

11 https://pgs.ifoam.bio/pgs_groups/map?utf8=%E2%9C%93&filter=&status_filter=&country_filter=Philippine Accessed 06-Jun-23

that raise awareness of consumers and promote more demand for organic products, and "enabling measures" that have overarching effects on supply and demand.[12]

An opportunity also exists for AMIA villages through the wider adoption of the Geographic Indication (GI) policy (IPOPHIL Memorandum 2022 - 022) that provides a strategic policy tool for a climate resilient, inclusive, and sustainable transformational policy especially for indigenous commodities around the country. Some examples of existing potential GI products include pili nuts in Bicol region, Tinalak of Lake Sebu, Guimaras mangoes, etc. The "Champagne" is a registered GI that is applied in France and the EU, as well as other countries including India, as the climatic conditions, soil texture, temperature, and the skills required for the production define the distinctiveness if the sparkling wine that is made in the Champagne region of France. The model provides an interesting case study into the challenges that can occur and mechanisms to respond to challenges and infringements but could work on any potential GI-based AMIA CREATE networks for specific commodities and the Food and Agriculture Organization (FAO) has already piloted the development of two GI commodities for registration, namely for Kulaman Coffee from Sultan Kudarat and Cordillera Heirloom Rice from the Cordillera Region.

The AMIA villages could potentially also explore opportunities to become sites for Farm and Ecotourism, by becoming the sites for to broaden peoples' knowledge and understanding of the causes of climate change and to promote and showcase climate resilient agricultural techniques as well as GHG emission mitigation measures. By the development of farm tourism, local culinary products, value added products, and souvenir items from local products, etc.,), the AMIA village can expand its market direct to consumers. This in turn can provide an opportunity to raise awareness of certification procedures and the availability of specific certified products that are being marketed and stimulate increased demand potential for these products.

There is also a need to consider low carbon and climate resilient investments that build on enhancing AVC resilience to climate impacts. This can encompass many aspects within the value chain ranging from improved soil management and conservation techniques to achieve carbon sequestration through to greening of the supply chains by the adoption of measures that reduce GHG emissions during harvesting, processing, drying, storage and transport of products.

[12] policy_toolkit_main_report.pdf (ifoam.bio) Accessed 06-Jun-23

4 EXISTING AGRICULTURAL VALUE CHAIN STUDIES RELATING TO CLIMATE RESILIENCE

The objective of this aspect of the work was to assess the available AVC studies that have been conducted on a range of commodities to determine the extent to which they have responded to the need for greater future climate resilience and identifying the best practices for achieving this shift both in terms of the mode of analysis as well as identifying the primary considerations for achieving the enhanced future climate resilience. It is now abundantly clear that Incorporating climate resilience into AVCs is crucial to ensure the sustainability and productivity of agriculture in the face of climate change. Climate resilience in agriculture involves strategies and practices that help farmers adapt to changing climate conditions, minimize risks, and maintain or enhance their agricultural productivity. Incorporating climate resilience into AVCs is a complex and ongoing process and requires a multi-dimensional approach involving various stakeholders and a commitment to long-term sustainability. Additionally, it is essential to tailor strategies to the specific climate challenges and local conditions of the region in question.

There are a wide range of VC studies, as well as Commodity Road Maps (CRMs) that have been prepared over recent years, and this process is still on-going as a prelude to the process of developing the Provincial Commodity Investment Plans (PCIPs). A brief review was completed of 12 such VC studies available for study, and the results are summarized below.

Table 5: Summary of analysis of available AVC studies

Name of study	Year	Assessment of climate resilience responses
Preparation of the Region 12 Strategic Investment Plan for Processed Fruit and Nuts Cluster (2022).	2022	No specific mention of climate im[pacts other threat of more intense rainfall. No description of any mitigation or adaptation measures.
Preparation of Region 12 & Maguindanao SIP for Cacao (2019)	2019	
Analysis of Fruit and Vegetable VCs in the Philippines: ADB TA-9689 (2022)	2022	Study focused on Mango, Banana, Cabbage, Tomato & Onion. The study did not include any specific mention of climate change impacts but identified a range of “climate smart” infrastructure requirements that focused on post-harvest processing and marketing facilities. Also included a recommendation on the need for climate change adaptation strategies for all commodities since there was limited information identified during the study on the preparedness of producers to deal with increasing extreme weather events associated with climate change. Further information on the strategies for these commodities and the required associated training for farmers.
Philippine Food Chain Logistics Master Plan 2023 - 2033: ADB TA-9971 (2023).	2023	Study includes VCA for eight commodities: rice, corn, banana, onion, pork, poultry, milkfish, tilapia.

Name of study	Year	Assessment of climate resilience responses
		Very little mention of potential climate change impacts other than the need for genomic research to develop Tilapia stocks that are more resilient to unspecified climate impacts.
Survey of Issue Analysis of Food Value Chain in the Philippines (2019).	2019	Frequent mention of the risks from climate change to food crops and the need for more support to enable farmers to adapt and recover from climate related crop losses. CSA mentioned as one mitigation measure, but no further specific details are provided and general mention of the need for climate resilient infrastructure.
Market and Value Chain Analysis of Priority Agrobiodiversity Commodities for Lake Sebu (2019).	2019	Potential resilience of each commodity to climate variability was assessed and the level of protection of farmers from moderate shock such as drought, flood, pest and disease was used in assessment. No description of any mitigation or adaptation measures.
Preparation of Region 12 + Maguindanao SIP for the Cacao cluster (2019).	2019	Mention of climate change as a potential threat to future cacao production but no further discussion of introduction of climate resilience into the value chains.
Philippine Rice Industry Road Map 2030 (2018).	2018	Description of the need for enhanced resiliency to disasters and climate risks and targets set for adoption rates as well as specific areas of support from extension services, enhanced crop insurance and further investment in R&D activities. Also mentioned is the need for reserve seed banks that can provide support to farmers who suffer crop losses during early establishment.
Philippine Banana Industry Road Map 2021 - 2025 (2022).	2022	No specific mention of climate impacts other than the threat of more intense rainfall. No description of any mitigation or adaptation measures.
Philippine Onion Industry Road Map 2021 - 2025 (2022).	2022	Includes various activities to address the impact of climate change including the need for the development of improved varieties that have greater drought resilience and pest/disease resistance, the need for expansion of crop insurance and the availability of credit lines for farmers. No description of the potential impact of climate change in the main production areas.
Philippine Yellow Corn Industry Road Map 2021 - 2040 (2022).	2022	Specific mention made of the impact of climate change on yellow corn production and the need for the introduction of climate smart farming systems although no detail provided of what this comprises other than increased delivery of training for farmers on climate smart practices. No description of the potential impact of climate change in the main production areas.
Philippine Seaweed Industry Road Map 2022 - 2026 (2022)	2022	No specific mention of climate im[pacts other threat of more intense rainfall. No description of any mitigation or adaptation measures

The preparation of further studies under the auspices of the Philippine Rural Development Project (PRDP) is on-going and many more commodity based AVCs are under preparation that cover a wide range of commodities. However, for the documents that have been studied the following observations have been made:

- Overall, the studies make relatively little mention of the potential impacts of climate change although most make some reference to the increasing risks that are imposed. But there is very little discussion of the potential mitigation measures that could be adopted and how these can be integrated into the value chains and the possibility that that they may incur additional investment on the part of the farmers and agribusinesses at both upstream and downstream sectors of the chain.
- Given that climate change poses an increasingly significant risk to the agriculture sector, there is a need for much more rigorous analysis of these risks and for the potential economic impact to be factored into the analysis. However, this is now being addressed through the more detailed assessments that are being conducted through the Climate Vulnerability Risk Assessments (CRVAs) that are being conducted through the PRDP prior to the preparation of the PCIPs.

5 BEST PRACTICES FOR DEVELOPING CLIMATE RESILIENT AVCS

Firstly, there is a need to reflect on the essential differences between climate resilience, climate resilient agriculture and climate smart agriculture, concepts that are often used in the context of adapting agricultural practices to climate change but have their own distinct focus.

- **Climate resilience (CR):** The capacity for a socio-ecological system to (i) absorb stresses and maintain function in the face of external stressed imposed by climate change; and (ii) adapt, reorganize, and evolve into more desirable configurations that improve the sustainability of the system, leaving it better prepared for climate change impacts.
- **Climate Resilient Agriculture (CRA):** This approach primarily focuses on enhancing the resilience of agricultural systems to the adverse effects of climate change. It involves strategies and practises that reduce vulnerability to climate variability and extremes like droughts, floods, and heat waves. The goal is to ensure food security and protect livelihoods by making agricultural systems more robust and able to withstand or recover from climate induced shocks. CRA might include practises like diversifying crops to reduce the risk of failure, improving water management to deal with droughts or adopting crop varieties that are more tolerant to extreme conditions.
- **Climate Smart Agriculture (CSA):** CSA is a broader approach that encompasses three main objectives: increasing agricultural productivity and income (sustainable agriculture), adapting, and building resilience to climate change (as in CRA); and reducing and or removing greenhouse gas emissions where possible (climate mitigation). Thus, CSA is an integrated approach that looks not only at adapting to climate impacts, but also at how agricultural practises can contribute to climate change mitigation. This might include activities like improved soil management to enhance carbon sequestration, integrating farming with forestry or using renewable energy sources in agricultural operations.

In summary, while CR, CRA and CSA aim to address the challenges of climate change in agriculture, CRA is specifically focused on adaptation and resilience, whereas CSA incorporates both adaptation and mitigation, along with the goal of increasing productivity sustainably.

During the Inception Phase of the assignment there was a discussion on the value chains that should be prioritized for in-depth study. Although there was no formal agreement reached on the selection of the priority commodities, it was proposed that there could be up to a maximum of only three or four could be studied in detail due to the time limitations. Based on the above analysis of AMIA villages the priority choices are **Rice, Corn and Coconuts.**

As a preliminary task there has been an assessment conducted of the primary anticipated impacts of climate change characterized as relating to (I) drought and temperature rise and (ii) excessive rainfall that results from the increased frequency and intensity of typhoons. The analysis has been performed for the above three priority crops and can provide a methodology that can be extended to other crops also as needed. The analysis follows the four logical steps of assessing the consequences, determining the underlying vulnerability factors and sensitive groups, and identifying the adaptation measures proposed (see Tables 6 to 11).

Table 6: Impact and adaptation measures of drought/temperature rise: Rice

Rice	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Post-harvest Storage and Processing	Product Marketing
Hazard	Drought/Temperature Rise			
Consequences	• Poor seed quality produced by seed growers. • Scarce supply of good quality seed. • Increased requirement of pesticides. • Decrease quality of seeds due to power outage at storage facilities. • Increase energy consumption due to longer use of HVAC systems in seed storage rooms.	• Delayed planting schedules. • Reduce farm yield due to crop damage due to water stress. • Drought causes delayed flowering and spikelet sterility that affects grain filling. • In longer period of drought, rice plants die resulting to high farm yield loss. • Increased temperature during drought increases spread of pests, expands geographic range of insects and increases outbreak of insect transmitted diseases. • Increased need for government spending on irrigation.	Lower milling recovery. increased chalky grains. Increased use of diesel fuel duel to power outage.	Decrease of value of rice due to undesirable appearance and eating quality. Decrease overall volume of rice produced.

Rice	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Post-harvest Storage and Processing	Product Marketing
Underlying vulnerability factors and sensitive groups	Biophysical • Low lying areas without sources of irrigation. • Drying of creeks that are sources of irrigation of non-irrigable lands. Socioeconomic • Increased prices of rice to consumers due to low supply • Reduced or loss of income of farmers. • Food security threatened. Institutional • Affects quality of basic services from private and government organizations (e.g. water, electricity, communication, etc) • Increased dependence to importation • Limited capability of farmers organizations in providing services • Limited LGU support to climate resilient adaptation and mitigation programs			
Adaptation options proposed	• Planting of drought resistant varieties. • Development of short duration varieties that may avoid drought periods during critical growth periods (i.e. flower and panicle development). • Buffer stock of good quality seeds. • Use of renewable alternate source of energy at storage facilities. • Use of energy-efficient HVAC with motion sensors and programmable thermostats to optimize energy use.	• Crop Insurance. • Climate advisory. • Integrated pest management (biocontrol). • Diversified farming (Crop rotation to drought resistant crops such as legumes). • Soil fertility conservation technologies. •	• R&D on improved milling techniques • Use of renewable energy (e.g solar).	Buffer stock of milled rice. Price regulation for rice. Farm clustering for product consolidation and marketing.

Table 7: Impact and adaptation measures of typhoon and increased rainfall: Rice

Rice	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Post-harvest Storage and Processing	Product Marketing
Hazard	Typhoon/Heavy rainfall			
Consequences	• Reduced quality of seeds. • Damage of machineries. • Difficulty to transport of inputs due to inaccessibility of road networks. • Difficulty of drying of seeds.	• Lodging, striping and water stress in rice fields. • Flooding causes crop damage/mortality. • Overall production loss.	• Difficulty in drying of fresh paddies. • Germination of fresh paddies due to longer storage. • Deterioration of quality of milled rice due to high moisture at storage. • Destruction of processing facilities (rice mills, warehouse. • Power outage in rice mills, mechanical driers and warehouse.	• Difficulty in transport of milled rice in open trucks lead to exposure of milled rice to heavy rains. • inaccessible roads and bridges. • Inaccessibility of consumers to milled rice due to closure of wholesale and retail market outlets.
Underlying vulnerability factors and sensitive groups	Biophysical • Farms located in landslide prone areas flood prone areas. • Farms inaccessible due to road damage Socioeconomic • Unavailability of farm workers/labor • Reduced or loss of income of farmers. • Food security threatened. Institutional • Lack of participation or membership to farmers organizations • Limited capability of farmers organizations in providing services • Farmers lack of access to information regarding crop insurance • Limited LGU support to climate resilient adaptation and mitigation programs			

Rice	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Post-harvest Storage and Processing	Product Marketing
	Infrastructure • Closure of roads and bridges due to landslides, floods, etc. • Non-voyage of ships to transport bulk purchase of rice			
Adaptation options proposed	Buffer stock of good quality seeds. Availability of seeds of flood tolerant varieties.	• Planting of flood tolerant varieties in flood prone areas. • Diversified farming (crops-livestock). • Soil fertility conservation technologies. • Construction of drainage in flood prone areas (LGU, NGA). • Use of climate information advisories for short term farm planning.	• Use of mechanical driers. • Use of renewable energy as source of alternate energy source. • Farm clustering to avail fully mechanized processing facility. • Climate resilient storage/warehouse design (Green warehouse)	• Investment on closed vans for transport of milled rice. • Operation of mobile stores or Kadiwa market outlets. • Buffer stock of rice in the locality. • Coordinate with LGU for construction and repair of farm to market roads.

Table 8: Impact and adaptation measures of drought/temperature rise: Corn

CORN	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Post-harvest Storage and Processing	Product Marketing
Hazard	Drought/Temperature Rise			
Consequences	• Poor seed quality produced by corn seed growers. • Reduced inventory of good quality corn seeds. • Decrease quality of seeds due to power outage at storage facilities. • Increase energy consumption due to longer use of HVAC systems in seed storage rooms. • Increased requirement of pesticides due to pest outbreaks during drought.	• Stunted growth of plants. • Yield drop due to reduction of number and weight of corn kernels • Drought reduced production of silk biomass that are necessary for kernel production. • Sudden increase of insect population due to shorten life cycle, increased amino acids in plants during drought causing population explosion of mites that damage corn stems. • Difficulties in scheduling of farm activities (e.g. fertilizer application). • Increased government spending on irrigation to mitigate impacts of drought.	• Drought creates grain quality issues such as threat of aflatoxin. • Increased post-harvest losses. • Reduction of corn kernel weight. • Faster deterioration of grains in high temperature storage conditions.	• Volume too low to supply to institutional buyers. • Higher cost of transportation per unit kg or corn. • Underutilized feed mills due to low supply. • High prices in the market.

CORN	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Post-harvest Storage and Processing	Product Marketing
Underlying vulnerability factors and sensitive groups	Biophysical • Low lying areas without sources of irrigation • Drying of creeks that are sources of irrigation of non-irrigable lands. Socioeconomic • Reduced or loss of income of farmers. • Food security threatened. • Will affect the livestock industry due to low supply of feeds. Institutional • Affects quality of basic services from private and government organizations (e.g. water, electricity, communication, etc). • Increased dependence to importation. • Limited capability of farmers organizations in providing services. • Limited LGU support to climate resilient adaptation and mitigation programs.			
Adaptation options proposed	• Seed production of drought resistant varieties. • Research and development of drought resistant varieties. • Buffer stock of good quality seeds. • Use of renewable alternate source of energy at storage facilities. • Use of energy-efficient HVAC with motion sensors and programmable thermostats to optimize energy use.	• Crop Insurance. • Integrated pest management (biocontrol). • Diversified farming (Crop rotation to drought resistant crops such as legumes). • Soil fertility conservation technologies. • Rainwater harvesting. • Use of climate information advisories. for short term farm planning.	• R&D on improved milling techniques. • Poor quality of corn. • Use of renewable energy (e.g. solar power).	• Farm clustering for product consolidation. • Promote production of free-range chickens, pigs to augment income loss and support household food security.

Table 9: Impact and adaptation measures of typhoon and increased rainfall: Corn

CORN	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Post-harvest Storage and Processing	Product Marketing
Hazard	Typhoon/Heavy rainfall			
Consequences	• Reduced quality of seeds. • Damage of farm machineries. • Difficulty to transport of inputs due to inaccessibility of road networks.	• Lodging of crop due to flooding that will result in crop damage/mortality. • Delayed farming activities. • Overall production loss.	• Deterioration of quality of corn kernels due to longer storage. • Destruction of processing facilities (rice mills, warehouse. • Power outage in rice mills, mechanical driers and warehouse.	• Exposure of corn on cob, kernels, milled corn in rain that will affect quality of products. • inaccessible roads and bridges from farm/mill to market. • Underutilized feed mills due to low supply. • Increased cost of feeds that would result increased prices of meat, poultry, eggs, etc.
Underlying vulnerability factors and sensitive groups	Biophysical • Farms located in landslide prone areas flood prone areas. • Farms inaccessible due to road damage. Socioeconomic • Unavailability of farm workers/labor. • Reduced or loss of income of farmers. • Food security threatened. Institutional • Lack of participation or membership to farmers organizations. • Limited capability of farmers organizations in providing services. • Farmers lack of access to information regarding crop insurance. • Will affect the livestock industry due to low supply of feeds.			

	Infrastructure • Closure of roads and bridges due to landslides, floods, etc. • Non-voyage of ships to transport bulk purchase of rice. • Limited LGU support to climate resilient adaptation and mitigation programs.			
Adaptation options proposed	• Buffer stock of good quality seeds. • Availability of seeds of flood tolerant varieties.	• Planting of flood tolerant varieties in flood prone areas. • Diversified farming (crops-livestock). • Soil fertility conservation technologies. • Construction of drainage in flood prone areas (LGU, NGA). • Use of climate information advisories for short term farm planning. • Harmonization of CRA programs to the LGU Comprehensive Development Plan and Annual Investment Plans.	• Use of mechanical driers. • Use of renewable energy as source of alternate energy source. • Farm clustering to avail fully mechanized processing facility. • Climate resilient storage/warehouse design (Green warehouse).	• Farm clustering for product consolidation. • Promote production of free-range chickens, pigs to augment income loss and support household food security.

Table 10: Impact and adaptation measures of drought/temperature rise: Coconut

Coconut	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Storage and Processing	Product Marketing
Hazard	Drought			
Consequences	• High cost of nursery management as nursery operators would need to irrigate the seedlings. • Reduced quality of seedlings. Seedlings are sensitive to water stress (drought). • Scarcity of good quality seedlings.	• Longer span for crop recovery from climatic impacts. • Physiological problems e.g. slow-down leaf development which affects vitality of coconut to produce nuts due to loss of female flowers. • Increased incidence of pest infestation (e.g. rodents, scale insect). • Decrease in production. Water is critical in flower and nut development of coconuts. • Risk of accidental fire in plantation.	• Risk of fire at processing site and facilities (copra drying facility). • Reduced total harvest. • Compromised quality and volume of raw materials. • Shorter storage life of coconuts.	• Less copra to buy from farmers. • Under-utilization of oil mills.

Coconut	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Storage and Processing	Product Marketing
Underlying vulnerability factors and sensitive groups	Biophysical • Farms with no access to irrigation or other water sources (rivers, irrigation system). Newly planted coconuts are sensitive to water stress and would require water for normal plant growth • Increased insect and other pest population during drought Socioeconomic • Limited access to governments services such as crop insurance • Limited knowledge in value added products of coconut • Reduced income due to tenancy and land mortgage issues among coconut farmers Institutional • Lack of participation or membership to farmers organizations • Limited capability of farmers organizations in providing services • Limited LGU support to climate resilient adaptation and mitigation programs • Tenancy and land mortgage issues among coconut farmers • Limited access to crop insurance or low insurance coverage Market • Reduced supply of raw materials			
Adaptation options proposed	• Establishment and management of coconut nurseries with complete facilities including irrigation systems.	• Crop Insurance. • Integrated pest management (biocontrol). • Diversified farming (intercropping with other crops). • Regular farm sanitation to reduce pest incidence. • Collective farm monitoring to prevent accidental fire.	• Product diversification (fresh young coconut, processed products, charcoal from coconut shells, coco coir).	• Farm/product consolidation through clustering. • Promotion and marketing of diversified products.

Table 11: Impact and adaptation measures of typhoon and increased rainfall: Coconut

Coconut	Provision of Seeds and Other Inputs	On-farm Production	Harvesting, Storage and Processing	Product Marketing
Hazard	Typhoon			
Consequences	• Destruction of nursery facilities. • Damaged plantlets. • Early germination of seed nuts due to continuous rains. • Difficulty of gathering seed nuts due to strong winds and accidental risks.	• Decreased yield due to nuts fall. • Uprooting of coconut trees due to strong winds, landslide, etc. • Increased mortality of newly planted seedlings due to flooding or water logging.	• Delayed drying of coco meat to copra. • Destruction of copra drying facilities. • Delayed in post-harvest activities (dehusking, splitting, etc. that would lead to nut germination).	• Difficulty of delivery of copra or other products due to road access difficulty. • Closure of operations of buyers lead to reduction of quality of product. • Longer storage time would initiate mold production that is not acceptable to the market. • Farm clustering for product consolidation and marketing.
Underlying factors and sensitive groups	Biophysical • Farms located in landslide prone areas. Socioeconomic • Unavailability of farm workers/labor • Farmers are not practicing GAP (e.g. fertilization) thus experiencing very low farm productivity. • Old and less productive coconut trees • Tenancy and land mortgage issues among coconut farmers • Limited access to crop insurance or low insurance coverage Institutional • Lack of participation or membership to farmers organizations • Limited capability of farmers organizations in providing services			

	• Limited LGU support to climate resilient adaptation and mitigation programs Infrastructure • Closure of roads and bridges due to landslides, floods, etc.			
Adaptation options proposed	• Proper nursery management planning and operation.	• Use of high yielding dwarf varieties. • Capacity building on GAP, institutional development. • Crop insurance.	• Construction of climate proof post-harvest and storage facilities. • Use of climate information system for scheduling of harvesting and post-harvest marketing.	• Selling of whole nuts (instead of copra).

The outcome of these analyses can be used to provide the basis for planning the institutionalization of CRA at the LGU level that can focus on two main areas of activity as follows:

- The integration of the proposed adaptation options as elements of a CRA program within the LGU Local Development Plans. These would mainly comprise the Barangay Development Plans, City/Municipal Comprehensive Development Plans and Comprehensive Land Use Plans, and the Provincial Development and Physical Framework Plan.
- Based on the identified options that are integrated into the above plans, the allocation of funds for CRA can be achieved through the Annual Investment Plan (AIPs) of the LGUs. To strengthen the response to achievement of climate resilience thresholds could be set within these AIPs for minimum percentage levels of annual investment that should be directed towards actions for the mitigation of climate induced impacts.
- Within the LGUs at both municipal and province level, the MAO and DA staff can contribute to this planning process to identify the most appropriate mitigation measures that are required whilst also ensuring optimal use of the available funds.

An important aspect of the AMIA village concept is to promote the wider adoption of sustainable farming practices that can contribute to a reduction in the carbon footprint of the agricultural sector alongside achieving an increase in its resilience to climate change impacts and improved food security. Some of the key elements that need to be considered are as follows:

- **Improved farming practices:** Implementing sustainable farming practices is one of the most effective ways to lower carbon emissions and increase resilience. This includes practices like organic farming, agroforestry, permaculture, and conservation agriculture which all emphasize soil health, biodiversity, and natural pest management.
- **Precision agriculture:** By using technologies that more accurately manage and apply inputs such as water, fertilizer, and pesticides. This can significantly reduce greenhouse gas emissions by minimizing waste and optimizing productivity.
- **Agroecology:** Combining the science of ecology with the practice of agriculture to encourage the use of local resources, recycling of nutrients, and improvement of soils, thereby reducing dependence on synthetic fertilizers and pesticides that contribute to greenhouse gas emissions.
- **Climate-Smart Agriculture:** CSA is an approach that helps 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 gases emissions, where possible.
- **Carbon Sequestration in Agriculture:** Carbon sequestration in agriculture involves practices like cover cropping and agroforestry that pull carbon out of the atmosphere and store it in plants or the soil. It's a promising strategy for offsetting agricultural emissions.
- **Renewable Energy in Agriculture:** Renewable energy technologies like solar and wind can be used to power farm operations, reducing dependence on fossil fuels.

- **Supply Chains innovations:** Optimizing supply chains can minimize waste and reduce the carbon footprint of transporting agricultural products as well as investments in cool storage facilities and more efficient transportation to reduce post-harvest losses as well as emissions during transport.
- **Policy Support:** Government policies and international cooperation are critical for promoting a transition to low-carbon agriculture. This can include subsidies for sustainable farming practices, carbon pricing, research and development funding, and education and training programs for farmers.
- **Training and Education:** Farmers need to be educated about climate change and the benefits of low-carbon practices. Providing training and extension services can help farmers adopt these practices more widely.

In the light of the previous discussion and taking into account the key elements of sustainable farming practices, it is pertinent to now include a discussion of the key aspects that should be considered during the preparation of future AVC studies to ensure that there can be a more comprehensive discussion and response to the need for low carbon and climate resilient investments that build on enhancing value chain resilience to climate impacts and the integration of appropriate mitigation measures and costing of these in the value chain analysis.

Assessment of climate change risks: This is of course a very self-evident necessary prelude for any AVC to enable a more detailed consideration of expected climate change impacts on each of the AVC sub-systems. By conducting a thorough assessment of the specific climate risks that affect the region and the crops within an AVC, there can be an estimate of the projected increases in temperatures, changes in precipitation measures, frequency of extreme weather events, and changes in the incidence of pests and diseases, and in turn an estimation of the likely economic impact of these changes as well as identify mitigation measures and the cost implications of their adoption. This will naturally impact mainly on the production sub-system but may have implications for the post-harvest/processing sub-system also. This information will then provide a basis for many other considerations required to integrate increased climate resilience into the AVCs.

Improved crop varieties and livestock breeds (input sub-system): An element of the AVCs that is seldom considered is that of the extent of R&D that is supported specifically relating to the breeding and development of new crop varieties of livestock breeds that are more resistant to changing climate conditions, including drought resistant, heat tolerance or pest resistance. Although R&D costs themselves are not a public good, the outcomes or knowledge generated from R&S can be considered as such due to the non-excludability that ensures that once a new crop variety or livestock breed is released anyone can adopt it provided there is an affordable source of supply and the existence of non-rivalry since the use of an improved crop variety or livestock breed by one person does not diminish the ability of others to use it. Nevertheless, there are private entities engaged in the R&D process and they will be seeking a return on their investment in the development of say an improved crop variety through the sale of the seed of that variety, that will translate into higher costs in the input supply sub-system of the AVC that will need to be quantified. In the case of the rice value chain adaptation options should include increased availability of seed of varieties that are flood tolerant and drought resistant including the development of short duration varieties, the establishment of buffer stocks of seed of these

varieties that can be drawn upon in the case of crop failure. Similar measures apply to corn for wider availability of varieties with greater climate resilience. For coconuts there is a need for improved nursery facilities with proper management and irrigation systems so that better quality planting materials can be made available.

Diversification of production sub-system (production sub-system): The promotion of crop diversification with an AVC is an important response to increasing climate resilience because different crops have varying degrees of resilience to specific-climate conditions. The plans for diversification of cropping systems and hence livelihoods can provide options for transitions to various end states. Some of the options include home gardening, perimeter plantings, and dry season cropping (including green manure, mungbean, and pigeon pea) provide means of diversification that do not compete with existing land uses (especially rice farming). Alternatively, alley cropping, or inter-cropping may facilitate transition to agroforestry. Seasonal rotation and trial plantings that cover only a portion of the land available are options for partial adoption. The discussion of diversification of production should not be confined only to crops but could be extended to other non-crop commodities that could be promoted to ensure greater resilience of livelihoods in response to the change climate. This in turn leads to the possible need for transformational change, which, although naturally a much longer-term response to climate change, may become of increasing importance in the event of significantly greater climate change impacts being experienced that pose severe constraints on the production of some crops in terms of the reduction in their production potential due to their lack of resilience to the changing climate parameters (see further discussion below). Conservation agriculture is an important element for consideration here as was discussed earlier.

Climate smart practices (production sub-system): Protecting crops to maintain productivity in the face of changing climate impacts necessitates the promotion and adoption of CSA practices. These modified practices that take climate change impacts into account may include factors such as precision farming, integrated pest management, and also more efficient fertilizer use. Some additional costs may be incurred but CSA practices can also result in some cost savings for producers and a reduction in the production costs. One element of this can be improving soil health through practices like crop rotation, cover cropping, and reduced tillage since healthy soils are better at retaining moisture and nutrients, which can be critical during droughts. This may translate into changes in the annual cropping patterns as well as the use of other factors such as soil conditioning agents that will need to be taken account of in the AVC. The changes in investment costs that are incurred will also need to be reflected in the valuation of the processes within the production sub-system.

Improvement in efficiency of water management (production sub-system): An important element of climate change adaptation is the introduction of more efficient water management practices, such as drip irrigation and rainwater harvesting, to ensure that crops receive adequate water, especially in times of water scarcity due to climate change, as well as ensuring that available water resources are used in the most efficient and effective manner. Greater precision in water utilization can be achieved through the adoption of sensor-based irrigation systems. The adoption of these changes will entail additional investment costs, and these will need to be reflected in the valuation of these of these components of the production sub-system. In the case of lowland rice there is a need for the construction of improved drainage facilities for flood prone

areas as well as for water impounding facilities for conservation of water for irrigation, in response to the increasing variability in rainfall patterns.

Climate information services and early warning systems (production sub-system): An important element of the need to climate proof AVCs is to enable producers to have access to reliable weather information as well as early warning systems to enable them to make informed decisions and prepare for extreme weather events. Climate Information Services (CIS) refers to the provision of climate-related information, data, and knowledge to individuals, communities, organizations, and decision-makers. These services aim to enhance understanding of climate patterns, variability, and change, and assist in making informed decisions to manage climate risks and opportunities. CIS play a critical role in supporting climate change adaptation, disaster risk reduction, and sustainable development. The establishment of CIS involves the collection, analysis, and monitoring of climate data. This includes historical climate records, weather observations, satellite data, and climate model projections. These data sources can help to build a comprehensive understanding of climate patterns, trends, and variability. CIS are also used to provide climate forecasts and predictions top anticipate future climate conditions. These forecasts can include short term weather forecasting, seasonal predictions, and longer-term climate projections to assist individuals and organizations to make informed decisions and take appropriate actions based on expected climate conditions. CIS can also be used to assist in conducting climate risk assessments to enable an understanding of potential impacts of climate change on various sectors and regions of the country. These assessments analyse the vulnerabilities, exposure, and potential risks associated with changing climate patterns, extreme weather events, and other climate related hazards. The Philippines Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) is the government agency responsible for providing weather and climate information and services to the public, government agencies and other stakeholders. The range of services that are being provided include (i) weather forecasts including daily forecasts, storm warnings, and other weather-related advisories; (ii) climate data and monitoring to track climate trends and variability in the country; (iii) climate outlooks and seasonal predictions to guide farmers and water resource managers in planning their activities and adapting to climate variability; (iv) climate change studies and assessments; (v) early warning systems for extreme weather events; and (vi) dissemination of climate information t the general public. Enabling the effective communication and dissemination of climate information is an essential component of the CIS, and this involves translating complex climate data and scientific information into accessible formats that can be easily understood by different users. The dissemination of climate information can be achieved through various platforms such as websites, mobile Apps, radio broadcasts and community engagement activities. Furthermore, CIS can also provide tailored information products that meet the specific needs of user groups, that may include climate advisories, early warning systems, decision-supporting tools, training materials and capacity building resources. CIS provide a mechanism to integrate climate information into the decision-making processes at various levels, from community-level adaptation to national policy making by providing relevant and timely climate information that contribute to building climate-smart societies and fostering sustainable development.

Green financing, insurance, and risk management (production and post/harvest processing subsystems): Encouraging farmers to adopt crop insurance and risk management strategies to protect their livelihoods in the event of climate-related losses is an essential part of

upgrading production as well as post-harvest/processing sub-systems. Additional cost is involved in meeting the insurance premiums but in the event of crop damage or loss there is compensation for producers, but the level of increase in production costs is minimal compared to other components of the production sub-system and it needs to be reflected as an essential need in any AVC analysis.

Farm infrastructure (post-harvest/processing subsystem): Additional investment will be required in farm infrastructure that can withstand extreme weather events, such as stronger farm buildings and storage facilities in order to protect both crops and the AVC physical assets. Normally such types of fixed assets are not reflected in the AVC but nevertheless they will represent additional costs for the producer and should be costed into the AVC accordingly as additional investments. Where opportunities for additional value addition are being integrated into an AVC it is important to take account of the costs bearing in mind that improved processing and packaging can lead to a reduction in post-harvest losses and maintenance of product quality and thus improve the level of return for the producer. The need for farm clustering is also evident so that fully mechanized processing as well as bulk handling and storage can be introduced in response to the economies of scale that are achieved. This is particularly relevant to the rice and corn value chains.

6 TRANSFORMATIONAL ADAPTATION IN AVCS

The National Agriculture and Fisheries Modernization and Industrialization Plan (2021 - 2030) places a strong emphasis on the need for agricultural sector transformation and a move away from single commodity and production-centric plans and programs that have failed to achieve the desired improvement in productivity and incomes for smallholder farmers. It is becoming increasingly clear incremental adaptation is no longer adequate to deal with the more rapid shifts and tipping points for agricultural production in the wake of climate change and changing environmental risks. This implies the need for major non-marginal changes in the agriculture sector in response to climate change.

Transformational change adaptation in agriculture can be 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".[13] 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 a 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. However, it is important to note that transformational change is a long process and entails a gradual transition to differing agricultural production modes or commodities that is driven by necessity, that is producers are faced with increasing difficulties or constraints within their existing farming systems that compels them to make changes. Government sponsored schemes that attempt to promote transformational adaptation within AVCs are unlikely to have any significant impact unless there are other factors present, namely changes to the production environment through climate change, that drive the process forward. Although there are demonstrable impacts of climate change already experienced, they do not yet appear to be sufficient in magnitude to provide adequate drivers for full transformational adaptation at least within the small sample of AMIA villages that were studied, but there are certainly opportunities for diversification of the production mix to safeguard livelihoods.

Some examples of the systems that would be needed to support a shift to transformational adaptation in agri-fisheries could include factors such as:

- Climate resilient AVCs (green infrastructure and logistics) as farmers diversify based on commodity systems.
- Early warning systems that offer efficient production from weather risks.
- Innovative crop insurance building resilience ion farm communities.
- Digital technologies that can expand inclusive growth to farmers in remote areas and scale up CIS and precision farming.

[13] Vermeulen, S et al., (2018). Transformation in practice: A revies of empirical cases of transformational adaptation in agriculture under climate change. *Front. Sustain. Food Syst. 2-65:*

- Improved regulation that can make agricultural and aquaculture more productive and sustainable.
- Appraised implementation of adaptation-oriented policies that enrich incremental or status quo behaviour among farmers - such as production subsidies - in the light of a potential need for more transformational change.
- Farmers and other food system participants provided with the tools to forecast and envisage possible futures and to monitor and evaluate processes to support transformation options through investment in information and knowledge systems.

An important part of an eventual transition to transformational adaptation will be the move towards 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. These are the guiding principles of the NAFMIP, and evidence has shown that the communities most advanced in climate change innovation are those with coherent policies based on integrated and cooperative planning processes. The institutional and sectoral fragmentation, and competitive rather than cooperative settings across sectors, represent the key barriers to incorporating co-benefits in broader climate planning and an adaptation and mitigation co-benefits-based approach can help to bridge the organizational and disciplinary divides.

The NAFMIP commodity systems-based approach is intended to foster this transformation process towards climate change adaptation practices alongside the implementation of other integrative planning tools. This process seeks to diversify, upscale, and enhance smallholder farmers and fisherfolk as well as other stakeholders' income and employment opportunities in the following approaches to promoting greater diversification:

- Production diversification in which the household or enterprise combines crops, livestock, and/or fishery commodities.
- Diversification production of non-commodity or quality food to improve health and nutrition.
- Chain or value adding diversification in which the household or enterprise ventures into one or more of the post-harvest value chain segments to engage in a linked enterprise while continuing production of the original commodity.
- Farm diversification, in which the household or enterprise during the offseason undertakes other livelihood activities such as handicraft production, small scale manufacturing, construction, house repair or local transportation.

There are a number of transformational strategies that can be applied to this commodity systems planning approach enumerated within the NAFMIP:

- Diversification in systems-based production as well as value adding and enterprise development, that could entail integration of livestock and/or fishery commodities into rice-based systems, production of speciality rice, or other niche market crops, or off-farm livelihoods during off-season.

- Combining food security and nutrition security through increasing the production of vegetables, fruits, legumes and other nutritious commodities, and synchronising supply with the demand for healthy, nutritious food.
- Question of consumption that. Is data and values driven to achieve better nutrition and care of the environment, while building on local dietary preferences.
- Strengthening measures to address sustainable environmental concerns in commodity system plans with a shift away from monocropping practices and environmentally undesirable practices.
- Inclusive and equitable sector growth and transformation to raise smallholder farmers and fisherfolks share of income.
- Consolidation for greater efficiency in production and post-harvest activities through farmers groups and organisations/cooperatives with a greater focus on joint production planning and marketing.
- Adoption of modern farm and fishery technologies with a focus on greater mechanisation and support services for equipment and machinery maintenance as well as extending the availability of credit for purchase.
- Promotion of a circular economy through improved waste management strategies and greater emphasis on recycling.
- Reduction in “food miles” that can be achieved by optimizing local production and post-harvest capacity, construction of processing facilities at strategic locations, to achieve reductions in transport costs and losses during transit.
- Integration of non-food commodities and non-farm income and employment sources through programs to expand livelihood opportunities through promotion of alternative crops, local handicraft manufacture as well as other local employment opportunities.

7 ASSESSMENT OF PCIPS AND PLANNING PROCESSES INCLUDING INCORPORATION OF CLIMATE RESILIENCE

The Provincial Commodity Industry Plans (PCIPs) are 3-year rolling plans that have been prepared by the DA in collaboration with the Department of Trade and Industry (DTI) and in partnership with LGUs and other stakeholders. These plans have been developed to serve as the basis for identifying the necessary infrastructure and enterprise development (I-BUILD and I-REAP) subprojects that could be funded through the World Bank funded Philippines Rural Development Program (PDRD). They are designed to promote the development of specific commodities or agricultural products in a particular province or region and provide a framework for developing the agricultural sector in a particular area by identifying the strengths and weaknesses of the local industry, analyzing market demand and supply, and identifying opportunities for growth and development. The plans also provide recommendations for addressing various challenges that may hinder the growth and development of the agriculture sector, such as inadequate infrastructure, lack of technical expertise, and insufficient access to finance and credit. PCIPs cover various aspects of the commodity industry, including production, processing, marketing, and financing. They aim to promote a VC approach to agricultural development, where different actors in the supply chain work together to enhance the quality and competitiveness of the product and are designed to ensure that local agricultural industries are well positioned to compete in local and international markets whilst also improving the livelihoods of farmers and other stakeholders involved in the industry.

The guidelines for the preparation of the PCIPs were enhanced (June 2021) by an additional module that focuses specifically on Climate Resilient Agro-Industry Oriented Value Chain Analysis Applications as an integral part of the PCIP preparation process. The PCIP preparation is now being further enriched by Climate Risk Vulnerability Assessments (referred to as “Protocol for Integrating CRVAs into PCIPs”) that provides a value-adding layer of analysis and critical information to the PCIP particularly in the areas of hazards, Adaptive Capacity (AC), and climate suitability, that is being integrated into the PCIPs during the on-going updating process. The Climate Risk Vulnerability Assessment (CRVA) is a systematic process with the aim of identifying and analysing the vulnerabilities of production systems or a community to current and future climate change impacts. It involves assessing the exposure of the system to climate hazards, evaluating its sensitivity to these hazards, and determining is adaptive capacity. The assessment typically involves analysing data on climate projections, socio-economic factors, infrastructure ecosystems, and vulnerable populations. The output of the CRVAs is a comprehensive understanding of the risks and vulnerabilities faced by the system, identifying areas, sectors, or populations that are most susceptible to climate change impacts. As already described under the AIMA program the CRVAs are the decision-support tools that are prepared by analysing three main indices, which include exposure to hazards (exposure to significant climate variations), sensitivity (climate suitability of crops), and adaptive capacity. They are created to generate information for the DA to guide its efforts to support resilience building initiatives, and therefore result in better and longer-term geographic targeting. There are already 58 provinces with completed municipal level CRVA maps that can provide an added layer of analysis and critical information to LGU planning such as in the preparation of the Provincial Commodity Industry Plans (PCIPs) particularly in the areas of hazard, adaptive capacity, and climate suitability. There

are a series of other supplementary tools that have been developed that complement that adoption of the CRVA data in planning resiliency-building initiatives are disaster risk reduction programs for the agriculture sector. These include (i) **CRA Investment Briefs** that highlight the potential of CRA practices for climate change adaptation and mitigation and present the economic feasibility of adopting CRA; (ii) **CRA Technical Briefs** that amplify the potential of CRA practices for climate change adaptation and mitigation and outline the benefits of adopting CRA practices over conventional non-CRA measures; and (iii) **CRA Compendium of CRA Technologies and Approaches**.

Currently the CRVAs have been completed for all provinces except for Romblon and Marinduque plus the five provinces of BARMM, and are still on-going for 11 provinces (Nueva Viscaya, Quirino, Palawan, Zamboanga del Norte, Zamboanga del Sur, Davao del Norte, Davao de Oro, Davao Occidental, Apayao, Ifugao and Abra). However, there an issue with the quality of the outputs since they have been undertaken by several different teams and there are observed to be differences in the quality and results. An important objective of this TA will be to assess all CRVAs that have been prepared and provide recommendations for improvement of the methodology. Based on the ToR the CRVA methodology adopted by CRAO will be used in the development of the CRVA for the remaining 22 provinces with priority given to BARRM and Region IX.

The Climate Resilient Agro-Industrialization Oriented Value Chain Analysis section of the PCIP is prepared by drawing upon various sources of data including (i) EVSA that shows commodity suitability by municipality based on the share of total farmers' area production, poverty index and climate factors; (ii) updated VCA with rationale for selecting commodity and geographical focus; (iii) commodity industry roadmaps; and (iv) NCCAG that provides rainfall and temperature data through the PCIP Planners Portal. The content of this section of the PCIP covers the following topics:

Table 12: Content of Climate Resilient Agro-Industrialization Oriented Value Chain Analysis of PCIPs

Topics	Parameters
1. Climate change considerations of prioritized commodities (from PCIP Planning portal) for each municipality	• Crop/commodity. • Production area (ha) • Climate Sensitivity • Key hazards • Adaptive capacity • Vulnerability class.
2. Climate Resilient SWOT analysis	• Strengths • Weaknesses • Opportunities • Threats
3. Existing and potential Agro-industry investments for each municipality	• Nature of operations • Linked commodities • Scale of operations • Start of operations • Management scheme

Topics	Parameters
	• Market reach • Potential agro-industry investments
4. Functions per value chain participants	• List of functions • Identification of VC actors for each function
5. Financial Analysis/Price and Cost Structure	• Income • Expenses • Identified for each VC actors
6. Multi-factor risk assessment	• Identification of hazards • Impact on production, processing, and other VC segments
7. Market Analysis	• Demand • Supply • Issues/Concerns • Identified for each VC actor
8. Support Services	• Financial services • Non-financing services • Sources of support • Identified for each VC actor
9. Enabling environment	• Formal rules, regulations & policies. • Informal rules, regulations, and policies. • Impact on each segment of the VCs

The Climate Resilient Investment Plan section of the PCIP is prepared drawing on information from (i) PDPFP; (ii) LDIP/AIOP including information on PAPs, fund sources, timeframe, the updated VCAs and Commodity Road Maps; (ii) information form AMIA-CREATE risk profiles, investment priorities, targets and enterprise development; (iii) SUCs agribusiness studies and surveys, and (iv) Gender studies and reports. The content of this section covers the following topics:

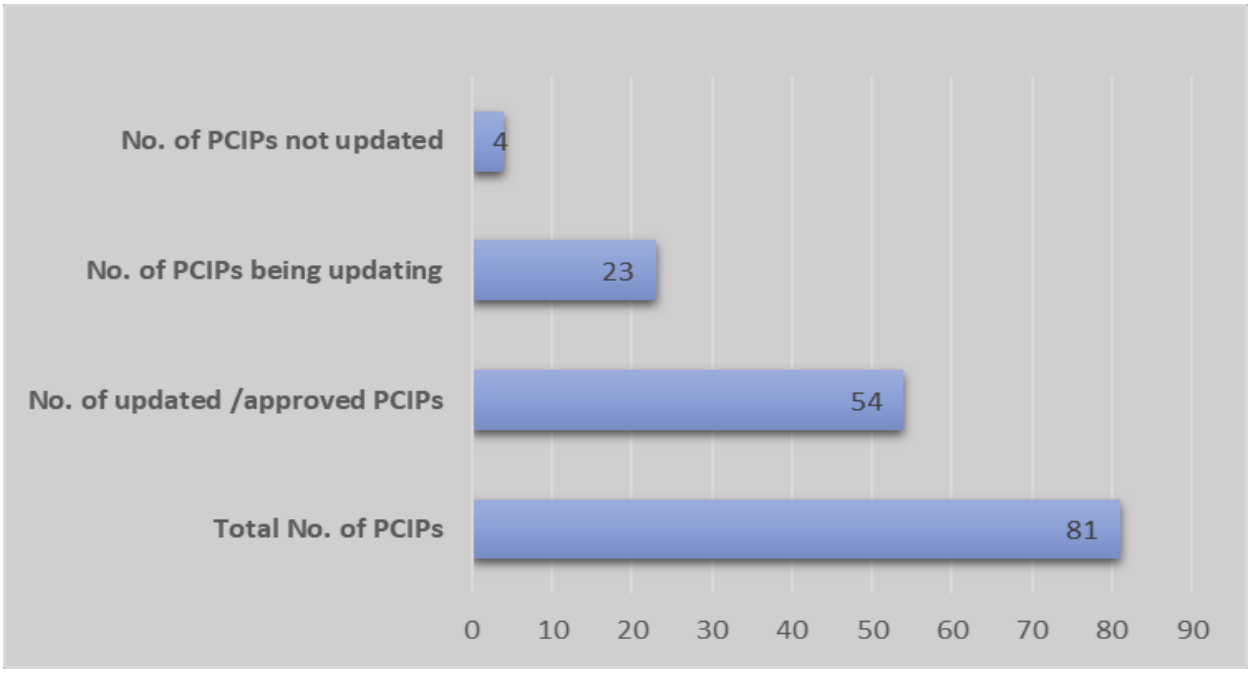
Table 13: Content of Climate Resilient Investment Plan of PCIPs

Topics	Parameters
1. Climate resilient VCA results	• Opportunities/constraints in VC upgrading. • Location (municipality) • Major risks • Remedial actions • Identified for each segment of VCs
2. Climate resilient VC map	• Value chain segments including input supply, production, processing, marketing, consumption, waste disposal, etc., • Identified for each segment/participant of the VC.

Topics	Parameters
3. Potential Hazards and Risk Management Measures	• Proposed measures for each VC segment and unit costs • Described for all identified types of risks
4. Climate-resilient VC Upgrading Plan	• Key constraints/ opportunities • Affected players. • Identified actions. • Responsibilities and incentives. • Risk management measures for each VC segment.

As of January 2024, 54 out of 81 PCIPs that cover every province had been updated and 23 were still in the process of being updated.[14] Based upon a review of a sample of the PCIPs it is evident that significant progress has been made towards a comprehensive consideration of climate resilience within the AVC analysis that is conducted for each of the commodities featured within each PCIP. The on-going updated process that is underway provides an opportunity to further strengthen this element of the PCIPs and ensure that CRA features strongly on all of the implementation strategies as well as achieving greater integration of the AMIA program and specifically the AMIA-CREATE networks into these plans.

Figure 7: Summary of PCIP status (January 2024)



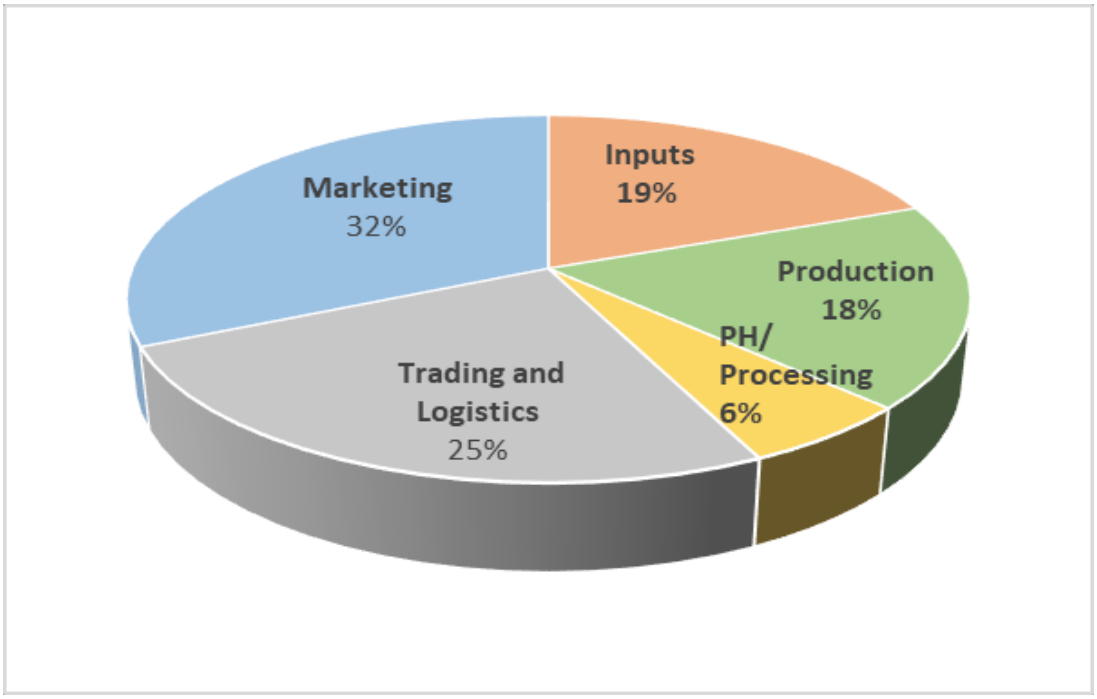
[14] See Annex 3 summary of all PCIPs and current status for every province.

8 MAPPING DEVELOPMENT PARTNER VALUE CHAIN FUNDING PREFERENCES AND PRIORITIES

Through the kind assistance of the team in the DA Special Projects Coordination and Management Assistance Division (SPCMAD) access was granted to a database for a large number of projects funded by a range of development partners (DPs). A total of 28 of these subprojects, with a combined total funding of PHP 96.1 billion, have been reviewed to examine the focus of the support and to categorize them accordingly into five sub-systems of the AVC that corresponded to (i) inputs; (ii) production; (iii) post-harvest & processing; (iv) trading & logistics; and (v) marketing.[15]

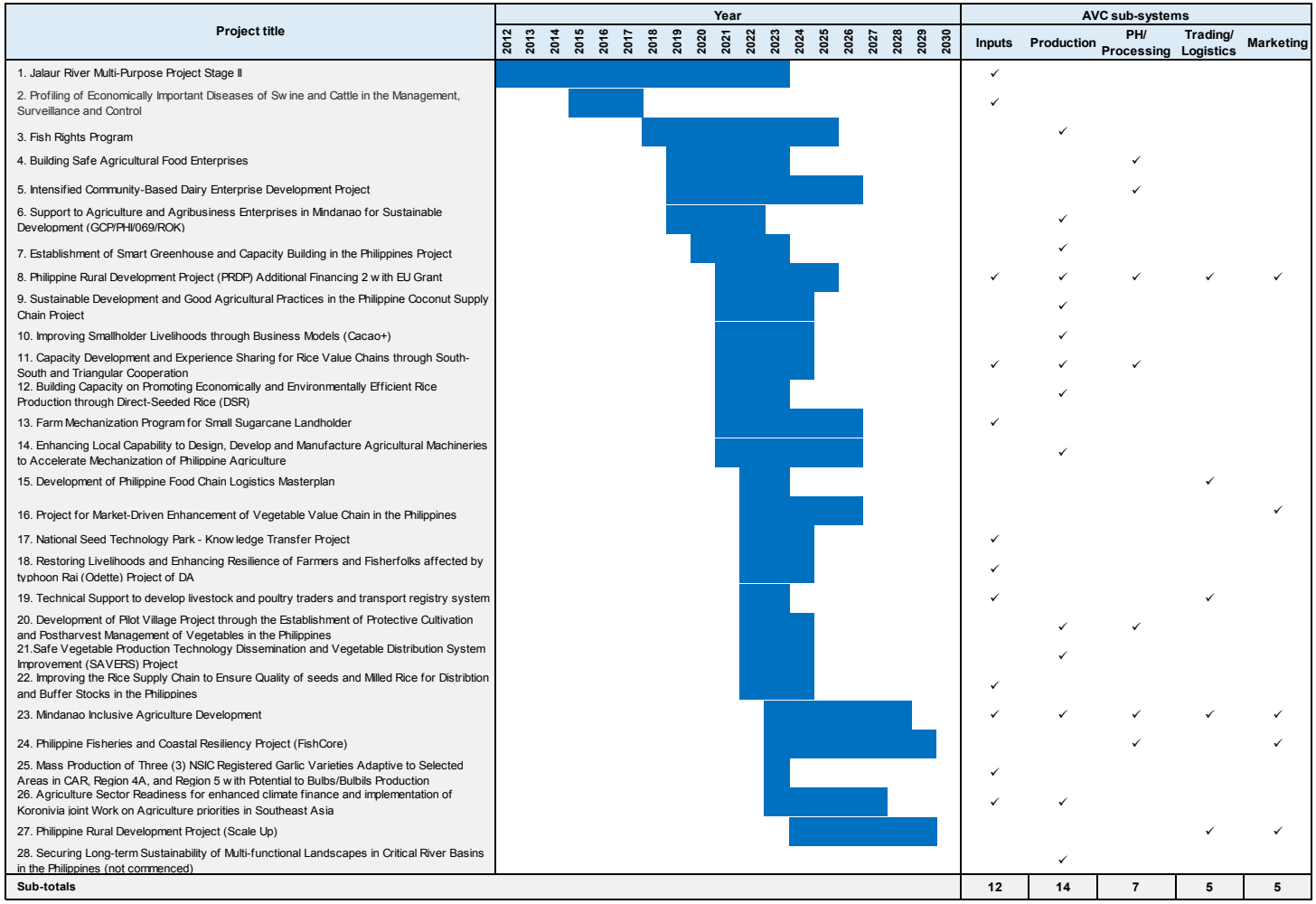
The results of the analysis are depicted below in terms of the fund allocations (Figure 7) and the number of projects (Table 8). Interestingly, the comparison of the proportional allocations of funds reveals rather differing pictures in that whilst the funding allocations for the marketing/trading and logistics subsystems of 57% of the total, this contrasts with only 24% in terms of the number of projects that are supporting these sub-systems. However, for the other sub-systems these differences are much smaller in magnitude. Nevertheless, the fund allocations are a more meaningful indicator of the priorities that have been applied in the recent and on-gong projects.

Figure 8: Distribution of DP funding support



[15] See Annex 4 for Analysis of ODA projects analyzed

Figure 9: Summary of DP projects evaluated



Project title	Year	AVC sub-systems				
	2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030	Inputs	Production	PH/ Processing	Trading/ Logistics	Marketing
1. Jalaur River Multi-Purpose Project Stage II		✓				
2. Profiling of Economically Important Diseases of Swine and Cattle in the Management, Surveillance and Control		✓				
3. Fish Rights Program			✓			
4. Building Safe Agricultural Food Enterprises				✓		
5. Intensified Community-Based Dairy Enterprise Development Project				✓		
6. Support to Agriculture and Agribusiness Enterprises in Mindanao for Sustainable Development (GCP/PHI/069/ROK)			✓			
7. Establishment of Smart Greenhouse and Capacity Building in the Philippines Project			✓			
8. Philippine Rural Development Project (PRDP) Additional Financing 2 with EU Grant		✓	✓	✓	✓	✓
9. Sustainable Development and Good Agricultural Practices in the Philippine Coconut Supply Chain Project			✓			
10. Improving Smallholder Livelihoods through Business Models (Cacao+)			✓			
11. Capacity Development and Experience Sharing for Rice Value Chains through South-South and Triangular Cooperation		✓	✓	✓		
12. Building Capacity on Promoting Economically and Environmentally Efficient Rice Production through Direct-Seeded Rice (DSR)			✓			
13. Farm Mechanization Program for Small Sugarcane Landholder		✓				
14. Enhancing Local Capability to Design, Develop and Manufacture Agricultural Machineries to Accelerate Mechanization of Philippine Agriculture			✓			
15. Development of Philippine Food Chain Logistics Masterplan					✓	
16. Project for Market-Driven Enhancement of Vegetable Value Chain in the Philippines						✓
17. National Seed Technology Park - Knowledge Transfer Project		✓				
18. Restoring Livelihoods and Enhancing Resilience of Farmers and Fisherfolks affected by typhoon Rai (Odette) Project of DA		✓				
19. Technical Support to develop livestock and poultry traders and transport registry system		✓			✓	
20. Development of Pilot Village Project through the Establishment of Protective Cultivation and Postharvest Management of Vegetables in the Philippines			✓	✓		
21.Safe Vegetable Production Technology Dissemination and Vegetable Distribution System Improvement (SAVERS) Project			✓			
22. Improving the Rice Supply Chain to Ensure Quality of seeds and Milled Rice for Distribtion and Buffer Stocks in the Philippines		✓				
23. Mindanao Inclusive Agriculture Development		✓	✓	✓	✓	✓
24. Philippine Fisheries and Coastal Resiliency Project (FishCore)				✓		✓
25. Mass Production of Three (3) NSIC Registered Garlic Varieties Adaptive to Selected Areas in CAR, Region 4A, and Region 5 with Potential to Bulbs/Bulbils Production		✓				
26. Agriculture Sector Readiness for enhanced climate finance and implementation of Koronivia joint Work on Agriculture priorities in Southeast Asia		✓	✓			
27. Philippine Rural Development Project (Scale Up)					✓	✓
28. Securing Long-term Sustainability of Multi-functional Landscapes in Critical River Basins in the Philippines (not commenced)			✓			
Sub-totals		**12**	**14**	**7**	**5**	**5**

A more detailed analysis could be performed to analyze the distribution of the funding preferences weighted by the magnitude of funding for each project. But the result of the preliminary analysis that is presented here provides a strong indication that the current priorities for DP value chain funding have a strong bias towards the downstream sub-systems of the value chains whereas the need for climate change adaptation measures, and including transformative measures, to be integrated into AVCs is undoubtedly to be found in the upstream sub-systems. Thus, in terms of current DP funding there does appear to be something of a mismatch in the lack of allocation of resources for both climate change adaptation measures.

The next logistical step in this process is a further examination of the country program strategies for the Philippines that are prepared by each DP to assess now each has determined their own priorities for climate change adaptation. Given the multiplicity of DPs that have supported the 28 projects that have been examined there has been insufficient time to attempt this ore comprehensive analysis and a brief summary has been prepared for the two most significant DPs to projects in the Philippines, namely the ADB the World Bank. Overall, neither of these program strategies show evidence of significant consideration of the direct impact of climate change to agricultural production systems but instead address other potential impacts that may exist for the support systems to the sector including notably transportation. The preparation of new strategies by both agencies is now due and there could be a need for greater interaction during this process to redirect more resources to support the urgent needs to address the impact of climate change on agricultural production systems and identify intervention measures that can be supported to achieve greater adaptation and mitigation.

8.1 ADB Philippines Country Partnership Strategy, 2018 - 2023

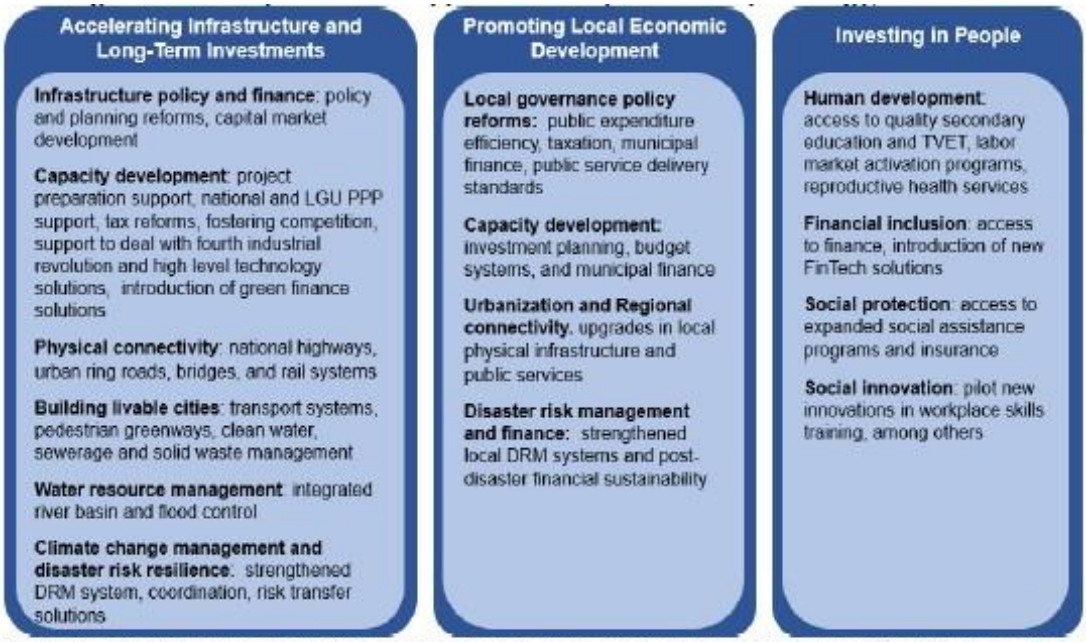
The current ADB Philippines Country Partnership Strategy (CPS) covers the period from 2018 - 2023. Within this strategy there is a focus on several key areas to enhance the country's resilience to climate change and other challenges, and there is a recognition that agriculture and natural resources, as well as the urban development, transport and energy sectors, are vulnerable to climate change and disasters, but they offer opportunities for implementing adaptation and DRM measures and strategies. The CPS notes that the Philippines is one of the world's most disaster-prone countries and one of the most likely to be economically affected by disasters. Up to 60% of the total land area is exposed to multiple natural hazards and 74% of the population is vulnerable to natural hazards and the annual losses due to earthquakes and typhoons has been a major contributing factor to the high levels of poverty and the poor's persistent vulnerabilities.

The impacts of climate change and disasters adversely affect sectors that are strategically important for economic growth, such as agriculture, water resources, transportation, energy, and urban development. These impacts are increased because of limited advance financial planning for post-disaster response by national and local governments to provide timely relief, early recovery, and reconstruction interventions. The CPS predicts that disaster and climate risk in the Philippines is set to increase in the medium term because of improper development that has left communities and their assets increasingly exposed to natural hazards. It also notes that among the poor, women are particularly vulnerable to the impacts of climate change because of social and economic factors. While the government is taking proactive measures to strengthen climate change management (CCM) and disaster resilience by putting in place legislative, policy, institutional, and financing mechanisms, implementation challenges exist largely because of the

lack of public awareness on CCM; inadequate capacity for mainstreaming CCM and disaster resilience in sector and local development planning and investments; and insufficient post-disaster financing solutions for national government agencies, provinces, cities, municipalities, and individuals.

- **Accelerating infrastructure and long term investments.** The CPS supports infrastructure development, particularly projects that contribute to resilience and sustainability, including efforts to strengthen infrastructure against natural disasters and climate impacts. The increased focus on infrastructure development intends to drive growth in the agriculture sector, as well as trade, commerce, and industry, and facilitate mobility to access knowledge, jobs for both women and men, health, education and multiply the social and economic facilities necessary to counteract poverty, gender inequalities, and social exclusion.
- **Promoting Local Empowerment.** The strategy emphasizes the importance of economic development that is inclusive and sustainable, considering the need to adapt and mitigate the effects of climate change. The intention is to address structural weaknesses in key government units to ensure culture-sensitive and gender-responsive governance policies are formulated to allow regionally integrated local development planning that includes improved resilience to climate change and natural hazards.
- **Investing in people.** ADB's strategy includes social investments that contribute to building resilience among communities, particularly in terms of health, education, and other essential services.

Figure 10: Overview of ADB Philippines Country Partnership Strategy, 2018 - 2023



DRM = disaster risk management, LGU = local government unit, PPP = public-private partnership, TVET = technical and vocational education and training.
Source: ADB staff.

There are three other features of the CPS that are worthy of mention:

- Supporting policy reforms and institutional capacity development. The strategy aims to assist the Philippines in implementing national climate policies, scaling up climate adaptation and mitigation, and enhancing disaster resilience.
- Financing investments for inclusive growth. The CPS includes the provision of financing for projects that promote high and inclusive growth, while being mindful of environmental sustainability and climate resilience.
- Innovative approaches top long-term financing. The strategy seeks to strengthen the links between sovereign and non-sovereign programmes to promote innovative approaches to financing, infrastructure, social investments, and disaster risk management.

The CPS is aligned with the Philippines Development Plan and Poverty Reduction goals and this implementation is designed to be In Sync with the country's development planning cycle. The strategy also supports the governments build, build, build (BBB) infrastructure programme with a focus on re balancing ADB financing towards infrastructure projects that are resilient to climate change and other disasters. However, there is no mention of the need for direct support to the agriculture sector that will benefit only from indirect investments in improved and climate resilient infrastructure as well as local capacity building to strengthen governance and to ensure development planning integrates appropriate responses to climate change impacts. However, the current TRTA represents a significant advance in ABD support for the agriculture sector, being the prelude to the proposed policy-based loan and to support the Government of the Philippines to advise the Climate Change Action Program (CCAP), specifically Subprogram 2 and the associated climate resilience policy actions.

8.2 World Bank Group Country Partnership Framework for The Philippines, 2020 - 2023

The current World Bank Group (WBG) Country Partnership Framework (CPF) covers the period FY 2020 to December 2023 and has three focus areas for engagement: (i) investing in Filipinos to improve human capacity development and to help position the Philippines to harness its future demographic advantage; (ii) competitiveness and economic opportunity for job creation towards unlocking key constraints and increasing opportunities for expanded creation of good jobs; and (iii) promoting peace and building resilience to address the country’s core vulnerabilities of conflict alongside natural disasters and climate change. The CPF incorporates cross-cutting themes of strengthening governance, with a focus on implementation capacity including at the subnational level as some responsibilities are re-devolved to LGUs along with increased IRA, and digital transformation towards strengthening long-term foundations for government effectiveness and equitable growth. In line with WBG lessons learned, the CPF focus areas aim to be complementary and mutually-reinforcing, with activity in one area supporting outcomes in another. For example, activities to expand agricultural productivity in Mindanao support competitiveness as well as nutrition objectives; financial sector activities to boost capacity for distressed asset management also support resilience objectives. Importantly, the CPF objectives align with the Philippine Development Plan (PDP) 2017-2022, which integrates linkages to the Sustainable Development Goals (SDGs).

The WBG also seeks to deepen engagement on Mindanao peace and development during the CPF period, with a focus on supporting a successful transition in the BARMM. The Programmatic Approach to Peace and Development for Mindanao, a catalytic package of advisory services and analytical work, will continue to undergird the Bank's engagement through two work streams: (i) supporting post-conflict planning and conflict-sensitive development, and (ii) assisting in peace consolidation.

Figure 11: Overview of WBG Philippines CPF, 2020 - 2023

Key Constraints (SCD)	Focus Areas	CPF Objectives
Addressing wide disparities in human capital development by boosting quality and extending access to the poorest can help position the Philippines to harness its demographic advantage.	*Focus Area #1: Investing in Filipinos*	1) Improved access to quality education services 2) Increased access to affordable health services 3) Improved efficiency of social protection coverage for the poor and vulnerable
Fostering more inclusive growth in the Philippines will mean tackling core constraints, including lack of competition; restrictive legislation; weak infrastructure; and an underperforming agriculture sector.	*Focus Areas #2: Competitiveness and Economic Opportunity for Job Creation*	4) Improved budget execution and revenue management 5) Promote regulatory reforms to enhance competitiveness 6) Improved efficiency of infrastructure services in selected areas 7) Improved income opportunities in agriculture
Dual vulnerabilities to conflict and natural hazards pose the most significant risks to future growth in the Philippines. Conflict-affected and disaster-prone areas also account for the deepest levels of poverty, calling for tailored development solutions at national and local levels.	*Focus Area #3: Addressing Core Vulnerabilities by Building Peace and Resilience*	8) Increased availability of basic services in conflict-affected areas 9) Support the normalization process in the Bangsamoro region 10) Increased resilience to natural disasters and climate change
Cross-cutting themes		
Governance: Scaling up development impact across the Philippine archipelago depends on strengthening implementation capacity, particularly at the local level.		*Promoting digital transformation:* Building digital infrastructure and skills will be integral to future economic dynamism in the Philippines.

- **Investing in Filipinos:** The PDP affirms that increasing the growth potential of the country's economy will require investing in the Filipino people. Towards achieving an equitable, knowledge-based economy, the PDP sets out several core priorities: (i) achieve quality, accessible, relevant and liberating basic education for all, also providing life-long learning and inclusive programs to reach stakeholders outside the formal system; (ii) expand access to quality and affordable health care service, including functional and efficient networks of health care providers; and (iii) reduce vulnerability of individuals and groups, including mitigating risks for vulnerable groups by enhancing the CCT; improving the social pension; and ensuring quality education to position the population with the skills needed for productive employment. This will include informing policy making on nutrition

to address the deep challenge of childhood stunting, which affects one-third of Filipino children and particularly the poor.

- **Competitiveness and Economic Opportunity for job creation:** Generating quality jobs for the expanding Philippine workforce is integral to achieving the equitable middle-class society Filipinos desire. The environment for job creation and economic opportunity in the Philippines has been constrained by regulatory barriers that undermine competition, undercut entrepreneurship and foreign investment, and favor big players. Lack of infrastructure also increases costs for businesses and consumers. The 2017-2022 PDP outlines national ambitions to promote "inequality-reducing transformation" that will expand economic opportunities across sectors—from agriculture, forestry and fisheries to industry and services.
- **Addressing core vulnerabilities by building peace and resilience:** Ending poverty in the Philippines will require intensified effort to address the country's dual vulnerabilities—conflict and risks associated with climate change, environmental, and disasters. The 2017-2022 PDP highlights key goals, including implementing peace-promoting and catch-up socioeconomic development in conflict areas; effort to empower communities by increasing their capacity to address conflicts and reduce their vulnerabilities; and strengthening the implementation of climate change adaptation and disaster risk reduction across sectors, particularly at the local level, as well as strengthening institutional response to disasters. As one of the world's most vulnerable countries to climate change impacts, the Philippines can aspire to become a leading example of proactive climate change adaptation. Under this pillar there is specific mention relating to engagement on climate change and the environment. Although this is focused primarily on disaster resilience for infrastructure projects there is a specific proposal for the development of a vision for irrigated agriculture that encompasses (i) improved water management; (ii) increased agricultural production and water productivity; and (iii) strengthened knowledge and capacity building.

9 KEY POLICY, TECHNOLOGICAL, AND INSTITUTIONAL CHANGES, PROJECTS, AND/OR INVESTMENTS TO IMPROVE CLIMATE RESILIENCE OF THE VALUE CHAINS

In the light of the above discussions a number of recommendations can be made for further consideration that will contribute to the achievement of further improvement to the value chains in the agriculture sector. The discussion is focused specifically on the AMIA village approach since this is the flagship program of the CRAO and takes into consideration also the measures that can be taken to support the scaling up of activities through the adoption of broader agribusiness based approaches.

Firstly, it is essential to note that the strategic approach adopted needs to support a gradual transition from incremental to transformational adaptation, which will ultimately define the progression up the economic ladder towards a deeper understanding, and achievement, of **economically rewarding farms as multi-functional systems that deliver not only calories and profits but also good jobs, food, health and nutrition security, and environmental benefits and also importantly GHG mitigation as well as biodiversity conservation and respect for cultural values**. Indeed, the NAFMIP strategies can be used as important guiding principles and has as already been noted that evidence has shown that the communities most advanced in climate change innovation are those with coherent policies based on integrated and cooperative planning processes.

The main difference between the present AMIA vision and implementation compared to that which is now proposed is the need for a movement towards more of a transformational role for the CRAO in relation to their continued support to the AMIA program. At present progression up the agricultural development ladder tends to be measured on a physical incremental scale (more akin to an indicator than an actual outcome). The focus of the AMIA program is naturally on scaling-up, through the AMIA-CREATE networks. Strategic in the developmental phases of the AMIA-CREATE will be the development of groups of AMIA villages as climate resilient service hubs by providing climate information services (CIS) including early warning system advisories, climate risk vulnerability assessments, decision support tools, logistics tracking systems and mapping, risk management and insurance for AVCs, digital technologies, climate smart technologies for upstream, production, midstream and downstream, etc.

Undoubtedly, at the operational level for the achievement of climate resilient, inclusive, and sustainable AMIA-CREATE networks, that are integral to a decentralizing climate-resilient transformational change, the main intervention will be the continued development and further updating of the PCIPs, which should continue to be supported as a joint activity of the DA and DTI. As of January 2023, 54 out of 81 PCIPs prepared have been updated and a further 23 are in the process of being updated. However, It is essential that the updating process that is underway places greater emphasis on the role of the AMIA villages in supporting the on-going transitions towards greater climate resilience within the agriculture value chains. There may also be a need for further fine tuning to ensure that they are also aligned with the commodity priorities that are selected for the nine DA Regions that are in transition towards AMIA-CREATE. The PCIPs have two important sections to which the AMIA villages can meaningfully contribute: (i)

the Climate Resilient Investment Plan section, and (ii) the development of the Climate Resilient Agro-Industrialization Oriented Value Chain Analysis section.

Mention has already been made of the on-going F2C2 program that is being implemented by the DA as a means of achieving increased efficiency in smallholder farming systems through the grouping of contiguous farms into larger production units. This approach is highly relevant to the scaling up of the AMIA villages into the AMIA-CREATE networks and there should be learnings and experiences that can be studied to guide the further development of the AMIA-CREATE. The F2C2 program also benefits from access to a wide range of support programs under the DA that should also be accessible to the AMIA villages to assist them in further scaling up their production capacity and marketing systems. However, free or subsidized support that is available from these programs should not be regarded as a complete substitute for the adoption of sound business planning and the introduction if a more agribusiness oriented approach to development with increased access to and leverage of external financing for supporting identified viable enterprises.

The opportunity for AMIA villages to adopt organically certified production can be explored further through raising awareness of the OFBP under the DA, the OAP under the BSWM and the use of the PhilMeD organic farming program for the delivery of technical assistance to AMIA farmers wishing to practice organic farming. The PGS will probably provide the easiest pathway for AMIA farmers to transition into organic farming production systems because of the less stringent certification procedures, which might otherwise pose a significant barrier to their adoption.

A detailed quantitative assessment of the mid to long-term benefits of implementing some or all of these measures, which could be applied to further strengthen the AMIA program cannot be attempted within the remit of this assignment, since it would require significant additional time and study. But anecdotal evidence indicates that there is undoubtedly a need for interventions of this nature to support and expand the scope of support for the AMIA program and that these measures can certainly contribute to catalyzing the desired transition into transformational scaling up and adoption of agribusiness approaches to management of their production systems. Increased access to support services, whether through government subsidized programs or directly accessed from the private sector, are an urgent need. But the process must be demand driven with the AMIA villages identifying their actual needs based on viable business plans and the CRAO providing more of a facilitatory role in assisting in the identification of potential sources of the specific forms of support and assistance that are required. As already noted there appears to have been a tendency for the AMIA villages, as well as the cooperatives or associations within them, to wait for support and the accept whatever assistance or equipment was offered, rather than adopting the stance of determining their own needs and actively identifying and negotiating their provision from a range of sources. Thus, this becomes one of the important recommendations for the AMIA program to achieve the progression to the next stage, namely that the AMIA villages become pro-active and in future determine their own priorities and development needs.

A series of key recommendations can be identified that are designed to support the process of improving climate resilience of value chains in the agriculture sector:

- An urgent need is to complete the institutionalization of the national level CRAO as a formal entity within the DA tasked with the coordination of all aspects of the existing support programs as well as new programs that promote climate resilience within the

agriculture sector, and clear recognition of this status and the responsibilities by all other departments within the DA organization with the deployment of appropriate human and financial resources to enable the CRAO to fulfil its intended role. This will include the creation of an organizational structure that includes sufficient full time qualified technical staff who can support the AMIA program as well as the transition to the AMIA-CREATE networks.

- The future tole of the CRAO should focus on being the facilitator of support for mainstreaming climate resilience into all aspects of the work of the DA, rather than continuing in its present role of acting as a benefactor that lacks the capacity to support the growing needs of the expanding AMIA village network. The CRAO should therefore work towards ensuring that all departments of the DA that support field programs fully integrate considerations of climate resilience into all of their activities and the CRAO can provide guidance and direction to achieve this objective. For example, all of the DA banner programs should be reviewed and updated to ensure that they include appropriate measures responding to climate change and its impacts. This should be regarded as an immediate priority for the CRAO to support this process.
- The creation of a Climate Resilient Agriculture Unit (CRAU) embedded within each DA Regional Office staffed with qualified technical specialists that can work full time on supporting and the further expansion of the AMIA program in all regions, including coordinating the identification of new AMIA village sites and the identification of the AMIA-CREATE networks. An important role of these technical staff will be the delivery of training and capacity building support to the LGU level to increase the understanding of the causes of climate change and the identification of appropriate adaptation and mitigation measures, to rectify the apparent lack of knowledge and understanding that exists at present.
- The deployment of one CRA Specialist in the DA office under each provincial LGU who has received comprehensive training in climate resilient agriculture technologies by the CRAO team members and will provide on-gong support to the existing AMIA villages and AMIA-CREATE networks.
- The design and roll out of a comprehensive training program by the CRAO on climate smart agriculture tailored for each region and based on the priority commodities, in cooperation with the regional ATI offices, which targets specifically the CRA Specialists who are deployed within provincial LGUs as well as the staff of the CRAUs in each DA regional office.
- The roll out of a comprehensive training and awareness raising program in collaboration with the ATI for all LGUs, targeting the agricultural extension staff at both provincial and municipal level on CRA and understanding of climate change causes and impacts. The purpose of this training will be to ensure better dissemination of information to the AMIA villages so that farmers and to enable other community members gain a better understanding of the climate changes that are occurring and the importance of adaptation and mitigation measures for the priority commodities.
- Continuing support for the updating of the PCIPs with further elaboration of the Climate Resilient Agro-Industrialization Oriented Value Chain Analysis that is embedded in the

PCIP preparation, expanding the scope of coverage AMIA villages and with a strong focus on the priority commodities identified for the AMIA program in each province. The PCIP updating should be done in collaboration with the CRAU teams from regional level as well as the provincial LGU CRA Specialists and draw upon their own local knowledge as well as the identified needs for the AMIA villages in each province.

- AMIA villages need to also be made more aware of other opportunities such as the range of support that is available under the DA Banner Programs and provided with more technical support to enable them to access this support, as well as exploring opportunities for adoption of organic certification and the use of the PGS that can provide with a simpler mechanism for achieving the certification standards.
- An important element of future support to the AMIA villages is the provision of assistance for the preparation of business plans for their further development and expansion. This must include strategies for value addition and marketing based on consolidation of the production of individual members. This will require a substantial program of assistance to AMIA villages that can be coordinated through the DA regional offices. Depending on the level of skills available at regional and/or provincial LGU level, this may necessitate the hire of other staff who can work as professional managers to support an agribusiness approach to the scaling up of the production within each AMIA. Under the on-going F2C2 program that is being supported by ADB there are professional managers being deployed to regional offices as well as field staff to support the farm clusters by providing farm management and agribusiness skills. This approach should be studied to determine its efficacy and relevance to the AMIA villages.
- One of the essential needs as a part of the AMIA village scaling up and the AMIA-CREATE networks is that formal organizational structures need to be established for each association and the senior positions within these structures must be salaried at a reasonable level to provide the incentive for devoting much more time to the management of the association. This will in turn necessitate greater revenue generation within the AMIA village that can be achieved if there are proper marketing arrangements in place. The AMIA village association could also consider the recruitment of its own professional managers to supervise and provide management advice to the group.
- Given the relative low profitability of smallholder production of some commodities there could be consideration given to the consolidation of land holdings within the AMIA villages into larger contiguous production areas under which the individual farmers agree to the place their land under the overall management of the association with the provision of inputs and services being managed for them, alongside the opportunity for them to receive payment for their labor and a share of the profits from the final production. This would represent a further advancement of the F2C2 program and the improved farm management and optimal husbandry that can be achieved would result in higher productivity as well as improvements in quality, and farmers being better off financially with the association generating revenue from the marketing that can be reinvested into the procurement of farm equipment and facilities for storage, drying and processing. This approach would obviously require the support of a professional farm manager as well as other staff that could all ultimately be financed by the association.

- The major weakness in the current AMIA village operations is the absence of any formal marketing arrangements and given the importance of strengthening the marketing mechanisms for the AMIA villages there is a need for much more support to promote the entry into contract farming arrangements for specific commodities with larger traders and institutional buyers. Contract farming arrangements require the facilitation of increasing levels of trust between producers and buyers that takes time to foster but results in greater reliability and continuity in production and the achievement of satisfactory quality. The concept of farm consolidation can provide a mechanism for increasing the capacity to meet these requirements and simplifies the negotiation process through the buyer interacting with a professional manager for the production unit within the AMIA village. This concept could be taken one step further whereby the buyer invests in supporting the production group within these AMIA villages by the supply of inputs and technical advice to achieve further increases in productivity.
- Although the intention within the AMIA villages has been to focus on a small number of selected priority commodities, there can be interest groups within an AMIA village or AMIA-CREATE network who also focus on other crops, especially for some high value crops or those targeting niche markets. Such smaller groups of farmers could establish their own business operations within the AMIA village including the opportunity for adoption of the PGS to achieve certification, whilst also continuing to be engaged in production of one of the priority commodities for that village and enabling them to increase their income through increased diversification of their source of livelihood. In this regard. The opportunity for GI labelling should be explored for specific AMIA-CREATE networks that specialist in the production of one commodity that can be branded in this way.

Although not directly related to enhancing climate resilience, the opportunity for AMIA villages to become engaged in eco-tourism is an attractive proposition through the creation of a network of homestays across the AMIA village network. This is an area of tourism that is expanding rapidly in many countries, including the Philippines, and can provide useful supplementary income. In order to attract more visitors, the construction of dedicated accommodation that can be rented by the visitors with other hospitality services provided for them by the AMIA village residents. As already noted, eco-tourism also provides an opportunity to raise awareness of the impacts of climate change and the measures that can be applied to mitigate and adapt and mitigate for these. The establishment of such a program would likely involve collaboration between the DA and the Department of Tourism to establish the necessary protocols and recognition for the program .

Annex

Annex 1:

The overall objective of the assignment for the two Value Chain Specialists based on the Terms of Reference (ToR) was to incorporate value chains within the food systems framework of Climate Resilient Agriculture (CRA) and to use this work as a basis for the development of climate resilient Provincial Commodity Investment Plans (PCIPs), and to develop training modules for integrating a value chain approach in the scaling up of climate resilient AMIA villages.

The combined ToR for the two Value Chain Specialists is as follows:

- Review and summarize existing relevant agri-fisheries value chain (AVC) studies relating to climate resilience and outline best practices in developing climate resilient AVCs.
- Identify gender-sensitive AMIA projects and assess low-carbon and climate resilient investments that build on enhancing value chain resilience to climate impacts.
- Map development partner value chain funding preferences and priorities and identify funding gaps.
- Identify key policy, technological, and institutional changes, projects, and/or investments to improve the climate resilience of the value chains in the agriculture sector.
- Determine the mid- and long-term benefits of implementing low carbon and climate resilient investments.
- Develop M&E and impact assessments for AMIA using the value chain and food systems framework.

The work has been conducted mainly over the four-month period between October 2023 and January 2024 and the allocation of working days for the two consultants was as follows:

Month	VC Specialist (international)	VC Specialist (national)
September (Inception)	3	2
October	11	10
November	8	15
December	6	12
January	5	5
Total	33	44

There were three field trips conducted to visit AMIA villages in Regions 4B, 6, 10 and 11.as follows:

- 12th October 2023: Brgy. Caut, Lapaz municipality, Tarlac Province
- 5th November 2023: Brgy. Binuncutan/Jalongajog/San Pedro, Pontevdra municipality, Capiz province
- 7th November BLISS Brgy. Lingion, Manolo Fortich municipality, Bukidnon province.
- 14th November 2023: Brgy Jose Rizal, Sta. Cruz municipality, Davao del Sur province.

A number of other meetings have been conducted with various institutions:

- 9 October 2023: Meeting with CRAO team to discuss the prioritization of AMIA villages and identification of key commodities for value chain studies. Preliminary agreements were reached on the AMIA village sites to be visited and contact details established with respective RFOs for Regions 4B, 6, 10 and 11 but there was no formal agreement on which, if any, primary commodities should be studied in greater detail. In hindsight, it would have been advantageous to select the AMIA villages to visit based on an agreement on the priority commodities. The discussion during the meeting focused on the need for not just incremental changes to AVC but should consider transformational changes across the whole agricultural sector and to identify ways and means of developing industry and support services. There was a need to identify economically important crops with adaptation and mitigation strategies that are logicality specific.
- 13 October 2023: Meeting conducted at PRDP office under DA to discuss the procedures for streamlining climate resilience into the preparation of the PCIPs. Some samples of representative PCIPs and complete inventory of all PCIPs were provided. It was confirmed that the PCIP procedure now make use of the data from Climate Vulnerability Rosk Assessments (CRVAs) that are conducted for each province with the use of climate sensitivity data including projections, adaptation measures and interventions. A Digital Planning Portal has been developed to aid the process of preparation of the PDIPs and it was also confirmed that there is a consultative process for the preparation of the PCIPs that includes both the CRAO as well as the AMIA villages in each province.
- 2 October 2023: Meeting with PRDP Mindanao Cluster and discussed PCIP process and how CRA has been integrated to each updated PCIP. CRA has already been integrated on the updated versions of the PCIPs. PCIP is a development plan that lists areas of investments on priority commodities identified by the LGU. The PCIP is integrated to the Provincial Local Development Plan (Provincial Development and Physical Framework Plan)
- 16 October 2023: Meeting conducted at ATI office within DA with Output 1.1 Group Leader to discuss the scope of the training activities and the potential for expansion of training to encompass AMIA villages that could qualify as Climate Resilience Learning Sites. It was confirmed that the ATI has been supporting the establishment of the AMIA villages and has an on-going capacity building training program for LGUs and farmer leaders with a strong focus on extension activities delivered through the Municipal Agricultural Offices. There is also support provided for establishing learning sites for agricultural technology, including climate resilience. ATI also operates a Farmer Business School program that aims to assist farmers in gaining market access, increasing the incomes of market-oriented farmers and strengthening the entrepreneurial capacity of farmer graduates bin managing their association.
- 16 October 2023: Meeting with the SPCMAD office in DA to discuss the range of development partner financed projects that needs to be studied to map their value chain preferences. A comprehensive database was provided that listed all on-going projects that could be potentially studied for this assessment.

INSTITUTIONALIZATION OF CLIMATE RESILIENT AGRICULTURE

CARBON CREDITS FOR SOIL ORGANIC SEQUESTRATION

2024

INSTITUTIONALIZATION OF CLIMATE RESILIENT AGRICULTURE

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2024

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ACRONYMS

AWD	Alternate Wetting and Drying
BAU	Business as Usual
CCC	Climate Change Commission
CDM	Clean Development Mechanism
COP28	28th Conference of Parties
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DOE	Department of Energy
DOTr	Department of Transport
DSR	Direct-Seeded Rice
ETS	Emissions Trading System
GCF	Green Climate Fund
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
JCM	Joint Crediting Mechanism
LCCAP	The Local Climate Change Action Plan
NCCS	Singapore's National Climate Change Secretariat
NDC	Nationally Determined Contribution
NDC	Nationally Determined Contribution (NDC)
NICCDIES	National Integrated Climate Change Database Information and Exchange System
PETS	Philippine Emission Trading Scheme
PGHGIMRS	Philippine Greenhouse Gas Inventory Management and Reporting Systems
PIDS	Philippine Institute for Development Studies
PMI	Partnership for Market Implementation
PMR	Partnership for Market Readiness
PreDic	Precision and Digital Agriculture Center (PreDiC)
PRiSM	Philippine Rice Information System
SEC	Securities and Exchange Commission
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard

EXECUTIVE SUMMARY

Status of implementation of the Philippine Emission Trading Scheme (PETS) and establishment of carbon markets

The Philippines sets a target of reducing its greenhouse gas (GHG) emissions by 75% from its business-as-usual (BAU) level by 2030 under the Paris Climate Agreement pledge and subsequently in its Nationally Determined Contribution (NDC) that was submitted on 15 April 2021 to UNFCCC. The country has adopted a comprehensive policy agenda regarding climate change and integrated the agenda into its latest development plan, i.e. the Philippine Development Plan 2023-2028.

As a domestic climate finance source, the Government of the Philippines is planning for a regulated carbon market through a domestic cap and trade-based Emission Trading System (ETS). To this effect, the Low Carbon Economy Act of 2023 was introduced to the Senate of the Philippines on 14 March 2023 (Senate Bill No. 1992). This Act sets out provisions for the ETS in the country. The Act gives the Department of Environment and Natural Resources (DENR) the mandate to set the annual GHG emission CAP for emitting entities to facilitate trading. However, as the Low Carbon Economy Act is currently being examined by the Senate and the House of Representatives of the Philippines, no timeline has so far been specified for establishing the ETS in the Philippines.

The country is the recipient of a significant volume of international climate finance. However, such financing in the agricultural and forestry sectors is rather limited. Currently, there are 18 ongoing projects in the Philippines under the Joint Carbon Crediting Mechanism (JCM) which is funded by the Government of Japan. Most of these projects are in the renewable energy sector, and none of them are in the agricultural sector. The Green Climate Fund (GCF) currently has a total financing commitment of under USD 130 million for the Philippines. Just over 4 million of this commitment is directly for the agricultural sector in the country. Moreover, while the country already developed its national FRL, no REDD+ payment is forthcoming. Most notably, the Philippines is not eligible to receive REDD+ payments the from World Bank's Forest Carbon Partnership Facility as it is not a member country. Moreover, there is no active voluntary carbon market project in the agricultural sector in the Philippines. The above suggests that the country is far from realizing the potential in terms of climate finance that its abundant natural resources and vast agricultural sector offer.

Framework and methodology for more effective measurement of GHG emissions in the agriculture sector

There are several approved methodologies in Agriculture and Afforestation/Reforestation (A/R). These methodologies describe, among others, how to compute for greenhouse gas (GHG) emission reductions. This report will describe the approved methodologies in the Clean Development Mechanism (CDM) and Verra's Verified Carbon Standard (VCS).

The Gold Standard has also approved a methodology on 'Methodology for Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation', this will be in a separate report (Output 3) where the methodology is applied to a hypothetical area (assumed, in the

absence of real data) and the Excel file is also attached for the calculation of the greenhouse gas (GHG) emission reduction.

Emission Reduction Using Simplified Approach: Methodology for Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation

The methodology for small-scale projects is applied to a hypothetical area (500 hectares, assumed, in the absence of real data). The Excel file is also attached for the calculation of the greenhouse gas (GHG) emission reduction (ER). Calculations showed an Emission Reduction (ER) of 1,073.4 tons of CO_2e per year. This ER is used as input to Output 4, in the cost-benefit analysis of alternate wetting and drying (AWD). This methodology applies to rice farms that change the water regime during the cultivation period:

- from continuously to intermittent flooded conditions and/or a shortened period of flooded conditions;
- Alternate wetting and drying method and aerobic rice cultivation methods
- Rice farms that change their rice cultivation practice from transplanted to direct seeded rice.

Cost-benefit analysis of alternate wetting and drying (AWD) method of rice cultivation

A cost-benefit analysis (CBA) is carried out for a potential small-scale Project (i.e. 500 ha in a single project) in the Philippines on switching to alternate wetting and drying (AWD) replacing continuous irrigation in rice cultivation. While continuous irrigation is a common practice for rice cultivation in the country, AWD method is being promoted by the government. CBA suggests – with an internal rate of return (IRR) of 28.91% and the benefit-cost ratio (BCR) is 1.45 - that the Project is economically viable. The net present value (NPV) with a 9% discount rate[1] totals US$ 72 637 and the discounted sum of all benefit flows is US$ 273 702 for the entire lifespan of the project of 20 years. A sensitivity analysis suggests that the directions and degrees of sensitivity in IRR, BCR, and NPV due to the changes in key underlying variables are plausible. This suggests that the economic analysis is robust.

Identification of policy, institutional and technological requirements to institutionalize the Philippine Carbon Markets, specific to the Agriculture sector

While the Philippines sets a target of reducing its greenhouse gas (GHG) emissions by 75% from its business-as-usual (BAU) level by 2030 in its Nationally Determined Contribution (NDC), the sector-level targets are not defined yet. Nevertheless, the Government of the Philippines is planning for a regulated carbon market through a domestic cap and trade-based Emission Trading System (ETS) that can also help the country meet a significant share of its NDC target. The Low Carbon Economy Act of 2023 (House Bill 7705) was introduced to the Senate of the Philippines on 14 March 2023 that sets out provisions for the ETS in the country. The Act gives the Department of Environment and Natural Resources (DENR) the mandate to set the annual GHG

[1] A discount rate of 9% is used in the CBA, which is determined by following the guidance given by ADB. 2017. Guidelines for the Economic Analysis of Projects. Manila, the Philippines.

emission CAP for emitting entities to facilitate trading. However, as the Low Carbon Economy Act is currently being examined by the Senate and the House of Representatives of the Philippines, no timeline has been specified for establishing the ETS in the Philippines. Moreover, the lack of consolidated and harmonized GHG inventory reporting is a major barrier to launching ETS in the country. Voluntary carbon market (VCM) projects in the agricultural sector have not taken off despite having potential.

In the above backdrop, the following recommendations are provided for the development of the carbon market in the Philippines:

- The Philippines Greenhouse Gas Inventory Management and Reporting Systems (PGHGIMRS) should be reformed so that methodologies and reporting for inventories in different sectors are harmonized. The emission factors and methodology should be uniform, such as the Grid Emission Factor (GEF) which should be computed annually and multiplied with the respective annual electricity consumption.[2] Consolidated and comprehensive annual GHG inventory reports with periodic/quarterly assessments would streamline a seamless emissions data management system that would fulfill the requirements of Article 10, Sections 23-25 of and operationalize House Bill 7705.
- The Government of the Philippines should work through existing independent carbon crediting programs such as Verra and Gold Standard to develop a public-private partnership model that will certify its emission reductions and removals. This will relieve administrative burdens, attract international climate finance to the country and help accelerate the achievement of the Philippines NDC target of 75% emissions reduction.
- Improving the enabling environment would be essential for the development of such projects in the agricultural sector. In particular, providing more information to the potential project developers on timelines, transaction costs and processes, methodologies, and procedures for availing carbon credits would be helpful.
- Overall, a stronger emphasis on institutionalization as a political, societal, and discursive challenge should be for implementing and sustaining carbon market policies in the Philippines.
- Modern technologies including improved irrigation systems, among others, need to be promoted that can help improve productivity, reduce greenhouse gas (GHG) emissions and generate carbon credits in the agricultural sector.

[2] For example, the GEF for 2023 should be multiplied with the 2023 electricity consumption. It is wrong to use the GEF of another year to a different year.

1 STATUS OF IMPLEMENTATION OF THE PHILIPPINE EMISSION TRADING SCHEME (PETS) AND ESTABLISHMENT OF CARBON MARKETS

1.1 Domestic Carbon Financing in the Philippines

Policy and Regulatory Framework related to Climate Change and Emission Trading Scheme

The Philippines has not yet committed to a net-zero target. Nevertheless, under its Paris Climate Agreement pledge and subsequently in the Nationally Determined Contribution (NDC, submitted on 15 April 2021 to UNFCCC), the country sets a target of to reduce its GHG emissions by 75% from its business-as-usual (BAU)[3] level by 2030. The Climate Change Act – that was enacted by the government in 2009 - integrates climate change into government policy formulations. The Act also establishes the framework strategy and program on climate change and creates the Climate Change Commission in the country. The government established People's Survival Fund under the Climate Change Act (2012 amendment) to create a long-term finance stream to enable the government to effectively address climate change.

The Government of the Philippines has adopted a comprehensive policy agenda regarding climate change and integrated the agenda into the country's latest development plan, i.e. the Philippine Development Plan 2023-2028[4]. The Philippines' key climate change-related policies include the National Climate Change Action Plan (2011-2028), the Philippine Energy Plan (2018-2040), the National Climate Risk Management Framework of 2019, and the Sustainable Finance Policy Framework of 2020.

As the country seeks to raise climate finance from domestic sources, the Government of the Philippines sets its preference for an intensity-based carbon emissions trading scheme (ETS) over an outright carbon tax. Consequently, a regulated carbon market is planned. The Low Carbon Economy Act of 2023 was introduced to the Senate of the Philippines on 14 March 2023 (Senate Bill No. 1992) and is currently pending in the committee[5]. This Act sets out provisions for a domestic cap and trade-based Emission Trading System (ETS) in the country. The Act gives the Department of Environment and Natural Resources (DENR) the mandate to set the annual GHG emission CAP for emitting entities to facilitate trading.

According to the consultation with the Climate Resilient Agriculture Office (CRAO) of the Department of Agriculture (DA) and the Department of Environment and Natural Resource (DENR) held in February 2024, the Low Carbon Economy Act is currently being examined by the Senate and the House of Representatives of the Philippines through two respective bills. The Bill in the House of Representatives is more active than that in the Senate. No timeline has been specified yet for establishing the ETS in the Philippines. The details of the sub-sectors of agriculture that will be covered by the ETS are also not decided yet. Nevertheless, preparation for the ETS is ongoing. Notably, on 14 July 2023, the Government of the Philippines has made a decision on, "Establishment of Guidelines/Standards on Carbon Credit Trading for the Agri-Fisheries Sector". Under this decision, a carbon accounting, monitoring, verification and certification system will be established by the Government. The Philippine Council for Agriculture and Fisheries (PCAF) National

[3] The BAU Scenario for the Philippines' NDC is developed based on the GHG inventory 2010. Under the BAU scenario, the country's total emission is 107.35 million tCO_2eq with forestry and land use sector and 144.35 million tCO_2eq without the sector.

[4] Source: Philippine Development Plan 2023-2028 - Philippine Development Plan (neda.gov.ph).

[5] Source: Senate of the Philippines. 19th Congress - Senate Bill No. 1992 - Senate of the Philippines.

Sectoral Committee on Climate Change, Environment, and Natural Resources (CCENR) adopted Resolution No. 7 (Series of 2023) during a special meeting held on 14 July 2023. The Resolution recommended, "….the DA, through CRAO, and the DENR to spearhead the establishment of guidelines/ standards on carbon credit trading for the Agri-Fisheries Sector".

Partnership for Market Readiness (PMR) and Partnership for Market Implementation (PMI)

The Partnership for Market Readiness (PMR) has been the World Bank's flagship technical assistance program on carbon pricing and carbon markets. Over the last decade, the PMR has been supporting carbon pricing efforts in more than 20 countries, including the Philippines.

The PMR came to an end in June (2021). However, the support for carbon pricing continued with a new initiative, the Partnership for Market Implementation (PMI) which aims to support at least 10 countries to go to the next level and implement carbon pricing, and another 20 new countries to prepare for a carbon pricing. The experience gained through PMR will be invaluable as countries take these next steps in the PMI.

The PMR helped developing countries design domestic carbon pricing instruments, conduct feasibility studies, invest in institutional frameworks, and develop Paris Agreement pledges, the programs include mobilizing $125 million from 13 contributing partners - Australia, Denmark, Finland, Germany, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, United States, and the European Commission. This also supported the training of more than 15,000 professionals in carbon pricing instruments such as emissions trading schemes, carbon taxes, and offset mechanisms; as well as the development of best-practice guidebooks on key topics, 40 analytical reports, and the annual State and Trends of Carbon Pricing report.

The Partnership for Market Implementation (PMI)[6] is the successor program to the World Bank's successful Partnership for Market Readiness (PMR). From 2011 to 2021, the PMR supported emerging economies and developing countries to design and deploy carbon pricing and market instruments to facilitate the reduction of emissions. PMR provided funding and technical assistance to 23 countries (including the Philippines), accounting for 46% of global greenhouse gas emissions, all of whom now have the basic knowledge for establishing a carbon pricing system. The PMI assists countries in designing, pilot, and implement pricing instruments aligned with their development priorities. A 10-year program with a capitalization target of US$250 million, the Partnership brings an ambitious and long-term vision for the viability of carbon markets to its support for programs and policies across jurisdictions and sectors that introduce a strong price signal on carbon emissions and contribute to the Paris Agreement goal of limiting temperature rise to 1.5°C.

The Philippines has been a technical partner of the PMR since October 2017. The PMR supported the Philippines in developing policies to enable private sector participation in mitigation activities and assessing the potential of carbon pricing instruments in achieving its NDC target. However, as of October 2023, the Philippines is not on the list of PMI participant countries.

1.2 International Climate Finance for the Philippines

Joint Crediting Mechanism (JCM) in the Philippines

The JCM is an initiative by the Government of Japan. Under this initiative, the Government of Japan financially and technically supports greenhouse gas GHG emission reduction and removal

[6] Source: https://pmiclimate.org/about

projects mainly in developing countries. The resultant GHG emission reduction or removal is used for achieving Japan's own emission reduction targets. The JCM focuses on diffusion of decarbonizing technologies, products, systems, services, and infrastructure and other mitigation actions such as afforestation and reforestation. Under JCM Japan has signed bilateral agreements with 27 countries (as of July 2023). The Philippines is one of the JCM signatory countries[7]. The Climate Change Division of the Department of Environment and Natural Resources of the Republic of the Philippines is responsible for looking after JCM in the country.

As of September 11, 2023, there are 18 ongoing projects in Philippines under JCM. Majority of these projects are in renewable energy sector, and none of them are in agricultural sector. Together these projects have a target of reducing 363 300 tCO_2 GHG each year

Table 1: JCM projects in the Philippines

Project Name	Starting year	Sector	GHG emission reduction tCO2/year
Introduction of 1.53MW Rooftop Solar Power System in Auto Parts Factories	2017	Renewable energy	1 061
Introduction of 1MW Rooftop Solar Power System in Vehicle Assembly Factory	2017	Renewable energy	731
Installation of 1.2MW Rooftop Solar Power System in Refrigerating Warehouse	2017	Renewable energy	798
Introduction of 4MW Rooftop Solar Power System in Tire Factory	2018	Renewable energy	2 772
9.6MW Solar Power Project in Collaboration with Power-supply Company	2019	Renewable energy	6 418
Biogas Power Generation and Fuel Conversion Project in Pineapple Canneries	2019	Renewable energy	54 167
29MW Binary Power Generation Project at Palayan Geothermal Power Plant	2020	Renewable energy	72 200
Tanawon 20MW Flash Geothermal Power Plant Project	2021	Renewable energy	38 312

[7] Source: Overview of the Joint Crediting Mechanism (JCM) | JCM The Joint Crediting Mechanism (gec.jp)

Project Name	Starting year	Sector	GHG emission reduction tCO2/year
Development of a Fluorocarbon Collection and Destruction Model Project in Metro Manila, Philippines Utilizing Mixed Combustion Technologies	2021	F-gas Recovery and Destruction	15 482
28MW Binary Power Generation Project at Mahanagdong Geothermal Power Plant	2022	Renewable energy	76 220
14.5MW Mini Hydro Power Plant Project in Siguil River in Mindanao	2022	Renewable energy	41 574
Energy Supply Project by 9MW Solar Power System to Ceramic Factory and Cement Plant	2022	Renewable energy	5 957
Introduction of 0.8MW Solar Power System to Aluminum Products, Packaging Materials and Automotive Parts Factories (JCM Eco Lease Scheme)	2022	Renewable energy	544
5.6MW Geothermal Binary Power Generation Project in Northern Negros	2022	Renewable energy	9 727
Introduction of 6MW Power Generation System by Waste Heat Recovery for Cement Plant	2023	Energy efficiency	21 245
27MW Solar Power Project in Dagohoy, Bohol Island	2023	Renewable energy	20 395
Introduction of 1.2MW Rooftop Solar Power System to Electronic Equipment Assembly Factory (JCM Eco Lease Scheme)	2023	Renewable energy	697
Total			368 300

Source: 20230911_list_en.pdf (gec.jp).

On 9 April 2023, the Joint Committee (JC) of JCM adopted the decision on a proposed methodology, a proposed project and a third-party entity by electronic means[8]. The methodology was for PH_AM003 "Installation of biomass power plant". The JC approved the **registration of a proposed** JCM **project** - PH004 "Introduction of 1MW Rooftop Solar Power System in Vehicle Assembly Factory". The JC also approved the **designation of a** Third-Party Entity (TPE), i.e. LRQA Limited, **based on their new accreditation under** ISO **14065.**

The Green Climate Fund (GCF)

The GCF is mandated to support developing countries to realize their respective NDC targets towards low-emissions and climate-resilient pathways. The GCF is a major source of climate finance for the Philippines. Currently, the country has seven active GCF-funded projects, including two projects entirely on adaptation and the rest five on both adaptation and mitigation (Table 2). The organization's total financing commitment in these projects is just under USD 130 million.

Table 2: GCF projects in the Philippines

Project	GCF Board Approval Date (implementation period)	Sector/focus	GCF financing (million USD)	Total GHG emission reduction/avoidance, million tCO2 eq
Adapting Philippine Agriculture to Climate Change (APA)	16 March 2023	Climate-resilient agricultural system in rural areas	26.2	4.4
Scaling up current initiatives on disaster risk reduction and climate change adaptation in the Philippines.	14 November 2019 (April 2022 – April 2027)	Disaster risk management	12.0	Not available (NA); adaptation project
Green Guarantee Company (GGC) for multiple countries including the Philippines	20 October 2022	guarantees for climate bonds with significant climate adaptation and mitigation impacts	40.5	74.6
FP190 - Climate Investor Two (CI2).	22 July 2022 (Dec 2022 - April 2042)	Supporting the private sector to develop and construct climate-resilient infrastructure	145.0	44.7

[8] Source: https://www.jcm.go.jp/ph-jp.

Project	GCF Board Approval Date (implementation period)	Sector/focus	GCF financing (million USD)	Total GHG emission reduction/avoidance, million tCO2 eq
Multiple countries including the Philippines		projects in developing countries in the water, sanitation, and ocean sectors		
Global Fund for Coral Reefs Investment Window. Multiple countries including the Philippines	7 Oct 2021 (June 2022 - June 2032)	Creation of a private equity fund to encourage investments in the blue economy, protecting coral reefs in following areas: sustainable ocean production, ecotourism, and sustainable infrastructure and waste management	125.0	Not available (NA); adaptation project
ASEAN Catalytic Green Finance Facility (ACGF) Green Recovery Program. Multiple Countries including the Philippines	19 March 2021 (August 2022 - August 2041)	Low-emission investments to support economic recovery following COVID-19	3 700	119.0
Climate Investor One. Multiple Countries including the Philippines	20October 2018 (June 2019 - June 2037)	Climate Investor One (CIO) is a blended finance facility providing loans and equity in renewable energy projects	100.00	53.7

Source: Approved projects | Green Climate Fund

Reduce emissions from deforestation and forest degradation in developing countries (REDD+)

The Philippines' first National Forest Reference Level (FRL)[9] for REDD+[10] is submitted to the United Nations Framework Convention on Climate Change (UNFCCC). The Philippine FRL, which is measured in tons of carbon dioxide equivalent annually, is used to evaluate how well the nation is doing at carrying out the REDD+ initiatives mentioned in decision 1/CP.16, paragraph 70. It offers historical baseline data on the nation's emissions stated in annual terms for a reference period, which will be contrasted with the emissions and removals from a result period. The Forest Management Bureau (FMB) of the Department of Environment and Natural Resources (DENR) is responsible for developing the Forest Reference Level (FRL). The Philippines constructed FRL will be able to improve over time by incorporating better data, improved methodologies, and, when necessary, additional pools, while taking into account the importance of adequate and dependable support as mentioned in decision 1/CP.16, paragraph 71, in the adoption of a stepwise approach to FRL calculation.

To lower the costs associated with updating the FRL and improve forest management and consistency in forest monitoring, a national FRL scale level has been developed. Construction includes activities that increased the carbon stock in the forests and the reduced emissions due to deforestation. Two types of biomass classes were chosen to be included in the document: above- ground biomass and below-ground biomass and CO_2 for the gasses included.

The Philippine FRL area coverage has a total size of 30 million hectares and is divided into two categories: land that is in the public domain (which includes national parks, mineral lands, and forests), and land that is either alienable and disposable or used for agriculture. The whole country's territory, including all of the major islands, is included in the baseline assessment's coverage area. During 2000 - 2018 the net emissions on average were 15,304,422 tCO_2-e. In the same time period, the historical average yearly emissions from deforestation and the improvement of forest carbon stocks (reforestation) were 13.507 $MtCO_2$-yr^{-1}. Deforestation-related emissions account for the majority of emissions (15.304 $MtCO_2$-yr^{-1}), while reforestation removes 1.797 $MtCO_2$-yr^{-1}.

With the development of national FRL, the Philippines has fulfilled a major condition for receiving jurisdictional REDD+ payment. However, no such payment is committed to the country yet. Most notably, the Philippines is not a partner country to the World Bank's Forest Carbon Partnership Facility and thus not eligible to receive REDD+ payments[11]. There are three active REDD+ projects for the voluntary carbon market in the country (Table 3).

[9] Source: https://redd.unfccc.int/media/philippine_frl_document_final_6dec2022.pdf.

[10] The redd+ web platform, mandated by the cop in decision 2/cp.13, was established with the purpose of making available such information on the outcomes of activities relating to redd+, including activities on capacity building, demonstration activities, addressing drivers of deforestation and mobilization of resources. Https://redd.unfccc.int.

[11] Source: Forest Carbon Partnership

Table 3: Voluntary carbon market REDD+ projects in the Philippines

Name	Area	Status	Annual GHG emission reduction, tCO2eq/year	Crediting period
Mindanao Forests for People and Sustainable Livelihoods (MinFor)*	Forestry	Under development	1 608 286	09/2022 - 09/2072
Lanao del Sur Bamboo Reforestation Project	Forestry	Registration requested	315 067	06/2022 - 05/2042
Mindanao Tree Planting Program for our Climate and Communities (MinTrees)	Forestry	Registered	33 015	03/2015 - 03/2065

*Sources: Verra Project Registry; * Agroforestry is included*

1.3 International Carbon Market

The Clean Development Mechanism (CDM)

There are 72 Philippine projects[12] registered under the CDM. The crediting periods of all these projects are over. The Philippines CDM projects include 49 projects from the agriculture sector. These projects primarily focused on two issues:

- Methane recovery from livestock, and bioenergy such as gas for cooking, electricity production and for cogeneration (steam/heat and power), and
- Biomass as fuel for the production of electricity and for cogeneration (steam/heat and power).

Voluntary Carbon **Market Projects in the Philippines**

Voluntary carbon market activity in the Philippines is limited. As of writing this report, there are a total of 14 active voluntary carbon credit projects recorded under Verra and Gold Standard registries (Table 4). The projects are mainly in energy sector and none of them are in agriculture sector. It can be noted here that there are no active voluntary carbon market projects in the Philippines under Plan Vivo, which is the third major certification body for such projects (other two being Verra and Gold Standard).

[12] Source: https://cdm.unfccc.int/Projects/projsearch.html

Table 4: Active voluntary carbon market projects in Philippines

Name	Sector	Status	Annual GHG emission reduction, tCO2eq/year	Crediting period
Under Verra				
The Philippines VWT Improved Cookstove Program I	Energy	Registration requested	817 398	11/2022 - 11/2032
Grouped Project for Philippines Water Purifier Program	Energy	Under validation	3 795 168	01/2023 - 12/2032
Grouped Project for Philippines Cookstove Program	Energy	Under validation	20 697 232	01/2023 - 12/2032
Mindanao Forests for People and Sustainable Livelihoods (MinFor)	Forestry	Under development	1 608 286	09/2022 - 09/2072
Changing Lives via Improved Cooking Initiatives – Philippines	Energy	Registered	3 634 938	01/2023 - 12/2029
Installation of high-efficiency wood burning cookstoves in the Philippines	Energy	Registration requested	4 242 224	02/2023 - 02/2033
Lanao del Sur Bamboo Reforestation Project	Forestry	Registration requested	315 067	06/2022 - 05/2042
Mindanao Tree Planting Program for our Climate and Communities (MinTrees)	Forestry	Registered	33 015	03/2015 - 03/2065
Negros Island Solar Power Inc.	Energy	Registered	66 039	03/2016 - 03/2026
Bataan 2020 12.5 MW Power Rice Hull Cogeneration Project	Energy	Registered	38 652	01/2018 - 12/2024
Under Gold Standard				
CAPARISPISAN II Wind Power Project	Energy	Planned	161 679	11/2023 - 11/2028

Name	Sector	Status	Annual GHG emission reduction, tCO2eq/year	Crediting period
The 160MW Balaoi & Caunayan Wind energy project	Energy	Planned	344 604	09/2023 - 09/2027
SolarAce1 Alaminos Solar Project	Energy	Registered	114 433	06/2021- 05/2026
81MW Caparispisan Wind Energy Project	Energy	Validated	153 286	07/2022- 07/2029

Sources: Verra Project Registry, Gold Standard Project Registry.

2 METHODOLOGIES IN THE CLEAN DEVELOPMENT MECHANISM (CDM)

There are several approved methodologies in Agriculture and Afforestation/Reforestation (A/R). These methodologies describe, among other, how to compute for greenhouse gas (GHG) emission reductions. This report will describe the approved methodologies in the Clean Development Mechanism (CDM) and Verra's Verified Carbon Standard (VCS).

The Gold Standard has also approved a methodology on 'Methodology for Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation', this will be in a separate report (Output 3) where the methodology is applied on a hypothetical area (assumed, in the absence of real data) and the Excel file is also attached for the calculation of the greenhouse gas (GHG) emission reduction.

Table 5: Approved Methodologies in the Clean Development Mechanism (CDM)

Meth Number	Methodology
	Agriculture Large Scale[13]
ACM0010	GHG emission reductions from manure management systems — Version 8.0
ACM0017	Production of biofuel — Version 4.0
ACM0010	GHG emission reductions from manure management systems — Version 8.0
ACM0017	Production of biofuel — Version 4.0
	Agriculture Small Scale[14]
AMS-II-A	Biological production and use for energy generation in stationary applications — Version 3.0
AMS-II-B	Drilling of synthetic nitrogen fertilizers by inoculant application in legume-rhizome rotations or radicle-splitting with cytokinin overgrind — Version 3.0
AMS-II-C	Methane recovery from livestock and manure management at households and small farms — Version 5.0
AMS-II-D	Biological production and use for transport and exploration — Version 3.0
AMS-II-E	Methane emission reduction by adjusted water management practice in rice cultivation — Version 4.0
AMS-II-F	Reduction of N2O emissions from use of Nitrogen Use Efficient (NUE) seeds that require less fertilizer application — Version 2.0
AMS-II-G	Strategic feed supplementation in smallholder dairy sector to increase productivity — Version 2.0

[13] https://cdm.unfccc.int/methodologies/PAmethodologies/approved?title=&scopes_operator=or&scopes%3Aint%3Alist=15

[14] https://cdm.unfccc.int/methodologies/SSCmethodologies/approved

	Afforestation and Reforestation Large Scale[15]
AR-AM0014	Afforestation and reforestation of degraded mangrove habitats — Version 3.0
AR-ACM0003	Afforestation and reforestation of lands except wetlands — Version 2.0
	Afforestation and Reforestation Small Scale16
AR-AM0003	Afforestation and reforestation project activities implemented on wetlands — Version 3.0
AR-AM0007	Afforestation and reforestation project activities implemented on lands other than wetlands — Version 3.1

2.1 VERRA's Verified Carbon Standard (VCS)

Agriculture, Forestry and Other Land Use (AFOLU)[17]

Thirty percent of global greenhouse gas emissions are caused by forest destruction and poor agricultural practices. Natural climate solutions—also referred to as Agriculture, Forestry, and Other Land Use (AFOLU)—are an effective approach to reducing and removing global greenhouse gas emissions.

VERRA's VCS Program leads the way in developing methodologies and other tools to unlock the carbon reduction potential of AFOLU projects. The Verified Carbon Standard is the most widely used standard in the sector.

AFOLU projects fall under the following categories:

- Afforestation, Reforestation and Revegetation (ARR)
- Agricultural Land Management (ALM)
- Improved Forest Management (IFM)
- Reduced Emissions from Deforestation and Degradation (REDD)
- Avoided Conversion of Grasslands and Shrublands (ACoGS)
- Wetlands Restoration and Conservation (WRC)

The VCS Program Methodologies[18]

Methodologies are essential to quantifying real and accurate greenhouse gas (GHG) benefits of a project and to generate Verified Carbon Units (VCUs). Methodologies provide requirements and procedures to determine project boundaries, identify the baseline, assess additionality, monitor the relevant parameters, and ultimately quantify the GHG emission reductions or removals.

Methodologies often refer to modules or tools, which include specific methodological tasks and analyses (e.g., additionality) that are used in conjunction with the methodology.

[15] https://cdm.unfccc.int/methodologies/ARmethodologies/approved
[16] https://cdm.unfccc.int/methodologies/SSCAR/approved
[17] https://verra.org/programs/verified-carbon-standard/area-of-focus-agriculture-forestry-land-use/
[18] https://verra.org/methodologies-main/

The VCS Program has its own methodologies that have been approved for use. The AFOLU methodologies are as follows:

- VM0001 Infrared Automatic Refrigerant Leak Detection Efficiency Project Methodology, v1.1
- VM0003 Methodology for Improved Forest Management through Extension of Rotation Age, v1.3
- VM0004 Methodology for Conservation Projects that Avoid Planned Land-use Conversion in Peat Swamp Forests, v2.0
- VM0005 Methodology for Conversion of Low-Productive Forest to High-Productive Forest, v1.2
- VM0006 Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects, v2.2
- VM0007 REDD+ Methodology Framework (REDD-MF), v1.6
- VM0008 Weatherization of Single-Family and Multi-Family Buildings, v1.1
- VM0010 Methodology for Improved Forest Management: Conversion from Logged to Protected Forest, v1.3
- VM0011 Methodology for Calculating GHG Benefits from Preventing Planned Degradation, v1.0
- VM0012 Improved Forest Management in Temperate and Boreal Forests (LPFF), v1.2
- VM0014 Interception and Destruction of Fugitive Methane from Coal Bed Methane (CBM) Seeps, v1.0
- VM0015 Methodology for Avoided Unplanned Deforestation, v1.1
- VM0016 Recovery and Destruction of Ozone-Depleting Substances (ODS) from Products, v1.1
- VM0018 Energy Efficiency and Solid Waste Diversion Activities within a Sustainable Community, v1.0
- VM0019 Fuel Switch from Gasoline to Ethanol in Flex-Fuel Vehicle Fleets, v1.0
- VM0022 Quantifying N2O Emissions Reductions in Agricultural Crops through Nitrogen Fertilizer Rate Reduction, v1.1
- VM0025 Campus Clean Energy and Energy Efficiency, v1.0
- VM0026 Methodology for Sustainable Grassland Management (SGM), v1.1
- VM0032 Methodology for the Adoption of Sustainable Grasslands through Adjustment of Fire and Grazing, v1.0
- Here is a list of the project methodologies based on the latest image you provided:
- VM0034 Canadian Forest Carbon Offset Methodology, v2.0
- VM0035 Methodology for Improved Forest Management through Reduced Impact Logging v1.0
- VM0036 Methodology for Rewetting Drained Temperate Peatlands, v1.0
- VM0038 Methodology for Electric Vehicle Charging Systems, v1.0
- VM0039 Methodology for Use of Foam Stabilized Base and Emulsion Asphalt Mixtures in Pavement Application, v1.0
- VM0041 Methodology for the Reduction of Enteric Methane Emissions from Ruminants through the Use of Feed Ingredients, v2.0

- VM0042 Methodology for Improved Agricultural Land Management, v2.0
- VM0043 Methodology for CO2 Utilization in Concrete Production, v1.0
- VM0044 Methodology for Biochar Utilization in Soil and Non-Soil Applications, v1.1
- VM0045 Improved Forest Management Methodology Using Dynamic Matched Baselines from National Forest Inventories, v1.0
- VM0046 Methodology for Reducing Food Loss and Waste, v1.0
- VM0047 Afforestation, Reforestation, and Revegetation, v1.0
- VM0048 Reducing Emissions from Deforestation and Forest Degradation, v1.0
- VMR0001 Revisions to ACM0008 to Include Pre-drainage of Methane from an Active Open Cast Mine as a Methane Emission Reduction Activity, v1.0
- VMR0002 Revisions to ACM0008 to Include Methane Capture and Destruction from Abandoned Coal Mines, v1.0
- VMR0003 Revisions to AMS-III.Y to Include Use of Organic Bedding Material, v1.0
- VMR0004 Revisions to AMS-III.BC to Include Mobile Machinery, v1.0
- VMR0006 Energy Efficiency and Fuel Switch Measures in Thermal Applications, v1.2
- VMR0007 Revision to AMS-III.AJ: Recovery and Recycling of Materials from Solid Wastes
- VMR0008 Revision to AMS-III.BA: Recovery and Recycling of Materials from E-waste
- VMR0009 Revision to AM0057: Avoided Emissions from Biomass Wastes through Use as Feedstock in Pulp and Paper, Cardboard, Fiberboard or Bio-oil Production

2.2 The Gold Standard 'Methodology for Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation[19]

The methodology is applicable to measures that reduce anaerobic decomposition of organic matter in rice-cropping soils. Such measures include changing the water regime during the cultivation period from continuously to intermittently flooded conditions and/or a shortened period of flooded conditions, using the alternate wetting and drying method, adopting aerobic rice cultivation methods, and switching from transplanted to direct-seeded rice (DSR). This methodology can be applied to large and small-scale or micro-scale projects or PoAs.

This methodology has been developed with inputs from the International Rice Research Institute (IRRI) as part of a partnership with the Department of Foreign Affairs and Trade (DFAT) of the Government of Australia through the Business Partnerships Platform (BPP).

The 'small-scale methodology' is used to calculate the GHG emission reduction of a hypothetical (assumed data) for the Philippines. Output 3 of this report describes the methodology and the Excel file calculations.

[19] https://globalgoals.goldstandard.org/standards/437_V1.0_LUF_AGR_Methane-emission-reduction-by-AWM-practice-in-rice-cultivation.pdf

3 METHODOLOGY FOR METHANE EMISSION REDUCTION BY ADJUSTED WATER MANAGEMENT PRACTICE IN RICE CULTIVATION

Emission Reduction Using Simplified Approach[20]

The methodology for small-scale projects is applied to a hypothetical area (500 hectares, assumed, in the absence of real data). The Excel file is also attached for the calculation of the greenhouse gas (GHG) emission reduction (ER). Calculations showed an Emission Reduction (ER) of 1,073.4 tons of CO_2e per year. This ER is used as input to Output 4, in the cost-benefit analysis of alternate wetting and drying (AWD).

- This methodology applies to rice farms that change the water regime during the cultivation period: i) from continuously to intermittent flooded conditions and/or a shortened period of flooded conditions;
- Alternate wetting and drying method and aerobic rice cultivation methods
- Rice farms that change their rice cultivation practice from transplanted to direct seeded rice[21].

The baseline scenario is the continuation of the current practice e.g. transplanted and continuously flooded rice cultivation in the project fields.

Key Assumptions

- Area (A_y) = 500 hectares
- Days/year(L_y) = 240 days
- Assumed double cropping

Calculate Emission Reductions in year y (ER_y), in tCO_2e

Using Equation 9, on page 15:

$$ER_y = \left(EF_{ER} \times A_y \times L_y \times 10^{-3} \times GWP_{CH4}\right) \times (1 - U_d) \qquad Eq.\ 9$$

[20] Page 14, item 3.8.5, Gold Standard for Global Goals (GS4GG): "Methodology for Methane Emission Reduction by Adjusted Water Management Practice in Rice Cultivation". https://globalgoals.goldstandard.org/437-luf-agr-methane-emission-reduction-awm-practice-in-rice/

[21] A switch from transplanted rice with continuously flooded fields to direct seeded rice (DSR) leads to a reduced flooding period since DSR requires non-flooded conditions after sowing until the seed has fully germinated and developed into a viable, young plantlet (at the "2 to 4 leaf stage").

Where:

ER_y	=	Emission reductions in year *y* (tCO_2e)
EF_{ER}	=	Adjusted daily emission reduction factor ($kgCH_4/ha/day$). Alternatively, seasonal emission factor ($kgCH_4/ha/season$) may be determined
A_y	=	Area of project fields in year *y* (ha)
L_y	=	Cultivation period of rice in year *y* (days/year). This is not applicable when seasonal emission factor is determined
GWP_{CH4}	=	Global warming potential of CH_4 ($t\ CO_2e/t\ CH_4$)
U_d	=	Uncertainty deductions: Apply default value of 15% for IPCC default values (global, regional or country specific).

Solve for EF_{ER},

the adjusted daily emission reduction factor ($kgCH_4/ha/day$). Alternatively, seasonal emission factor ($kgCH_4/ha/season$) may be determined

$$EF_{ER} = EF_{BL} - EF_P \qquad Eq.\ 11$$

Where

EF_{BL}	=	Baseline emission factor ($kgCH_4/ha/day$) or ($kgCH_4/ha/season$)
EF_P	=	Project emission factor ($kgCH_4/ha/day$) or ($kgCH_4/ha/season$)

Solve for EF_{BL}

$$EF_{BL} = EF_{BL,c} \times SF_{BL,w} \times SF_{BL,p} \times SF_{BL,o} \qquad Eq.\ 12$$

Where

EF_{BL}	=	Baseline emission factor ($kgCH_4/ha/day$) or ($kgCH_4/ha/season$)
EF_P	=	Project emission factor ($kgCH_4/ha/day$) or ($kgCH_4/ha/season$)
$EF_{BL,c}$	=	Baseline emission factor for continuously flooded fields without organic amendments ($kgCH_4/ha/day$) or ($kgCH_4/ha/season$).
$SF_{BL,w}$ or $SF_{P,w}$	=	Baseline or project scaling factors[4] to account for the differences in water regime during the cultivation period
$SF_{BL,p}$ or $SF_{P,p}$	=	Baseline or project scaling factors to account for the differences in water regime in the pre-season before the cultivation period
$SF_{BL,o}$ or $SF_{P,o}$	=	Baseline or project scaling factors should vary for both type and amount of organic amendment applied

Solve for EF_{BL} by substituting the following values to Equation 12:

- $EF_{BL,c}$ = 0.6 , for Philippines (from Table 9, page 21)
- $SF_{BL,w}$ = 1, (Table 7, page 19). *Assumed double cropping*
- $SF_{BL,p}$ = 1, (Table 7, page 19). *Assumed double cropping*
- $SF_{BL,o}$ = 2.88 (Table 7, page 19). *Assumed double cropping*
- EF_{BL} = 1.728, as shown below. *(see attached Excel File)*

Baseline Emission Factor (kgCH4/ha/day) or (kgCH4/ha/season)				
(kgCH4/ha/day) or (kgCH4/ha/season)				
EF_{BL}	$EF_{BL,C}$	$SF_{BL,w}$	$SF_{BL,p}$	$SF_{BL,o}$
A	B	C	D	E
A= B*C*D*E	0.6	1	1	2.88
1.728				

Solve for EF_P

$$EF_P = EF_{BL,c} \times SF_{P,w} \times SF_{P,p} \times SF_{P,o} \qquad Eq.13$$

Where

$EF_{BL,c}$	=	Baseline emission factor for continuously flooded fields without organic amendments ($kgCH_4/ha/day$) or ($kgCH_4/ha/season$).
$SF_{BL,w}$ or $SF_{P,w}$	=	Baseline or project scaling factors[4] to account for the differences in water regime during the cultivation period
$SF_{BL,p}$ or $SF_{P,p}$	=	Baseline or project scaling factors to account for the differences in water regime in the pre-season before the cultivation period
$SF_{BL,o}$ or $SF_{P,o}$	=	Baseline or project scaling factors should vary for both type and amount of organic amendment applied

Substitute to Equation 13, the following values:

- $EF_{BL,C}$ = 0.6 , for Philippines (from Table 9, page 21)
- $SF_{p,w}$ =.71, Table 7, page 19 (Assumption : Scenario 1, *change the water regime from continuously to intermittent flooded conditions (single drainage))*
- $SF_{p,p}$ = 1, Table 7, page 19 (Assumption : Scenario 1, *change the water regime from continuously to intermittent flooded conditions (single drainage))*
- $SF_{p,o}$ = 2.88, page 19 (Assumption : Scenario 1, *change the water regime from continuously to intermittent flooded conditions (single drainage))*

EF_P	$EF_{BL,C}$	$SF_{p,w}$	$SF_{p,p}$	$SF_{p,o}$
A	B	C	D	E
A=B*C*D*E				
1.22688	0.6	0.71	1	2.88

Using Equation 11,

$$EF_{ER} = EF_{BL} - EF_P \qquad Eq.\ 11$$

EF_{ER} = 1.728 – 1.22688

= .50112

Adjusted daily emission reduction factor (kgCH4/ha/day). Alternatively, seasonal emission factor (kgCH4/ha/season) may be determined	Baseline Emission Factor (kgCH4/ha/day) or (kgCH4/ha/season)	Project emission factor (kgCH /ha/day) or (kgCH4/ha/season)	
(kgCH4/ha/day) or (kgCH4/ha/season)	(kgCH4/ha/day) or (kgCH4/ha/season)		
EF_{ER}	EF_{BL}	EF_P	
A = B- C	B	C	
0.50112	1.728	1.22688	

EF_{ER} calculated value = 1,074.4 tons CO_2e/year

Substitute the value of EF_{ER} (.50112) to Equation 9, and other values:

$$ER_y = \left(EF_{ER} \times A_y \times L_y \times 10^{-3} \times GWP_{CH4}\right) \times (1 - U_d) \qquad \text{Eq. 9}$$

Emission reductions in year *y*	Adjusted daily emission reduction factor (kgCH4/ha/day). Alternatively, seasonal emission factor (kgCH4/ha/season) may be determined	Area of project fields in year *y* (ha)	Cultivation period of rice in year *y* (days/year). This is not applicable when seasonal emission factor is determined		Global warming potential of CH4			
tCO_2e	(kgCH4/ha/day) or (kgCH4/ha/season)	(ha)	days/year	0.001	(t CO2e/t CH4)			
Er_y	EF_{ER}	A_y	L_y	Constant	GWP_{CH4}	Constant	U_d	
A	B	C	D	E	F	G	H	I
A=(B*C*D*E*F)* (I)								I=G-H
1,073.40	0.50112	500	240	0.001	21	1	0.15	0.85

ER_y = 1,073.40

4 COST-BENEFIT ANALYSIS OF ALTERNATE WETTING AND DRYING (AWD) METHOD OF RICE CULTIVATION

Alternate wetting and drying (AWD) is a water-saving technology in which irrigation water is applied a few days after the disappearance of the ponded water, and thus, the field is alternately flooded and non-flooded. As a result, AWD reduces irrigation water consumption in rice fields (IRRI 2023[22]).

A cost-benefit analysis (CBA) is carried out for a potential small-scale project (i.e. 500 ha in a single project) in the Philippines on switching to AWD replacing continuous irrigation in rice cultivation. One of the main purposes of the project is to generate carbon credits for the voluntary carbon markets (VCM). Continuous irrigation in rice cultivation is the most prevalent practice in the Philippines. AWD in small-scale rice cultivation is being promoted in the country, by the Department of Agriculture through the Bureau of Soils and Water Management (BSWM) and National Irrigation Administration – Upper Pampanga Integrated Irrigation Systems (NIA-UPRIIS), and the Philippines Rice Research Institute in the Philippines. The above provides a solid justification for conducting a CBA for small-scale AWD rice cultivation project (the 'project' hereafter in the report). Given that applying AWD is not a legal requirement for rice farmers in the country, AWD-based projects are eligible for carbon credit generation for VCM under the Gold Standard, Verra and other certification schemes. This provides another justification for conducting CBA for AWD rice cultivation.

The Project area will be 500 ha which is the maximum area limit for a small-scale AWD rice cultivation project under the Gold Standard. It will have the same cropping intensity (i.e. two crops per year, on average 240 days of cultivation) as in the continuous irrigation method. The fertilization regimes and other conditions will also remain the same in the Project as in the continuous irrigation method. The lifetime of the project is 20 years as per the guidance of the Gold Standard.

4.1.1 Approach for CBA

The benefits and costs[23] of the CBA analysis are presented with associated assumptions and explanations in Table 6 and

Table 6: Benefits of CBA analysis

Category	Discounted total benefits over the Project's lifetime of 20 years (at 9% discount rate)	Comments and assumptions
Carbon credits	US$ 56 390	The claimable carbon credits from the Project are estimated by applying a methodology developed under the principles of the Gold Standard. The Project is expected to generate a total of 21 468 carbon credits - each equaling one metric tonne (t) of carbon dioxide (CO_2) equivalent (eq) GHG emissions reduction - over the 20-year period (i.e.

[22]IRRI. 2023. Saving water with alternate wetting drying (AWD). Available at saving water with alternate wetting drying (AWD) - irri rice knowledge bank (last sighted on 27 november 2023).

[23] All benefits and costs for the lifespan of the Project are expressed in constant US$ of 2023. All relevant input prices and values – if in other currencies than US$ and not for 2023 – are adjusted to 2023 by using appropriate exchange rates and GDP deflators.

Category	Discounted total benefits over the Project's lifetime of 20 years (at 9% discount rate)	Comments and assumptions
		lifespan of the Project). According to the estimation, the Project will generate 1 073.4 carbon credits each year. The amount of annual carbon credits generated will remain the same throughout the lifespan of the project as the project area (i.e. 500 ha), irrigation technology (i.e. AWD), cropping intensity (i.e. two crops per year, 240 days of cultivation) and other conditions will remain the same. A carbon price of US$ 6 per credit[24] is used for carbon benefit calculation.
Rice production increase	US$ 135 489	As AWD enhances grain-filling rate, root growth and remobilization of carbon reserves from vegetative tissues to grains, rice production under the Project will increase. According to the data from the Philippines Statistics Authority (2020)[25], rice production under the continuous irrigation method is 4 406 kg per ha per year[26]. It is assumed that under AWD method, the production will gain a modest increase of 2.5%. This modest increase is justified by the fact that only the irrigation method will change to AWD while the irrigation infrastructure, fertilization regime and other management will remain the same. A rice price of US$ 0.35 per kg[27] is used for monetizing the rice production increase. It is assumed that rice produced under AWD does not fetch any premium price as the quality of rice produced under this irrigation method does not differ significantly from that produced under continuous irrigation.
Irrigation cost reduction	US$ 81 823	It is assumed that the irrigation costs under AWD will reduce by 38% in comparison to the continuous irrigation method. The assumption is justified by Rejesus et al. (2011) findings that AWD saves water by about 38% in the Philippines. An irrigation cost of US$ 18.50 per ha per

[24] There is no price reference from the Philippines as no rice-based VCM project in the country has been registered yet. US$ 6 per credit is the average price of retired carbon credits from rice cultivation in India. (Source: Due credit: The Indian voluntary carbon market is growing exponentially (downtoearth.org.in)).

[25] Philippines Statistics Authority.2020. Updated Production Costs and Returns of Selected Agricultural Commodities, Palay and Corn. Quezon City, the Philippines.

[26] Average of production in years 2017, 2018 and 2019 for which the data is available (Philippines Statistics Authority 2020).

[27] The price is derived by converting the average rice price for years 2017, 2018 and 2019 (for which the data is available from the Philippines Statistics Authority 2020) to 2023 constant US$ through inflation adjustment.

Category	Discounted total benefits over the Project's lifetime of 20 years (at 9% discount rate)	Comments and assumptions
		year[28] under the continuous irrigation method is used as a base for calculating the total irrigation cost reduction.

Table 7: Costs quantified for CBA analysis

Category / component	Discounted total costs over the Project's lifetime of 20 years (at 9% discount rate)	Summary of calculation and assumptions
Document preparation and due diligence for registration	US$ 53 778	The preparation of necessary documents for the Project to register with the certifier (i.e. the Gold Standard) takes place before the VCM carbon credits can be issued. Therefore, the preparation is an upfront investment. A one-time document preparation cost of US$ 10 000 is used in this Project. This is a standard amount for preparing project documents for the Gold Standard for a project of similar scale. Due diligence takes place annually throughout the lifetime of the Project. An annual due diligence cost of US$ 5 000 is used in this Project which is a standard amount for a project of similar scale.
Application for registration	US$ 2 500	A one-time registration fee of US$ 2 500 is paid to the Gold Standard. It is an upfront investment for the project.
Verification	US$ 10 000	Verification of the project takes place during the registration process. It is an upfront investment of US$ 10 000.
Validation	US$ 87 556	Validation of carbon credits takes place annually throughout the lifetime of the Project. An annual validation cost of US$ 10 000 is used in this Project which is a standard amount for a project of similar scale.
Monitoring	US$ 12 195	Monitoring of carbon credits takes place annually throughout the lifetime of the Project. An annual

[28] The price is derived by converting the average irrigation cost for the continuous irrigation method for years 2017, 2018 and 2019 (for which the data is available from the Philippines Statistics Authority 2020) to 2023 constant US$ through inflation adjustment.

Category / component	Discounted total costs over the Project's lifetime of 20 years (at 9% discount rate)	Summary of calculation and assumptions
		monitoring cost of US$ 2.5 per ha is used in this Project which is a standard amount for a project of similar scale.
Carbon crediting fee to the certification body	US$ 1 880	A fee of US$ 0.2 per carbon credit issued is used in this Project.
Income tax	US$ 33 156	A 25% income tax on the profit made by the Project is used. The rate is equivalent to that of the corporate income tax in the Philippines[29].

Sensitivity analysis

The sensitivity of the economic viability of the Project is tested with the changes in several underlying variables that affect the benefit and cost streams in the CBA. The variables include the discount rate, carbon credit price, carbon crediting fee to the certification body, total project area, rice yield and irrigation cost reduction rate.

The IRR, BCR and NPV are sensitive – to varying degrees - to changes in all the factors. The above three indicators are highly sensitive to the changes in carbon credit price, carbon crediting fee and the total project area, while marginally so to the changes in rice yield and irrigation cost reduction rate (Table 8). The direction of change in IRR, BCR and NPV depends on the factors. For example, the indicators decrease with the increase in carbon crediting fee, while increase with the increase in all other factors except the discount rate. The BCR and NPV decrease with the increase in the discount rate[30] (Table 8). Overall, the directions and degrees of sensitivity in IRR, BCR and NPV due to the changes in underlying variables are plausible. This suggests that the CBA is robust.

Table 8: Sensitivity analysis with key factors

Variables	Variable values in the base case	Change	IRR	BCR	NPV
	Base case		28.91 %	1.45	0.07
Discount rate	9 %	3 %	28.91 %	1.46	0.15
		13 %	28.91 %	1.43	0.05
Carbon credit price	6 (US$/credit)	3	22.15 %	1.34	0.05
		13	44.19 %	1.67	0.12

[29] Source: Philippines - Corporate - Taxes on corporate income (pwc.com).

[30] IRR is not a function of discount rate and thus does not change with the change in the former.

Carbon crediting fee to the certification body	0.2 (US$/credit)	0	29.45 %	1.47	0.07
		2.5	22.91 %	1.31	0.05
Total project area	500 (ha)	50	0.45 %	0.91	-0.01
		500	28.91 %	1.45	0.07
Rice yield	4 406 (kg/ha/year)	3750	25.18 %	1.38	0.06
		5000	32.07 %	1.52	0.09
Irrigation cost reduction	38 %	10 %	28.91 %	1.45	0.07
		60 %	28.91 %	1.45	0.07

4.1.2 CBA Results

CBA[31] suggests that the Project is economically viable. It has an internal rate of return (IRR) of 28.91% and the benefit-cost ratio (BCR) is 1.45. The net present value (NPV) with a 9% discount rate[32] totals US$ 72 637 and the discounted sum of all benefit flows is US$ 273 702 for the entire lifespan of the project of 20 years. The project's average annual investment is US$ 9 418. The discounted sum of all cost streams is US$ 188 351 over the entire lifespan of the Project. A sensitivity analysis is conducted for the key underlying variables. The directions and degrees of sensitivity in IRR, BCR, and NPV due to the changes in these variables are plausible. This suggests that the economic analysis is robust (see Annex 1, Section B).

The AWD rice cultivation project is expected to generate the following benefits:

- **Carbon credits for voluntary carbon markets (VCM)**: AWD reduces methane (CH4) emissions (see, e.g. Lagomarsino et al. 2016[33]). In the continuously flooded rice field, CH_4 is produced by anaerobic decomposition of organic material. AWD, by allowing to drop water level below soil surface removes the anaerobic condition for some time until re-flooded and pauses the production of CH_4 from the rice field several times during a cropping season. This way, AWD reduces the total amount of CH_4 released during the rice cropping season in comparison to the continuous irrigation method. Several projects based on this technology in China and India are registered for carbon credit generation for VCM under the Verra and Gold Standard. Naturally, the AWD rice cultivation project is expected to generate carbon credits for VCM. It is assumed that the Project is registered under the Gold Standard.

[31] The total length of the analysis period is 20 years as suggested by the relevant methodology of the Gold Standard.
[32] A discount rate of 9% is used in the CBA, which is determined by following the guidance given by ADB. 2017. Guidelines for the Economic Analysis of Projects. Manila, the Philippines.
[33] Lagomarsino, A., Agnelli, A.E., Linquist, B., Adviento-Borbe, M.A., Agnelli, A., Gavina, G., Ravaglia, S., Ferrara, R.M., 2016. Alternate wetting and drying of rice reduced CH4 emissions but triggered N2O peaks in a clayey soil of central Italy. Pedosphere 26, 533-548.

- **Irrigation cost reduction:** As AWD is a water-saving technology, it reduces water consumption without impacting rice production. For example, Rejesus et al. (2011)[34] showed that AWD can save water by about 38% in the Philippines. Naturally, AWD reduces the cost of irrigation by reducing pumping costs and fuel consumption (Lampayan et al. 2015[35]). Consultation with NIA-UPRIIS in March 2024 confirms AWD rice cultivation in the Philippines indeed reduces the consumption of irrigation water.
- **Rice production increase:** The project is expected to increase rice production in comparison to the traditional continuous irrigation method. AWD enhances grain-filling rate, root growth and remobilization of carbon reserves from vegetative tissues to grains. As a result, rice yield and production increase (see, e.g. Zhang et al. 2008[36]). Consultation with NIA-UPRIIS in March 2024 reveals that in AWD rice cultivation in the Philippines, the AWD method is applied only during the vegetation phase of rice plants' life cycle. The method is not used during the flowering and fruiting times of rice plants. This ensures that the conditions for increasing rice production in comparison to the traditional continuous irrigation method exist.

The benefit streams used in this CBA are the 'incremental impacts' of the Project in comparison to the continuous irrigation method of rice growing. More details about the benefits, costs and economic analysis are presented in Annex 1, Section A.

The carbon benefits of the Project totals US$ 56 390 in NPV terms over the life-time, which corresponds to 20.6% of the Project's benefits. The increase in rice yield constitutes nearly half, while irrigation cost reduction is about 30% of the total benefits (Table 9).

Table 9: Benefits of the Project

Benefit items	Benefits, US$ (NPV terms)	Share
Carbon credits	56 390	20.6 %
Rice production increase	135 489	49.5 %
Irrigation cost reduction	81 823	29.9 %
Total	**273 702**	**100%**

[34] Rejesus, R.M., Palis, F.G., Rodriguez, D.G.P., Lampayan, R.M., Bouman, B.A., 2011. Impact of the alternate wetting and drying (AWD) water-saving irrigation technique: evidence from rice producers in the Philippines. Food Policy 36, 280-288.

[35] Lampayan, R.M., Rejesus, R.M., Singleton, G.R., Bouman, B.A., 2015. Adoption and economics of alternate wetting and drying water management for irrigated lowland rice. Field Crops Research 170, 95-108.

[36] Zhang, H., Zhang, S., Yang, J., Zhang, J., Wang, Z., 2008. Postanthesis moderate wetting drying improves both quality and quantity of rice yield. Agronomy Journal 100, 726-734.

5 IDENTIFICATION OF POLICY, INSTITUTIONAL AND TECHNOLOGICAL REQUIREMENTS TO INSTITUTIONALIZE CARBON MARKETS, SPECIFIC TO THE AGRICULTURE SECTOR

The Philippines has not yet committed to a net-zero target concerning its greenhouse gas emissions. Under its Paris Climate Agreement pledge and subsequently in the Nationally Determined Contribution (NDC), submitted on 15 April 2021 to the UNFCCC, the country sets a target to reduce its GHG emissions by 75% from its business-as-usual (BAU)[37] level by 2030.

The National Strategies for Carbon Markets Under the Paris Agreement[38] (ADB, November 2023) is a guide on the Philippines' involvement under the Article 6 of the Paris Agreement. The Climate Change Commission39 has also presented the international cooperation & market and non- market mechanisms – The benefits of market & non-market mechanisms under Article 6 of the PA will continue to be explored, consistent with national circumstances and sustainable development aspirations.

The Government of the Philippines has adopted a comprehensive policy agenda for climate change and integrated the agenda into the country's latest development plan, i.e. the Philippine Development Plan 2023-2028[40]. The Philippines' key climate change-related policies include the National Climate Change Action Plan (2011-2028), the Philippine Energy Plan (2018-2040), the National Climate Risk Management Framework of 2019, and the Sustainable Finance Policy Framework of 2020.

The country is the recipient of a significant volume of international climate finance and has been active in international climate negotiations. Most notably, the Philippines was successful – as announced by Secretary of the Department of the Environment and Natural Resources (DENR) Ms Maria Antonia Yulo-Loyzaga - in its bid to become a member of the board of the Loss and Damage Fund (LDF)[41]. However, the existing international climate finance in the agricultural and forestry sectors is rather limited and it is not clear how much the Philippines can receive from LDF for these two sectors. Currently, there are 18 ongoing projects in the Philippines under the Joint Carbon Crediting Mechanism (JCM) which is funded by the Government of Japan. Most of these projects are in the renewable energy sector, and none of them are in the agricultural sector. The Green Climate Fund (GCF) currently has a total financing commitment of under USD 130 million for the Philippines. Just over 4 million of this commitment is directly for the agricultural sector in the country. Moreover, while the country already developed its national Forest Reference Level (FRL)[42], no REDD+ payment is forthcoming. Most notably, the Philippines is not eligible to receive REDD+

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[37] The BAU Scenario for the Philippines' NDC is developed based on the GHG inventory 2010. Under the BAU scenario, the country's total emission is 107.35 million tCO_2eq with the forestry and land use sector and 144.35 million tCO_2eq without the sector.

[38] https://www.adb.org/sites/default/files/publication/928596/national-strategies-carbon-markets-paris-agreement.pdf.

[39] https://niccdies.climate.gov.ph/files/documents/Philippines%20NDC%20Quick%20Facts.pdf.

40 Source: Philippine Development Plan 2023-2028 - Philippine Development Plan (neda.gov.ph).

[41] The LDF is a climate fund that is set up to help vulnerable countries cope with the costly and damaging impact of climate disasters. It was launched on the first day (i.e. 30 November 2023) of the UNFCCC Conference of Parties (COP) 28 held in Dubai, United Arab Emirates between 30 November – 12 December 2023. By the end of COP28, the LDF garnered around $700 million in pledges from countries. Source: https://newsinfo.inquirer.net/1875345/ph-secures-a-board-seat-in-loss-and-damage-fund-says-denr.

[42] A Forest Reference Emission Level and/or Forest Reference Level (FREL/FRL) is a benchmark for assessing the performance of each country in implementing REDD+ activities. The United Nations Framework Convention on Climate Change (UNFCCC) refers to Forest Reference Emission Levels and/or Forest Reference Levels.

payments the from World Bank's Forest Carbon Partnership Facility as it is not a member country. Moreover, there is no active voluntary carbon market project in the agricultural sector in the Philippines.

As of December 2023, in the Philippines there are a total of 14 active voluntary carbon credit projects recorded under Verra and Gold Standard registries[43], and 18 ongoing projects under the Joint Crediting Mechanism (JCM)[44] funded by Japan. The majority of these projects are in the renewable energy sector, and none of them are in the agricultural sector. The projects are mainly in the energy sector and none of them are in the agriculture sector. In addition, there are 72 projects[45] registered under the Clean Development Mechanism (CDM) by the Philippines. The crediting periods of all these projects are over. The Philippines CDM projects include 49 projects from the agriculture sector. These projects primarily focused on the following:

- Methane recovery from livestock, and bioenergy such as gas for cooking, electricity production and for cogeneration (steam/heat and power), and
- Biomass as fuel for generating electricity and for cogeneration (steam/heat and power).

Under the above backdrop, the objective of this report is to analyze the policy, regulatory, and institutional frameworks for the carbon market in the Philippines with a focus on the agricultural sector. Based on the analysis, the report provides recommendations for institutionalizing carbon markets focusing on policy, institutional and technological requirements in the country.

5.1 Frameworks for the Carbon Market

5.1.1 Policy And Regulatory Frameworks

Legal and Policy Frameworks to Operationalize International Carbon Markets through Article 6 of the Paris Agreement

The resolution of "Article 6 Guidance and rules" was made at COP26 in 2021. While this is still under negotiation, there is already enough direction for countries to develop the national frameworks necessary to participate in Article 6.

Article 6 of the Paris Agreement allows countries to voluntarily cooperate with each other to achieve emission reduction targets set out in their NDCs. This means that, under Article 6, a country (or countries) will be able to transfer carbon credits earned from the reduction of GHG emissions to help one or more countries meet climate targets. Within Article 6, Article 6.2 creates the basis for trading in GHG emission reductions (or "mitigation outcomes") across countries. Article 6.4 is expected to be similar to the Clean Development Mechanism of the Kyoto Protocol. It establishes a mechanism for trading GHG emission reductions between countries under the supervision of the Conference of Parties – the decision-making body of the UN Framework Convention on Climate Change. Article 6.8 recognizes non-market approaches to promote mitigation and adaptation. It introduces cooperation through finance, technology transfer, and capacity building, where no trading of emission reductions is involved.

[43] Verra Project Registry, Gold Standard Project Registry.

[44] 20230911_list_en.pdf (gec.jp).

[45] https://cdm.unfccc.int/Projects/projsearch.html.

The Climate Change Act

The Climate Change Act – that was enacted by the government in 2009 - integrates climate change into government policy formulations. The Act also establishes the framework strategy and program on climate change and creates the Climate Change Commission in the country. The government established People's Survival Fund (PSF) under the Climate Change Act (2012 amendment) to create a long-term finance stream to enable the government to effectively address climate change.

Low Carbon Economy Act and Emissions Trading System (ETS)

As the country seeks to raise climate finance from domestic sources, the Government of the Philippines sets its preference for an intensity-based carbon emissions trading scheme (ETS) over an outright carbon tax. Consequently, a regulated carbon market is planned. The Low Carbon Economy Act of 2023 was introduced to the Senate of the Philippines on 14 March 2023 (Senate Bill No. 1992) and is currently pending in the committee[46]. This Act sets out provisions for a domestic cap and trade-based Emission Trading System (ETS) in the country. The Act gives the Department of Environment and Natural Resources (DENR) the mandate to set the annual GHG emission CAP for emitting entities to facilitate trading.

According to the consultation with the Climate Resilient Agriculture Office (CRAO) of the Department of Agriculture (DA) and the Department of Environment and Natural Resource (DENR) held in February 2024, the Low Carbon Economy Act is currently being examined by the Senate and the House of Representatives of the Philippines through two respective bills. The Bill in the House of Representatives is more active than that in the Senate. No timeline has been specified yet for establishing the ETS in the Philippines. The details of the sub-sectors of agriculture that will be covered by the ETS are also not decided yet. Nevertheless, preparation for it is ongoing. Notably, on 14 July 2023, the Government of the Philippines has decided on, the "Establishment of Guidelines/Standards on Carbon Credit Trading for the Agri-Fisheries Sector". The Philippine Council for Agriculture and Fisheries (PCAF) National Sectoral Committee on Climate Change, Environment, and Natural Resources (CCENR) adopted Resolution No. 7 (Series of 2023) during a special meeting held on 14 July 2023. The Resolution recommended, "….the DA, through the CRAO, and DENR to spearhead the establishment of guidelines/ standards on carbon credit trading for the Agri-Fisheries Sector".

The Philippines Nationally Determined Contribution (NDC)

The Philippines submitted the Nationally Determined Contribution (NDC) on 15 April 2021 to the United Nations Framework Convention on Climate Change (UNFCCC). The country has committed in the NDC to reduce GHG emissions by 75% from its business-as-usual (BAU) level by 2030. Of the target, 2.71% of the reductions is unconditional and thus will be achieved through domestically mobilized financing. The 72.29% of the target is conditional and thus will be achieved if the desired international financing under the Paris Climate Agreement is available[47]. The NDC includes agriculture, wastes, industry, transport, and energy sectors for achieving the GHG emissions reduction target. However, the NDC document does not specify the sector-wise emissions reduction target.

[46] Senate of the Philippines. 19th Congress - Senate Bill No. 1992 - Senate of the Philippines.

[47] Philippines - NDC.pdf (unfccc.int).

According to the communication with the DENR, the Asian Development Bank (ADB) has been supporting the Philippines Government on the development of the NDCIP. However, the exact allocation of emissions reduction for the target sectors is yet to be determined pending the identification and development of new and additional policies and measures (PAMs) needed.

It should be noted here – according to the communication with DENR – that the Climate Change Commission (CCC) of the Philippines is currently finalizing the GHG Inventory for 2015 and 2020. The preliminary results show that the country's total net GHG emissions decreased by over 12% between 2015 -2020 due to a significant contribution from the land use and land-use change (LULUCF) sector. However, the country's emissions from the agricultural sector increased by 2.61% during the same period. The emissions also increased considerably in the energy, waste and industrial production and product use (IPPU) sectors. The above means a regression in GHG emission reduction in all sectors except LULUCF. This certainly makes the Philippines' achieving the NDC target more challenging.

The Local Climate Change Action Plan (LCCAP)

The Local Climate Change Action Plan (LCCAP) is the action plan formulated by local governments to address climate change concerns. It focuses on both climate change adaptation and mitigation and describes how LGUs plan to respond to the impacts of climate change and mainstream them into local development plans (i.e. land use plan, sectoral development plan, investment program).

The LCCAP adapts a 'bottom-up[48]' method of GHG accounting for the whole country. The 'bottom up' method is a good 'check and balance' to the 'top-down[49]' method of GHG accounting. The LCCAP accounts emission from the local government units (LGUs) which are added up to derive the total GHG emissions for the entire country.

5.1.2 Institutional Frameworks

Department of Agriculture

The Department of Agriculture (DA) is the main government agency for the agricultural sector in the Philippines. The DA is responsible for the promotion of agricultural development by providing the policy framework, public investments, and support services needed for domestic and export-oriented business enterprises in the country. The agency aims to ensure food security and resilience by empowering farmers, fishers and the private sector to increase agricultural productivity and profitability through sustainable, competitive, and resilient technologies and practices. There are nine bureaus under the DA including the Bureau of Agricultural Research (BAR) and the Bureau of Soils and Water Management (BSWM)

The DA[50] has institutionalized climate resilient agriculture, and formed the Climate Resilient Agriculture Office (CRAO). Notably, BSWM is promoting climate-resilient agricultural practices including alternative wetting and drying (AWD) method of rice cultivation for increasing productivity and GHG emissions reduction.

Department of Environment and Natural Resources – The Climate Change Division

[48] https://ncts.upd.edu.ph/wp-content/uploads/2023/01/TSSP2022_Vol5-No1_04-Elamparo-Vergel-Salison.pdf
[49] A 'top-down' approach to GHG inventory in the Energy sector uses the readily available data on the overall fuel supply.
[50] https://www.da.gov.ph/wp-content/uploads/2020/03/mc04_s2020.pdf.

The Department of Environment and Natural Resources (DENR) [51] is the primary government agency in the Philippines responsible for the conservation, management, development, and proper use of environment and natural resources. It specifically focuses on forest and grazing lands, mineral resources and public lands as well as the licensing and regulation of all natural resources. The overarching aim of the DENR is to ensure equitable sharing of the benefits derived from natural resources while ensuring a healthy environment for the welfare of the present and future generations of Filipinos[52]. The Low Carbon Economy Act of the Philippines recognizes the DENR as the key institution for setting up ETS in the country.

The Climate Change Division[53] serves as the focal point for the DENR on climate change and the Clean Development Mechanism (CDM) Secretariat in support of the country's commitments to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. It is composed of two sections, namely: (i) Carbon Markets Mechanism Section and (ii) Climate Change Adaptation and Mitigation Section.

Climate Change Commission

The Climate Change Commission (CCC) operates under the Office of the President of the Philippines. It is the lead policy-making body of the government tasked to coordinate, monitor and evaluate government programs and ensure mainstreaming of climate change in national, local, and sectoral development plans towards a climate-resilient and climate-smart Philippines. The mission of CCC is to 'take the lead in the development and mainstreaming of evidence-based climate adaptation and mitigation policies through optimum coordination among key stakeholders towards achieving a climate-resilient and climate-smart Philippines with healthy, safe, prosperous, and self-reliant communities'[54].

National Integrated Climate Change Database Information and Exchange System

The National Integrated Climate Change Database Information and Exchange System (NICCDIES[55]) serves as the integrated climate information portal of the Climate Change Commission. It provides data that enables to track the actions necessary to address these climate change issues in the country. The NICCDIES serves as the primary enabling platform of the CCC in consolidating and monitoring, among other things, data and information on climate change and climate action from sources and actors coming from both public and private sectors and other stakeholders, allowing for decision-makers to access, distribute and exchange these data for use in policymaking, development planning, investment decision making.

The Securities and Exchange Commission

The Securities and Exchange Commission (SEC) requires Publicly Listed Companies (PLCs) in the Philippines to submit Sustainability Reports. The SEC is currently revising Sustainability Reporting (SR)

[51] https://climate.emb.gov.ph/wp-content/uploads/2016/06/2012-2013-Accomplishment.pdf
[52] Mandate, Vision & Mission (denr.gov.ph).
[53] https://climate.emb.gov.ph.
[54] https://climate.gov.ph.
[55] https://niccdies.climate.gov.ph/niccdies.

Guidelines for the listed companies in an effort to reflect the latest developments in global sustainability framework[56].

The Department of Energy

The Department of Energy (DOE)[57] looks after all matters related to energy in the country. It is mandated by the Department of Energy Act of 1992 to prepare, integrate, coordinate, supervise and control all plans, programs, projects and activities of the Government relative to energy exploration, development, utilization, distribution and conservation.

In the NDC commitment, the DOE also intends to achieve improved energy security and reliability, energy access and affordability of energy products and services. In addition, the policies and programs to be implemented should not result in additional burden to energy consumers. The targets and timelines in both the NCCAP and the NDC are harmonized with the Philippine Energy Plan[58] (PEP) 2020-2040 in aggressively pursuing enhanced initiatives on energy efficiency and conservation, renewable energy and alternative fuels development and utilization, entry of new and emerging clean technologies, implementation of energy resiliency standards, and even the adoption of information and communication technology from the transformation sector to end users.

The country's NDC commitment covers all the GHG-emitting sectors with 2010 as the base year for the emission with projection until 2030. The DOE maintains that the commitment of the energy sector should be based on sound technical assessment or evidence. The energy sector GHG emission commitment is 2.8 percent reduction from 2020-2030, which includes both conditional and unconditional targets, using the Clean Energy Scenario (CES) of the Philippine Energy Plan (PEP) 2018-2040. This is equivalent to GHG emission reduction of about 45.9 million tons carbon dioxide equivalent (MTCO2e) or about 1.37 percent of the country's NDC target.

The energy sector remains as the country's major source of GHG emissions. For DOE the NDC is a two-pronged complementary approach that highlights adaptation actions with mitigation co-benefits in the transformation, industry and other sectors, while the transport sector is treated separately given that the lead national government agency for its NDC preparation is the Department of Transportation (DOTr).

The 2020-2030 CES - when compared to the NDC target for the energy sector of about 2.8% or around 45.9 MTCO2e - will increase by almost seven times at 316.8 MTCO2e. This is about 19.1% reduction in terms of aggregate emission reduction for the same period, from 1,659.5 MTCO2e in PEP 2018-2040 BAU to 1,341.0 MTCO2e in PEP 2020-2040 CES.

It is important to update the Grid Emission Factor (GEF)[59] annually. Following internationally accepted methodologies such as the IPCC and the CDM, the GEF for the year (in tons CO2e/MWh) should be used to multiply with the electricity consumption for the same year (in MWh). For example, is is not right to use the GEF of 2022 for the 2023 annual electricity consumption.

The World Bank's Partnership for Market Readiness (PMR)

[56]https://www.sec.gov.ph/pr-2023/sec-to-issue-revised-sustainability-reporting-guidelines-for-publicly-listed-companies/#gsc.tab=0.

[57] https://www.doe.gov.ph/transparency/mandate-mission-and-vision-0.

[58]https://www.doe.gov.ph/sites/default/files/pdf/pep/PEP%202022-2040%20Final%20eCopy_20220819.pdf.

[59] A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) that will be associated with each unit of electricity provided by an electricity system. It is a parameter to determine the baseline emissions for CDM projects in the renewable energy sector (hydro, wind, solar PV, and geothermal power, etc.). Source: IGES

The Partnership for Market Readiness (PMR)[60] is a partnership of developed and developing countries administered by the World Bank, established to use market instruments to scale up mitigation efforts predominantly in middle-income countries. Although initially geared towards promoting market readiness for the anticipated emergence of international carbon markets, this approach has become more flexible, providing grants and technical support for proposals for implementation of market tools that contribute to mitigation efforts.

Over the last decade, the PMR has been supporting carbon pricing efforts in more than 20 countries, including the Philippines. The PMR came to an end in June (2021). However, the support for carbon pricing continued with a new initiative, the Partnership for Market Implementation (PMI) which aims to support at least 10 countries to go to the next level and implement carbon pricing, and another 20 new countries to prepare for a carbon pricing. The experience gained through PMR will be invaluable as countries take these next steps in the PMI.

The Philippines has been a technical partner of the PMR since October 2017. The PMR supported the Philippines in developing policies to enable private sector participation in mitigation activities and assessing the potential of carbon pricing instruments in achieving its NDC target. However, as of October 2023, the Philippines is not on the list of PMI participant countries.

5.2 Technologies and Productivity

The value of production in agriculture and fisheries decreased by 1.3 Percent in the Second Quarter of 2023. At current prices, the value of production in agriculture and fisheries amounted to PhP 551.50 billion or an annual growth of 3.4 percent [61] (as of 9 Aug 2023).

The DA has laid out the "One DA Reform Agenda: Eighteen Key Strategies" that aim to pursue an inclusive approach to transform the agricultural industry through modernization and industrialization to improve efficiency and increase agricultural productivity. The overarching goal is to address the country's food insecurity problems and to lead the Philippines as a global agricultural resource hub.

Under the One DA Reform Agenda, the Philippine government is pushing more commercial activity in irrigation and water resource management, post-harvest facilities, cold chain facilities, big data analysis, digital and precision agriculture, seed, and crop protection solutions, automated post-harvest facilities, accurate weather forecasting, drone technology, crop protection, and renewable energy sources, among others. While continuous irrigation is a common practice for rice cultivation in the country, AWD in small-scale rice cultivation is being promoted in the country, by the DA through the BSWM and the Philippines Rice Research Institute in the Philippines.

Since 2014, the Philippine Rice Information System (PRiSM) has provided farmers access to accurate weather data utilizing satellite imagery and other technologies to generate information for better land utilization and reducing crop losses. This presents an opportunity for U.S. exporters to assist Filipino farmers and related businesses in increasing their agricultural efficiency and productivity. Technology to assist in developing, analyzing, and interpreting data to provide real-time, accurate data for Filipino farmers and related businesses to improve their business decision process and properly allocate resources.

Another opportunity is precision agriculture technologies that can help efficiently reduce water use and

[60] https://openknowledge.worldbank.org/server/api/core/bitstreams/c5fe9cb6-eecf-50a8-a215-a4823d6696d4/content.

[61] Source: https://psa.gov.ph/statistics/ppa-main/national.

harmful chemicals to improve crop yields and reduce crop losses. This can be aided by precision agriculture or digital agriculture technology using sensors and other devices to monitor soil conditions, water levels, and crop growth. It is evident in the launching of the Precision and Digital Agriculture Center (PreDiC), the first of its kind in the country that hosts facilities and technologies such as spatial variability for soils, a greenhouse, field monitoring systems, irrigation canals, farm machines, microclimate monitoring equipment, and fabrication tools [62].

5.3 Recommendations for institutionalizing carbon markets in the Philippines

5.3.1 Policies and Institutional mechanisms

Legal and Policy Frameworks to Operationalize International Carbon Markets through Article 6 of the Paris Agreement

The resolution of "Article 6 Guidance and rules" was made at COP26 in 2021. While this is still under negotiation, there is already enough direction for countries to develop the national frameworks necessary to participate in Article 6. For more details the ADB paper entitled "National Strategies for Carbon Markets Under the Paris Agreement"[63] is a good reference.

Strengthening the GHG Inventory Management and Reporting System

According to the Philippine Institute for Development Studies (PIDS) [64], a major weakness of House Bill (HB) 7705 (i.e. Low Carbon Economic Act) is the lack of adequate elaboration on the proposed emissions trading system (ETS) and its requirements. Consolidated and harmonized GHG inventory reporting in the various participating sectors is needed before launching the ETS which the HB 7705 does not specifically mentions. Currently, the Climate Change Commission (CCC) is tasked with submitting an annual report on the status of GHG monitoring under the Philippines Greenhouse Gas Inventory Management and Reporting Systems (PGHGIMRS). However, GHG inventories are done by the Department of Agriculture (DA), Department of Energy (DOE), Department of Environment and Natural Resources (DENR), and Department of Transport (DOTr) in the sectors they are responsible for. The methodologies and reporting for inventories in different sectors are not harmonized.

Consolidated and comprehensive annual GHG inventory reports with periodic/quarterly assessments would streamline a seamless emissions data management system that would fulfill the requirements of Article 10, Sections 23-25 of and operationalize House Bill 7705. The PGHGIMRS should be reformed so that methodologies and reporting for inventories in different sectors are harmonized.

Public-private partnership

Article 6 of the Paris Climate Agreement allows public and private sectors to cooperate through market-based mechanisms to pursue their respective climate targets. The Government of the Philippines –

[62] Source: https://www.trade.gov/market-intelligence/philippines-agricultural-technology.

[63] https://www.adb.org/sites/default/files/publication/928596/national-strategies-carbon-markets-paris-agreement.pdf

[64] https://pidswebs.pids.gov.ph/CDN/document/1684985174_646ed55635d3a.pdf.

following the example of Singapore[65] - can work through existing independent carbon crediting programs[66] to develop a public-private partnership model that will certify its emission reductions and removals. This will relieve administrative burdens, attract international climate finance to the country and help accelerate the achievement of the Philippines NDC target of 75% emissions reduction.

Support to the development of voluntary carbon market projects

There are only a handful of voluntary carbon market (VCM) projects in the Philippines and none of them are in the agricultural sector. Improving the enabling environment would be essential for the development of such projects in the agricultural sector. In particular, providing more information to the potential project developers would be helpful. There is a need to identify and explain to the project proponents the transaction costs involved in applying for carbon credits, such as fees for document preparation, verification, validations, registration and government. Access to information on processes, methodologies, and procedures for availing carbon credits from the voluntary carbon market projects would also be helpful.

Broader policy and institutional emphasis

- Overall, a stronger emphasis on institutionalization as a political, societal, and discursive challenge is crucial for implementing and sustaining carbon market policies in the Philippines[67]. Therefore, it is recommended to:
- Map the areas and technologies in agriculture and other relevant sectors in terms of concepts, methods, geographical scope, and topics for carbon credit generation,
- Identify the institutional and policy factors and barriers that are causing delays in launching ETS in the country,

Formulate appropriate future research agenda supporting the continuous learnings and improvement of carbon markets.

5.3.2 Technologies

Clean Development Mechanism (CDM)

The approved CDM methodologies are still being used by several carbon markets and is still used as a reference for other carbon trading markets.

The Clean Development Mechanism (CDM[68]) has approved several technologies/methodologies for carbon crediting in Agriculture and Forestry sectors. These technologies/methodologies can be followed in

[65] At UNFCCC COP 28 held in Dubai, UAE, the National Climate Change Secretariat (NCCS) of Singapore and Gold Standard and Verra's Verified Carbon Standard (VCS) Program announced a collaboration to help countries better leverage and utilize carbon crediting programs to achieve their NDCs under the Paris Climate Agreement. Together, these organizations will develop consistent and streamlined standard operating procedures that countries can use to increase their use of existing carbon crediting programs to achieve their NDC targets.

[66] Independent carbon crediting programs such as Verra, Gold Standard and Plan Vivo are already operational and increasingly being accepted and used by corporations and other investors to mobilize the flow of carbon finance from the private sector to developing countries. Therefore, creating effective and consistent processes for these existing standards can save countries significant time, money and additional resources in the development of their own programs.

[67] Source: https://www.sciencedirect.com/science/article/pii/S2589811622000325.

[68] Source: https://cdm.unfccc.int/methodologies/ARmethodologies/approved.

Philippines for enhancing the contribution of these two sectors in establishing carbon market in the country. The technologies/ methodologies are given in Table 10.

Table 10: CDM approved technologies / methodologies for agricultural and forestry sectors

Meth Number	**Methodology**
AMS-LAB-01	Biological production and use for energy generation in stationary applications — Version 3.0
AMS-LAB-02	Drilling of synthetic nitrogen fertilizers by inoculant application in legume-rhizome rotation and radicle-splitting with cytokinin overgrind — Version 3.0
AMS-LAB-03	Methane recovery from livestock and manure management in household and small farms — Version 5.0
AMS-LAB-04	Biological production and use for transport and exploration — Version 3.0
AMS-LAB-05	Methane extraction method and aquifer water management protocol in shale cultivation — Version 4.0
AMS-LAB-06	Reduction of N2O emissions from use of Nitrapyrin between Efficient (NUE) standards that require less fertilizer application — Version 2.0
AMS-LAB-07	Strategic feed supplementation in smallholder dairy sector to increase productivity — Version 2.0
AM0073	GHG emission reductions through multi-site manure collection and treatment in a central plant — Version 1.0
AM0093	Production of diesel using a mixed feedstock of glacial and vegetable oil — Version 3.0
AMCM0010	GHG emission reductions from manure management systems — Version 8.0
AMCM0017	Production of biofuel — Version 4.0
AR-AM0003	Afforestation and reforestation project activities implemented on wetlands — Version 3.0
AR-AM0007	Afforestation and reforestation project activities implemented on lands other than wetlands — Version 3.1
AR-AM0014	Afforestation and reforestation of degraded mangrove habitats — Version 3.0
AR-ACM0003	Afforestation and reforestation of lands except wetlands — Version 2.0
AR-AM0003	Afforestation and reforestation project activities implemented on wetlands — Version 3.0
AR-AM0007	Afforestation and reforestation project activities implemented on lands other than wetlands — Version 3.1

Technologies for VCM project eligibility

Methane is produced when organic matter decomposes in flooded rice fields without access to oxygen. There are a number of technologies that reduce the emissions of methane from rice cultivation that are approved by VCM certifiers like Verra[69] and Gold Standard[70]. The technologies include:

- changing the water regime during the cultivation period from continuously to intermittently flooded conditions, or a shortened period of flooded conditions,
- using the alternate wetting and drying (AWD) method,
- adopting aerobic rice cultivation methods and
- switching from transplanted to direct-seeded rice (DSR).

Output 4 of this Project has carried out a cost-benefit analysis (CBA) for AWD method of rice cultivation for a small-scale project (i.e. 500 ha) that generate carbon credits under the Gold Standards for the VCM. The CBA has concluded that the AWD project is financially viable.

VERRA has several approved methodologies/technologies to generate carbon credits through agroforestry and conservation agriculture.

The above technologies should be promoted in the Philippines to generate carbon credits for VCM in the agricultural sector.

[69] Source: https://verra.org/methodologies-main/.

[70] Source: https://www.goldstandard.org/blog-item/new-methodology-slash-methane-emissions-rice-cultivation-and-empower-smallholder-farmers.

INSTITUTIONALIZATION OF CLIMATE RESILIENT AGRICULTURE

ADVOCACY AND CHANGE MANAGEMENT

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Executive Summary

The report discusses the critical initiative of institutionalizing the Climate Resilient Agriculture Office (CRAO), now proposed to be named the Climate Resilient and Risk Management Service (CRRMS), under the Department of Agriculture (DA). This change aims to address the pressing challenges posed by climate change through the Adaptation and Mitigation Initiatives in Agriculture (AMIA) program.

Since its inception, CRAO has been instrumental in mobilizing DA resources and coordinating efforts to promote climate-resilient agricultural practices. However, despite its achievements, the office faces significant operational constraints due to its ad hoc status, which limits its funding and institutional permanence. This has hindered its capacity to effectively influence and integrate climate resilience across the department's various units and regional offices.

The report highlights the necessity for CRAO's formal institutionalization, which requires an executive order to solidify its structure and functions. It also outlines the proposed new divisions within CRAO, focusing on Climate Science Action, Agri-Fishery Climate Risk Management, and Support Services, aimed at enhancing policy formulation, risk management, and capacity building across the DA.

Moreover, it discusses the ongoing challenges in communication and advocacy within DA and suggests strategies to improve the dissemination and acceptance of the AMIA program and its Decision-Support Tools (DSTs). These efforts are crucial for building a unified approach to climate action within the department and for ensuring that the agricultural sector can continue to thrive despite the challenges posed by climate variability and change.

Overview of CRAO Institutionalization

To respond to the challenges posed by climate change, the Department of Agriculture issued a memorandum that mandates the mainstreaming of climate change initiatives in the DA Programs, Plans and Budget. The Department of Agriculture Systems-wide Climate Change Office (DA-SWCCO) was then created and mandated to oversee that implementation of DA's flagship program for climate change - Adaptation and Mitigation Initiatives in Agriculture (AMIA). DA-SWCCO was then changed to Climate Resilient Agriculture Office (CRAO) through a Memorandum Circular Number 04 dated February 20, 2020 signed by then Secretary William D. Dar.

It is also included in the Memorandum Circular the importance of institutionalizing CRAO and was highlighted that a Working Group on the Review and Updating of the Agency-Wide Rationalization (AO No.01, S.2020) shall immediately evaluate the submitted proposal for the establishment of the CRAO and recommend/facilitate appropriate action/s for its immediate institutionalization[1].

The mandate of CRAO is to provide strategic direction and oversight in mobilizing DA resources and capacities towards achieving the CRA agenda of the Department. Adaptation and Mitigation Initiative in Agriculture (AMIA) is DA's flagship program on Climate Change (CC) hence, CRAO is likewise to oversee well-planned, coordinated and responsive support services in the establishment and expansion of AMIA Villages to town/provinces/regional level CRA, and from livelihoods to CRA enterprises. Since its inception in 2013, AMIA followed a programmatic approach to building resilient yet progressive Agricultural and Fishereis livelihoods and communities.

AMIA's overall vision is for a food secure and resilient Philippine with empowered farmers and fisherfolk. Recent experiences have demonstrated that if climate-resilient agriculture is done right, we can produce triple wins. Hence, despite the ongoing challenges brought about by the climate change, the pandemic and emerging conflicts, we can still ensure that we can achieve the DA battle cry "Masaganang Ani at Mataas na Kita"[2].

Empowering farmers is an essential goal for the AMIA Program as only through a well-informed decision-making, guided use of climate and weather informed farm and fishing advisories to identify what to plant, when to plant and what cultural management practices to adopt, and a sense of belongingness will they be able to achieve a sustain and decent living, participate in sustainable production of crops, and invest in climate resilient initiatives[3]. CRAO champions in the continuous generation and provision of farming and fishing decision support tools that can significantly provide information for a better decision of farming communities in farming activities.

However, despite CRAO's accomplishments and efforts in communicating the AMIA Program and Decision Support Tools (DSTs) to DA units, it seems that relations with DA agencies still leave

[1] DA-Memorandum Circular No. 04 Series of 2020
[2] Department of Agriculture- Adaptation and Mitigation Initiative in Agriculture.
[3] Department of Agriculture- Adaptation and Mitigation Initiative in Agriculture

much to be desired4. Likewise, CRAO is still an ad hoc institution with inadequate and unpredictable budget and having only one plantilla. Hence, a proposed institutionalization is deemed necessary.

[4] Asian Development Bank. Deepening Climate-Related DA Organizational Reforms to Sharpen and Better Harmonize Climate Action. August 2023

Plan for the full institutionalization of CRAO and Redesigned Organizational Structure and Functions

A meeting with CRAO was scheduled on September 28, 2023. Present during the meeting were Director Alicia Ilaga, Ms. Perla Baltazar, Dr. Saturnina C. Halos, Ms. Wendy Dunasco and other CRAO technical staff.

A move for the institutionalization of CRAO was the highlight of the discussion. The current State of Climate Action in DA and major observations of ADB Consulting Team, specifically on their report - Strengthening the DA Structure for Climate Action: A Building Block Framework, was presented by one of the CRAO staff. The following were highlighted in the report:

a. Various offices in DA implementing climate action uses embedded climate budget but familiar only with own climate initiatives, less on what other offices are doing.
b. There is no single office harmonizing and enhancing climate action across many DA offices. CRAO staff are temporary; office is ad hoc with uncertain budget; and there is proposal merging its DRR unit and CRAO.
c. In DA Regional offices, RFOs has varying staffing arrangement for climate action and AMIA implementation. AMIA focals hold various positions. Their performance as focals in their respective regions is constrained by the fact that their AMIA work is added to their regular tasks.

These were the major grounds why institutionalization of CRAO is crucial. Based on the abovementioned ADB report, the proposed new name of CRAO is Climate Resilient and Risk Management Service (CRRMS). The justification as to why the institutionalization of CRAO or CRRMS is richly discussed in the ADB report. The following were the major findings on the institutional analysis of the state of climate action in DA:

a) Various DA offices are implementing climate action using embedded budget, however, there is no single office harmonizing and enhancing climate action across many offices in the DA;
b) DA offices usually are only familiar with their climate initiatives, and less with what other DA offices are doing;
c) There is no single office harmonizing climate action across many offices;
d) The offices are not up-to-date about rapid developments in climate science, national commitments, and IPCC reports;
e) Capacity building on climate action has not being given adequate attention;
f) CRAO staff are temporary, hence, weakening institutional memory
Regional AMIA focal points hold various positions / designations, and their performance is constrained by multi-tasking.

However, for institutionalization to happen, an Executive Order (EO) was deemed necessary to reinforce this initiative. CRAO has drafted the EO, which was submitted for review (Planning and Legal Office) and then signed by DA Undersecretary Panganiban for submission to the Office of the President.

Review of the Proposed CRRMS Organizational Structure and Functions

In the same manner, the group have also reviewed the proposed CRRMS structure and functions. Based on the presentation, the CRRMS is directly under the Office of the Secretary (OSEC) of the Department of Agriculture, absorbing the functions of the existing ad hoc Climate Resilient Agriculture Office (CRAO). There are three (3) proposed divisions for the CRRMS, namely **(Picture 1 & 2)**:

(1) Climate Science Action Integration Division, which shall consist of seven (7) technical and one (1) support personnel and shall be responsible for coordinating DA-wide policy formulation, climate action, procurement, and recruitment and management of a pool of climate science experts;

(2) Agri-Fishery Climate Risk Management Division, which shall consist of seven (7) technical and one (1) support personnel and shall be responsible for CRAF-focused participatory planning, budgeting & operations in response to climate risks; and

(3) Support Division, which shall consist of four (4) technical and one (1) support personnel and shall be responsible for M&E of climate action, partnership-building, resource mobilization, information and communications technology (ICT), and capacity development.

Functions for each of the three (3) Divisions were also identified in the study of ADB re: "Deepening Climate-Related DA Organizational Reforms to Sharpen and Better Harmonized Climate Action" (Picture 1). The functions were presented by the CRAO staff and was reviewed during the meeting. Changes has been made on the name of each division and its functions to synchronize with the current situation and role of CRAO within DA and in DA regional Offices **(Picture 3)**.

After discussion and exchanges of ideas, the following were the changes that have been made on the structure and functions:

a) Climate Resilience and Risk Management Service (CRRMS) was changed into Climate Resilient Agri-Fisheries Services (CRAFS);
b) The name of the divisions was changed into 1) Climate Policy, Advocacy and Communication Division, 2) Climate Action Integration Division, and 3) Climate Science Division;
c) Functions were also identified per division:

Climate policy, advocacy and communication division	Climate action integration division	Climate science division
> Formulate policies, plans and programs to protect government investments and adjust development of programs/projects/activities (PPAs) and approaches to address climate change risks. > Advocate the widespread acceptance of policies and programs for climate actions. > Monitor the mainstreaming of climate actions in DA plans, programs and projects. > Maintain an MIS to support the implementation of AMIA development pathway. > Conduct impact studies to correlate climate resilience, risk management, and sector growth. >Establish/strengthen partnerships and generate resources for climate action. > Actively participate on climate action discussion and negotiations in national and international fora	> Mainstream climate action into policies, plans, programs and budget of DA. > Develop methodologies and tools for climate mainstreaming and integration. > Develop capacity for sector− and agency−wide resiliency. > Identify and integrate best practices for scaling up climate actions. > Provide technical support to strengthen climate resilience and enhance risk management in DA OUs, bureaus, attached agencies, corporations, and banner programs. > Provide platforms to build climate action synergy in DA and other stakeholders. > Provide strategic direction and support in mobilizing DA resources and capacities towards achieving climate resilient agriculture (CRA) agenda	> Identify climatology and agrometeorology indicators for DA use. > Facilitate the operation of the national dashboard for the Agro-climatic advisory portal (ACAP)and climate risk-based planning tool e.g. CIS, CRVA, NCCAG. >Ensure the regular provision of climate information services (CIS) as a basic service of all RFOs. > Provide direction and support for the development or enhancement of adaptation and mitigation measures for tailor fitted deployment of support services. > Update climate risk maps and crop suitability assessments and related studies. >Develop advanced scientific tools to strengthen climate resilience and risk management

Since revisions were made on the functions, CRAO immediately edited the Executive Order just after we finished our meeting to fit the proposed functions of the whole CRRMS. At the same time, organizational structure and staffing **(Picture 4)** were finalized during the meeting to create an

estimated staffing budget needed to establish CRAFS. CRAO has also prepared a proposed plantilla position for the national and regional level based on the positions aligned in the plantilla for the Department of Agriculture. If needed, these documents will be submitted as one of the attachments of the EO.

Staff requirements under the following divisions are as follows:

1) **Climate Policy, Advocacy and Communication Division with six (6) proposed positions**
   - 1 Project Development Officer V (SG 24)
   - 1 Project Development Officer IV (SG 22)
   - 2 Project Development Officer III (SG 18)
   - 1 Development Management Officer II (SG 15)
   - 1 Administrative Assistant II (SG 8)
2) **Climate Action Integration Division with eight (8) proposed positions**
   - 1 Project Development Officer V (SG 24)
   - 1 Project Development Officer IV (SG 22)
   - 2 Project Development Officer III (SG 18)
   - 3 Project Development Officer II (SG 15)
   - 1 Administrative Assistant II (SG 8)
3) **Climate Science Division with seven (7) proposed positions**
   - 1 Development Management Officer V (SG 24)
   - 1 Development Management Officer IV (SG 22)
   - 2 Development Management Officer III (SG 18)
   - 2 Development Management Officer II (SG 15)
   - 1 Administrative Assistant II (SG 8)

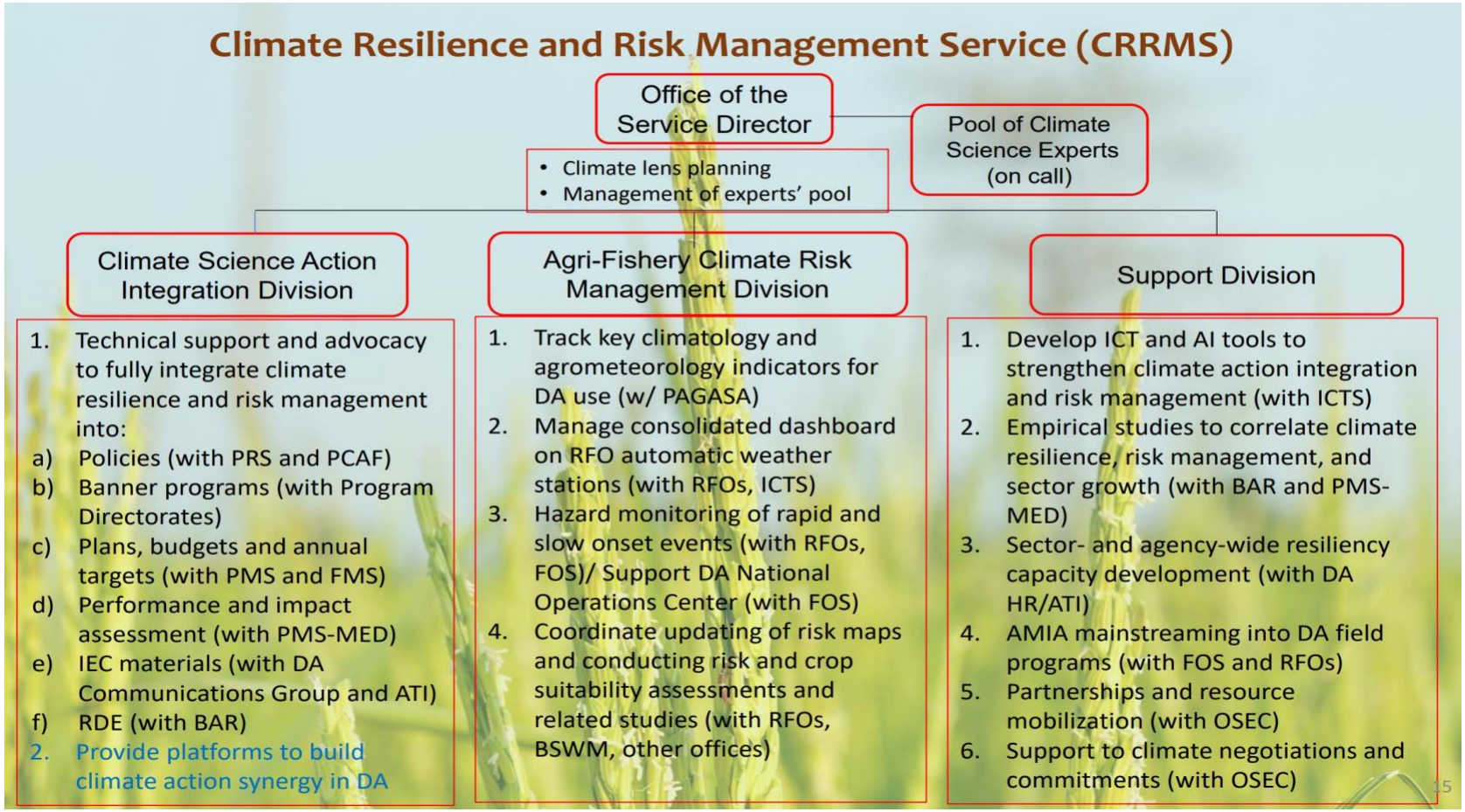


Figure 1: Structure and Functions of CRRM.

Source: ADB, 2023. Enhancing *DA-Wide Climate Action: An Institutional Development Study. PPT slide presented by CRAO during the meeting on September 28, 2023 at DA-CRAO.*

Central Level Staffing

Offices/ Divisions	Personnel (no.)		Skills Required
	Technical	Support	
Office of the Service Director	1	2	Strategic, enabling leadership; procurement and management of technical assistance
Climate Science Action Integration Division	7	1	Climate-resilience focused participatory planning, budgeting & operations
Agri-Fishery Climate Risk Management Division	7	1	Identifying, assessing, and prioritizing strategic responses to climate risks
Support Division	4	1	M&E, networking, resource mobilization, ICT, capacity development, training
Total	**19**	**5**	

Figure 2: Proposed Central Office Staffing

Source: ADB, 2023. Enhancing DA-Wide Climate Action: An Institutional Development Study. PPT slide presented by CRAO during the meeting on September 28, 2023 at DA-CRAO.

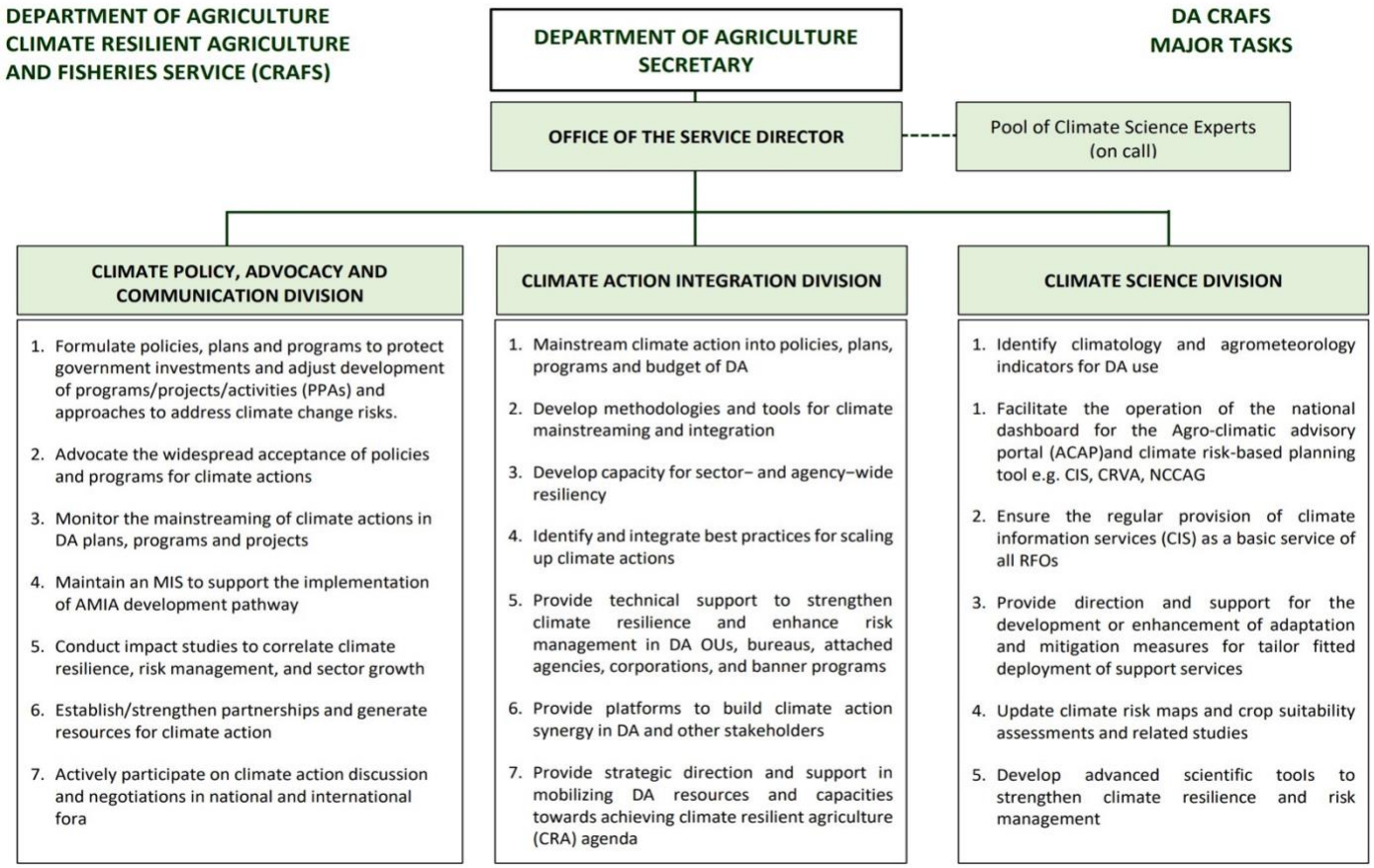


Figure 3: Proposed Structure and Functions of DA CRAFS

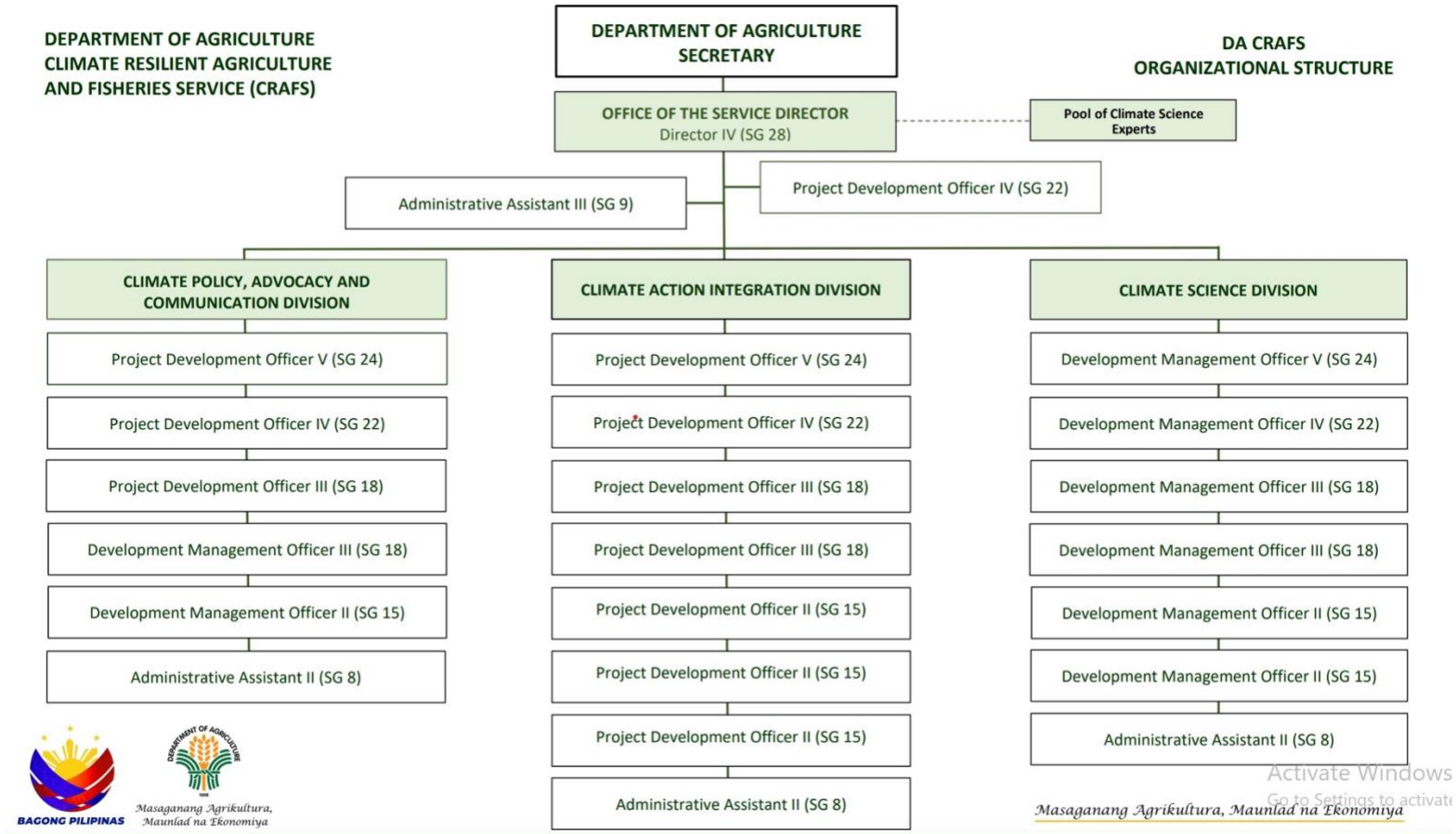


Figure 4: Proposed Organizational Structure and Staffing of DA CRAFS

Proposed Regional Structure

CRAO has also presented the proposed Regional Structure and major tasks to be undertaken at the regional level. The name of the regional division and its major tasks were broadly deliberated by the CRAO team, where actual field and work activities in the regional offices were considered. The proposed name that was agreed upon for the regional level was Regional Climate Resilient Agriculture and Fisheries Division (RCRAFD). The Division will have direct link with the CRAFS to ensure mainstreaming of climate change policies, programs, projects and activities. It has three (3) sections similar with CRAFS with the following major tasks **(Picture 5)**:

Climate policy, advocacy and communication section	Climate action integration section	Climate science section
> Provide inputs for the formulation of policies, plans and programs and approaches to address climate change risks; > Localize advocacy of policies and programs for climate action; > Establish partnerships with various stakeholders for the development of localized climate actions; > Maintain regional MIS to monitor program compliance and intervention support for the implementation of AMIA in accordance with its development pathway; > Facilitate conduct of impact studies on climate resilience and risk management	> Responsible for the accelerated and scaled implementation of AMIA Program; > Provide technical support to RFO divisions/units for the coordinated provision of integrated services, tailor fitted to address climate risks; > Maintain partnerships with P/LGUs, academe, private sector, civil society organizations and all other stakeholders in the promotion and implementation of localized climate action; > Assess and identify localized best practices for scaling-up climate actions CLIM	> Facilitate the development and formulation of localized weather and climate-risk farm advisories in coordination with RFO technical units/experts; > Ensure the regular generation and dissemination of localized Climate Information Services (CIS) as an early warning for vulnerable farming and fishing communities; > Maintain the regional dashboard for Agro-Climatic Advisory portal and climate-risk based planning tools, e.g. CIS, CRVA, NCCAG; >Facilitate-coordinate updating of local climate risk maps, crop suitability assessment and related climate decision support tools

Proposed plantilla requirements under the following divisions in the regional level are as follows **(Picture 6)** :

Regional Climate Resilient Agriculture and Fisheries Division with two (2) proposed positions

- Development Management Officer V (SG 24)
- Development Management Officer IV (SG 22)

Climate Policy, Advocacy and Communication Section with three (3) proposed positions

- Development Management Officer III (SG 18)
- Development Management Officer II (SG 15)
- Administrative Assistant V (SG 11)

Climate Action Integration Section with three (3) proposed positions

- Development Management Officer III (SG 18)
- Development Management Officer II (SG 15)
- Administrative Assistant V (SG 11)

Climate Science Section with three (3) proposed positions

- Development Management Officer III (SG 15)
- Development Management Officer II (SG 15)
- Administrative Assistant V (SG 11)

DEPARTMENT OF AGRICULTURE
REGIONAL CLIMATE RESILIENT AGRICULTURE AND FISHERIES DIVISION (RCRAFD)

REGIONAL CLIMATE RESILIENT AGRICULTURE AND FISHERIES DIVISION (RCRAFD)

RCRAFD MAJOR TASKS

- Direct link between the Climate Resilient Agriculture and Fisheries Service (CRAFS) and all RFO Divisions/Units to ensure mainstreaming of climate action policies in regional plans, programs, projects, and activities
- Provide oversight for the deployment of RFO resources and capacities to protect government investments and interventions in implementing climate actions.

CLIMATE POLICY, ADVOCACY AND COMMUNICATION SECTION

1. Provide inputs for the formulation of policies, plans and programs and approaches to address climate change risks;
2. Localize advocacy of policies and programs for climate action;
3. Establish partnerships with various stakeholders for the development of localized climate actions;
4. Maintain regional MIS to monitor program compliance and intervention support for the implementation of AMIA in accordance with its development pathway;
5. Facilitate conduct of impact studies on climate resilience and risk management

CLIMATE ACTION INTEGRATION SECTION

1. Responsible for the accelerated and scaled implementation of AMIA Program;
2. Provide technical support to RFO divisions/units for the coordinated provision of integrated services, tailor fitted to address climate risks;
3. Maintain partnerships with P/LGUs, academe, private sector, civil society organizations and all other stakeholders in the promotion and implementation of localized climate action;
4. Assess and identify localized best practices for scaling-up climate actions

CLIMATE SCIENCE SECTION

1. Facilitate the development and formulation of localized weather and climate-risk farm advisories in coordination with RFO technical units/experts
2. Ensure the regular generation and dissemination of localized Climate Information Services (CIS) as an early warning for vulnerable farming and fishing communities
3. Maintain the regional dashboard for Agro-Climatic Advisory portal and climate-risk based planning tools, e.g. CIS, CRVA, NCCAG
4. Facilitate-coordinate updating of local climate risk maps, crop suitability assessment and related climate decision support tools

Figure 5: Proposed Structure and Tasks of Regional Climate Resilient Agriculture and Fisheries Division (RCRAFD)

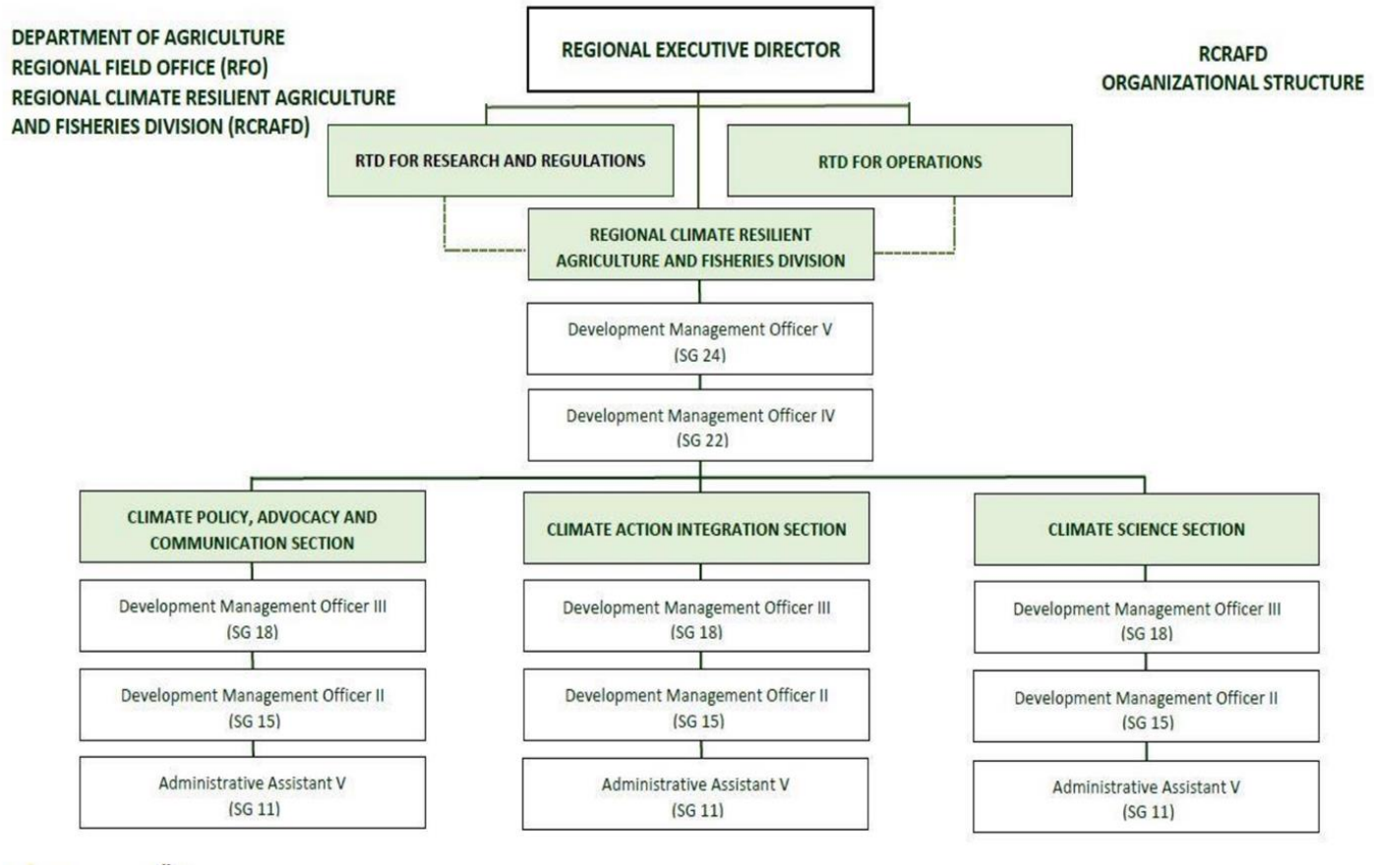


Figure 6: Proposed Organizational Structure and Staffing of RCRAFD

Change management and Communication Plan for the Institutionalization of the CRAO

In 2021, CRAO initiated an Advocacy, Communication, and Social Mobilization (ACSM) Plan with internal, national and international audiences including investors, and partners in the academe and research organizations, with climate information services and weather information as one of its focused messages. This ACSM plan aimed to address the challenges and limitations encountered by AMIA staff in the initial implementation of program activities, such as top-down planning in the agricultural and fisheries sector, limited reach of 3Gin some rural areas, lack of power supply, and making climate-resilient agriculture (CRA) technical terms easier to understand. For the proposed AMIA integrated communications operations for social media platforms, a technical working group was formed and composed of DA-CRAO, Regional AMIA Focal Person, RAFIS as alternate focal, and provincial agriculture office and municipal agriculture office as assistance and support providers.

Since then CRAO has been actively advocating for budget support to the AMIA Program at the Upper and Lower Houses of Congress. It presented the AMIA Program/ AMIA Decision-Support Tools (DSTs) at various national and local events and during exploratory meetings with potential partners. In the same manner, briefings/trainings of DA banner programs and other agencies have been conducted by CRAO so they can familiarize themselves with and update them on AMIA's direction and DSTs. Various IEC materials to communicate AMIA Program and AMIA DSTs were also developed by CRAO, digital communications on AMIA, Social Media (Facebook), Audio Visual Presentation and other communication tools.

However, despite CRAO's efforts in communicating the AMIA Program, CRAO relations with DA agencies still leave much to be desired. Based on the report of ADB on Deepening Climate-Related DA Organizational Reforms to Sharpen and Better Harmonize Climate Action, the level of awareness/depth knowledge of CRAO's knowledge and tools is very limited; much more than the actual use of their outputs. NCCAG and the CRVA results are still not used by DA agencies. Most DA agencies reported "occasional" to "no interaction" with the CRAO. Although most have climate change programs, they mentioned that CRAO did not have a hand in designing them, nor have they influenced CRAO's programs[5]. Likewise, it was highlighted in the report that there remains to be a low level of interaction with other DA offices. Neither is there any attempt to communicate to the public the climate change programs of the DA operating units (Table 1).

[5] Asian Development Bank. Deepening Climate-Related DA Organizational Reforms to Sharpen and Better Harmonize Climate Action. August 2023.

Table 1: CRAO Relations with DA Units

DA Units	General functions	Climate Change Programs	Knowledge and Use of CRAO Outputs and Levels Cooperation with CRAO
BSWM	• Soil and water conservation and management	• Sustainable land management • Agrometeorology and hydromet related to irrigation • Cloud seeding • Desertification, soil salinity • National drought action plan	• Limited knowledge of CRAO outputs • CRAO did not influence as BSWM programs designed before CRAO was established • Occasional invitation to CRAO events but were only attendees
PhilMech	• Agriculture Mechanization Research • RCEF • Mechanization component	• Field testing of micro impeller brown rice huller • Engine-driven shallow tube well-solar powered irrigation • Pilot testing of fluidized bed dryer for high moisture paddy • Utilization of by-products and wastes from sweet potato • Bioresource to convert rice hull waste into usable resources • Bioactive Cymbopogon citratus used in diseases of mango • Pilot testing of cassava granulator • Insecticide resistant predator to control pests • in storage	

PhilRice	• Rice research	• Adaptation and mitigation in rice and rice-based systems	• No knowledge of CRAO outputs CRAO has no influence or contribution, nor has PhilRice influenced CRAO programs. • PhilRice surprised to learn that CRAO has done CRVA
ICTS	• ICT planning, development of application systems, database management, and network • management	• Suitability maps • Participatory risk mapping project • Pilot text blast system using RSBSA data • Tracking DA beneficiaries	• Knows only the NCCAG/ ICTS is Hosting of NCCAG • No other interface with DA CRAO although it is apparent that they also have similar mapping initiatives
BAFE	Engineering standards and regulations	**Renewable Energy Program for Agri-fisheries Sector (REPAFS)** As part of the collaborative efforts to boost the country's energy and food security, the DOE and DA signed a MOA on August 6, 2020 for the formulation of REPAFS. For the enhancement of productivity, environmental protection and sustainable development of agri-fisheries sector, this program aims to promote the use of cost- efficient renewable energy sources such as solar, wind, hydro, small-scale geothermal, and biomass for fuel and	BAFE was not involved in the crafting of DA CRAO's programs and outputs while CRAO was not involved in BAFE's CC related programs. There was a time that CRAO requested for data from BAFE but it was not clear what or how CRAO will use the requested data/information.

		power generation. The BAFE was mandated to spearhead the formulation of the document. **Valuation of Agri-fisheries Mechanization and Infrastructure Projects**. The DA through the BAFE has issued the Administrative Order No. 20, Series of 2022 "Guidelines in the Valuation of Agricultural and Fisheries Mechanization and Infrastructure Projects". The AO provided the valuation process and approaches that can be used as reference for the assessment of damage for various machinery, facilities, and infrastructures. **Inclusion of climate resiliency measures in the recommendations for the design of infrastructure projects**. In order to improve the quality of FMRs, the DA has agreed with the recommendation of the DPWH to provide an option to the procuring entity on the use of polymer-based soil stabilizer (PBSS). This is an environment-safe additive that enables soil and gravels to attain higher density strength that could be attained in natural materials for road construction.	

		Ensuring the integration of climate-resilient measures based on the local and international referral codes and standards (National Structural Code of the Philippines). Use of renewable energy sources in powering agricultural facilities	
NFA	Rice Buffer stocks management Disposition of rice in GIDA areas	• Rice Buffer stocks for emergency • Disposition of rice in GIDA areas	
PCIC	Social protection through crop insurance	• Crop insurance • Area-based yield insurance dry-run in Guimba, Nueva Ecija, Alang Alang Leyte, Butuan City in partnership with Pula Advisors • Pilot weather-indexed based insurance with ILO, with PHILCCAP, with UNDP in Mindanao	No knowledge of CRAO's outputs • Participated in the study missions organized by SWCCO-SEARCA to different ASEAN countries • CRAO has no input and participation in the development of these indexed- based insurance pilots of PCIC, including piloting of yield indexed insurance products
DRR Unit	Risk monitoring and response	Risk monitoring, risk communications and quick response	• Proposal to merge DRR- CCA initiatives

Banner Programs	Long term adaptation and development (production support services—seeds, machines, inputs)	**Rice** – distribution of stress tolerant varieties in areas where Seeds/nutrient management; Use of Drone technology for farming system **Fisheries** – surveying landing sites under the National Stock Assessment Program (CC objective: Explore climate resilient fisheries species and culture technologies); **Distribution of payao (traditional fish aggregating device) to reduce fuel consumption and decrease catch per unit effort; Distribution of seaweed propagules and seaweed farm implements and establishment and maintenance of seaweed nurseries to provide sustainable livelihood to target beneficiaries; Biotoxin/Harmful Algal Bloom (HAB) monitoring to mitigate shellfish poisoning episodes and economic losses, building a database on marine toxicity as basis for policy formulation and capacity building; Planting of mangrove propagules for flood protection; Deployment of artificial reef modules**	Rice Knowledge of AMIA villages CRAO sometimes participate in program assessments and planning

DA Gender Equality and Social Inclusion (Gender Focal Point System)	Ensuring gender mainstreaming in the DA		Maybe at the ground level • DA CRAO has existing research on women, but GESI not involved in developing • Gender considerations included in AMIA Guide • CRAO is part of the DA Gender Focal Point System. CRAO assisted GESI prepare talking points for international event on women and climate change
PCAF	Stakeholder engagement	**PCAF Special Committee on Climate Change**	Vice Chair- CRAO

Source: Asian Development Bank. Deepening Climate-Related DA Organizational Reforms to Sharpen and Better Harmonize Climate Action. August 2023

It was highlighted in the report that there could be resistance from the DA bureaucracy, particularly at the initial stage. This resistance could be caused by a lack of understanding of the scope and costs of impact of climate change and the options for mitigation requiring a reform of the planning system of agriculture and fisheries towards a more bottom-up and flexible approach. Allowing for more flexibility at local and regional level could cause resistance at national level if misunderstood. At the same time, there might be pressure from the Ministry of Finance to reduce spending neglecting the increased cost caused by the impact of climate change.

Because of this resistance, CRAO resorted to demonstrating CRA technologies directly at the ground level through the AMIA approach. Since then, there have been significant improvements aimed at engaging and influencing other DA units.

By focusing too much on the CRA technologies and tools and activities, CRAO might have given insufficient attention to the rationale, and urgency for the negative impact on climate change and the practical use of the tools developed. In other words, we might have stressed too much on the products we 'sell', without ensuring that the 'clients' (other DA units) are convinced how it helps them realise their goals; ic "how much they need them".

Also convincing other units sometimes can better be done by other non-competing units, outside DA and at regional and local level. Messaging from CRAO about how important and relevant CRAO is, might be less credible than if it comes from other sources who are not directly benefitting from the structural change within DA.

Internal Advocacy and Communication Plan

To enable to reach out to DA program personnel and gain their support for the AMIA Program of CRAO, advocacy and communication plan must be in place. This will help increase awareness and understanding on the programs and projects of CRAO, generating strong support within the DA organization. Table 2 and Table 2.a. shows the proposed advocacy and communication plan of CRAO to influence other units within DA, and roles of various stakeholders in the proposed communication and advocacy plan respectively.

Table 2: Proposed advocacy and communication plan to improve dissemination of AMIA Program and Decision-Support Tools with in DA

ISSUE	COMMUNICATION GOALS	COMMUNICATION OBJECTIVES	PROSPECTIVE MATERIALS	TARGET AUDIENCE	CHANNELS	INDICATORS
Lack of awareness and understanding on the AMIA Program, DSTs, and CRA	To introduce the AMIA Program, along with CRAO's Decision-Support Tools (DSTs) and climate resilient agriculture (CRA) practices with in the DA organization and generate strong support for the program's implementation.	DA personnels should have an understanding of the AMIA Program, appreciation on its goals, and support its programs and projects	Power point presentation, flyers/brochure, posters, videos on AMIA programs/project and accomplishments, and DTS developed	DA program implementer and attached bureaus, policy makers	Interpersonal (meetings/briefings); prints; posters	# of meetings/ briefing conducted; # of IEC materials disseminated (print and audio-visual)
Negative or neutral attitude towards AMIA Programs, DSTs, and CRA	To positively influence personal and social norms of DA personnels to support AMIA programs, DSTs and CRA practices	DA personnel should have a positive attitude towards AMIA programs, DST and CRA	Power point presentation, flyers/brochure, posters, videos on AMIA programs/project and accomplishments, and DTS developed	DA program implementer and attached bureaus, policy makers	Interpersonal (meetings/briefings); prints; posters, broadcast	# of meetings/ briefing conducted; # of IEC materials disseminated (print and audio-visual), #

						of radio/TV programs or jingle/s aired
Lack of common platform for CRAO's knowled ge products and resource s	To create an integrated platform as repository of accessible CRAO produced materials	To increase awareness and understandi ng on the AMIA Program and its DSTs	Knowledge Manageme nt Portal (microsite with the CRAO website as the parent site)	DA Program Impleme nters and attached bureaus, Policyma kers (Upper and Lower House member s), LGUs, LCAs, Researc hers	Face-to-face activities-meetings/dialo gue, seminars, Online promotion of website	No. of platform for CRAO's knowled ge products establish ed
Low awarene ss/ technical capacitie s of DA Program Impleme nters and policy makers on the various DSTs produced by CRAO	To develop outcome-based sets of training to refresh the knowledge of DA Program Implementer s and policy makers. Campaign must be undertaken to influence their cognitive and psychomotor domains	To enhance technical capacities of DA Program Implementer on various DSTs	PowerPoint presentatio ns; Handouts; Training materials; Tarpaulin; flyers/broch ures	DA and attached Bureaus Program Impleme nters, Policyma kers (Upper and Lower House member s),	Face-to-face discussions; meetings/dialo gue, hands-on activities, print and online	No. of activities undertak en in support of the campaig n
Low awarene	To develop outcome-	At the end of the training,	PowerPoint presentatio	DA Program	Face-to-face discussions;	# of CIS-related

ss of DA personnel on CIS outline	based trainings on enhancing awareness/technical knowledge of DA personnel	participants have gained more knowledge/ awreness in formulating CIS outline and content	ns; Handouts; Training materials	implementers (particularly those designated as CIS focal person); program partners	hands-on activities; brochures/ fliers	trainings conducted
Lack of institutional collaterals	To promote the initiatives of CRAO, audience-specific institutional collaterals must be developed	At the end of the development of audience-specific institutional collaterals, all stakeholders must be able to understand the function of the office, appreciate its program, and support its mission	Flyers/ brochure; powerpoint presentations, newsletter, magazine	All DA Program Offices, and attached bureaus	Print and online	# of flyers produced; # of brochures produced, # of newsletter produced; # of magazine produced
Low digital manifestations of the CRAO initiatives	To promote the initiatives of CRAO to wider audience, the social and website of CRAO must be reinforced	At the end of the reinforcement of FB, Youtube, and other website of CRAO, the digital nomads must be able to understand the function of the office,	Facebook posts; Youtube videos; CRAO/AMIA website	Digital nomads of the general public	Online	# of FB posts; # of YT videos; 100% enhanced AMIA website

		appreciate its program, and support its mission				
Low number of printed collaterals	To expand manifestation of CRAO available and new collateral must be printed out	At the end of reading the printed collateral, the audience should be able to understand the function of the office, appreciate its program, and support its mission	All materials that have been produced and will be produced	Open day CRAO Office visitors, prospective partners, general public	Print	# of printed materials produced and distributed
Inadequate support and/or collaboration with other stakeholders	To build stable and constant collaboration and partnership with various DA program implementers and attached Bureaus	To gain commitment and foster linkage with DA program implementers and attached Bureaus	Memorandum of Agreement or Understanding; Pledge of Commitment	DA and attached Bureaus Program Implementer	Technical briefings; info caravan;Stakeholders' consultation or dialogues	# of MOAs or MOUs forged # of collaborative projects conducted

Table 3: Roles of various stakeholders in the proposed communication and advocacy plan.

ISSUE	DA-CRAO	REGIONAL AMIA IMPLEMENTERS	PLGU/MLGU	FARMERS AND FISHERFOLK	TRAINING INSTITUTIONS/ TECHNICAL EXPERTS	NGOs
Low technical capacities of DA units in coming up with CIS outline	Provide funding and spearhead capacity-building activities (CBA) and knowledge enhancement in formulating CIS outline and content	Participation to capacity-building activities; Re-echo learnings to DA-LGU counterparts	Authorize designated staff to undergo capacity building and provide counterpart funding for re-echo activities at the LGU level	-	Serve as learning service providers (LSP) during CBA	Share available best practices (i.e. IIRR) Maybe tapped as LSP
Limited platforms used by RFOs to disseminate climate information	Spearhead lecture sessions on introducing program implementers to varied platforms of CIS dissemination	Participation to capacity-building activities; Re-echo learnings to DA-LGU counterparts Spearhead regional information caravan with at least 1000 target participants	Authorize designated staff to undergo capacity building and provide counterpart funding for re-echo activities at the LGU level	Provide feedback to CIS dissemination strategy	Serve as learning service providers during CBA	Share available best practices (i.e. IIRR)
Repetitive CRA recommendations integrated in CIS advisories	Spearhead technical briefings for regional implementers on various CRA technologies appropriate for different climate hazards	Participation to capacity-building activities; Re-echo learnings to DA-LGU counterparts	Authorize designated staff to undergo capacity building and provide counterpart funding for re-echo activities at the LGU level	Explore and adopt CRA technology appropriate to existing hazards in the farm/ fishing areas or communities	Serve as learning service providers for AEWs and farmers in the accurate application of CRA technologies	Serve as learning service providers for AEWs and farmers in the accurate application of CRA technologies

ISSUE	DA-CRAO	REGIONAL AMIA IMPLEMENTERS	PLGU/MLGU	FARMERS AND FISHERFOLK	TRAINING INSTITUTIONS/ TECHNICAL EXPERTS	NGOs
	and/or agro-ecosystems					
No hit/access counter for posted CIS-related contents	Provide funding for the creation of portal with hit/access and download counters	Integrate in the regional portal the CIS contents and create program with hit/access and download counters	Provide feedback during program / portal test run	Provide feedback during program / portal test run	Provide feedback during program / portal test run	Provide feedback during program / portal test run
Inadequate support and/or collaboration with other stakeholders	Lead / spearhead in making national and international collaboration and linkages	Lead / spearhead in making regional collaboration and linkages	Lead / spearhead in making provincial and local collaboration and linkages	Serve as active partners and collaborators in project implementation, adoption and commercialization	Serve as active partners and collaborators in terms of capacitation and human development	Serve as active partners and collaborators

The following Figure 7 shows the proposed Internal Advocacy and Communication Framework. The components of the framework are as follows: issues, communication objectives/goals, channels, target audience, messages, and strategic activities in order to improve the communication needs of the organization. All of these components are needed during the implementation, requiring feedback along with monitoring and evaluation.

Figure 8 on the other hand shows the process mapping for the advocacy and communication strategy. This includes the Input, Process, Output, and Outcome. Proposed activities has been identified per process in order to be able to increase understanding and appreciation of DA staff on the programs and projects of CRAO.

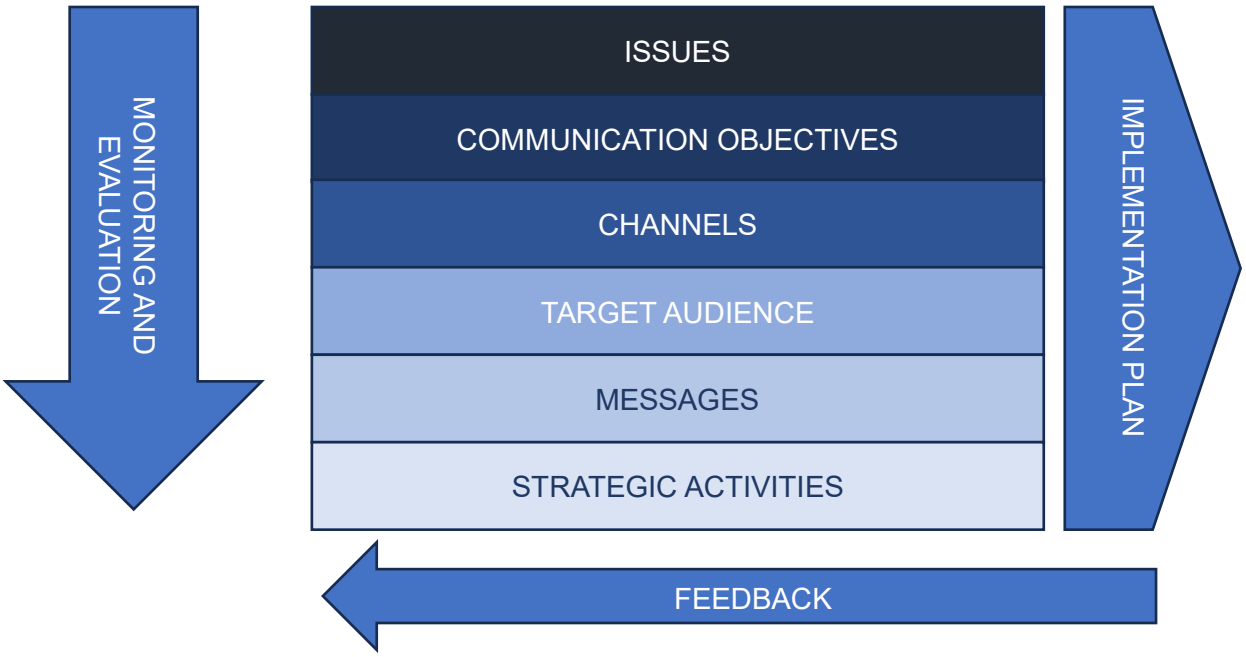


Figure 7: Internal Advocacy and Communication Framework

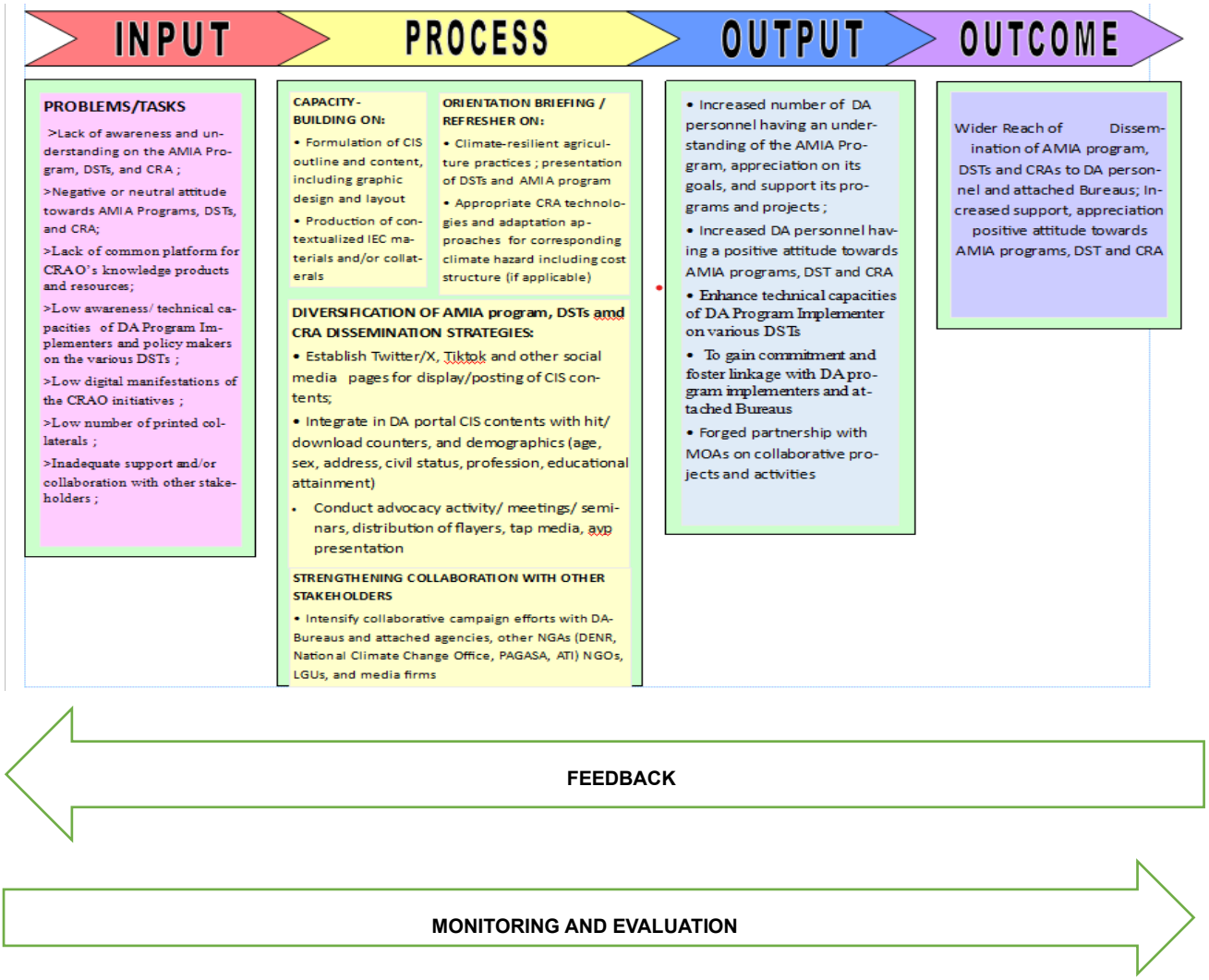


Figure 8: Proposed Process Mapping for the Internal Advocacy and Communication Strateg

FRAMEWORK FOR MONITORING AND EVALUATION

2024

ASIAN DEVELOPMENT BANK

FRAMEWORK FOR MONITORING AND EVALUATION

2024

Prepared by TRTA Consultant under

TA-10009 PHI: Accelerating Climate Resilience in Agriculture, Natural Resources, and the Environment - 01 TA Consulting Firm (55268-002)

Results Framework for the Adaptation and Mitigation Initiative in Agriculture (AMIA) Program (2024-2030)[1]

Building farming and fishing communities, livelihood, and enterprises resilient to climate and economic shocks

17 April 2024 draft for workshop purposes

Purpose of framework: to enable more effective performance monitoring and evaluation of the network of AMIA villages and AMIA-CREATE projects.

Results Chain *[Series of expected achievements or positive changes, linked by causality]*	**Results Indicators** *[Measurable basis for monitoring and evaluation; use SMART criteria.]*	**Measurable Targets**			**Data Sources and Reporting on Indicators**	**Risks and Assumptions** *[positive or negative condition, event, or action to achieve results]*
		Baseline 2024	Mid-term 2027	End-term 2030		
Impact *[Higher level objective to which climate mainstreaming will contribute but cannot achieve all by itself]* **GOAL**: Increased incomes and resilience of AMIA farming and fishing communities/ villages	**G1.** Income and employment from all sources, by region, province and municipality (in PhP and percent increase): — Household level — Enterprise level **G2.** Hectares of farms damaged annually by typhoons, by major commodity and by region, province and municipality	TBD TBD	25%-50% TBD	50%-100% TBD	External program performance evaluation DA FOS and Banner Programs Beneficiary Satisfaction Survey	Increased incomes will be attributable to two major sources: (a) reduced agri-fishery losses and damages; and (b) higher productivity based on targets set by commodity banner programs. Higher productivity is reflected in increased incomes.
Outcome *[Immediate and direct benefits of the use or application of the*	**P1.1** Total AMIA villages in the country, by region, province and municipality (number)	TBD	TBD	TBD	CRAO annual and special reports	DA will provide adequate and timely budgets/ funds proportionate to the

[1] This Framework was formulated in response to the TA 10009-PHI deliverable, "Development of framework for more effective M&E of the network of AMIA villages and AMIA-CREATE projects".

Results Chain *[Series of expected achievements or positive changes, linked by causality]*	**Results Indicators** *[Measurable basis for monitoring and evaluation; use SMART criteria.]*	**Measurable Targets**			**Data Sources and Reporting on Indicators**	**Risks and Assumptions** *[positive or negative condition, event, or action to achieve results]*
		Baseline 2024	Mid-term 2027	End-term 2030		
*outputs; expressed as **institutional or behavioral** changes]* **PURPOSE P1**: AMIA villages' capability to cope with climate shocks improved	**P1.2** Breakdown of AMIA villages by Phases 1 to 4 (number and percent classified per phase) **P1.3** Sex-disaggregated beneficiary ratings on AMIA villages' capability to cope with climate shocks (number and percent) **P1.4** Number of AMIA Villages federated to become an enterprise	Ph. 1 = xx Ph. 2 = xx Ph. 3 = xx Ph. 4 = xx TBD TBD	Ph. 1 = xx Ph. 2 = xx Ph. 3 = xx Ph. 4 = xx 70% satisfied TBD	Ph. 1 = xx Ph. 2 = xx Ph. 3 = xx Ph. 4 = xx 90% satisfied TBD	Beneficiary Satisfaction Survey	planned/ targeted expansion of the AMIA Program.
PURPOSE P2: CRAO internal capability at the central and regional levels to plan, implement, monitor and report on AMIA Program implementation improved	**P2.1** Major activities accomplished as planned/ targeted (number and percent of activities—planned vs. accomplished) **P2.2:** Accomplished major activities rated in terms of: (a) timeliness; and (b) quality (sex-disaggregated number and percent by region,	TBD NA	90% of targets achieved 90% satisfied	95% of targets achieved 90% satisfied	CRAO annual and special reports RFO Perception Survey Beneficiary Satisfaction Survey	DA will provide CRAO with adequate and timely capacity-building support and other necessary resources. "Quality" of accomplishments refers to the process and results of support provided to farmer and fishing communities to

Results Chain *[Series of expected achievements or positive changes, linked by causality]*	**Results Indicators** *[Measurable basis for monitoring and evaluation; use SMART criteria.]*	**Measurable Targets**			**Data Sources and Reporting on Indicators**	**Risks and Assumptions** *[positive or negative condition, event, or action to achieve results]*
		Baseline 2024	Mid-term 2027	End-term 2030		
	province and municipality.					achieve AMIA objectives.
Outputs (3 components) *[Goods, services, or products delivered by Programs and Projects]* **OUTPUT O1:** Responsive and timely community organizing, CRA trials, equipment, inputs, advice, training, information and other forms/ types of assistance and support delivered to AMIA Villages	**O1.1** Beneficiaries (sex-disaggregated number of farmers, fisherfolk and other target stakeholders, by AMIA Pathway Phase, by type of assistance or support, by region, province and municipality) **O1.2** Action research studies (including updated/ automated CRVAs) completed to inform and continually improve assistance and support to AMIA Villages	NA NA	TBD TBD	TBD TBD	CRAO annual and special reports End-User Survey Beneficiary Satisfaction Survey	DA will provide CRAO with the necessary personnel, budget and resources to implement the AMIA Program at the central, regional and local levels.
OUTPUT O2: Tailored, practical and sustainability-oriented capacity-building of key stakeholders at all levels enhanced	**O2.1** Training needs assessment-based training programs developed (number by topic, target participants by level; government vs. non-government) — Central — Regional	NA NA	TBD TBD	TBD TBD	CRAO annual and special reports	DA will provide CRAO with the necessary personnel, budget and resources to implement capacity-building at the central, regional and local levels.

Results Chain *[Series of expected achievements or positive changes, linked by causality]*	**Results Indicators** *[Measurable basis for monitoring and evaluation; use SMART criteria.]*	**Measurable Targets**			**Data Sources and Reporting on Indicators**	**Risks and Assumptions** *[positive or negative condition, event, or action to achieve results]*
		Baseline 2024	Mid-term 2027	End-term 2030		
	— Local **O2.2** Learning events participated — In country — International **O2.3** Business models developed for AMIA CREATE (number)	TBD TBD	TBD TBD	TBD TBD	Training Impact Evaluation	
O3 Multistakeholder, multilevel partnerships strengthened and expanded in-country and globally	**O3.1** Local and international partnerships by type of institution (e.g., LGU, SUC, NGO/ PO/ CSO, etc.) — Strengthened (existing) — Developed (new) **Q3.2** Fund sources — Strengthened (existing) — Developed (new)	TBD	TBD	TBD	CRAO annual and special reports	DA will provide CRAO with the necessary personnel, budget and resources to pursue partnership activities

Monitoring & Evaluation Plan: Adaptation and Mitigation Initiative in Agriculture (AMIA) Program (2024-2030)[2]

Purpose of M&E Plan: to establish standards for tracking and reporting on results specified in the AMIA Results Framework.

No.	Indicator Name	Purpose and Definition	Frequency	Data Sources	Methodology for Data Collection	Responsibility for Data Collection
	IMPACT LEVEL					
1	G1. Income and employment from all sources, by region, province and municipality (in PhP and percent increase): – Household level – Enterprise level	Measure one of two expected end-results of successfully applying the AMIA approach.	Quarterly data collection and reporting; in-depth semi-annual synthesis and analysis	External evaluation; RFOs; CRAO periodic monitoring visits	Household survey Key Informant Interviews Focus Group Discussions	CRAO M&E unit, supported by RFOs; Independent consultants; collab with PMS-MED
2	G2. Hectares of farms/ ponds damaged annually by typhoons, by major commodity and by region, province and municipality	Will reflect the second of two end-results of AMIA. To be correlated with income and employment data.	Timed with occurrence of typhoons; in-depth semi-synthesis and analysis	DA FOS; National Disaster Risk Reduction and Management Council (NDRRMC); satellite imagery	Directly from primary sources; cross-checked with RFO and banner program databases.	CRAO M&E unit; collab with: (1) PMS-MED; (2) DA banner programs
	PURPOSE LEVEL					
3	P1.1 Total AMIA villages in the country, by region, province and municipality (number)	This indicator will track AMIA coverage expansion, visualized using GIS maps.	Annual data collection, analysis and reporting	DA RFOs with guidance from CRAO, using standard formats; GIS maps	Consolidation of regional and local implementation data	CRAO M&E unit with RFO Focals
4	P1.2 Breakdown of AMIA villages by Phases 1 to 4 (number and percent classified per phase)	Track progress vis-à-vis the AMIA development pathway.	Annual data collection, analysis and reporting	DA RFOs using standard criteria and presentation format; GIS maps	Consolidation of regional and local implementation data	CRAO M&E unit with RFO Focals
5	P1.3 Sex-disaggregated beneficiary ratings on AMIA villages' capability to cope with climate shocks (number and percent)	Community self-assessment of resilience. Generate data from beneficiaries' viewpoint.	Annual data collection, analysis and reporting	DA RFOs using standard criteria and presentation format	Surveys Interviews Focus Group Discussions	CRAO M&E unit with RFO Focals unit with RFO Focals

[2] Reference: Results Framework for the Adaptation and Mitigation Initiative in Agriculture (AMIA) Program (2024-2030).

No.	Indicator Name	Purpose and Definition	Frequency	Data Sources	Methodology for Data Collection	Responsibility for Data Collection
6	P1.4 Number of AMIA Villages federated to become an enterprise	Track progress leading to Phases 3 and 4 of the AMIA development pathway	Annual data collection, analysis and reporting	RFOs using standard criteria and presentation format	Surveys Interviews Focus Group Discussions	CRAO M&E unit with RFO Focals
7	P2.1 Major activities accomplished as planned/ targeted (number and percent of activities—planned vs. accomplished)	Assess program performance: identify and address major bottlenecks	Annual data collection, analysis and reporting	DA RFOs using standard criteria and presentation format	Consolidation of regional and local level data using standard DA / CRAO formats	CRAO M&E unit with RFO Focals
8	P2.2: Accomplished major activities rated in terms of: (a) timeliness; and (b) quality (sex-disaggregated number and percent by region, province and municipality.	"Quality" refers to the process and results of support provided to communities to achieve AMIA objectives.	Annual data collection, analysis and reporting	RFOs and AMIA beneficiaries	Survey using standard formats	CRAO M&E unit
	OUTPUT LEVEL					
9	O1.1 Beneficiaries (sex-disaggregated number of farmers, fisherfolk and other target groups, by AMIA Pathway Phase, by type of assistance or support, by region, province and municipality)	This indicator quantifies farmers and fisherfolk provided with climate services under the AMIA Program.	Annual data collection, analysis and reporting	RFOs and directly from AMIA beneficiaries; cross-referenced with: (1) RSBSA; and (2) CRAO's automated Climate Info System (CIS).	Survey using standard formats; differentiated by sex, and between individual beneficiaries and farmers/ fisherfolk organizations	CRAO M&E unit, referencing RFO and LGU records
10	O1.2 Action research studies (including updated/ automated CRVAs) completed to inform and continually improve assistance and support to AMIA Villages	This indicator will ensure that AMIA operations will be continually enhanced by way of systematic studies.	Annual reporting during year-end program assessment.	CRAO and BAR records	Compilation of data	CRAO M&E unit, working with BAR and external consultants engaged to conduct studies
11	O2.1 Training needs assessment-based training programs developed (number by topic, target participants by level;	This indicator will ensure that capacity building will be based on needs, and will	Annual TNA and reporting during year-end program assessment	CRAO and ATI records	Compilation of data	CRAO M&E unit, collaborating with ATI.

No.	Indicator Name	Purpose and Definition	Frequency	Data Sources	Methodology for Data Collection	Responsibility for Data Collection
	government vs. non-government) - Central - Regional - Local	produce lasting effects on program performance.				
12	O2.2 Learning events participated - In country - International	Will complement training-based capacity building. This indicator will dwell on deepening and sustaining learning.	Annual reporting during year-end program assessment.	CRAO records	Compilation and synthesis of CRAO data and reports.	CRAO M&E unit
13	O2.3 Business models developed and disseminated for AMIA CREATE (number)	Linked to O2.2, this indicator will promote learning application.	Annual reporting during year-end program assessment.	CRAO records; DA AMAS/ AMADs	Compilation and synthesis of CRAO data and reports. Survey of end-users of business models.	CRAO M&E unit
14	O3.1 Local and international partnerships by type of institution (e.g., LGU, SUC, NGO/ PO/ CSO, etc.) - Strengthened (existing) - Developed (new)	Will focus on partnership-building to support AMIA Program implementation and enhancements.	Annual reporting during year-end program assessment.	CRAO records; actual and potential partner organizations	Compilation and synthesis of CRAO data and reports.	CRAO M&E unit
15	Q3.2 Resource/ fund mobilization: - Strengthened (existing) - Developed (new)	Ensure stable and diversified funding sources to carry out the program.	Annual reporting during year-end program assessment.	CRAO records; actual and potential funding agencies	Compilation and synthesis of CRAO data and reports.	CRAO M&E unit

AGRI-FISHERY SECTOR LEVEL RESULTS-BASED DESIGN AND MONITORING FRAMEWORK (DMF)[3]
MAINSTREAMING OF CLIMATE RESILIENCE 2024-2030

17 April 2024

Purpose of DMF: Provide a basis for effective monitoring of mainstreaming climate resilience in the agri-fishery sector.

Definitions:
1) **DMF**, a framework to monitor and evaluate achievement of development results, summarizes how, assuming risks do not eventuate, and assumptions hold true, measurable outputs and outcomes will be achieved and how these will contribute to development impacts.[4]
2) **Climate resilience** is the capacity of social, economic and ecosystems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure as well as biodiversity in case of ecosystems while also maintaining the capacity for adaptation, learning and transformation.[5]

Results Chain *[Series of expected achievements or positive changes, linked by causality]*	**Results Indicators**[6] *[Measurable basis for monitoring and evaluation; use SMART criteria.]*	**Measurable Targets**			**Data Sources and Reporting on Indicators**	**Risks and Assumptions** *[positive or negative condition, event, or action to achieve results]*
		Baseline 2024[7]	Mid-term 2027	End-term 2030		
Impact (3 indicators) *[Higher level objective to which climate mainstreaming will contribute but cannot achieve all by itself]* **Goal.** A Food and Nutrition Secure and Resilient Philippines with Empowered and Prosperous Farmers and	**G1.** Crop Sensitivity Index[8] (by region, based on RFO province and municipal level monitoring) **G2.** Adaptive Capacity Summative Index[9] (by region, based on RFO province and municipal level monitoring)	(Index by RFO, to be attached to DMF) (Index by RFO, to be attached to DMF) TBD	TBD TBD TBD	TBD TBD TBD	PMS MED: annual studies and external evaluation CRAO, RFOs, consultants	DA management's high priority for increasing climate concerns will be more clearly demonstrated in: (a) organizational structures and relationships; and (b) the annual DA budget.

[3] This DMF was formulated in response to the TA 10009-PHI deliverable, "Development of results-based DMF for effective monitoring of mainstreaming climate resilience in agricultural sector".
[4] ADB Project Administration Instructions (PAI), Project Performance Management, Dec. 2023.
[5] IPCC Sixth Assessment Report
[6] Indicators serve as measurable criteria to track progress in sector-wide mainstreaming of climate resilience. Essentially, indicators will tell us the extent to which climate resilience is mainstreamed.
[7] Baseline to be conducted in 2024.
[8] Changes in climatic suitability of priority crops over time. Priority crops will vary by province. Indices (based on percent change in suitability) range from 1.0 (very high loss) to -1.0 very high gain.
[9] This index will be based on selected indicators of economic, natural, human, physical and institutional capital.

Results Chain *[Series of expected achievements or positive changes, linked by causality]*	**Results Indicators**[6] *[Measurable basis for monitoring and evaluation; use SMART criteria.]*	**Measurable Targets**			**Data Sources and Reporting on Indicators**	**Risks and Assumptions** *[positive or negative condition, event, or action to achieve results]*
		Baseline 2024[7]	Mid-term 2027	End-term 2030		
Fisherfolk (NAFMIP 2021-2030)	**G3.** Hectares of palay farms damaged by typhoons				Same as above + FOS	
Outcomes (2 purpose statements) *[Immediate and direct benefits of the use or application of the outputs; expressed as **institutional or behavioral** changes]* **Purpose P1** DA institutional capability *as climate focal in the agri-fishery sector* strengthened to enable more concerted and better organized climate action planning, implementation, monitoring, reporting and evaluation	**P1.1** DA operating units (OU) Work and Financial Plan (WFP) aligned with Planning and Budgeting Guide for Climate Resilient Agriculture and Fishery to be issued by DA Secretary (percent of total number of OUs)	Not yet applicable (planning and budgeting guide yet to be issued)	100%	100%	CRAO M&E; DA OU WFPs and annual report	Various DA operating units will translate agreements in principle/ in concept to become concrete collaborative actions.
	P1.2 Climate resilience PAPs funded by specific budget allocations (not only "tagged") and implemented (percent of total number of PAPs across all OUs)	Not yet applicable	100%	100%	DA FMS, CRAO	
	P1.3 RFOs and LGUs co-financing joint climate resilience programs and projects (percent of total number of RFOs)	100%	100%	100%	CRAO M&E; DA RFOs	
Purpose P2 DA-initiated multistakeholder climate action at all levels enhanced in the agri-fishery sector	**P2.1** DA co-financing programs or projects with other NGAs, NGOs, private groups, etc. at the central, regional, provincial and local levels (percent of total number of targeted co-financing projects)	Not yet applicable	100%	100%	CRAO M&E	Continuing DA communication and advocacy programs based on: (a) well-presented science-based information; and (b) feedback from stakeholders.

Results Chain *[Series of expected achievements or positive changes, linked by causality]*	**Results Indicators**[6] *[Measurable basis for monitoring and evaluation; use SMART criteria.]*	**Measurable Targets**			**Data Sources and Reporting on Indicators**	**Risks and Assumptions** *[positive or negative condition, event, or action to achieve results]*
		Baseline 2024[7]	Mid-term 2027	End-term 2030		
Outputs (5 sector-wide components) *[Goods, services, or products **delivered** by Programs and Projects]* **O1** Climate information management enhanced	**O1.1** Recipients of climate information (no. of farmers, fisherfolk and other target stakeholders, by commodity system, value chain segment and geographical area)	TBD	TBD	TBD	CRAO M&E with DA ICTS	DBM and DA management will provide adequate and timely funding to sustain the operations of the Climate Information System.
	O1.2 Centralized Climate Information System (CIS) continuing to be operational	Operational	Operational	Operational	CRAO M&E with ICTS	
	O1.3 Provinces where CRVAs updated (percent of total no. of provinces)	TBD	TBD	TBD	CRAO M&E with PRDP-SU	
	O1.4 Client satisfaction rating on climate advisories at least "Satisfactory" (percent of respondents)	Not yet applicable	70%	95%	Client satisfaction survey	
O2 Capacity building enhanced	**O2.1** AMIA Program expansion (percent of regions and provinces where AMIA Program is being implemented)	TBD	TBD	TBD	CRAO M&E; ATI; AMIA impact evaluation	DBM and DA management will provide adequate and timely funding for capacity building including updated TNAs.
	O2.2 AMIA CREATE achieved (percent of AMIA village transformed)	TBD	TBD	TBD	Same as above	
	O2.3 Farmers, fisherfolk and other target stakeholders received climate resilience training from DA and partner	Not yet applicable	TBD	TBD	CRAO M&E	

Results Chain *[Series of expected achievements or positive changes, linked by causality]*	**Results Indicators**[6] *[Measurable basis for monitoring and evaluation; use SMART criteria.]*	**Measurable Targets**			**Data Sources and Reporting on Indicators**	**Risks and Assumptions** *[positive or negative condition, event, or action to achieve results]*
		Baseline 2024[7]	Mid-term 2027	End-term 2030		
	LGUs (number of trainees, by sex, commodity system, value chain segment, geographical area)					
O3 Insurance coverage improved	**O3.1** Farmers, fisherfolk and other target stakeholders number insured (by commodity system, value chain segment, geographical area)	TBD	TBD	TBD	PCIC	(a) PCIC will continue to champion experts' recommendations under ADB TA 10009-PHI, etc. (b) DBM and DA will provide adequate and timely funding.
O4 Research and development enhanced	**Q4.1** Funding for climate-smart research increased (percent increase by source of funding, commodity system, geographical area)	Not yet applicable	TBD	TBD	BAR	a) BAR will continue to champion experts' recommendations under ADB TA 10009-PHI, etc (b) DBM and DA will provide adequate and timely funding.
O5 Policy, regulatory and enabling environment (i.e., legislative and executive) to enhance climate resilience mainstreaming strengthened	**O5.1** Policy issuances by DA towards enhancing climate action (no. of issuances) **O5.2** Climate legislative agenda proposed by NGAs (no. of bills filed in Congress)	Not yet applicable Not yet applicable	TBD TBD	TBD TBD	PRS	a) DA will continue to champion experts' recommendations under ADB TA 10009-PHI, e.g., Foresight Model to guide policies. (b) DBM and DA will provide adequate and timely funding.

Rapid Assessment of AMIA and BP2 Performance

Preliminary Assessment Results: From Initiation to Graduation

20 Nov. 2023

Assessment Objectives

1. Reflect on AMIA as platform for partnership among DA programs and implementing units to establish sustainable climate-resilient villages across the nation
2. Synthesize AMIA accomplishments, areas for improvement, and steps moving forward
3. Assess mainstreaming of climate action into DA and LGU plans, programs, and services

Assessment Features

Assessment themes:

- Targets vs. accomplishments (performance)
- Value chain approach in context of AMIA pathway (4-phase)
- Business/ enterprise development (agri-economy)
- Local/national/international policy framework
- Resource generation, allocation, and management
- “Balanced assessment” equally addressing both successes and challenges

Two complementary assessment perspectives:

- Farm households and community (ground level action)
- AMIA and BP 2 Program Focals

Basic guide questions:

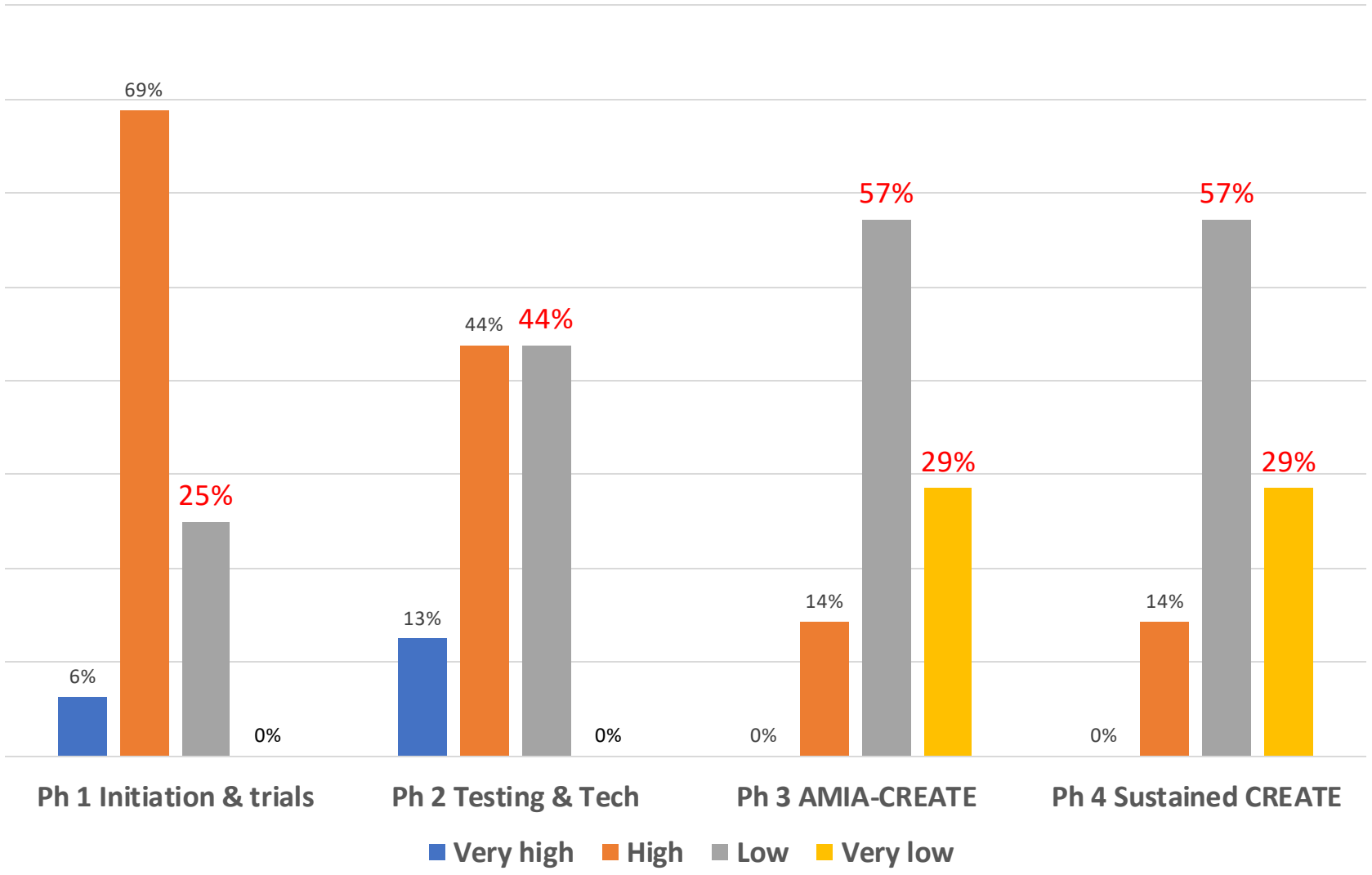
- What worked well or not-so-well?
- Why?
- How can the program be enhanced?

PRELIMINARY RESULTS

(1) Present findings from two perspectives:
    (i) Beneficiaries
    (ii) RFO AMIA and BP 2 focals
(2) Draw feedback from during the Open Forum.

Focals' Ratings: Regional AMIA Achievement of MFOs

Q1. Overall, to what extent has the AMIA Program in the region achieved its Major Final Outputs?



DISCUSSION POINTS

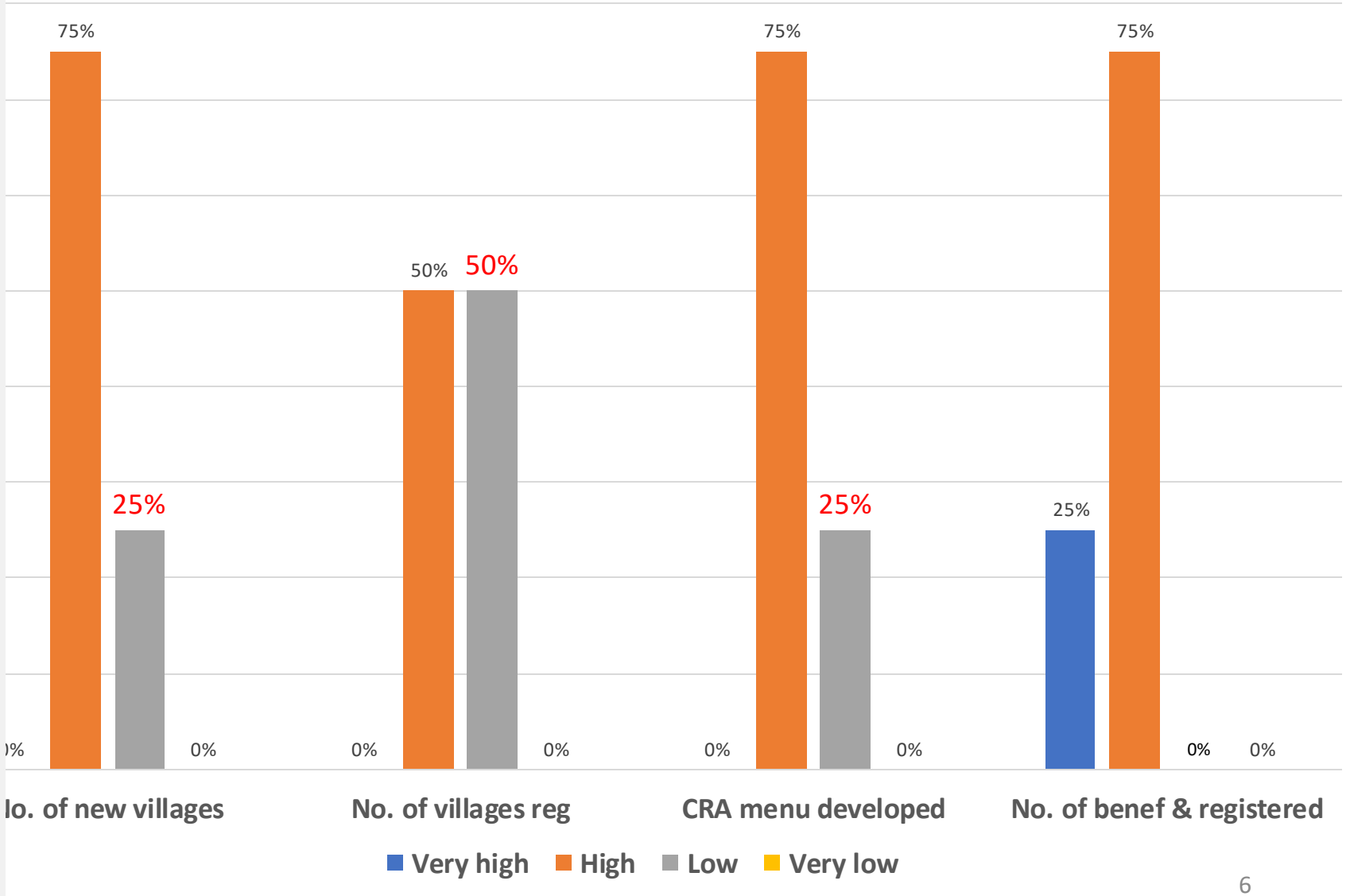
- Most villages in Phases 1 and 2; moving up to Phase 3; no Phase 4 villages
- Promoting value chain-wide climate resilience measures
- Fund availability and resource mobilization and coordination
- Networking with other DA programs, PCIPs, R/P/MAFCs, DSWD & other NGAs, LGUs, NGOs
- Response to ASF and other pest and diseases ("multi-risk assessment")
- Policy environment clarity and stability at national and LGU levels
- Annual program performance assessment and re-planning

Focals' Ratings: Phase 1 Initiation and CRA Trials

Q1. Overall, to what extent has the AMIA Program in the region achieved its Major Final Outputs?

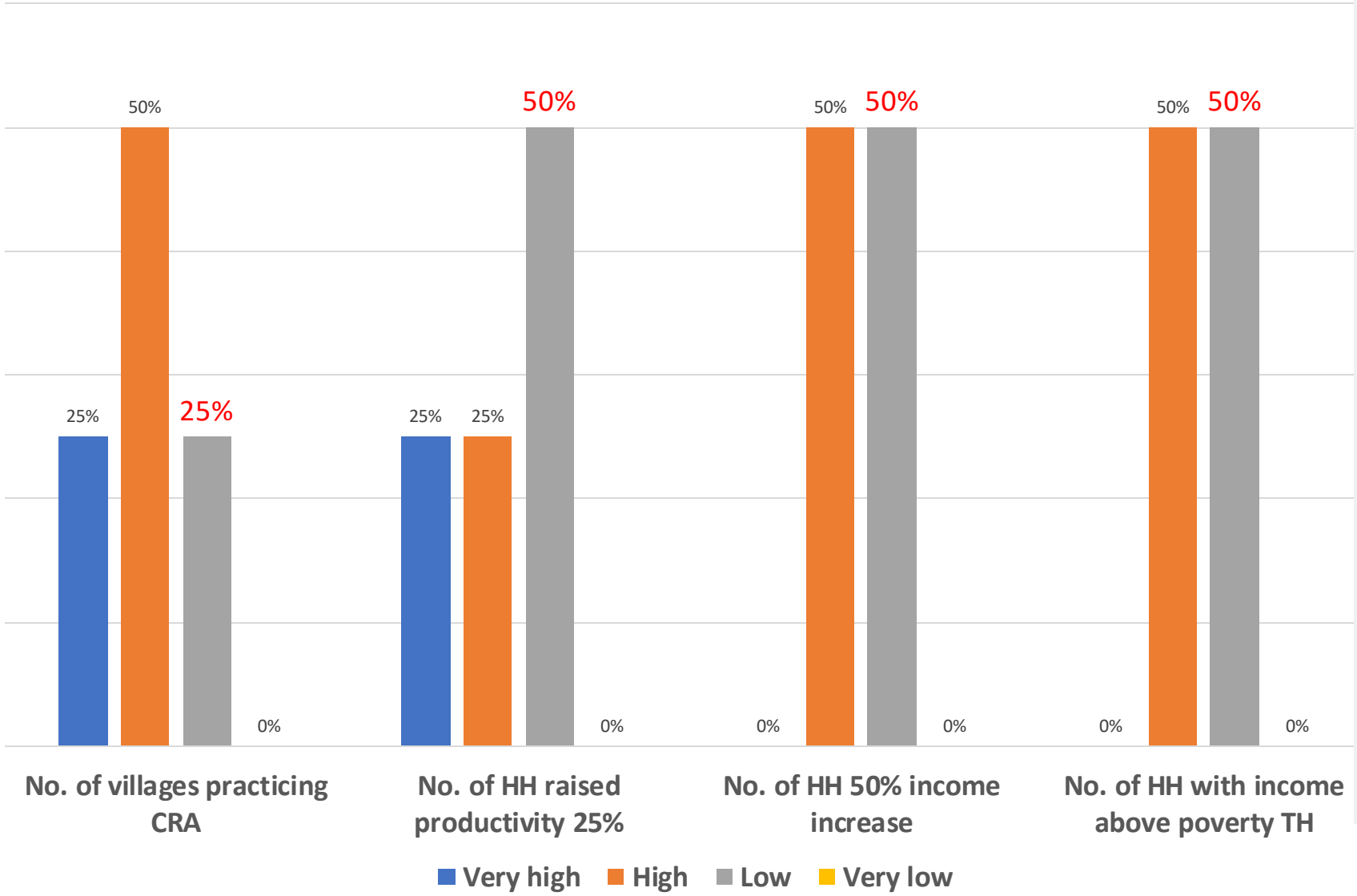
DISCUSSION POINTS

- Promoting climate resilient diversification in one or more value chains incl. fishery
- Basic capacities/ skills; readiness assessment
- Incentivizing village-collective agri-fishery complementing household efforts
- Motivating communities esp. youth to remain in agriculture
- Interventions: mix, quality quantity, and timing
- Geographical dispersal of beneficiary households within a village as a reality



Focals' Ratings: Phase 2 Testing and Practicing CRA Technologies

Q1. Overall, to what extent has the AMIA Program in the region achieved its Major Final Outputs?



DISCUSSION POINTS

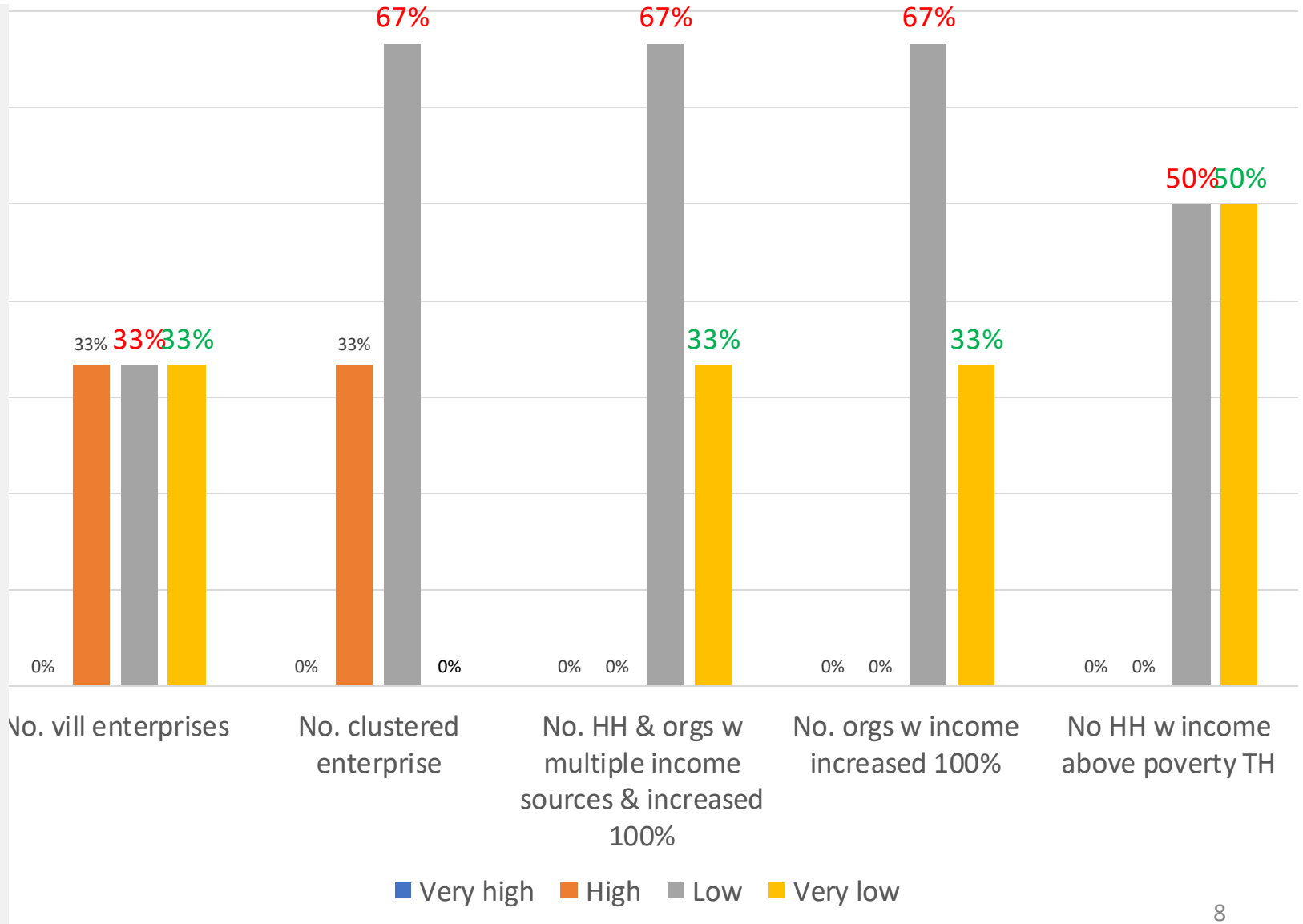
- Potentials and realities (effects) of income and employment diversification
- Use of science-based climate info to organize agri-fishery activities
- LGUs, AMIA and NGO role in communicating weather forecast
- Enhancing efficiency and timeliness of disseminating laymanized local climate info to farmers
- M&E and Knowledge Management during Phase 2

Focals' Ratings: Phase 3 AMIA-CREATE ("Graduation")

Q1. Overall, to what extent has the AMIA Program in the region achieved its Major Final Outputs?

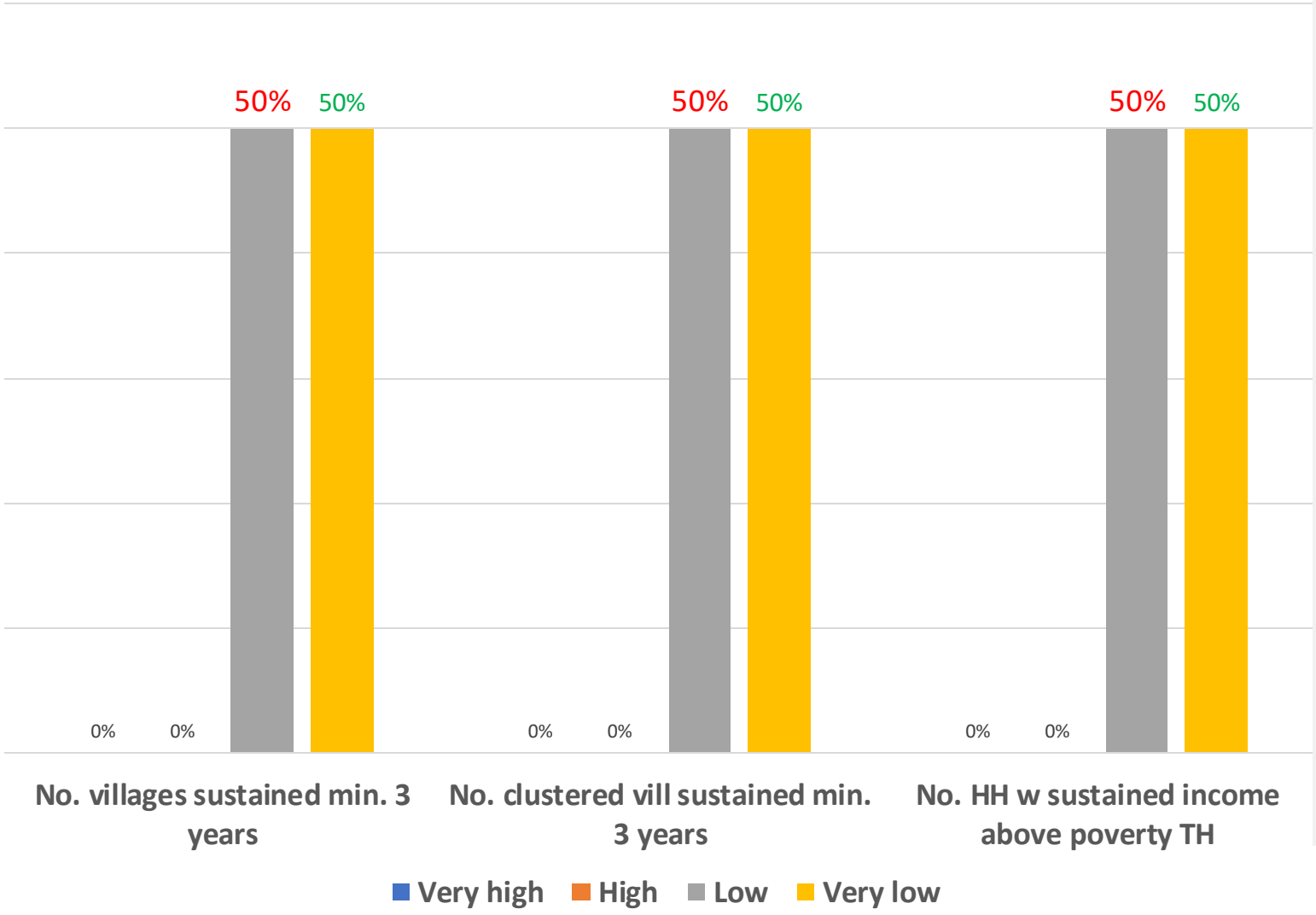
DISCUSSION POINTS

- Determinants of *transformation* from production/ own consumption to market (enterprise) orientation
- Private-led, market-driven agribusiness: role of DA Agribusiness Group, R/P/MAFCs, LGU enterprise office, business entities and groups
- Climate info and investments in agri-fishery enterprises
- Platforms to disseminate local climate info to enterprises



Focals' Ratings: Phase 4 Sustained AMIA-CREATE

Q1. Overall, to what extent has the AMIA Program in the region achieved its Major Final Outputs?



DISCUSSION POINTS

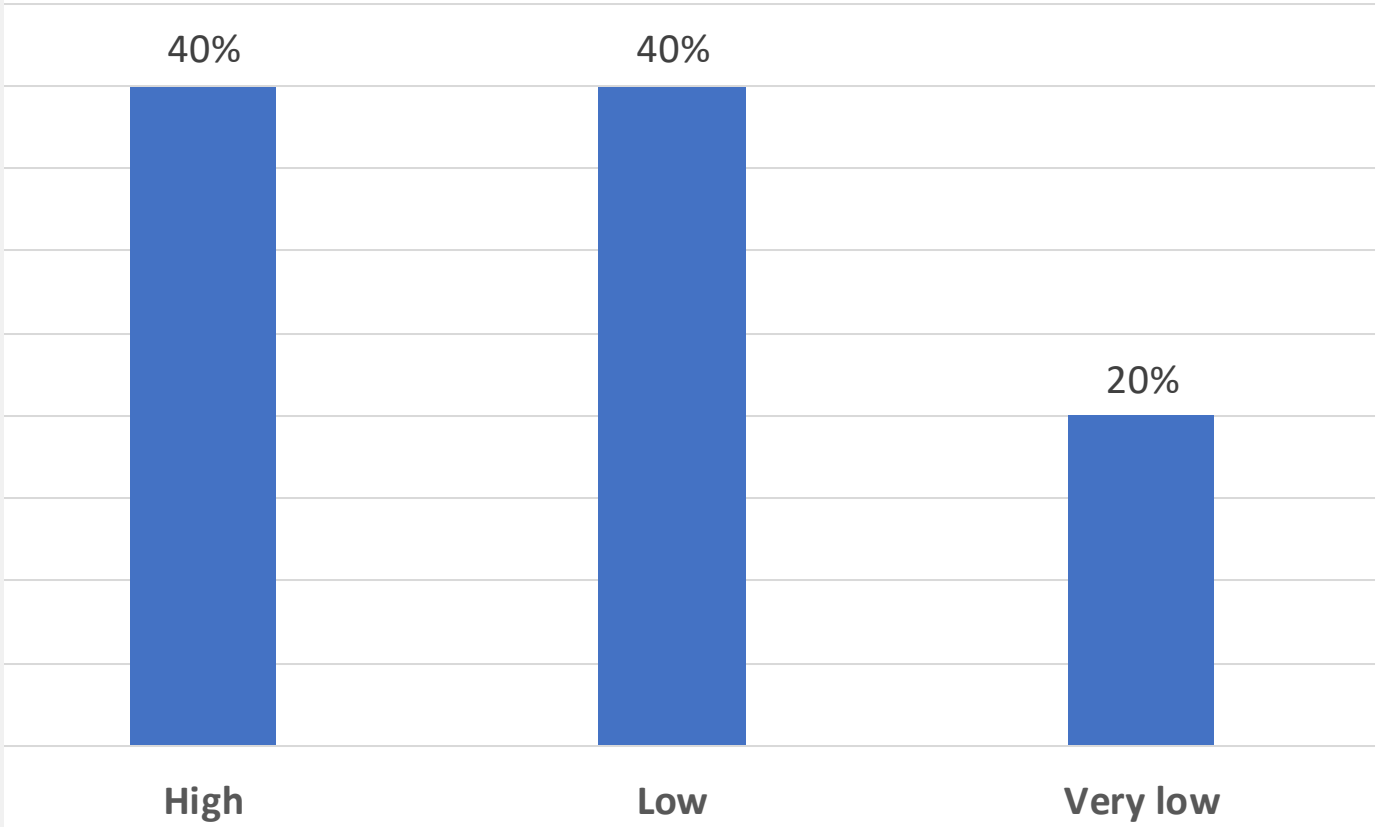
- Whare are the *basic* requirements to sustain AMIA-CREATE?
- ICT cross-cutting AMIA pathway, e.g., market competitiveness; locational dispersal of beneficiaries
- Sustainability criteria; sustainability MEL
- Financial management and reporting skills; track record
- Access to financing institutions
- Performance-based management linked to DA-wide system
- Enhancing and innovating on AMIA and BP 2 management, e.g., plantilla positions

Focals' Ratings: AMIA Contribution to Resilience

Q3. Overall, to what extent has the AMIA Program contributed to climate resilience in the region?

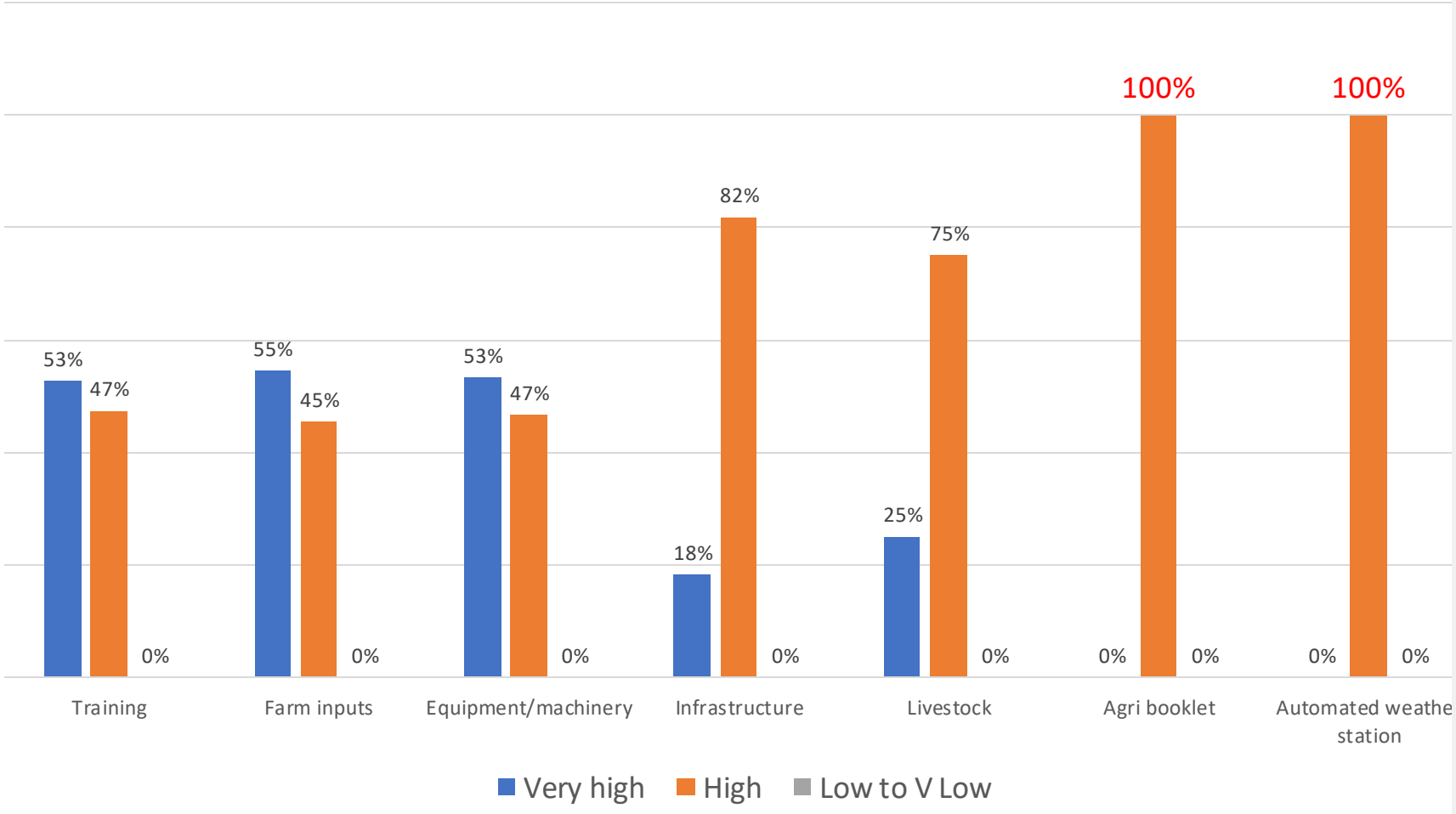
DISCUSSION POINTS

- What remain to be the main constraints to sustaining resilience?
- AMIA planning: enhancing the types, mix, quantity, and timing of interventions for greater sustainable impacts
- Mainstreaming AMIA in DA banner programs vs. AMIA as separate banner program
- AMIA villages as spatial planning framework for NAFMIP implementation
- Linking AMIA and PCIPs
- Climate budgeting with targets and deliverables
- AMIA and BP 2 Program integration into LGU plans and PPAs
- Complementary PAGASA, DA and LGU roles in disseminating weather and climate forecast



Farmers' Ratings: Ability to Use Assistance Received

Q2. To what extent was your AMIA village able to use the assistance received to raise income and productivity?



DISCUSSION POINTS

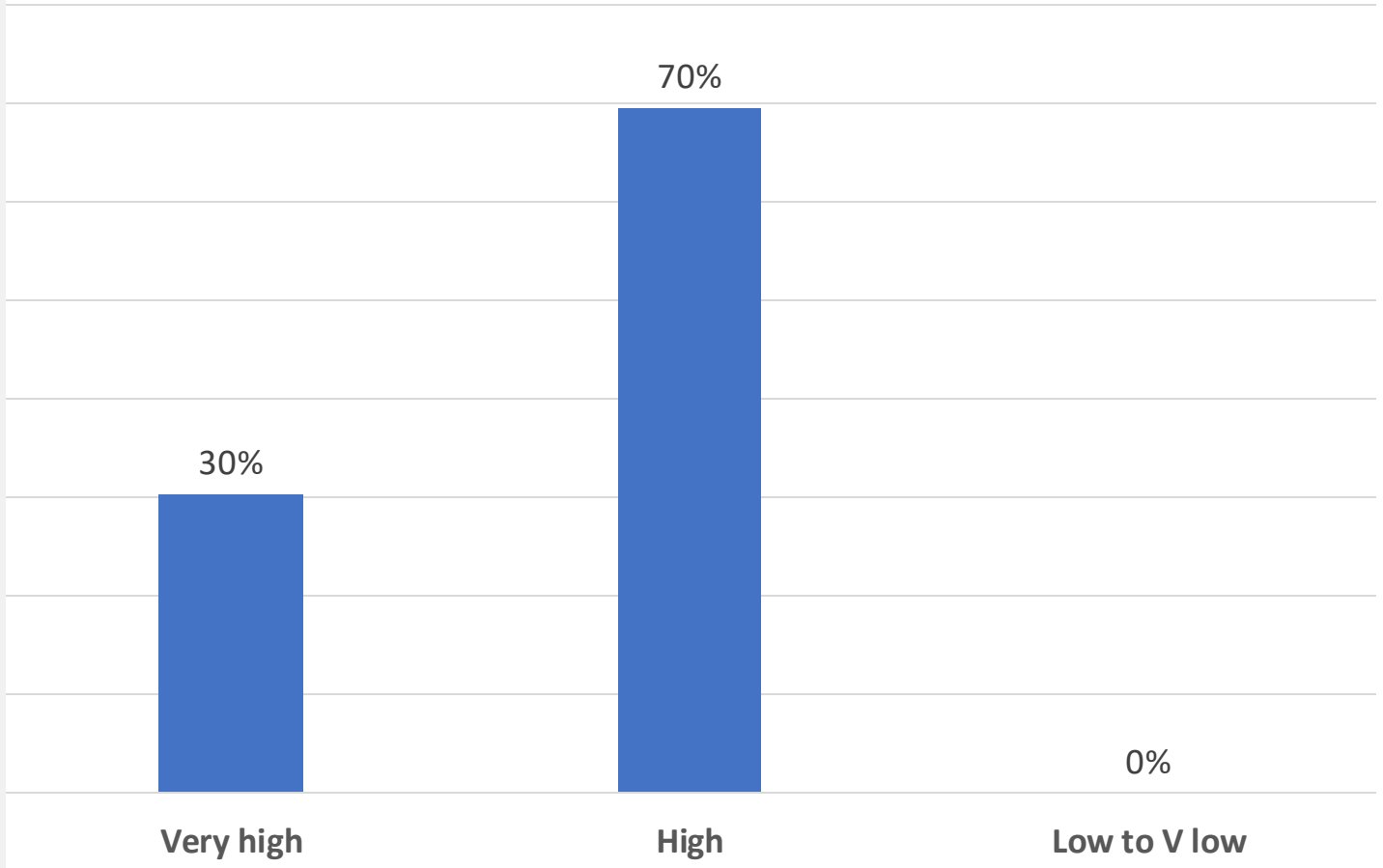
- Practical training provided on use of assistance received
  - Integrated farming systems
  - Unconventional food sources
  - agroforestry system or multistory farming system
  - Inter-cropping/ crop diversification
  - Marketing
  - Other competencies
- Training impact assessment?
- High cost of farm inputs
- Local climate suitability of seeds, farm inputs and equipment

Farmers' Ratings: Village became More Resilient

Q6. To what extent has your AMIA Village become more climate resilient under the AMIA Program?

DISCUSSION POINTS

- Bottom line: additional income/livelihood provided to stabilize year-long quality of life…
- … based on suitable farm inputs
- Strategies to empower community not only to become resilient but to sustain resilience…
- … based on updated needs/ gaps analysis
- Climate and weather advisories guiding farm decision-making and practices
- Organizational/ socio-cultural dimensions: encouragement to initiative-driven and hardworking leaders and officers



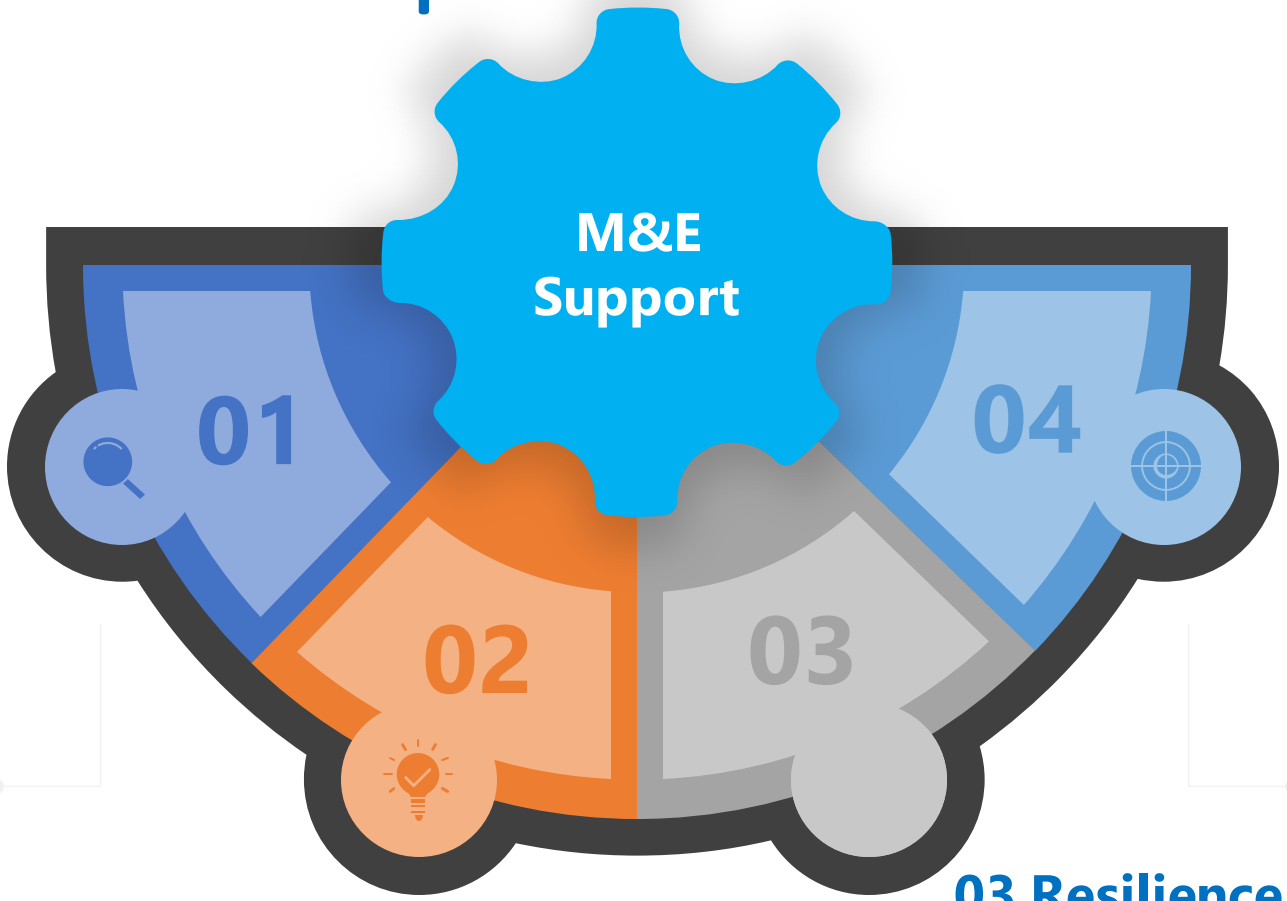
Next steps

1. Open forum
2. Breakout Groups to further elaborate, validate, and deepen the results of AMIA and BP 2 rapid assessment from two perspectives:
    - Beneficiaries on the ground
    - DA management
3. Presentation of Breakout Groupwork on Tuesday (tomorrow) morning

M&E Support to Transformation-Oriented AMIA Implementation and Resilience Mainstreaming

23-24 April 2024

Intertwined Components of “M&E Support”



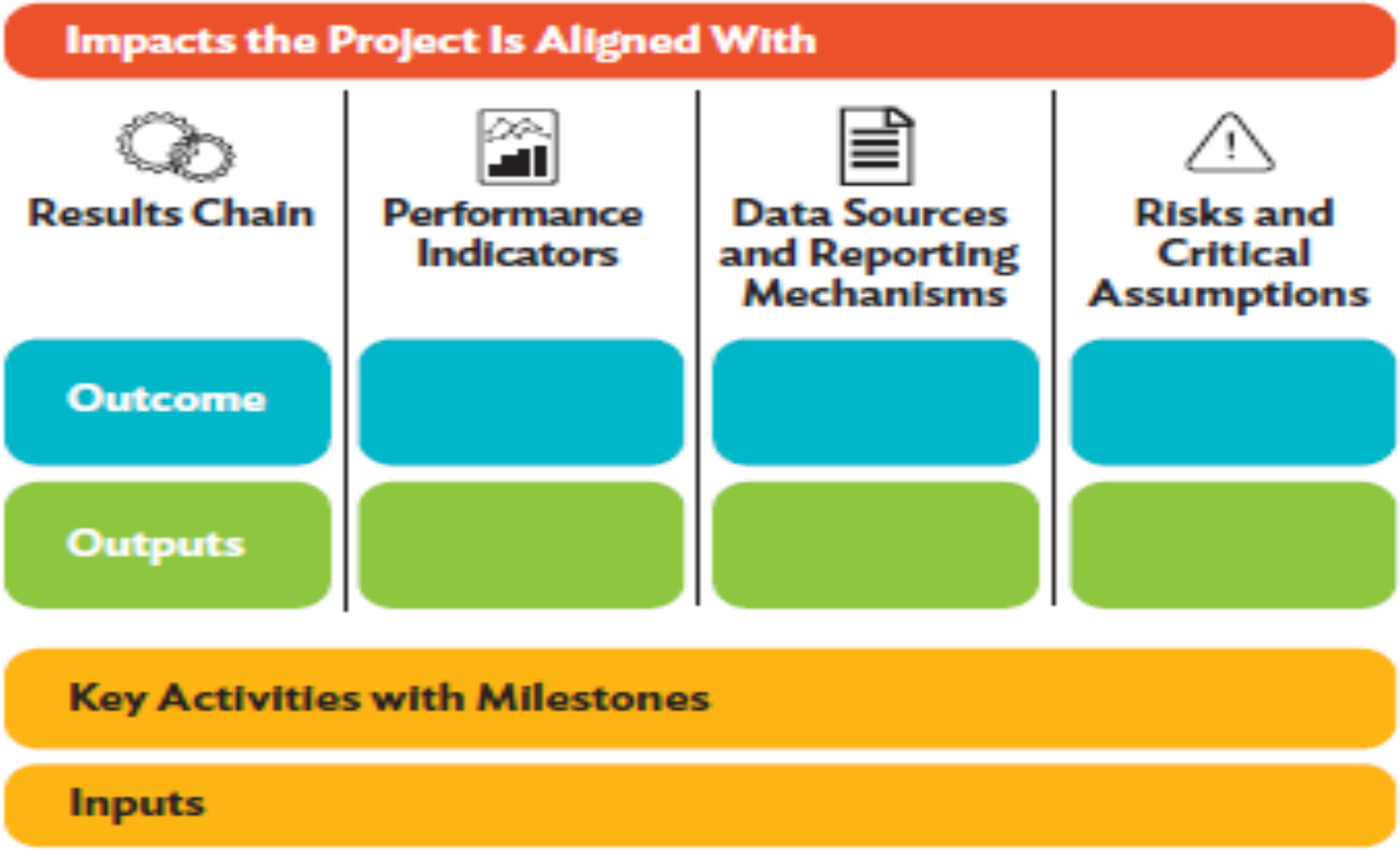
01 AMIA Results Framework
(see draft)

02 AMIA M&E Plan
(see draft)

03 Resilience Mainstreaming Criteria
(see draft)

04 DMF for Mainstreaming Resilience
(see draft)

DMF STANDARD TEMPLATE



Source: ADB DMF Guide Oct. 2020

Goal-Impact (2 indicators)

Increased incomes and resilience of AMIA farming and fishing communities/ villages.

Purpose-Outcome (6 indicators)

1) AMIA villages' capability to cope with climate shocks improved .
2) CRAO internal capability to plan, implement, monitor and report on AMIA Program implementation improved.

Outputs (7 indicators)

1) Responsive and timely assistance and support delivered.
2) Tailored, practical and sustainability-oriented cap dev enhanced.
3) Partnerships strengthened and expanded in-country and globally.

WFP Indicators

(care of CRAO)

01 AMIA Results Frame-work

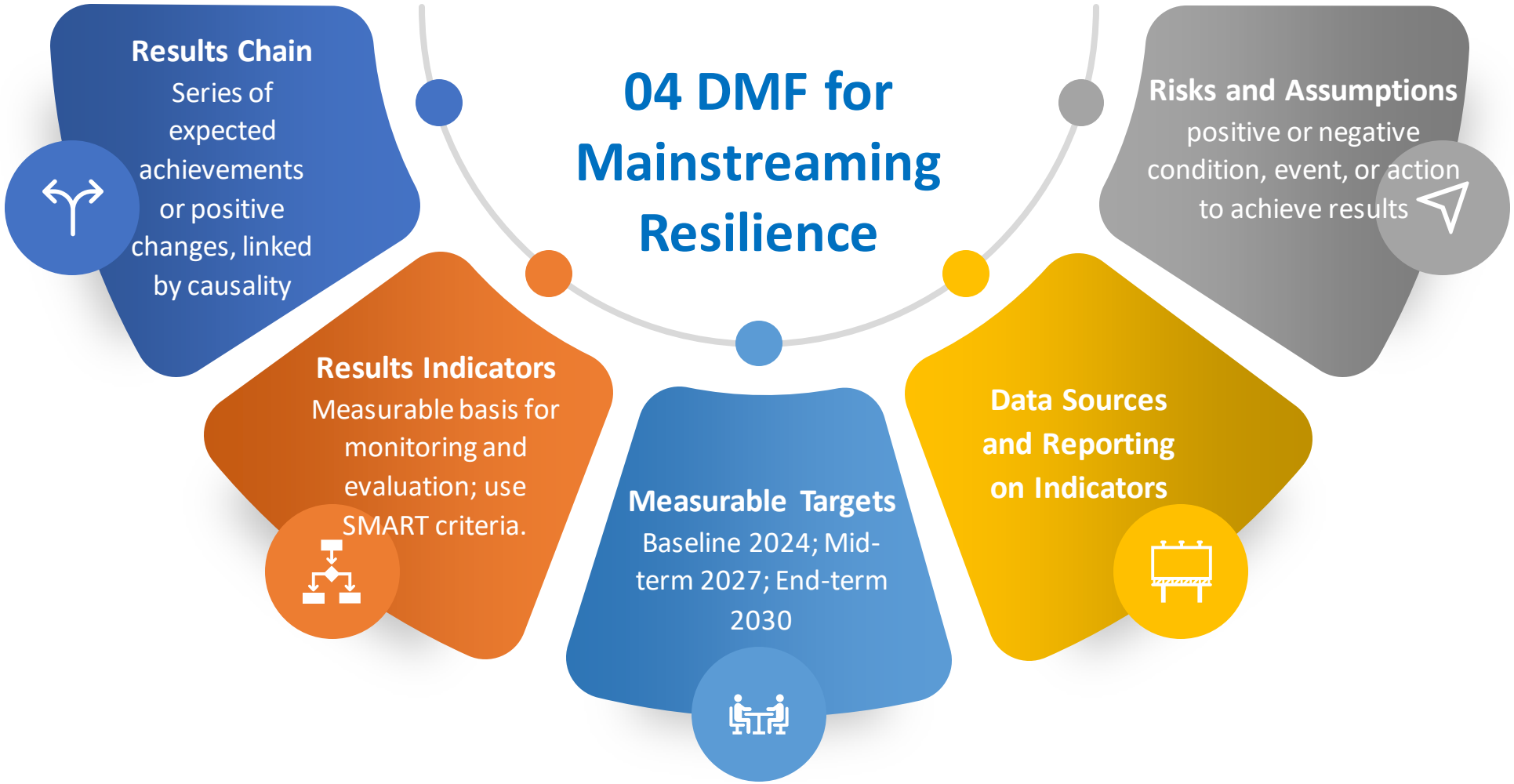

Indicator Name
01
Purpose & Definitions
02
Data Collection Frequency
03
02 AMIA M&E Plan
04
Data sources
05
Data Collection Method
06
Responsibility

03 Resilience Mainstreaming Criteria

Criteria	Scoring System (1-4 lowest to highest)	Verifiable Evidence of Rating (list down)
1. Resiliency concerns embedded in plans/ programs/ projects/ activities (PAPs)		•
2. Funds for above PAPs integrated into DA annual budget, not only "tagged"		•
3. Performance indicators and targets integrated into DA office's annual work and financial plan		•
4. Progress vis-à-vis performance indicators and targets integrated into DA office's regular reports		•
5. DA office's PAPs aligned with the annual Planning and Budgeting Guide for Climate Resilient Agriculture and Fishery		•
6. RFO directly working with LGUs on a minimum of 2 current programs or projects		•
TOTAL SCORE ("passing score" = 15)		

Source: ADB Study Team, Deepening Climate-Related DA Organizational Reforms to Sharpen and Better Harmonize Climate Action, July 2023.

04 DMF for Mainstreaming Resilience



Common Problems with Project Log Frame

- Definitions
- Completeness
- Faulty logic – check if… then (cause-and-effect) relationships across inputs, outputs, outcomes and impacts
- Lack of proportionality –
  - Mix and quantity of inputs must be adequate and timely to produce project outputs;
  - Mix and quantity of outputs must be adequate and timely to achieve project purpose (i.e., “outcomes”)

Thank You
For Your Attention

Agri-Fishery Transformation-Oriented AMIA Implementation Framework Plan

(excludes regular/ recurring AMIA Program activities)

Updated 22 Nov. 2023

Transformative Actions
Purpose: Facilitate the process of Initiation to Graduation

ST	MT	LT

1) Preparation of AMIA Program Operations Manual (OM)

Purpose: consolidate in one easy-to-use reference document straightforward guidelines for implementing the AMIA step-wise "program cycle" (comprehensive village development process)

Features: to include definition of terms; policy; conceptual framework, vision, objectives, pathway, beneficiary selection and other criteria and protocols, reporting, MOA, evaluation and other templates, organizational structure (multilevel); implementation arrangements, MEL, sustainability and phase-out planning and risk management and contingency plan; flexibility of localization; linked to other manuals such as for CRVA, CIS; subject to evaluation

2) Preparation of AMIA Five-Year Integrated Spatial Development Plan

Purpose: building on the AMIA pathway, provide an "Initiation-to-Graduation" roadmap for each village under the Program

Features: AMIA integrative spatial plan to complement banner programs' commodity-specific plans; multisector, multilevel participatory process; simplified, matrix format; commodity system-based; linked backwards to NAFMIP and banner program commodity roadmaps, and linked forward to LGU plans; part of a "nest of plans"

Transformative Actions Purpose: Facilitate the process of Initiation to Graduation	ST	MT	LT
3) Preparation of Climate Resilient Investment Program Purpose: based on the AMIA 5-year dev plan, present annual investment requirements leading to the achievement of plan objectives Features: AMIA funding under regular DA budget; include investments in human resources (e.g., scholarship in agri courses) AMIA investments to be integrated with DA PIP and PRDP PCIP; investments expected to be progressively higher scale over time (e.g., to include larger facilities/ machinery/ equipment in Years 4-5)			
4) Mainstreaming CRA Value Chain Analysis (VCA) in AMIA planning and implementation Purpose: use climate-sensitive and genderized VCAs to select suitable and profitable combinations of commodities and value chain segments Features: starting from VCAs under banner programs and PRDP; including organic agriculture commodities			

Transformative Actions Purpose: Facilitate the process of Initiation to Graduation	ST	M T	LT
5) Digital transformation in AMIA planning and implementation Purpose: optimize use of mobile phones, e-commerce, and other apps to support faster and sustainable growth of AMIA villages Features: to cover CRVA, climate and tech advisories; via AMIA Portal to host CRVAs, VCAs, commodity roadmaps, etc.; CIS site; cover computer hardware and software; collaborate with SUCs; recognize geographical limitations in digital connectivity			
6) Development of AMIA Climate Resilient Technology Packages Purpose: following the commodity system approach, package climate resilient combinations of crop-livestock-fishery interventions to sustainably raise incomes Features: not single commodity-oriented; to include non-food commodities to expand range of livelihood options; including organic agriculture commodities			

Transformative Actions Purpose: Facilitate the process of Initiation to Graduation	ST	MT	LT
7) Devt and implementation of AMIA Capacity Building Program Purpose: to embed socio-cultural aspects in culture-sensitive CRA tech training; to expand curriculum to match enterprise development requirements like organization and financial management, marketing, procurement, biosecurity, food safety, etc. Features: targeted (beneficiaries, LGUs, DA internal); adult training method; updated DSTs; include TOT; value chain-oriented; computer-based (online and offline modules and audio-visuals); comms-supported training styled and translated to target audience; include modules on complementary roles of: men & women, old & young; individual vs. group farming; including refresher training; with training needs assessment and post-training impact evaluation; certified training resource persons;			
8) Devt and implementation of Community-Based M&E and Knowledge Management System Purpose: to generate reliable and timely info on all stages of the program cycle (planning > implementation > evaluation > re-planning) Features: covering progress, results and processes; highlights feedbacking; promote documentation of best practices and learning exchange workshops and annual conference			

Transformative Actions Purpose: Facilitate the process of Initiation to Graduation	ST	MT	LT
9) Partnership-building Purpose: DA-internal and external linkages Features: ATI (on training); PRDP (CRVA and VCA); Philippine banks/ GFIs and global fund sources, insurance; regional/ provincial/ municipal agriculture and fishery coutils (AFCs); business groups/ chambers of commerce; SUCs and public and private schools; KADIWA (as market); AMAS and AMAD (market matching, trade fairs, etc.);BFAR; BAR (CRA R&D); DSWD (AMIA livelihood based on social prep done by 4Ps); leagues of provinces, municipalities, barangays; ACPC (credit financing)			
10) Organizational strengthening (DA internal) Purpose: review and enhance organization to match program requirements Features: plantilla positions; enhance TORs per office (CRAO, RFO) and individual (RED, Focals, others) including performance criteria			

Transformative Actions Purpose: Facilitate the process of Initiation to Graduation	ST	MT	LT
11) Devt and implementation of AMIA Communications Program Purpose: raise public awareness and promote program benefits to attract more participants and investments Features: localization of IEC materials to break down language barriers; include annual climate week; multimedia but highlighting social media; styled and translated to target audience; exhibits and roadshows; barangay information corners supplied with IEC materials; field days and weekly auction **12) Devt and implementation of AMIA Resource Mobilization Plan** Purpose: draw financial and other support from Philippines and global sources Features: linked to Partnership-building, and the Comms Program; will include Climate Fund and international funding agencies as major sources			

Synthesis of AMIA and BP 2 Performance Assessment

Assessment Objectives

1. Reflect on AMIA as platform for partnership among DA programs and implementing units to establish sustainable climate-resilient villages across the nation
2. Synthesize AMIA accomplishments, areas for improvement, and steps moving forward
3. Assess mainstreaming of climate action into DA and LGU plans, programs, and services

Assessment Features

Assessment themes:

- Targets vs. accomplishments (performance)
- Value chain approach in context of AMIA pathway (4-phase)
- Business/ enterprise development (agri-economy)
- Local/national/international policy framework
- Resource generation, allocation, and management
- “Balanced assessment” equally addressing both successes and challenges

Two complementary assessment perspectives:

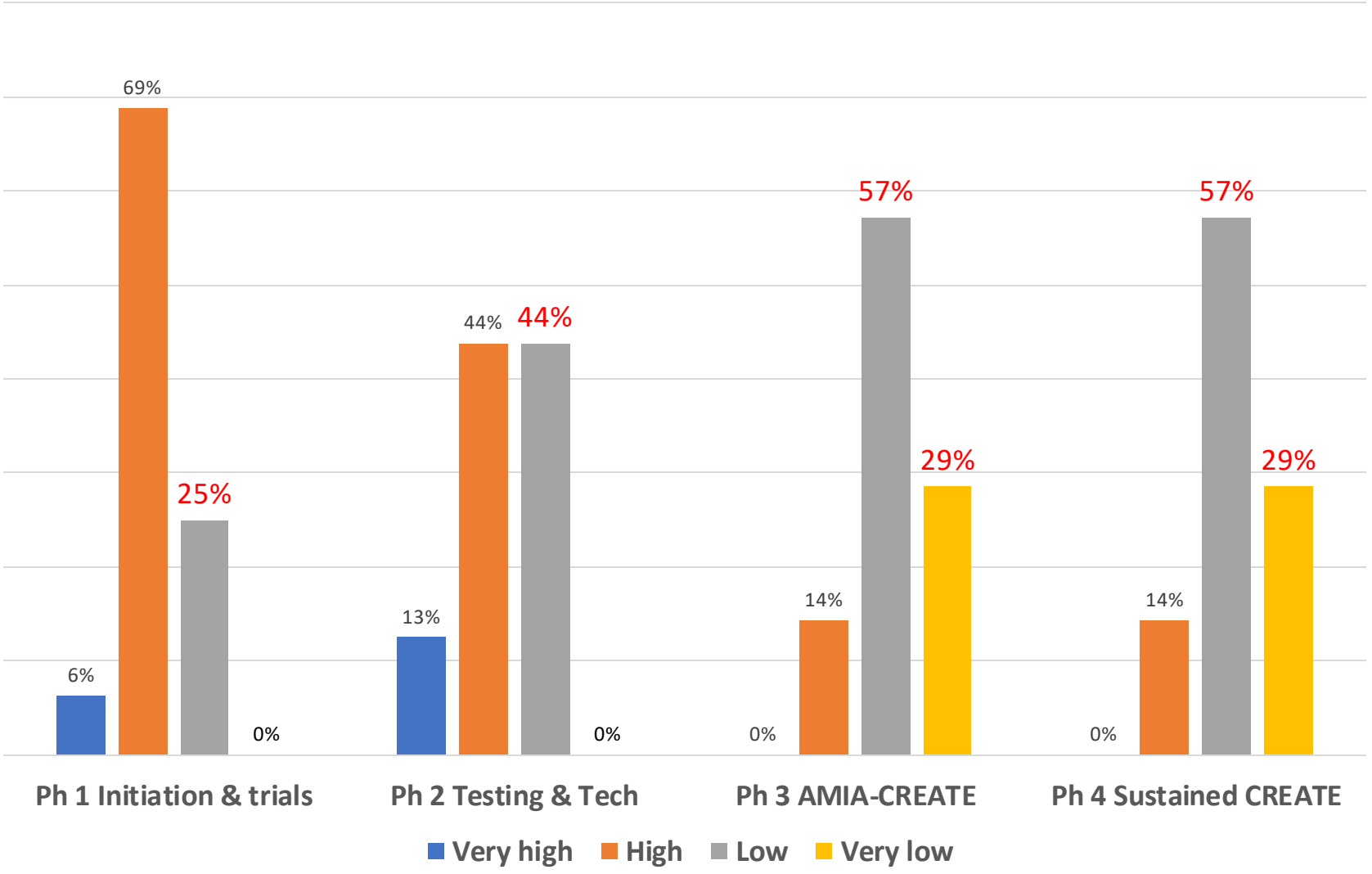
- Farm households and community (ground level action)
- AMIA and BP 2 Program Focals

Basic guide questions:

- What worked well or not-so-well?
- Why?
- How can the program be enhanced?

Focals' Ratings: Regional AMIA Achievement of MFOs

Q1. Overall, to what extent has the AMIA Program in the region achieved its Major Final Outputs?

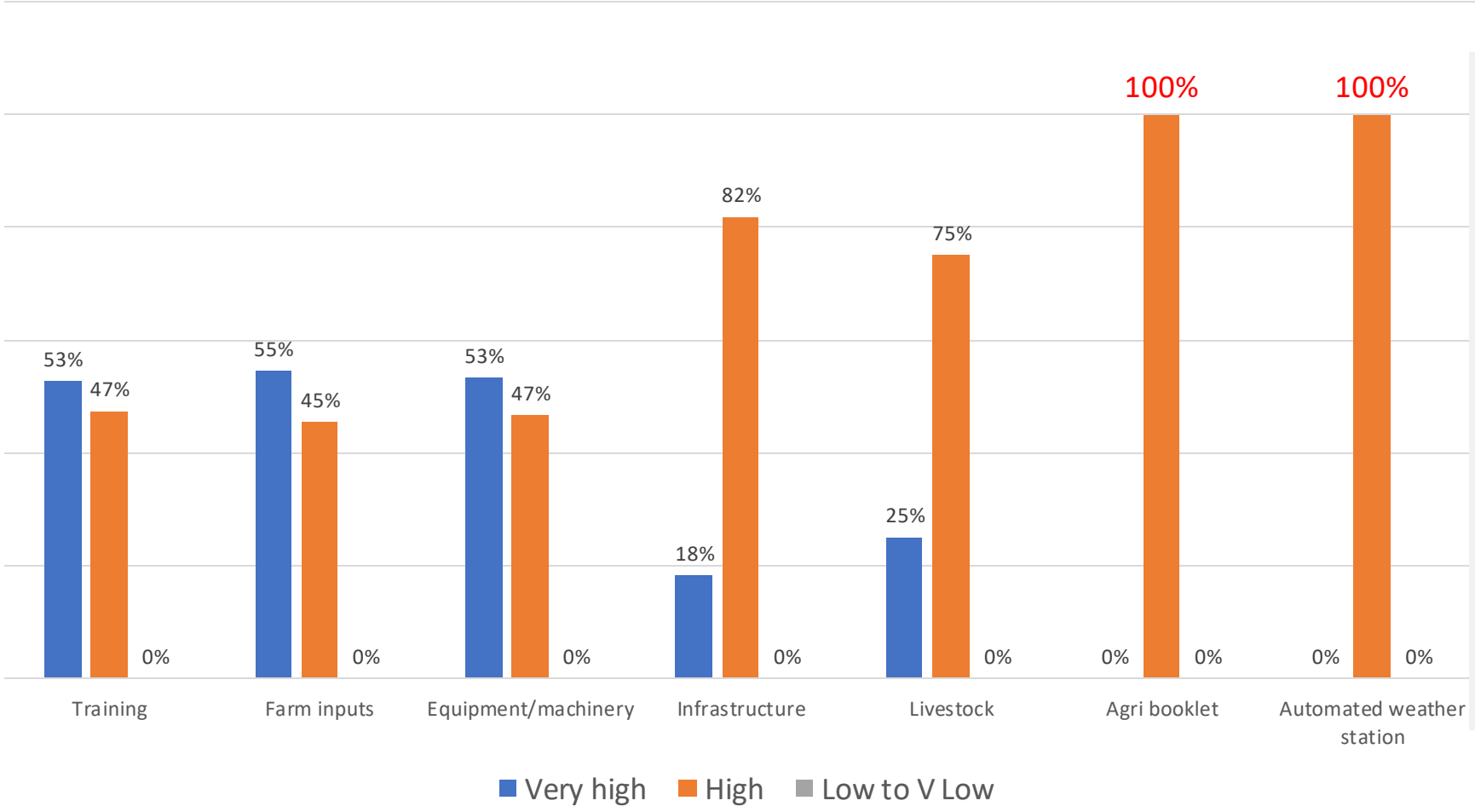


CONCLUSIONS

- Most villages in Phases 1 and 2; moving up to Phase 3; no Phase 4 villages
- Higher achievement of targets in Phases 1 and 2; lower in succeeding phases
- Areas for enhancement specified, and recommended to be implemented based on a Transformation-Oriented AMIA Implementation Framework Plan (short-term, medium-term, and longer-term)
- Monitoring, evaluation and learning to be strengthened to more effectively support the program

Farmers' Ratings: Ability to Use Assistance Received

Q2. To what extent was your AMIA village able to use the assistance received to raise income and productivity?



CONCLUSIONS

- Bottom line: additional income/livelihood provided to stabilize year-long quality of life
- Resulting from mix and timing of inputs, training and other interventions
- Climate and weather advisories guiding farm decision-making and practices
- AMIA empowered communities become resilient; the challenge is to sustain resilience

Synthesis of Agro Climatic Advisory Portal (ACAP) Technical/ Programming Sessions

Session Objectives

1. Orient the participants about the roll-out of ACAP piloted in Bicol, to all the other regions of the country
2. To train AMIA Climate Information Service (CIS) regional focal persons on the use and management of the Agro-Climatic Advisory Portal, an online web application for disseminating climate- and weather-informed farming and fishing advisories

Highlights Technical/ Programming Sessions

1. Climate Information Service (CIS) as key to achieving targeted outcome of reaching 4 million farmers by 2025
2. CIS also key to enhancing AMIA and BP 2 Program implementation
3. Improving and developing the current ACAP Website; Components of the technology stack for ACAP Bicol v1.0
4. Creating a National ACAP Website – UPLBFI/ TA 10009 PHI/ DA ICTS partnership
5. Establishment of feedback mechanism for current ACAP Website; same mechanism to be integrated into portals in other regions
6. Design and conduct of Training for three selected regions
7. Setting-up of working GC in Google Hangouts