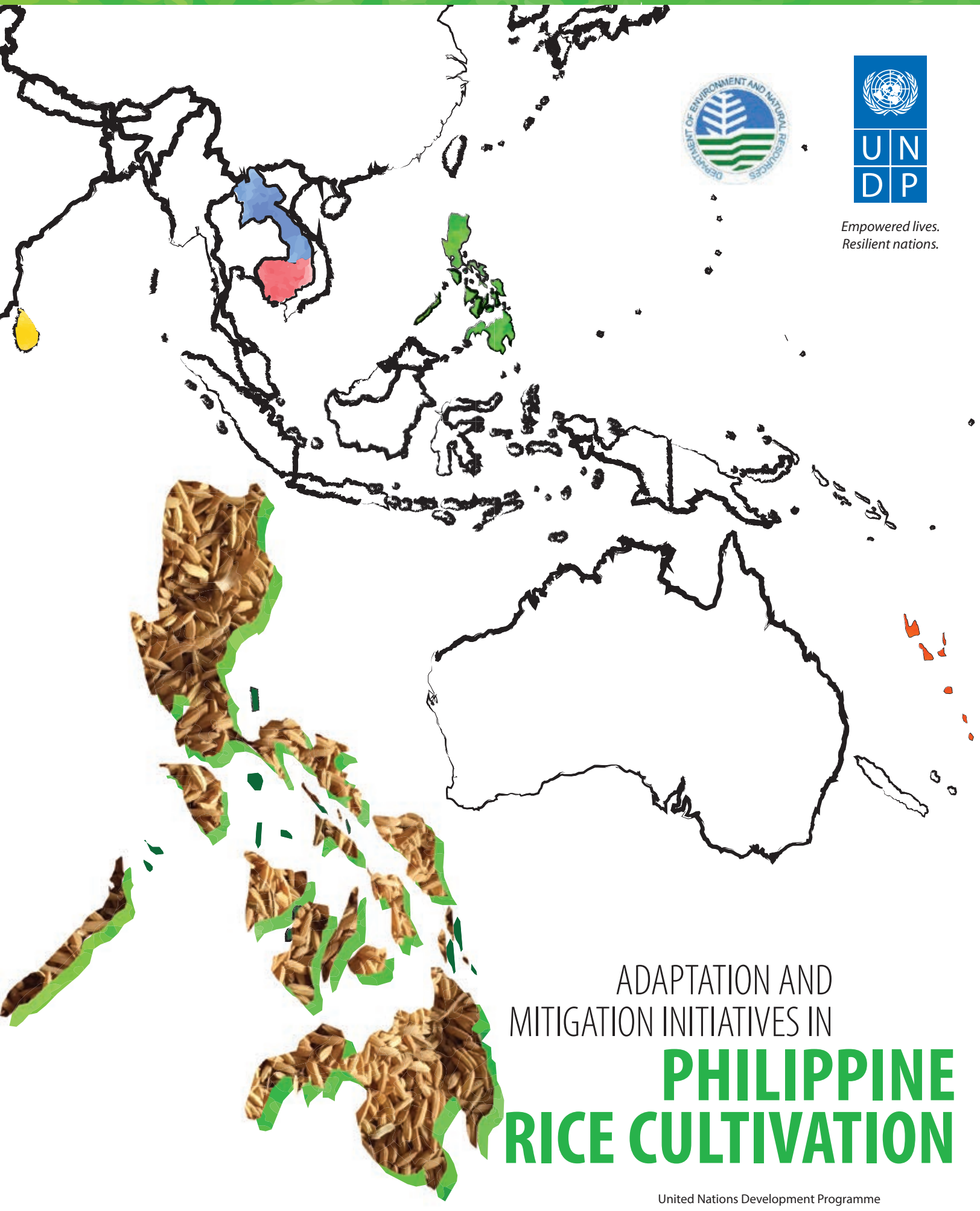

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Technical Oversight and Guidance
Alexandra Soezer, Project Manager, UNDP MDG Carbon

Lead Author
Vladislav Arnaoudov, Senior Consultant, Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.

Co-authors
Evangeline B. Sibayan, Water Management Specialist and Raymond C. Caguioa, Independent Climate Change Consultant

Reviewers
Asian Development Bank, Philippine Statistics Authority (Bureau of Agricultural Statistics), Bureau of Soils and Water Management, Climate Change Commission (Office of the President of the Philippines), Department of Agriculture, Department of Environment and Natural Resources, International Rice Research Institute, National Irrigation Administration, Philippine Rice Research Institute, United Nations Development Programme

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Contact Information
Albert Altarejos MAGALANG
albertmgg@emb.gov.ph
Telefax: +632 920 2251 / +632 376 1992

Alexandra Soezer, Ph.D.
Project Manager
UNDP MDG Carbon
alexandra.soezer@undp.org

Editor
Georgina Wilde

Design
Kimberly Koserowski

Photo Credits
PhilRice, Alexandra Soezer and Vladislav Arnaoudov

FOREWORD

Rice is one of the major agricultural crops in the Philippines. The agricultural sector contributes 14 per cent of the country's gross domestic product and 13 million workers (32 per cent) comprise the labor force.

The proposed Adaptation and Mitigation Initiatives in Agriculture (AMIA) cover an agriculture sector – rice cultivation – that is extremely vulnerable to the impacts of climate change and commonly associated with food security. AMIA is a new sector-specific climate change instrument that addresses both the adaptation and mitigation aspects of agriculture in the Philippines and reflects the policy targets for the sector. The AMIA goes beyond the scopes of Nationally Appropriate Mitigation Actions or NAMAs, as well as National Adaptation Plans (NAPs) by combining elements of both in a more holistic and result-oriented framework.

During recent years, adaptation and mitigation actions have become the focus of climate change negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) process. UNDP believes that the proposed initiative can provide the essential holistic adaptation and mitigation framework to overhaul an entire sector within the context of sustainable development, as focusing on sectoral sustainability is essential for achieving lasting results.

UNDP's MDG-Carbon Programme has supported the development of this AMIA in order to help the Philippines to deploy climate change resilient rice cultivation schemes and enable the country to reduce the impact of a major emission source from agricultural activities, and increase agricultural yield and sustainability. The implementation of the AMIA provides a number of incentives for rice farmers to switch from continuous flooding to Alternative Wetting and Drying water management practices and thus promotes climate change resilient rice production.

This AMIA builds on a 2014 NAMA Study which was developed out of the inputs from a national multi-sector working group under the Department of Environment and Natural Resources of the Philippines and in this way reflects all the comments received from its members to guarantee full ownership of the AMIA.

The proposed AMIA framework is embedded into existing agricultural policies and is developed as a bankable programme with a clear donor exit strategy that allows it to become self-sufficient after the transformation of the sector is completed. The overall goal of the work to embed AMIA in existing institutional structures will ensure strong national coordination and management.

The AMIA provides the country with an accurate and credible information framework by applying a robust but simple MRV system for GHG emission reductions and sustainable development benefits. The calculation of GHG emission reductions are based on a CDM Standardized Baseline for the rice sector with country-specific seasonal

default values while the MDG Carbon Sustainable Development Evaluation Tool allows to quantify and monitor the sustainable development benefits.

This AMIA is an exciting encouraging adaptation and mitigation framework that is expected to help the Philippines to move towards climate resilient rice production and advancing its long-term sustainable development goals.

Marcel Alers
Head, Energy, Infrastructure, Transport & Technology
UNDP - Global Environment Facility
Bureau for Policy and Programme Support

Albert Altarejos Magalang
Head, Climate Change Office
Environmental Management Bureau
Department of Environment and Natural Resources

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Executive Summary

The Adaptation and Mitigation Initiatives in Agriculture (AMIA) in this report are proposed for a sector – rice cultivation – that is extremely vulnerable to the impacts of climate change and commonly associated with food security. However, agriculture also contributes to more than 30 per cent of the GHG emissions in the Philippines and is the second largest GHG emission source in the country. Although rice cultivation occupies the top position among the sources of agricultural emissions, this emission source has not been addressed by any major climate change-related activities up to the present.

As the sector follows a deeply entrenched cultivation practice, involving the continuous flooding of rice fields up to harvest, a holistic approach, such as a AMIA, emerged as the only possible way to introduce overall transformational changes and address a wide array of issues in the sector beyond reductions in GHG emissions.

Several activities are considered effective in reducing methane formation in rice production. Among them, the modification of water management, through allowing for shorter periods of rice field flooding and better soil aeration (e.g. Alternate Wetting and Drying or AWD), is the one with highest potential for GHG mitigation. Under AWD water saving conditions, methane emissions are likely to be reduced by more than 50 per cent and nitrous oxide (N_2O) emissions can be kept at levels similar to those of a continuously flooded paddy system by adjusting the timing of nitrogen fertilizer application and irrigation.

Experience with past pilot projects showed that farmers are willing to follow water management programmes for the duration of the pilot projects and while they receive continuous guidance with their performance being monitored. However, in the absence of incentives to support continuous water management after the end of pilot projects, they tended to revert to continuous flooding. As of 2013, despite the few successful examples, only 8 per cent of all irrigated rice fields in the Philippines or 140,000 ha applied AWD.

This AMIA will target a total of 750,000 ha of irrigated rice fields, approximately half of the irrigated rice fields across the whole country. The introduction of AWD in these flooded irrigated rice fields could potentially bring approximately 12,151 $ktCO_2e/yr$ of emission reductions by 2020. This will represent a sizeable mitigation effect, decreasing GHG emissions from rice cultivation by close to 25 per cent. Once the AMIA is successfully implemented in its current format, it can be further expanded to cover all irrigated rice fields in the Philippines.

Technical training will be the core of AMIA implementation. As the AMIA aims at changing an established cultural practice, in addition to the economic incentives, continuous training and guidance for farmers are crucial for the success of the AMIA and reaching its targets.

To achieve a wider transformational impact, as well as acceptance among farmers, the AMIA will offer a support package, consisting of an optional course of training to participating farmers in diversifying agricultural production. Thus, the proposed AMIA will allow not only sizeable reductions of GHG emissions, but also the transformation of the rice sector by providing more efficient irrigation solutions and increasing productivity.

The baseline scenario for this AMIA consists of two components, a GHG baseline and a Sustainable Development (SD) baseline that also covers adaptation benefits. Setting the baseline scenario in this way allows the effects of the Nationally Appropriate Improvements (NAI) to be properly assessed and quantified through the monitoring activities described in the Measurement, Reporting and Verification (MRV) system.

The GHG MRV system for this AMIA is designed based on the approved Standardized Baseline ASB0008 "Standardized Baseline for Methane Emissions in Rice Cultivation in the Republic of the Philippines". Furthermore, in order to determine whether the participating rice fields are correctly applying AWD and can participate in the emission reduction calculations, an AWD compliance protocol has been designed as part of the AMIA. In addition to GHG emissions, the MRV system of the AMIA will cover sustainable development benefits.

The costs of AMIA implementation arise from the cost of capacity-building and training of farmers under the basic package, the delivery of training under the support package, and the need for funding for the additional economic incentives. Total donor support for the AMIA is estimated to be approximately US$15.7 million over a period of four years, including a major result-based funding component.

The actual implementation of the AMIA will be supervised by a Rice Sector AMIA Supervisory Board, consisting of representatives of the Government of the Philippines (the CCC, DENR, DA and others), donors and stakeholders (such as IRRI and environmental NGOs). The Supervisory Board will provide guidance to the AMIA implementer, issue rules and procedures for the Rice Sector AMIA's operations and screen its outcomes, including the rate of adoption of AWD, GHG emission reductions and financial performance. The Supervisory Board will also approve the inclusion of any new projects in the AMIA.

Towards the end of the AMIA implementation, it is expected that half of the irrigated rice fields will have adopted AWD as their standard irrigation practice. By that time, the Philippines will have a transformed and more resilient rice production sector capable of withstanding many of the challenges of climate change, thus guaranteeing the stable supply of the staple food of Philippine people.

The proposed AMIA is unique as it addresses, through the proposed set of interventions a large number of policy goals and targets related to climate change, sustainable development and agricultural sector reform, and provides an overall solution to climate change risk management and the transition to low GHG emission agriculture, and the empowerment of farmers. It is worth noting that the Philippines has already created under different programmes most of the enabling policy environment for the implementation of these, but the proposed AMIA is the first attempt to put the programmes together in a single policy implementation structure.

Abbreviations and Acronyms

ACPC	Agricultural Credit and Policy Council
AMIA	Adaptation and Mitigation Initiatives in Agriculture
AWD	Alternate Wetting and Drying
BAS	Bureau of Agricultural Statistics
BSWM	Bureau of Soils and Water Management
CAF	Cancun Adaptation framework
CALF	Comprehensive Agricultural Loan Fund
CARP	Comprehensive Agrarian Reform Program
CCC	Climate Change Commission
CDA	Cooperative Development Authority
CDM	Clean Development Mechanism
CGI	Credit Guarantee Institution
CH_4	Methane
CIS	Communal Irrigation System
cm	Centimetre
CO_2	Carbon dioxide
COP	Conference of Parties (to the United Nations Framework Convention on Climate Change)
CS	Crop Specialist
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DEVCO	EuropeAid Development and Cooperation
DNA	Designated National Authority
DS	Dry Season
EE	Executing Entity
FFS	Farmer Field School
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas
ha	Hectares
IA	Irrigators' Association
INDC	Intended Nationally Determined Contribution
IRRI	International Rice Research Institute
ISF	Irrigation Service Fee
kg	Kilogram
km	Kilometre

$ktCH_4/yr$	Kiloton of methane per year
$ktCO_2e/yr$	Kiloton of carbon dioxide equivalent per year
LBP	Land Bank of the Philippines
MDG	Millennium Development Goals
MRV	Measurement, Reporting and Verification
NAI	Nationally Appropriate Improvements
NAMA	Nationally Appropriate Mitigation Actions
NAMA-WG	AMIA Working Group
NAP	National Adaptation Plan
NCCAP	National Climate Change Action Plan
NFSCC	National Framework Strategy on Climate Change
NGO	Non-governmental Organization
NIE	National Implementing Entity
NIA	National Irrigation Administration
NIS	National Irrigation System
PCIC	Philippine Crop Insurance Corporation
PDP	Philippine Development Plan
₱	Philippine Peso
PSA	Philippine Statistics Authority
PVC	Polyvinyl chloride
PhilRIce	Philippine Rice Research Institute
RSO	Rice Sufficiency Officer
Quedancor	Quedan Rural Credit and Guarantee Corporation
SBC	Small Business Corporation
SD	Sustainable Development
SDG	Sustainable Development Goal
SDC	Swiss Agency for Development and Cooperation
SEC	Securities Exchange Commission
SWISA	Small Water Irrigation System Association
SWOT	Strengths, Weaknesses, Opportunities and Threats
tCO_2e	Tons of carbon dioxide equivalent
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
US$	United States Dollar
VND	Vietnamese Dong
WS	Wet Season
WST	Water Saving Technology

Introduction

Agriculture is one of the sectors with significant contribution to greenhouse gas emissions globally that is extremely vulnerable to the effects of climate change. The US Environmental Protection Agency reports that agriculture contributes to 14 % of global GHG emissions[1], while in some countries such as the Philippines, the emissions from agriculture amount to as much as 29 %[2] of total GHG emissions. However, agriculture is unique, as it is directly related to food security and the livelihood of a large number of farmers, thus calling for a holistic approach under any climate change-related initiatives.

The complexity of the agricultural sector and the far reaching effects of any interventions there have been strongly reflected in the climate change and agriculture policy of the Philippines. The government has been aiming for a long time to go beyond pure adaptation or mitigation solutions for the sector and design holistic approaches that address, in addition to climate change-related issues, food security, water savings and poverty eradication. This resulted in the idea for a new climate-change instrument, AMIA or Adaptation and Mitigation Initiatives in Agriculture, that addresses both climate change adaptation and mitigation and reflects the various policy targets for the agricultural sector in the Philippines. In this way, the AMIA goes beyond the scopes of Nationally Appropriate Mitigation Actions as well as National Adaptation Plans by combining elements of both in a more holistic and result-oriented framework.

The proposed AMIA covers an agriculture sub-sector - rice cultivation - that is commonly associated with food security. The idea for this AMIA originated in 2013, as part of the development of a standardized baseline for the rice sector in the Philippines, building on the existing small-scale CDM methodology AMS-III.AU. (UNFCCC, 2012). Although the methodology had been approved in 2011 and its version 3 has since even provided some global default emission reduction factors, interviews with various stakeholders and practitioners pointed to the conclusion that it is extremely difficult to develop adjusted water management projects within the CDM framework.

On one hand, the sector in the Philippines is heavily dominated by individual landowners who manage small plots of land and follow a deeply entrenched cultivation practice, involving the continuous flooding of rice fields up to harvest. On the other hand, there are no policies or economic incentives for farmers in the Philippines to implement new or modified water management systems. Thus, a consensus started to emerge that methane emissions in the rice sector could be tackled only through a broader approach, such as a NAMA, that introduces overall transformational changes and addresses a wide array of issues in the sector beyond reductions in GHG emissions.

In the first half of 2014, a NAMA study was conducted, which provided an outline of the proposed AMIA. The study was developed with active input from the Rice Sector NAMA Working Group (NAMA-WG) that was established under the Department of Environment and Natural Resources (DENR) of the Philippines and included representatives from various government entities, research institutes and donors.

1 http://www.epa.gov/climatechange/ghgemissions/global.html.
2 http://unfccc.int/resource/docs/natc/phlnc2.pdf

As the NAMA study was well received by stakeholders, the Designated National Authority (DNA) for the CDM of the Philippines requested the United Nations Development Programme (UNDP) to support the further development of the study into a full AMIA proposal. However, after more detailed discussions with the Department of Agriculture (DA) of the Philippines and other stakeholders, it was agreed to expand the scope of the work and incorporate climate change adaptation, food security and other policy targets into a fully-fledged AMIA for the rice sector.

The AMIA presented to your attention incorporates the existing agricultural policies in the Philippines and is built on established structures and relations in the rice sector. The design of the AMIA fully reflected the various comments received from the members of the NAMA-WG and other stakeholders, and allows for full local ownership of the results of this work. The AMIA is developed as a result-oriented and bankable document with a clear exit strategy that allows it to become self-sufficient after the initial support from donors is completed.

Chapter 1: AMIA for Rice Cultivation as an Opportunity for the Philippines

1.1 GHG Emissions in Rice Cultivation

Agriculture contributes to more than 30 per cent of the GHG emissions in the Philippines and is the second largest GHG emission source in the country (UNFCCC, 1998). Among the sources of agricultural emissions, rice cultivation occupies the top position. There are two main sources of GHG emissions from rice cultivation:

1. Methane from decomposition of organic material in the soil in flooded rice fields; and
2. Methane emissions from anaerobic decomposition of rice straw and rice husk.

Box 1. Methane Formation in Rice Fields

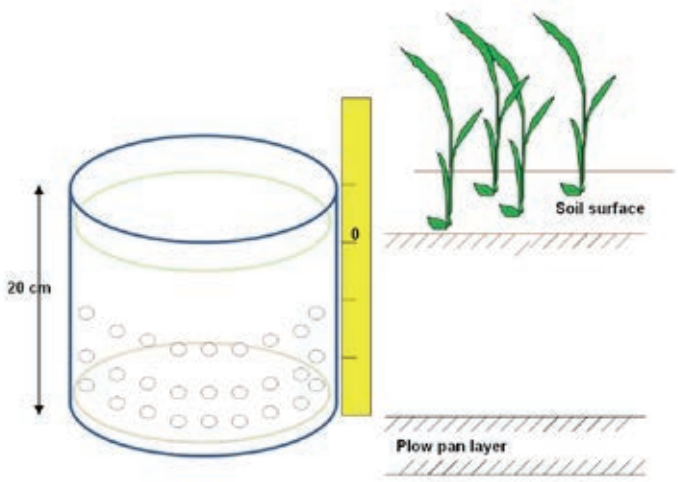
Paddy fields are considered an important anthropogenic source of atmospheric CH_4. The main vectors behind methane emissions from paddy rice fields are methanogenic (methane forming) bacteria (Epule, 2011). The bacteria perform well under anaerobic conditions and are responsible for harvesting organic carbon and transforming it into methane through the process of methanogenesis (Bloom and Swisher, 2010). Anaerobic conditions are the biochemical pathways of methane production (Epule, 2011). Methane is vertically transported to the atmosphere through three main pathways. These pathways include a) diffusion of dissolved methane, b) the emergence of bubbles triggered by soil fauna and crop management procedures, and c) plant transport by diffusion into the roots and conversion to gaseous methane in the cortex and aerenchyma, and subsequent release of methane to the atmosphere through plant micropores (Wassmann, Papen and Rennenburg, 1993).

The emergence of the Clean Development Mechanism (CDM) in the Philippines provided a boost for mitigation activities in the agricultural sector. However, all of the developed projects relating to the agricultural sector involve methane emissions avoidance from anaerobic decomposition of agricultural wastes (rice husk and straw) and their use as an alternative energy source. Methane emissions resulting from the anaerobic decomposition of organic matter in the rice fields due to flooding practices have received little or no attention, despite the existence of a CDM-approved methodology (UNFCCC, 2012).

1.2 Alternate Wetting and Drying as a Mitigation Activity

Several activities are considered effective in reducing methane formation in rice production. Among them, the modification of water management, through allowing for shorter periods of rice field flooding and better soil aeration (e.g. Alternate Wetting and Drying or AWD), is the one with highest potential for GHG mitigation. AWD is a water management technology that uses a simple tool to guide the farmer in determining the right time to irrigate and the right amount of water to apply.

Figure 1. Use of PVC Tube for AWD



Source: IRRI.

The simple tool is a perforated 10 cm x 25 cm polyvinyl chloride (PVC) tube (an observation well) that is inserted 15 cm into the ground during the dry season and 20 cm during the wet season. Irrigation water to a depth of 5 cm above the soil surface is applied and allowed to recede. Irrigation water is again applied when there is no more water inside the PVC tube. The AWD method is implemented at about 20 days after transplanting or sowing for direct seeded rice. However, during fertilizer application and panicle initiation to flowering, sufficient water must be available to maintain its level at 3-5 cm. When AWD is applied, the number of irrigation events in a season can range from four to six times only. This method achieves water saving of up to 30 per cent without any yield loss and can result in significant adaptation and sustainability improvements, produced by the change in rice cultivation practice, as the more efficient use of water resource translates into more irrigated rice fields, and ultimately, increased rice production and improved food security.

Other benefits of AWD include the promotion of higher zinc availability in soil and rice grains by enabling periodic aeration of soil, increased lodging resistance due to better root anchorage, reduction in pest infestation, such as golden apple snails, improved equity, and reduced upstream-downstream conflicts in canal irrigation systems.

Box 2. An Example of AWD Implementation

In 2001, the International Rice Research Institute (IRRI), together with the National Irrigation Administration (NIA) and the Philippine Rice Research Institute (PhilRice), implemented a project funded by the Swiss Agency for Development and Cooperation (SDC) entitled "Technology Transfer on Water Saving". It was implemented in Tarlac, Central Luzon in a GP 125 pump irrigation system with a 32.7 ha per season service area. The performance of the pump system was recorded as follows: with the same service area and pump discharge, the pumping hours per hectare per season were reduced from 22-28 without AWD to only 13-16 with AWD and the irrigation time per hectare also was reduced from 6-8 hours without AWD to only 3-6 hours with AWD. Statistically, there was no significant difference between the yield of the AWD plots and non-AWD plots. At this time the farmers serviced by the pump irrigation system in the province adopted AWD and saved water and money, the latter due to reduced use of the electricity or diesel that fuelled the engine.

Under AWD water saving conditions, methane emissions are likely to be reduced by more than 50 per cent and nitrous oxide (N_2O) emissions can be kept at levels similar to those of a continuously flooded paddy system by adjusting the timing of nitrogen fertilizer application and irrigation. Generally, AWD is an effective and efficient technology which not only increases rice production and helps conserve a limited resource, water, but also mitigates rice paddies' contribution to global warming (IRRI 2008).

IRRI (2008) and Lampayan and others (2015) reported that AWD as a water management strategy is widely used in China, and is rapidly being adopted in Vietnam, Bangladesh, Myanmar and Indonesia. In the Philippines, validation and promotion of AWD among the national agricultural research and extension systems and their partners started in 2001, as reported in Box 2.

Since 2005, there have been attempts to spread the technology to gravity irrigation systems. Big national irrigation systems such as the Upper Pampanga River Integrated Irrigation System and the Magat River Integrated Irrigation System, both in Luzon, have started piloting AWD as an irrigation management scheme in selected service areas of the system. Of the 160,000 farmers getting irrigation water from both gravity irrigation systems in these areas, 20 per cent were reported originally to be using AWD technology in 2007.

Demonstration trials were so successful, that the National Rice Program and later the Department of Agriculture were convinced that they should set up a Technical Working Group to formulate implementing guidelines for adopting water saving technologies for rice in the Philippines. On 11 September 2009, the Department of Agriculture issued DA Administrative Order 25 "Guidelines on the Adoption of Water Saving Technologies (WST) in Irrigated Rice Production Systems in the Philippines".[3] This is the only existing policy document that supports the implementation of AWD, but it has never been implemented.

It is important to emphasize that there is no concrete action plan with well-defined steps and a clear management structure to support the sector's transformation and the adoption of more efficient irrigation practices at present. Although there is overall understanding among policymakers of the benefits of AWD and a willingness to promote it, there is no clear vision as to how to do that. Researchers and participants in past pilot projects have generally

3 Available from http://www.da.gov.ph/images/PDFFiles/LawsIssuances/AO/2009AO/ao25.pdf.

emphasized the importance of capacity development; however, the overall assessment of capacity development projects up to the present shows a strong tendency to revert to continuous flooding after the projects have ended. Finally, no concrete plans exist for incentivizing farmers to switch to AWD, making promotion of AWD extremely difficult without any further policy interventions.

Experience with past pilot projects showed that farmers are willing to follow water management programmes for the duration of the pilot projects and while they receive continuous guidance with their performance being monitored. However, in the absence of incentives to support continuous water management after the end of pilot projects, they tended to revert to continuous flooding. This should not come as a surprise, as continuous flooding has been the traditional practice and is perceived by most farmers to be risk-free. Such behaviour is the most rational under the current policy framework, because:

1. There are no particular economic gains associated with water management and a switch to AWD, as farmers pay a fixed irrigation fee determined by the size of the irrigated area rather than the amount of water used. The only exception is for pumped irrigation systems.
2. Water management and AWD can initially be more labour intensive, as it requires farmers to attend more often to the fields and to follow strictly an established irrigation calendar up to harvest.

Despite the few successful examples, only 8 per cent of all irrigated rice fields in the Philippines or 140,000 ha applied AWD as of 2013.

1.3 AMIA as an Opportunity for the Agricultural Sector of the Philippines

This AMIA targets farmers in the Philippines who cultivate rice in irrigated rice fields. It aims to design policy and economic incentives for farmers to switch from continuous flooding to AWD and sustain that practice over the long run. In order for the AMIA to succeed, it will target the existing structure of the rice irrigation system, which is explained in detail in Chapter 3, while at the same time providing individual farmers with the required capacity-building and knowledge dissemination. Carrying out both sets of interventions simultaneously is a prerequisite for the AMIA to bring the necessary sectoral transformations.

The AMIA will target a total of 750,000 ha of irrigated rice fields, approximately half of the irrigated rice fields across the whole country, which are estimated to emit approximately 2,033 ktCH_4/yr or 50,826 ktCO_2e/yr. The introduction of AWD in these flooded irrigated rice fields could potentially bring approximately 12,151 ktCO_2e/yr of emission reductions by 2020, or 23,217 ktCO_2e/yr if implemented across the entire country. This will represent a sizeable mitigation effect, decreasing GHG emissions from rice cultivation by close to 25 per cent. Once the AMIA is successfully implemented in its current format, it can be further expanded to cover all irrigated rice fields in the Philippines.

However, the AMIA will also produce adaptation, climate change risk hedging and food security benefits. Although the Philippines is often perceived as a country with abundant water resources, climate change is expected to bring more unpredictable weather patterns and droughts. Introducing proper water management will allow water to be saved and more resilient rice production that is able to withstand these and other climate-change-related risks.

In terms of food security, two aspects should be taken into consideration. First, switching to AWD will allow an increase in the total irrigated area, as more water will be available for irrigation, especially during the dry season.

Research and pilot projects have also demonstrated that AWD does not lead to decreases in yields and can even increase yields by 5 per cent in many cases. Thus, the introduction of AWD is expected to lead to further increases in rice production.

Furthermore, the Philippine Rice Research Institute reported on the basis of pilot projects that the introduction of AWD leads to decreased conflict among farmers. In farming communities, it is often the case that farmers downstream the irrigation network receive less water than upstream farmers, especially during the dry season. The introduction of water management practices allows for the more even distribution of irrigated water among farmers, thus leading to a reduction, if not the total elimination, of conflict.

In order to achieve a wider transformational impact, as well as acceptance among farmers, the AMIA will offer a support package, consisting of an optional course of training to participating farmers in diversifying agricultural production. Under this optional scheme, all farmers who participate in the application of AWD under the AMIA will be provided additional support by the AMIA Implementer for cultivating other crops. This will allow farmers who are interested to develop new agricultural skills, access new markets and diversify their revenue sources.

Thus, the proposed AMIA will allow not only sizeable reductions of GHG emissions, but also the transformation of the rice sector by providing more efficient irrigation solutions and increasing productivity. Last but not least, the AMIA will deliver new income generating activities to farmers and help them move to more sustainable and diversified agricultural practices.

Chapter 2: Country Background

2.1 Geography

The Republic of the Philippines is an island nation in South-East Asia located in the western Pacific Ocean with a total land area of approximately 300,000 km^2. It is an archipelago of more than 7,100 islands, categorized into three main geographical regions, namely Luzon, the Visayas and Mindanao. It is bounded by the South China Sea in the west, the Philippine Sea and the Pacific Ocean in the east, the Sulu and Celebes Seas in the south, and the Bashi Channel in the north. The Philippines is approximately 800 km from the Asian mainland. Its northernmost islands are about 240 km south of Taiwan and the southernmost islands are about 24 km from the coast of Borneo (Kalimantan). Eleven of its largest islands, namely Luzon, Mindanao, Negros, Samar, Palawan, Panay, Mindoro, Leyte, Cebu, Bohol and Masbate, contain 94 per cent of the total land area, and are characterized by largely mountainous terrain, interior valleys and plains.

Figure 2. Map of the Philippines

Source: www.google.com/maps.

2.2 Climate and the Effects of Climate Change

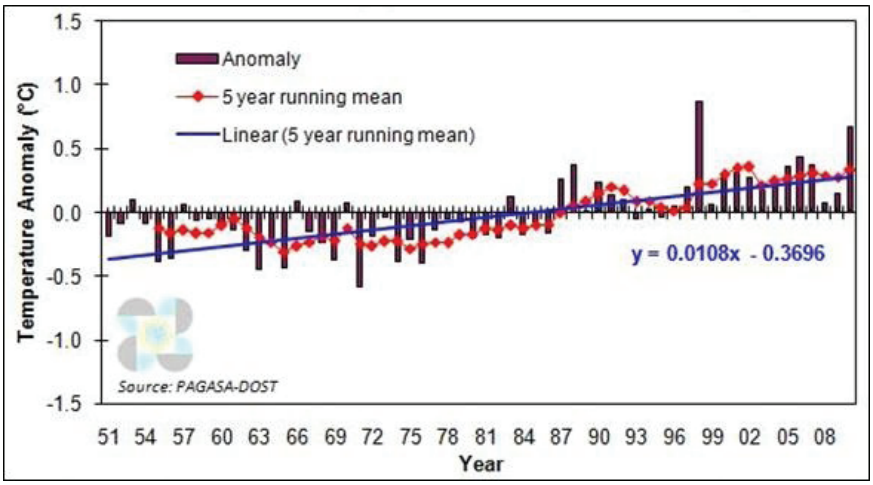
The Philippine climate is tropical and maritime with average annual temperature of 26.6 °C, high humidity and abundant rainfall. Distinguished by the amount of rainfall, there are two major seasons, the rainy or wet season

(WS) lasting from June to November and the dry season (DS) from December to May. The dry season is further subdivided into the cool dry season from December to February, and the hot dry season from March to May. The coolest month is January with a mean temperature of 25.5 °C, while the warmest month is May with a mean temperature of 28.3 °C.

The average annual rainfall of the Philippines is in the range of 965-4,064 mm and varies regionally depending on the direction of the moisture-bearing winds and the location of the mountain systems. A great portion of the rainfall is also influenced by typhoons. Due to the Philippines' geographical setting, typhoon occurrences are high compared with other countries with an annual average occurrence of 20 and the highest recorded number in one year being 32 in 1993.

Increasing mean temperatures and changes in the amount and intensity of rainfall, as well as the number of tropical cyclones in recent years, indicate that the Philippines has already been affected by climate change. The figure below shows a rising temperature pattern in the Philippines by tracking observed mean temperature anomalies (or departures from 1971-2000 normal values) during the period 1951-2010, indicating an increase of 0.648 °C over the whole period or an average of 0.011 °C annually.

Figure 3. Observed Annual Mean Temperature Anomalies (1951-2010) in the Philippines



Source: Philippine Atmospheric, Geophysical and Astronomical Services Administration, Department of Science and Technology (PAGASA-DOST).

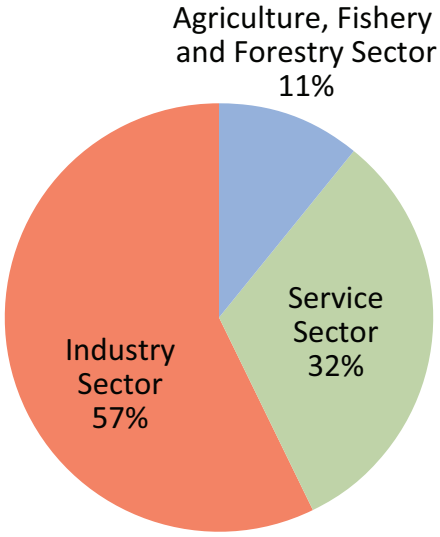
One of the sectors that will be severely affected by climate change is agriculture, where variations in yields can be brought about by fluctuations in temperature, rainfall patterns and rainfall regimes. Such changes may also affect the incidence of pests and outbreaks of diseases. Crops suffer decreases in yields whenever temperatures exceed threshold values and some, such as rice, may suffer spikelet sterility. Agricultural production will most likely suffer a decline if timely, effective and efficient interventions are not put in place.

2.3 The Role of Agriculture in the Philippine Economy

Although the Philippine economy has been transitioning to services and manufacturing due to accelerated industrialization, agriculture still plays a significant role. The Philippines employs about 12 million people in the agricultural sector out of its total labour force of approximately 40 million people. In 2012, the country's Gross

Domestic Product (GDP) grew by 6.81 per cent and the agricultural sector accounted for 11 per cent of GDP. The figure below shows the composition of GDP as of 2012.

Figure 4. Philippine GDP, 2012



Rice is considered the most important agricultural crop in the country and is a staple food. The Philippines was the eighth largest rice producer in the world in 2012, producing about 18 million tons, as shown in the table below.

Table 1. Rice Production by Country, 2012

Country	Rice Production (million tons)
China	206.0
India	153.0
Indonesia	69.0
Viet Nam	43.7
Thailand	37.8
Bangladesh	33.9
Myanmar	33.0
The Philippines	**18.0**
Brazil	11.5
Japan	10.7

Source: Food and Agriculture Organization of the United Nations, Statistics Division (http://faostat3.fao.org).

In terms of food security, the Philippines still remains extremely vulnerable. With a population of over 92 million as of 2010, rising at an average rate of more than 2 per cent per year, the amount of rice produced relative to domestic consumption remains insufficient and the gap needs to be filled through imports. In 2010 the country ranked top in the world among rice importers and it was the fourth largest rice importer in 2012 (see Table 2, below). Therefore, any future policies in the sector need to aim at increased and sustainable domestic production, while taking into consideration the possible adverse effects of climate change.

Table 2. Rice Imports by Country, 2012

Country	Rice Import (million tons)
Nigeria	2.7
China	2.4
Iran	1.7
The Philippines	**1.5**
Iraq	1.45
Saudi Arabia	1.225
Ivory Coast	1.115
Malaysia	1.105
Senegal	1.0
South Africa	0.95

Source: Food and Agriculture Organization of the United Nations, Statistics Division (http://faostat3.fao.org).

Chapter 3: The Rice Sector in the Philippines

3.1 Organizational Structure of the Rice Sector

Rice cultivation in the Philippines is under the authority of the Department of Agriculture (DA),[4] an executive department[5] of the Government of the Philippines responsible for the promotion of agricultural and fisheries development and growth. Programmes promoting rice production have been implemented by DA with a view to increasing yields and attaining rice self-sufficiency. However, the goal of self-sufficiency has been receding due to the decreasing area planted with rice brought about by urbanization and land conversions, as well as the limited availability of irrigation water during the dry season.

Most of the land producing rice is owned by individual farmers, who gained ownership as a result of the Comprehensive Agrarian Reform Program (CARP) adopted by the Government of the Philippines in 1988. Under this programme, tracts of land or haciendas were distributed to farmers. The programme limited land ownership to a maximum of 3 ha per individual for irrigated and 7 ha for rain-fed farms. Currently, the average landholding stands at about 1.2 ha per farmer in irrigated ecosystems. CARP is implemented by the Department of Agrarian Reform,[6] a separate department within the Philippine Government.

Under previous land reform programmes from the 1970s, farmers were organized into agricultural cooperatives. These cooperatives were registered with the Cooperative Development Authority (CDA).[7] Cooperatives received capacity-building interventions and training to enable them to operate as small farming enterprises and to master new rice and other crop production technologies. The cooperatives were provided with agricultural production loans by government-owned banks at minimal interest rates. However, most of them defaulted on their loan repayments and, at present, very few of them still exist.

As an alternative to the cooperatives, farmers in the irrigated ecosystems, national irrigation systems (NIS) and communal irrigations systems (CIS), are currently organized into water users' associations or Irrigators' Associations (IAs). To date, there are about 5,320 IAs in the country, representing farmers from the irrigated ecosystems, both national (2,460) and communal (2,860).

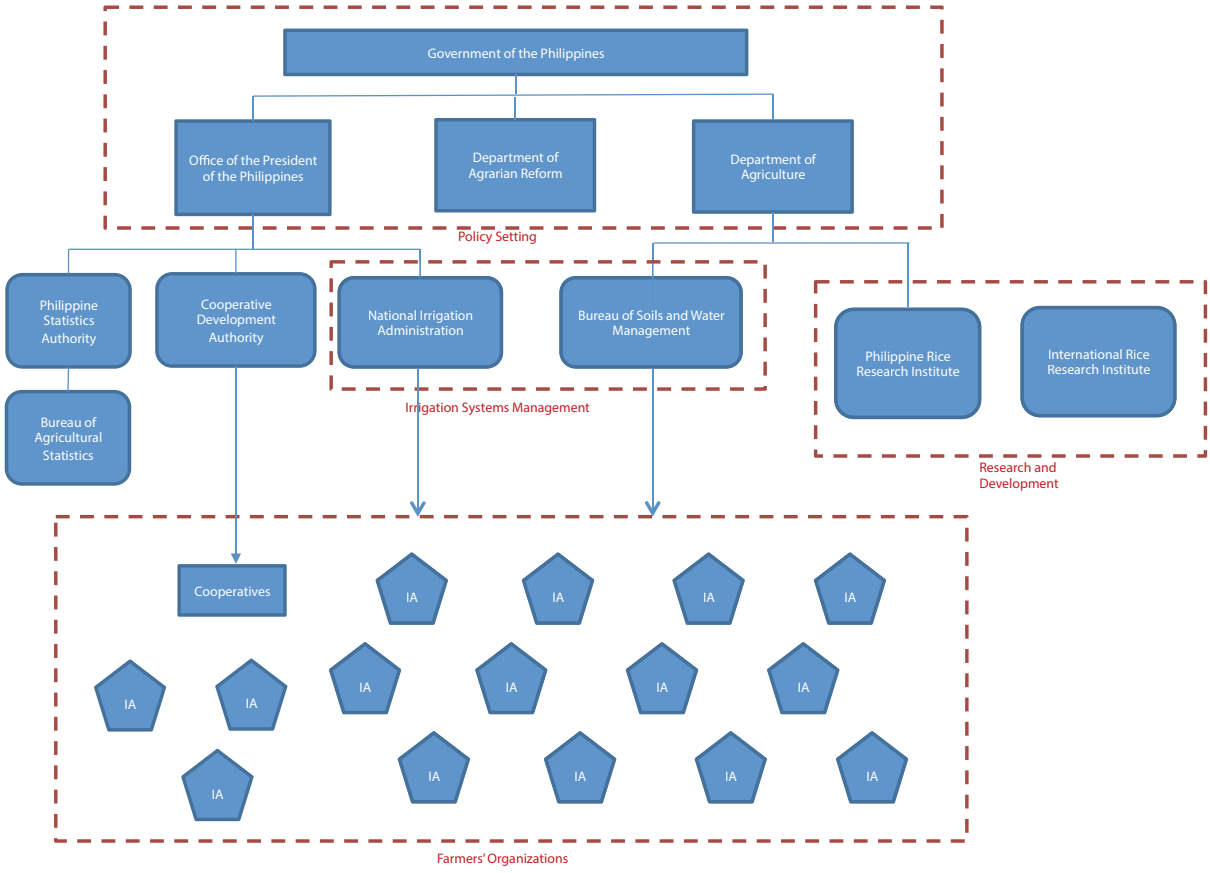
This organizational structure was originally envisaged as empowering farmers and transforming the IAs into independent bodies, so that in the future, they could manage a portion of the irrigation system and perform the delivery and allocation of irrigation water within the boundaries of laterals or sub-laterals. The IAs are registered with the Securities and Exchange Commission (SEC)[8] and enter into maintenance contracts with the National Irrigation Administration (NIA),[9] an agency under the Office of the President that manages the national irrigation systems, or the Bureau of Soils and Water Management (BSWM)[10] under the DA.

4 http://www.da.gov.ph/.
5 Departments in the Philippines are equivalent to ministries in many other countries.
6 http://www.dar.gov.ph/.
7 http://www.cda.gov.ph/.
8 http://www.sec.gov.ph/.
9 www.nia.gov.ph.
10 http://www.bswm.da.gov.ph/.

Most of the data related to agricultural activities in the Philippines are collected by the Bureau of Agricultural Statistics[11] (BAS), which is part of the Philippines Statistics Authority (PSA)[12] established in 2013. The PSA-BAS is the central information source for statistics on agriculture, fisheries and related fields. For the rice sector, several types of statistical information are publicly available, including ones on rice production, the area harvested to rice, and irrigated area.

The Philippines is in the advantageous position of being host to two major rice research institutes on its territory, the International Rice Research Institute[13] (IRRI) and the Philippine Rice Research Institute (PhilRice).[14] IRRI was established in 1959 and is the global knowledge hub for rice cultivation. The institute has been promoting improved water management as a component of adaptation and mitigation strategies in rice cultivation for many years, and has been pioneering research in this area. PhilRice is a national research and development institute established under the DA in 1986 for the purpose of supporting sustainable rice production in the Philippines. The institute has been collaborating with IRRI on issues related to water management and irrigation, and is one of the strongest advocates of the introduction of improved irrigation practices across the Philippines.

Figure 5. Organizational Structure of the Rice Sector in the Philippines



11 http://www.bas.gov.ph/.
12 http://www.psa.gov.ph/.
13 http://irri.org/.
14 http://www.philrice.gov.ph/.

3.2 Types of Ecosystems and Cultivation Practice

3.2.1 Types of Ecosystems

The types of rice ecosystems in the Philippines and their shares of total irrigated and harvested areas are summarized below. In 2013 the area harvested was 658,591 ha more during the WS or 32.2 per cent higher than in the DS of the same year. The lower harvested area during the DS can be attributed to decreased or limited irrigation water during the first and second quarters of the year.

Table 3. Types of Irrigation Ecosystems, 2013

Types of Irrigation Ecosystems	Area (ha)
Irrigable Area	3,019,609
Irrigated Area (average of dry and wet season totals)	1,675,595
National Irrigation System (NIS)	740,214
Communal Irrigation System (CIS)	573,419
Private Irrigation Systems	361,962
Total Harvested Area	
Dry Season	2,043,746
Irrigated	1,526,057
Rain-fed	517,689
Wet Season	2,702,337
Irrigated	1,710,280
Rain-fed	992,057

Source: PhilRice.

3.2.2 Cultivation Practices

Rice cultivation in the Philippines follows the practices of irrigated lowland culture. The soil is soaked to make it workable for ploughing and subsequently for harrowing. Five to seven day intervals between ploughing, first harrowing and second harrowing are observed to allow weeds and rice stubbles to be incorporated into the soil and to decompose. Final harrowing and leveling is done one day before transplanting. In some areas, direct dry seeding is also practiced and dryland preparation is common there.

In an attempt to introduce new technologies to the rice sector, the Philippine Rice Research Institute (PhilRice) published a handbook in 2007 entitled PalayCheck System for Irrigated Lowland Rice, which was patterned on the RiceCheck system in Australia. The handbook aims to disseminate information on new cultivation practices including water management, and the system was subsequently adopted by the Department of Agriculture (DA) in its national rice programmes. However, due to the lack of additional incentives and training for farmers, it is still not widely applied, leaving continuous flooding the predominant cultivation practice.

3.3 Irrigation Systems and Water Management

Irrigation plays a central role in rice production and the proper operation of the irrigation systems is the main responsibility of the NIA. The viability of the national irrigation system (NIS) is dependent on the ability of the NIA to collect Irrigation Service Fees (ISF) from the farmers it serves. These are currently levied based on irrigated area, not on the amount of water used, and vary depending on the type of irrigation system (e.g. pumps, reservoir, diversion). The ISF range from 2 to 22 cavan (50 kg bags)[15] of palay (rice) per hectare per cropping season (see Table 4, below). Thus, the way the ISF are currently set provides no economic incentives to farmers to introduce water saving technologies.

The only exception, as of now, are privately owned shallow-well pumps. In that case, reduction in water input for rice production directly translates to savings in operational costs (i.e. reduction in fuel and maintenance costs) and may provide incentives for adopting water saving technologies.

Table 4. Irrigation Fees in the Philippines

Irrigation Service Fee for Diversion, Reservoir and Irrigation Systems

Scheme/Crop		Wet Season	Dry Season	Third Crop
		Cavans per ha		
A.	**Diversion**			
	Rice	2.0	3.0	3.0
	Other Crops	60 per cent of the rate for rice		
	Annual Crops	7.5		
	Fishponds	5.0	5.0	5.0
B.	**Reservoir/Storage**			
	Mariis	3.0	3.0	3.0
	Upriis	2.5	2.5	3.5
	Other Crops	60 per cent of the rate for rice		
	Annual Crops	7.5		
	Fishponds	6.0	6.0	6.0
C.	**Pumps**			
	Rice	5.0 - 10.0		
	Other Crops	60 per cent of the rate for rice		
	Annual Crops	7.5		
	Fishponds	15.0	15.0	15.0

15 At 50 kg per bag and a support price of ₱17.00/kg.

Irrigation Service Fee For National Pump Irrigation Systems

Region	Pump Irrigation System (PIS)	National Irrigation System (NIS)	ISF Rate	
			Wet Season	Dry Season
			Cavans per ha	
1	Bonga Pump No. 1	Ilocos Norte Irrigation System (INIS)	8	12
1	Bonga Pump No. 2	INIS	8	12
1	Bonga Pump No. 3	INIS	8	12
2	Iguig-Alcala-Amulung	Iguig-Alcala-Amulung PIS	4	4
2	Solana	Solana PIS	5	5
2	Magapit	Magapit PIS	3.75	3.75
2	MRIIS Pump No. 1	Magat River Integrated Irrigation Systems	3	3.5
2	MRIIS Pump No. 2 & 3	MRIIS	3	3.5
3	Turbine Pump	AMRIS	₱ 3,000/ha	₱ 3,500/ha
3	Bunay	AMRIS	₱ 1,800/ha	₱ 5,000/ha
3	Kapatiran	AMRIS	₱ 1,500/ha	₱ 3,200/ha
3	Tibagan	AMRIS	2.5	3.5
3	Bustos-Pandi	AMRIS	2.5	2.75
3	Buenavista	AMRIS	2	3
3	Penaranda	Upper Pampanga River Integrated System	7	10
3	Nueva Ecija	Nueva Ecija PIS	2	2
4	Cabuyao East	Laguna Friar Lands Irrigation System	6	8
4	Dambu	Sta. Maria-Mayor River Irrigation System	No pump operation	10
5	Libmanan-Cabusao	Libmanan-Cabusao PIS	3	3
13	Lower Agusan	Lower Agusan River PIS	2.75	2.75

Source: NIA, 2013.

The willingness of farmers to pay the ISF is largely dependent on how much yield they get from their farm and the degree of satisfaction they receive from the irrigation service provided to them. With inequitable distribution of irrigation water within the system (national and communal) and even within the Irrigators' Associations, raising ISF collection rates looks unattainable.

The establishment of Irrigators' Associations was expected to result in the more even distribution of irrigation water among farmers and the provision of better irrigation services in general. Farmers were expected to agree among themselves on how to allocate irrigation water equitably so that every Irrigation Association member would be

served. However, the situation did not improve, i.e. the tendency is still for too much water to be concentrated on farms upstream and too little or no water at all to reach the tail-end, leading to persistent conflicts among farmers.

Several programmes have been designed to allow downstream farmers to be served first, but this practice proved to be unsustainable since upstream farmers still tended to draw water at their own convenience.

Another approach implemented on an experimental basis in some pump systems in Cagayan Valley in Luzon and on Bohol Island in the Visayas was "volumetric" pricing. Under this scheme, water diverted from the canal is measured and a corresponding cost per unit volume was determined. However, implementation of this scheme is inappropriate nationwide since most of the canals at the secondary and tertiary levels are unlined and dilapidated or without control structures. Alternative schemes emerged from research and development efforts aimed at "producing more with less water". One such example is AWD, which accounts for about 8 per cent of total irrigated area, as already stated above.

3.4 Funding Sources for Agricultural Activities

Implementation of any policies and measures in the agricultural sector depends also on the availability of funding. Funding can be broadly divided into government funding or subsidies, and agricultural credit from a variety of sources.

3.4.1 Government Funding

Currently, the Government of the Philippines generally channels its financial assistance to farmers through the Irrigators' Associations. The main types of government support in the past ten years are summarized below:

a. Provision or facilitating of access to high quality seeds (certified inbred seeds or hybrid seeds);

b. The fertilizer subsidy (provision of one bag of urea per hectare);

c. Provision of soft loans for agricultural machinery at heavily subsidized rates (e.g. the Makina-Saka Programme where farmer organizations have to pay only 15 per cent of the cost for equipment such as threshers, combine harvesters and tractors);

d. Rehabilitation and repair of irrigation facilities, including the provision of shallow tube wells for irrigation; and

e. Access to new technologies for rice production through training provided by Farmers' Field Schools and other institutions.

However, there is no assistance currently provided to support of the introduction of AWD and improved water management.

3.4.2 Agricultural Credit

Agricultural credit has an important role in the development of the agriculture sector. However, agricultural sector's use of formal credit is much lower than that of the non-agricultural sector. The bulk of agricultural loans supplied by the banking systems were absorbed by commercial agriculture. Small-scale agriculture sourced loans mostly from informal lenders. As the Asian Development Bank (1990) reports, the volume of institutional credit to the agricultural sector is considered inadequate and the sector has received a much smaller share of formal credit than the non-agricultural sector (Llanto, 1993).

In the 1970s and 1980s, macroeconomic policies tended to promote formal institutions as sources of credit. For instance, the abolition of share tenancy by the land reform of 1970s reduced the role of landlords as the main source of credit (Llanto, 2005). Then, the expansion of rural banks in the 1980s made formal financial institutions more accessible to rural borrowers. The early 1990s, however, were generally characterized by recourse to informal lenders, as banks limited their exposure to farms. Thus the current lending system is not fully prepared to supply the large and targeted credits needed for the transformation of the rice sector.

3.4.2.1 Formal Lenders

The formal lenders comprise commercial banks, thrift and development banks, the rural banks and the credit guarantee institutions. Commercial agriculture, consisting of medium and large-scale individual and corporate borrowers, is served by all types of lenders in the formal sector.

The government banks involved in agricultural and rural credit are the Land Bank of the Philippines[16] and the Development Bank of the Philippines[17]. The credit supply of the Land Bank of the Philippines in the countryside increased 26-fold from ₱105.06 million in 1987 to ₱2.8 billion in 1990 (Llanto, 1993). The Land Bank achieved its phenomenal growth in agricultural lending (mainly to small agrarian reform beneficiaries) by using cooperatives as conduits for its loans. The bank worked with private groups to help organize the cooperatives which, according to its latest report, totalled some 5,000 during that time. By the end of 1990, the Land Bank had delivered credit to 305,156 farmers through 2,879 cooperatives. However, the number of cooperatives has since declined enormously, most becoming non-operational with loans outstanding to the Land Bank. At present, Irrigators' Associations are replacing the cooperatives as borrowers from the bank.

A recent addition to the formal lending system is the credit guarantee institution (CGI). The following CGIs are currently operating:

1. The Philippine Crop Insurance Corporation (PCIC),[18] which is used by the Comprehensive Agricultural Loan Fund (CALF) to guarantee the production credit of small farmers;
2. The Quedan Rural Credit and Guarantee Corporation (Quedancor),[19] which provides guarantee cover for inventory financing; and
3. The Small Business Corporation (SBC),[20] which provides credit guarantees to small and medium-sized firms/ enterprises.

The CALF is managed by the Agricultural Credit and Policy Council (ACPC) of the DA, which oversees the credit guarantee operations of these three institutions and pays the guarantee calls submitted by the banks through the PCIC, Quedancor and SBC. The credit guarantee covers up to 85 per cent of the total amount of a loan (Llanto, 1993).

16 https://www.landbank.com/.
17 https://www.devbnkphl.com/.
18 http://pcic.gov.ph/.
19 http://www.quedancor.gov.ph/.
20 http://www.sbgfc.org.ph/.

3.4.2.2 Informal Lenders

The second source of agricultural credit is the informal sector. The informal sector comprises the informal money lenders (such as traders, millers, large farmers, friends, relatives, landowners and, recently, overseas contract workers), credit unions and credit cooperatives, and rotating savings and loans associations. The informal lenders usually serve the financing requirements of small-scale and subsistence agriculture and the majority of small rural borrowers.

It was reported by Llanto (1993) that despite the recent growth of formal credit to agriculture, the informal sector continues to be a critical feature of rural credit markets. The majority of rural borrowers in the Philippines, as in many developing countries, have always depended on informal lenders. Unfortunately, there are no organized and systematic data on informal lenders to help us assess their relative importance to the agricultural sector. Anecdotal evidence and several local surveys, however, point to their ability to operate in areas and for a specific clientele that banks fail to serve.

Chapter 4: The Policy Environment

The proposed AMIA is unique as it addresses, through the proposed set of interventions described in detail in Chapter 6, a large number of policy goals and targets related to climate change, sustainable development and agricultural sector reform, and provides a holistic solution to climate change risk management and the transition to low GHG emission agriculture, and the empowerment of farmers. It is worth noting that the Philippines has already created under different programmes most of the enabling policy environment for the implementation of these interventions and for reaching the targets under this AMIA, but this AMIA is the first attempt to put the programmes together in a single policy implementation structure.

4.1 Climate Change and Agriculture: The Existing Policy Framework

Climate change has been recognized as an issue of national importance in the Philippines. In recognition of the urgent need for action, Republic Act 9729, also known as the Climate Change Act of 2009, was passed. The Act mandates the mainstreaming of climate change in policy formulation, so that policies and measures that address climate change are integrated into development planning and sectoral decision-making.

Under the Climate Change Act, the Climate Change Commission (CCC) was established in 2009. The Commission is the lead policy-making body tasked to coordinate, monitor and evaluate programmes and plans to deal with climate change. It is mandated to formulate the National Framework Strategy on Climate Change (NFSCC) and the National Climate Change Action Plan (NCCAP).

The NFSCC is the country's roadmap for creating a climate-resilient Philippines. The NCCAP is an achievable programme of action for integrated climate change adaptation and mitigation, while calling for a policy on public financing that gives priority to adaptation and a policy environment that encourages private sector investment. The NCCAP provides for the conduct of vulnerability assessments, demonstration of the "eco-town" approaches, research and development that supports renewable energy, as well as the promotion of sustainable transport (DENR, 2012). It outlines the agenda for adaptation and mitigation for 2011-2028. Within the two long-term objectives of adaptation and mitigation, the NCCAP pursues seven strategic priorities as outlined in Box 3 below.

Box 3. Priorities and Expected Outcomes of the NCCAP

- Food Security - The objective of the national strategic priority on food security is to ensure the availability, stability, accessibility, and affordability of safe and healthy food amidst climate change.
- Water Sufficiency - In light of climate change, however, a comprehensive review and subsequent restructuring of the entire water sector governance is required. It is important as well to assess the resilience of major water resources and infrastructures, manage supply and demand, manage water quality, and promote conservation.
- Ecological and Environmental Stability - Ecosystem resilience and environmental stability during the plan period is focused on achieving one immediate outcome: the protection and rehabilitation of critical ecosystems, and the restoration of ecological services.
- Human Security - The objective of the human security agenda is to reduce the vulnerability of women and men to climate change and disasters.

- Climate-Friendly Industries and Services - NCCAP prioritizes the creation of green and eco-jobs and sustainable consumption and production. It also focuses on the development of sustainable cities and municipalities.
- Sustainable Energy - NCCAP prioritizes the promotion and expansion of energy efficiency and conservation; the development of sustainable and renewable energy; environmentally sustainable transport; and climate-proofing and rehabilitation of energy systems infrastructures.
- Knowledge and Capacity Development - The priorities of the NCCAP on knowledge and capacity development are:
  - Enhanced knowledge on the science of climate change;
  - Enhanced capacity for climate change adaptation, mitigation and disaster risk reduction at the local and community level; and
  - Established gendered climate change knowledge management accessible to all sectors at the national and local levels.

One of the agencies which came up with a programme addressing climate change in agriculture is the Department of Agriculture (DA). On 25 January 2013, the Secretary of Agriculture issued a Memorandum entitled "Mainstreaming Climate Change in the DA Programs, Plans and Budget" enumerating four strategic objectives to make the Department's plans and programmes climate change compliant or climate proof. The document contains the following strategic objectives:

a. To increase the adaptive capacity and productivity potential of agriculture and fisheries livelihoods by modifying commodity combinations to better meet weather issues and natural resource endowments;

b. To redefine or remap the Strategic Agriculture and Fisheries Development Zones (SAFDZ) by including climate change vulnerabilities as part of mapping variables;

c. To redefine the agriculture development planning framework as a basis of agricultural development planning by including key factors/variables associated with climate change; and

d. To develop a new framework and plan for the provision of new government agriculture services for the accelerated development of climate smart agriculture and fisheries industries.

The memorandum included seven DA systems-wide programmes on climate change, which cut across department policy instruments and agencies. These core systems-wide programmes allow the Department to better address climate change vulnerabilities and risks in creating and implementing the country's agriculture and fisheries modernization programmes. The Financial Management Service of the DA was instructed to allocate the necessary resources for the successful implementation of these programmes.

4.2 Climate Change Policy and the AMIA

The proposed AMIA responds entirely to the requirements of Republic Act 9729 by integrating climate change adaptation and mitigation measures into the AMIA design. The adoption of this AMIA will allow rice sector adaptation policies to be implemented by introducing climate change resilient irrigation practices. At the same

time, it will also create a mechanism for the reduction of GHG emissions resulting from rice production, which can be easily subjected to an MRV framework, is described in Chapter 8.

Furthermore, the AMIA addresses all the seven strategic priorities of the National Climate Change Action Plan (NCCAP), as described below.

Table 5. Rice Sector AMIA and Existing Climate Change Policies in Agriculture

Food Security	Implementation of the AMIA is expected to lead to increased rice production by up to 5 per cent per hectare as well as an increase in the irrigable land area because of increased irrigation water availability and improved irrigation services, especially during the dry season. This will result in an overall increase of rice production and allow the Philippines to meet its national target of attaining 100 per cent rice self-sufficiency.
Water Sufficiency	The implementation of the AMIA will result in savings in irrigation water and its more efficient use, thus allowing improved water sufficiency in agriculture.
Ecological and Environmental Stability	The proposed AMIA will create a more resilient and less drought-prone rice production ecosystem.
Human Security	Currently a large share of the population of the Philippines is engaged in agriculture, mainly rice production. The proposed AMIA will improve human security in two directions. First, it will transform the rice sector by making it a more climate resilient one that can sustain extended droughts caused by climate change. Second, the AMIA, through its optional component, will allow farmers to diversify agricultural production and thus possess the knowledge and skill base to overcome any adverse effects on rice production caused by climate change events, while at the same time widening their base for generating income.
Climate-Friendly Industries and Services	This AMIA transforms rice production into a climate change resilient and climate change smart mode. The reduced use of irrigation water, reduced fuel consumption in pump-irrigation systems, and reduced GHG emissions because of the introduction of AWD reduce the overall carbon footprint of rice production.
Sustainable Energy	The AMIA will have a particularly strong effect on pumped irrigation systems where the introduction of the AMIA will lead to the reduction of fuel consumption and energy savings.
Knowledge and Capacity Development	The implementation of the AMIA will promote the countrywide dissemination of AWD practices, as well as knowledge about the cultivation of other agricultural products by farmers (the Palayamanan concept). In this way the AMIA will contribute significantly to knowledge and capacity development in the agricultural sector.

4.3 Gaps and Risk Assessment

As seen in Chapter 2, the rice sector in the Philippines represents a large share of the country's economy and has a well-established organizational structure that can be used for carrying out any potential interventions. It also has ready access to the established knowledge base within IRRI and PhilRice, which allows it to stay abreast with the most recent scientific advances in rice cultivation.

On the other hand, the sector does not produce sufficient amounts of rice to satisfy the domestic consumption demands. This deficit will be further aggravated by the advance of climate change, especially through changing weather patterns and water shortages. Improved irrigation practices can be one potential solution for overcoming the sector's weaknesses and improving its management, as proposed in this AMIA.

A World Bank report entitled Getting a Grip on Climate Change in the Philippines contains observations on overall climate change policy in the Philippines, and identifies some major policy gaps that are highly relevant to this AMIA (World Bank, 2013, particularly Part III: Public Expenditure and Financial Management Review) .

The first major observation is that in spite the fact the Philippines has a comprehensive climate change policy there is a lack of coordination between different departments (ministries) of the government when it comes to implementation. Although the CCC that was created under the Office of the President of the Philippines has the mandate to coordinate national climate change policy, in practice policy fragmentation across sectors makes prioritization among sectors very difficult.

This observation is relevant to this AMIA. As seen in the section on AMIA governance in Chapter 7, a number of agencies need to interact if the implementation of the AMIA is to be successful. Although PhilRice is under the DA, the NIA and the BAS are under the Office of the President of the Philippines. Additionally, the Department of the Environment and Natural Resources (DENR), which will play an important role in the MRV of the AMIA, is a separate government entity. The smooth operation of this AMIA will require the establishment of a clear regulatory framework defining the tasks of various government agencies involved in the process.

Finally, it is worth noticing that some of the activities that are covered under this AMIA are already envisaged under existing DA policies. For example, AWD has been already prioritized in Administrative Order 25 of 2009, though the order has never been carried out. AWD is the main technology in the project "Accelerating the development and dissemination of associated technologies on rice production that are resource-use efficient" funded by DA's Bureau of Agricultural Research Food Staples Sufficiency Program.[21] The DA also has its own programme to help farmers diversify crop production and gain access to markets. Finally, the Sikat Saka programme offers direct lending to farmers through the Land Bank of the Philippines for their agricultural activities. The implementation of the AMIA will allow coordination of all related initiatives that are in place within the DA and other agencies, and mainstreaming them for the achievement of the AMIA's goals.

21 Personal communication from Ruben Lampayan of IRRI submitted by e-mail on 26 February 2015.

Chapter 5: AMIA Baseline and Expected Outcomes

5.1 Baseline Scenario

The baseline scenario of the AMIA is the hypothetical scenario describing what will happen in the absence of the proposed AMIA interventions. As policies to stimulate the introduction of AWD have not yet been implemented, the baseline scenario assumes the continuation of the current practice in rice cultivation, the continuous flooding of rice fields up to two weeks before harvest and the effects associated with that.

The baseline scenario consists of two components, a GHG baseline and a Sustainable Development (SD) baseline. Setting the baseline scenario in this way allows the effects of the Nationally Appropriate Improvements (NAI) to be properly assessed and quantified through the monitoring activities described in the Measurement, Reporting and Verification (MRV) system.

5.1.1 GHG Baseline

The GHG baseline assumes the continuation of current rice cultivation practices in irrigated rice fields in the Philippines, i.e. the continuous flooding of rice fields up to two weeks before harvest. These cover the emissions from the existing irrigated rice fields during the dry and wet seasons where both single and double cropping is practiced. The details of the GHG baseline estimation are provided in Annex II.

Analyzing the data for rice cultivation in 2013, it can be concluded that for most of the irrigated land in the Philippines double cropping is practiced for rice production. Thus, taking into account the 140,000 ha area of irrigated rice fields where AWD has already been introduced, it can be assumed that the approximately 1,386,057 ha of land used for double cropping in the wet and dry seasons, and the 184,223 ha used for single cropping during the wet season are still practicing continuous flooding. Following the formula described below and default baseline emission factors introduced in Chapter 8, it is estimated that the actual baseline emissions from rice cultivation are approximately 50,826 $ktCO_2e$/year.

$$BE_s = \sum_{g=1}^{G} EF_{BL,s,g} * A_{s,g} * 10^{-3} * GWP_{CH4} \quad \textbf{(1)}$$

Where:

BE_s	Baseline emissions from project fields in season s (tCO_2e)
$EF_{BL,s,g}$	Baseline emission factor of group g in season s ($kgCH_4$/ha per season, use default values)
$A_{s,g}$	Area of project fields of group g in season s (ha)

GWP_{CH4}	Global warming potential of CH_4 (tCO_2e/tCH_4, use value of 25)
g	Group ***g***, covers all project fields with the same cultivation pattern (G = total number of groups)

5.1.2 Sustainable Development (SD) Baseline

The SD baseline is the continuation of non-resilient rice production, characterized by unsustainable water and land usage, a sub-optimal rice yield and use of rice production technology that does not apply state-of-the-art agricultural techniques. The SD baseline is characterized by various indicators related to the environment, social, growth and development, and economic domains. Wherever possible, the parameters are quantified, otherwise qualitative description will be provided. The indicators for each domain and the baseline values are provided in the tables below. Details are provided in the Sustainable Development Tool (SD Tool) devised for this AMIA (see Annex 1).

5.1.2.1 Selection of SD Indicators

The SD indicators were selected in line with the country's Millennium Development Goals (MDGs), as reflected in the seven pillars of the Philippine National Climate Change Action Plan (see Chapter 4), namely:

- Food Security
- Water Sufficiency
- Ecological and Environmental Stability
- Human Security
- Climate-Friendly Industries and Services
- Sustainable Energy
- Knowledge and Capacity Development.

The AMIA ensures environmental sustainability through improved soil quality, therefore, soil quality was selected as an indicator in the environmental domain. The AMIA also contributes to the eradication of extreme poverty and hunger, by supporting farming communities in producing more rice, implementing sustainable cultivation and irrigation methods, and widening the income source base through diversification of agricultural production. Therefore, three indicators were selected in the social domain: "livelihood of poor, poverty alleviation, peace", "food security" and "provides vulnerable groups access to local resources and services."

The AMIA supports technology and know-how transfer which can contribute to more sustainable growth in the agricultural sector. Therefore, the following two indicators were selected in the growth and development domain: "access to sustainable technology" and "capacity-building."

Finally, the AMIA creates new opportunities for farmers to generate income, as well as for trainers and qualified personnel involved in AMIA management and implementation. Therefore, "job creation" and "income generation" were selected as indicators in the economic domain.

The results are provided in the table below.

Table 6. SD Indicators

Domain	Indicator	Relevance to SDGs and Targets	Selected (Yes/No)	Identified Impacts	Explanation of Chosen Indicator	Effect on Indicator	Monitoring done (Yes/No)
Environment	Air pollution/quality	Goal 11, Target 11.6				Positive	Yes
	Water pollution/quality	Goal 6, Target 6.6 Goal 11, Target 11.6 Goal 12, Target 12.4	Yes	Increased water savings	AWD leads to significant water savings as a result of improved irrigation	Positive	No
	Soil pollution/quality	Goal 2, Target 2.4 Goal 11, Target 11.6 Goal 12, Target 12.4	Yes	Improved soil quality	AWD involves periodic aeration of the soil which results in higher zinc availability, as well as increased plant root anchorage and lodging resistance.	Positive	No
	Others (Noise/visibility)	Goal 11, Target 11.6					
	Biodiversity and ecosystem balance	Goal 14, All Targets Goal 15, All Targets					
Social	Health	Goal 3, All Targets					
	Livelihood of poor, poverty alleviation, peace	Goal 1, All Targets Goal 2, Target 2.1 Goal 16, Target 16.1	Yes	Provide livelihood for poor/poverty alleviation. Decrease conflicts among farmers	Water savings from the implementation of AWD results in increased total irrigated land area. As a result, more farmers and farm helpers are required, providing additional livelihood for the poor farming communities; Because of the availability of more irrigation water for downstream farmers due to AWD, irrigation	Positive	No
	Affordability of electricity	Goal 7, Targets 7.1					
	Access to sanitation and clean drinking water	Goal 6, Tagets 6.1, 6.2, 6.4, 6.5					
	Food security (Access to land and sustainable agriculture)	Goal 2, All Targets Goal 12, Target 12.3	Yes	Increase in rice production. Increase in irrigated land	Water savings from the implementation of AWD results in increased total irrigated land area. Proportionately, increase in total number of rice fields results in the increase in rice yield.	Positive	Yes
	Quality of employment	Goal 8, Targets 8.2, 8.3, 8.5, 8.6, 8.7, 8.8					
	Time savings/time availability due to project	Goal 1					
	No child labour	Goal 8, Target 8.6					
	Provides vulnerable groups access to local resources and services	Goal 6, Targets 6.4, 6.5, 6.6, 6.a, 6.b	Yes	Increase access to water resources	AWD is a water management practice in rice cultivation promoting the efficient use of water resources. This provides vulnerable groups access to water resources and services which were not previously available to them, resulting in increased total irrigated land area.	Positive	Yes
Growth and Development	Access to clean and sustainable energy	7.3					
	Education	Goal 4, All Targets		Increased capacity for growing alternative crops	The AMIA will allow a large number of farmers to gain the necessary skills for growing alternative crops and practice alternative cropping.	Positive	Yes
	Empowerment of women	Goal 4, Targets 4.3, 4.6 Goal 5, All Targets					
	Access to sustainable technology	Goal 4, Target 4.3 Goal 7, Targets 7a, 7b Goal 9, Target 9b	Yes	Access to sustainable technology	The AMIA implementer will be providing the required capacity-building for the implementation of the AWD nationwide through direct interaction with the farmers and IAs. Being the country's authority on rice research, participating farmers and IAs will have the opprotunity to access other available sustainable technologies from PhilRice, such as variety development, pest and nutrient management, devising decision support tools, water harvesting and conservation, diversified/integrated farming,	Positive	Yes
	Energy security	Goal 7, Target 7.1, 7.2,					
	Capacity-building	Goal 4, Target 4.3, 4.5 Goal 6, Target 6.a	Yes	Knowhow transfer	The AMIA implementer will provide proper training and knowhow transfer of AWD implementation to the irrigation officers, irrigators associations and individual farmers.	Positive	Yes
	Equality (quality of jobs given, job conditions for men/women)	Goal 4, Targets 4.1, 4.2, 4.3, 4.7 Goal 5, All Targets Goal 10, Target 10.4					
Economic	Income generation/expenditure reduction/Balance of payments	Goal 8, Targets 8.1, 8.2, 8.3, 8.4 Goal 10, Target 10.1	Yes	Increased income for farmers. Increased collection of ISF	Increased income for the farmers as a result of the lower rice production cost (ISF); Increased income for the NIA and IAs as a result of increased collection rate of the ISF. It is expected that more farmers would be willing to pay the ISF because of better satisfaction with irrigation	Positive	Yes
	Asset accumulation and investments	Goal 7, Targets 7a, 7b Goal 9, All Targets Goal 17					
	Job Creation (number of men and women employed)	Goal 8, All Targets	Yes	New jobs created	Water savings from the implementation of AWD results in increased total irrigated land area. As a result, more farmers and farm helpers are required, providing more jobs.	Positive	No

*The SD Tool is provided in Annex 1.

Table 7. SD Parameters and Baseline Values

	Parameter	Unit	Baseline	
			Value applied	Baseline Value
1	Rice Production	tons		18,000,000
2	Harvested Land Area	ha		1,700,000
3	Additional Services	ha		0
4	Trainings	Persons		0
5	ISF cost	₱/ha/season		2,000
6	ISF collection percentage	Percentage		70
7	Area over which alternative crop is practiced	ha		0

5.2 Expected Outcomes of the AMIA

The AMIA targets are developed in line with the seven pillars of the NCCAP of the Philippines (see Chapter 4) and will be achieved through the implementation of nationally appropriate interventions. As described in Chapter 6, this will include the creation of economic incentives for the introduction of AWD, execution of training and capacity support programmes for IAs and farmers, as well as additional optional training in the diversification of agricultural production by rice farmers. The expected outcomes of the AMIA up to 2020 and the means of their verification are summarized in the table below.

Table 8. Expected Outcomes of the AMIA to 2020 and their Verification

Expected Outcomes	Values	Indicator/ Unit	Means of Verification
GHG Emission Reductions in Rice Cultivation	12,151,688	tCO_2e	Through the MRV system described in Chapter 8
Annual Rice Production in the Philippines	20,382,000	tons	Data from the Bureau of Agricultural Statistics, Philippine Statistics Authority
Irrigated Land Area	1,925,000	ha	Data from the Bureau of Agricultural Statistics, Philippine Statistics Authority
Trained Irrigation Officers	150	persons	Reports by AMIA Implementer
Trained Farmers/ IAs (in land area managed)	750,000	ha	Reports by AMIA Implementer
ISF Collection Rate	100	per cent	Data from NIA

The introduction of AWD is expected to significantly reduce GHG emission levels. If the Philippine rice sector manages to adopt AWD as a standard cultivation practice on the targeted 750,000 ha, it is estimated that approximately 12,151,688 tCO_2e/year of emission reductions can be achieved, which represents a significant reduction in the carbon footprint of rice cultivation of slightly less than 25 per cent from the baseline level. Following the implementation plan described in Chapter 9, over the five years of AMIA implementation, total emission reductions are expected to reach 36,455,063 tCO_2. This is a significant reduction, which will also be achieved in a cost- efficient manner at an average cost of CO_2 emission reductions of less than US$1/$tCO_2$.

The expected outcomes for SD Indicators are presented in the table below. The expected outcomes reflect the overall AMIA goal for adopting AWD on 750,000 ha of irrigated rice fields across the Philippines and the sustainable development improvements associated with that process. The targets for food security take into consideration two facts, namely the increase in yields per hectare as a result of AWD implementation and the increase in overall irrigable land due to the increased availability of irrigation water. The targets also assume that the ISF collection rate will reach 100 per cent in the areas where AWD is adopted, which will be sufficient to compensate for a 20 per cent reduction in the level of ISF for farmers participating in the AMIA. The Nationally Appropriate Improvements (NIA) for each of the SD domains have been calculated as per the UNDP NAMA Sustainable Development Tool and are reported in Table 8. The high values of the NIA show an high level of ambition of the AMIA implementer and the significant contribution of the AMIA to the sustainable development of the Philippines.

Table 9. SD Targets

Domain	Indicator	Parameter Selection				Measurement value	Measurement type	Baseline Value	Target value estimated (ex-ante)	Intervention Value monitored (ex-post)	Unit	NAIs estimated (ex-ante)	NAIs monitored (ex-post)	Evaluation of Project Success
		Number of parameters selected per indicator	Parameter name	Other Parameters	Effect									
Environment	Air pollution/quality				+									
	Water pollution/quality				+									
	Soil pollution/quality				+									
	Others (noise/visibility)													
	Biodiversity and Ecosystem balance													
Social	Health													
	Livelihood of poor, poverty alleviation, peace													
	Affordability of electricity													
	Access to Sanitation and clean drinking water													
	Food security (Access to land and sustainable agriculture)	2	Rice Production		+	National values	Indirect	18,032,525	18,702,349	18,702,349	tons	4%		
			Harvested Land Area		+	National values	Indirect	4,690,061	4,915,061	4,915,061	ha	5%		
	Quality of employment													
	Time savings/time availability due to project													
	Provides vulnerable groups access to local resources and services	1	Harvested Land Area		+	National values	Indirect	4,690,061	4,915,061	4,915,061	ha	5%		
											Domain Average	4%		
Growth and Development	Access to clean and sustainable energy													
	Education	1	Farmers who have Received training on Alternative Cropping and Practice it		+	Area over which alternative cropping is practiced	Direct	0	750,000	750,000	Persons	100%		
	Empowerment of women													
	Access to sustainable technology, Capacity development	1	Additional Services		+	Number of IAs and individual farmers to whom additional services have been provided	Direct	0	750,000	750,000	ha	100%		
	Energy security													
	Capacity building	1	Trainings		+	Number of Irrigation Officers, IAs and individual farmers who have been trained	Direct	0	150	150	Persons	100%		
	Equality (quality of jobs given, job condition for men/women)													
											Domain Average	100%		
Economic	Income generation/expenditure reduction/Balance of payments	1	ISF cost			ISF cost per hectare	Direct	4,250	3,400	3,400	Pls/ha/season	20%		
			ISF collection percentage		+	Percentage of ISF collection	Direct	70	100	100	Percentage	43%		
	Asset accumulation and investments													
	Job Creation (number of men and women employed)													
											Domain Average	31%		
											TOTAL AVERAGE	45%		

*The SD Tool is provided in Annex I.

Chapter 6: AMIA Interventions

The AMIA interventions are the set of measures proposed for the sustainable transformation of cultivation practices in the rice sector that will lead to overall GHG emission reductions and the other AMIA targets described in the preceding section, including climate change risk reduction, improved food security and strengthened climate change adaptation capacity, being met. As a result of the AMIA interventions, approximately 750,000 ha of irrigated area are expected to adopt AWD. The exact implementation structure and implementation plan are described in Chapter 7 and Chapter 9.

The AMIA interventions can be classified into two main packages: basic package and support package. The basic package will require the creation of policy and economic incentives and the delivery of training/education to farmers. The support package is a set of optional training sessions for participating farmers to diversify their production through gaining knowledge and experience in growing other crops (products) such as vegetables.

6.1 Basic Package

It is proposed that the basic AMIA package should consist of two main components: a national level incentives scheme and capacity-building for farmers and IAs.

It was already emphasized in the preceding sections that AWD has been well received in demonstration projects. At the same time, farmers tended to revert to the old practice, continuous flooding, once the demonstration projects were over. An important exception were the pump irrigation systems where the introduction of AWD led to reduced use of fuel, thereby reducing the cost of operating the irrigation pumps.

The general conclusion from these experiences is that the benefits which AWD offers under the rice sector's current structure are not sufficient to outweigh the perceived risks of changing the established cultivation practice, unless there are additional economic incentives. In other words, the main lesson of this experience is that an efficient intervention must be the one that offers a win-win solution for all the stakeholders involved, which in the case of rice cultivation, are the government agencies that supply irrigation water and the farmers who use it.

The introduction of AWD is a means of providing farmers with improved and reliable irrigation services. Additionally, AWD is expected to bring increased yields and, possibly, an increase in the cultivated area due to the water being saved being made available to additional farmers, particularly to the downstream of each system.

On the side of the government agencies, the stakeholders that will directly benefit from the introduction of AWD are the National Irrigation Administration (NIA) and the Bureau of Soils and Water Management (BSWM). For NIA and BSWM, stable ISF collection is the main incentive for the introduction of any new measure and policy. The introduction of AWD has the potential to increase the ISF collection rate as more farmers will get access to irrigation water and improved irrigation services, which is expected to increase their willingness to pay. Moreover, if AWD leads to an increase in the area cultivated, it will also translate into increased revenue for NIA, which is an additional incentive for the agency to support the measures under the AMIA.

In view of the above, the first intervention proposed under the AMIA is a complete overhaul of the ISF system, so that farmers adopting AWD can be eligible to pay a reduced ISF. As previously discussed, interviews with NIA staff

and IAs confirmed that the ISF collection rate varies between 50 per cent and 70 per cent, mainly due to provision of unsatisfactory irrigation services to tail-end farmers. At the same time, the introduction of AWD is expected to improve the overall supply of irrigation water so that it can reach even remote downstream farmers. Thus, it is expected that the irrigation service fee collection rate among AWD-adopting farmers will increase to reach close to 100 per cent soon after implementation of the AMIA[22].

A decrease in the size of the ISF payment involves a lot of uncertainty for NIA. In order to facilitate the decision to reform the ISF system, it is proposed that the difference in payment between the current level and discounted level for AWD-adopting farmers will be covered by international donors. Donors will cover 100 per cent of the difference for the first two years and their contribution will gradually decrease thereafter, so that donor support can be fully retired by 2020. Later on, the decrease in the ISF is expected to be offset by the increased ISF collection rate and increased payments from the additional harvested land, which can guarantee that NIAs' revenue does not decrease from its current level.

The ISF reform is a key measure for the financial sustainability of this AMIA and its successful implementation depends on building a strong consensus among all concerned agencies, such as the DA and NIA, as well as within the Government of the Philippines.

The second intervention under the basic AMIA package will require sufficient capacity-building that the AMIA implementer reaches each and every farmer. The AMIA implementer will play a pivotal role in delivering information dissemination campaigns and introducing AWD as the "new" and "appropriate" way of irrigating the rice crop or managing irrigation water in farmers' fields. As the AMIA aims to have countrywide dissemination and to cover up to 750,000 ha by 2020, the AMIA implementer will train 150 field officers for the NIA and the BSWM. These officers will be AMIA's executors on the ground in tandem with the existing Crop Specialists (CSs)/Rice Sufficiency Officers (RSOs), and will work actively with the IAs and individual farmers. At the same time, the AMIA implementer will actively supervise the delivery of training to the IAs in the first few years of the AMIA operation, and will retain a consultation role in the ensuing years.

The AMIA implementer will design the training programme, in consultation with rice irrigation experts and researchers, as well as with NIA and BSWM representatives. A special training manual will be produced and distributed to NIA/BSWM field officers to streamline the execution of the AMIA and guarantee its continuity over time.

All 150 field officers will receive initial training at the start of the AMIA, following the prescriptions contained in the training manual. Training will be delivered by the AMIA implementer. Additionally, knowledge updating ("brush-up") seminars will be delivered by the AMIA implementer to field officers at regular intervals, but at least once every six months. Finally, it is expected that NIA and BSWM will take over responsibility for carrying out training within two to three years from the start of the AMIA.

The AMIA Implementer will also establish a "hotline" service to provide field officers and farmers with constant support for the correct implementation of the AWD. The "hotline" will provide guidance on AWD implementation and allow farmers to raise any concerns that they may have regarding the new irrigation practice. The "hotline" service will also keep a database of all issues encountered by farmers and field officers to support the smooth implementation of the AMIA and its improvement.

22 A penalty can be imposed on farmers who do not pay the ISF by excluding them from the AMIA and denying them access to the support package and any other training.

Finally, in order to provide even further incentives for farmers and mitigate the potential risks associated with the implementation of AWD, a guarantee fund will be established. The fund will evolve over time into an AWD insurance product which is expected to be integrated eventually in the existing crop insurance system, already described in Chapter 3.

The guarantee fund is proposed to be established following the examples of previous pilot projects, implemented by PhilRice. Under the guarantee fund, any yield reduction that may result from the shift from continuous flooding to AWD will be covered by the fund. For example, the guarantee per hectare can be equivalent to ₱ 4,250.00 or 5 cavans (50 kg bags) of rice. The concrete mechanics of the guarantee fund is currently discussed among the relevant Philippine government entities and stakeholders..

During the implementation of the AMIA, additional donor funding will be provided to develop a crop insurance product. The product will reflect the results of the actual AMIA implementation and the issues encountered in the process. At the end of the AMIA implementation period, an AWD insurance product will be launched to replace the guarantee fund.

6.2 Support Package

The proposed AMIA includes an additional support package that will allow farmers who participate in the AMIA to receive additional training in the diversification of their production. This support package, although designed as an incentive, serves several purposes. It is aimed at supporting farmers in widening the base of their income sources and gaining access to different agricultural markets. In this way, it will assist a very vulnerable part of Philippine society, rice farmers, to raise their living standards by providing them with more opportunities. The additional training is also expected to make the AMIA more attractive to farmers and make the adoption of AWD, a fundamental change in existing agricultural practice, easier to accept and implement.

The training will be provided by the AMIA implementer and will include several modules, giving the farmers a choice of which to participate in (among modules, e.g., on production of mushrooms, vegetables or other crops). In each training module, farmers will receive a series of lectures on growing a particular agricultural product. Following that, they will start the actual growing process in close cooperation with and with support from the AMIA implementer. The AMIA implementer will work closely with farmers at least for the first two seasons, while continuing to provide them with support after that. PhilRice already has prepared such training modules and is delivering them on a pilot basis; therefore, their integration into the AMIA is not expected to face many hurdles.

For the success of this package and for it to have a real impact on the agricultural sector of the Philippines, it is crucial that farmers gain access to markets for the products that they grow. With that in mind, it is proposed that this component of the AMIA is also supported by the Department of Agriculture through its existing programmes for diversification of agricultural production and for giving farmers easier market access.

Although the support package is not the main focus of the AMIA, it targets one of the main issues of Philippine agriculture—monoculture growing—and provides farmers with access to an additional revenue stream from the production and sale of new agricultural products.

6.3 Costs of AMIA Implementation

The AMIA is expected to transform irrigation practice in a total of 750,000 ha of rice fields in the Philippines over a five-year period up to 2020. It is envisaged that, following the successful implementation of the AMIA, the Government of the Philippines will continue to expand the area of AWD application; however, donor funding will be needed to kick-start the entire process.

The costs of AMIA implementation are detailed in the section below. They arise from the cost of capacity-building and training of farmers under the basic package, the delivery of training under the support package, and the need for funding to offset the reduced ISF paid by participating farmers. All costs are based on assumptions provided by PhilRice.

6.3.1 Costs of ISF Reduction

The effects of the reduction of the ISF are not easy to estimate as the fee varies among regions. Therefore, an average value of ₱4,250/ha/season or 5 bags of rice (50 kg per bag at a supported price of ₱17.00/kg) was used in the analysis[23].

Table 10. Cash Flow Analysis of Reduction in the ISF

	Value	Unit	Year 1	Year 2	Year 3	Year 4	Year 5	Total
IA Covered		IA	1,200	2,400	3,600	4,800	6,000	6,000
Area Converted		ha	150,000	300,000	450,000	600,000	750,000	750,000
ISF Due without the AMIA	4,250	₱/season	637,500,000	1,275,000,000	1,912,500,000	2,550,000,000	3,187,500,000	9,562,500,000
ISF Collected without the AMIA		₱	446,2250,000	892,500,000	1,338,750,000	1,785,000,000	2,231,250,000	6,693,750,000
ISF Collected under the AMIA		₱	510,000,000	1,020,000,000	1,530,000,000	2,040,000,000	2,550,000,000	7,650,000,000
Increase Revenue for NIA under the AMIA		₱	63,750,000	127,500,000	191,250,000	255,000,000	318,750,000	956,250,000
		US$	1,482,558	2,965,116	4,447,674	5,930,233	7,412,791	22,238,372
Difference between ISF Due without the AMIA and ISF Collected under the AMIA		₱	127,500,000	255,000,000	382,500,000	510,000,000	637,500,000	1,912,500,000
		US$	2,965,116	5,930,233	8,895,349	11,860,465	14,825,581	44,476,744
Payment by Donors		per cent	100	100	50	20	0	
		₱	127,500,000	255,000,000	191,250,000	102,000,000	0	675,750,000
		US$	2,965,116	5,930,233	4,447,674	2,372,093	0	15,715,116
Exchange Rate	43	₱/US$						

23 This is the average irrigation fee for gravity irrigation systems where no direct fuel savings are expected to occur as a result of AWD introduction.

As the ISF collection rate is reported to be between 50 per cent and 70 per cent, the higher end value is applied here. Thus, in the absence of the AMIA, NIA will collect only ₱446.25 million, instead of the ₱637.5 million scheduled for the first 150,000 ha targeted in the starting year of the AMIA. In other words, the NIA is losing ₱191.25 million for that year from the targeted rice fields.

If the ISF is reduced by 20 per cent or to ₱3,400/ha/season for the farmers adopting AWD, NIA can achieve a 100 per cent collection rate from these fields. (The exact governance mechanism to support this assumption will be discussed in the next chapter). Thus, for the same year and from the targeted 150,000 ha of irrigated rice fields, NIA will raise revenue of ₱510 million, or approximately ₱63.75 million (US$1.48 million) more than it would receive without the fee reduction. This already makes a good enough case for reducing the ISF for farmers adopting AWD.

To assure the revenue stream to NIA, it is proposed that the difference in the ISF for target farmers will be covered by donors. The most pragmatic option is for donors to cover fully the difference between the actual and reduced ISF for participating farmers during the first two years. In the third year the coverage ratio will be reduced to 50 per cent, and to 20 per cent in the fourth year, before falling to zero in the fifth year. Total donor support is estimated to be approximately US$15.7 million over a period of four years.

The limited timespan for donor support under this component is considered to be sufficient to create a functioning system of ISF discounts for AWD farmers that can be fully borne by NIA from the fifth year onwards through increased ISF collection rates.

6.3.2 Costs of Technical Training and Overall AMIA Implementation

Technical training will be the core of AMIA implementation. As the AMIA aims at changing an established cultural practice, in addition to the economic incentives, continuous training and guidance for farmers are crucial for the success of the AMIA and reaching its targets. The costs of training and AMIA management are estimated over a period of five years, including the preparations before the start of the AMIA.

The costs consist of personnel services, which account for more than half of all expenses, maintenance and operating expenses, equipment expenses, and administrative costs.

Table 11. Total Budget Requirements for Capacity-Building
(₱ unless otherwise stated)

Particulars	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
I. Personnel Services (PS)							
A. Service Payment (Permanent Staff)		1,377,600	1,377,600	1,377,600	1,377,600	1,377,600	6,888,000
B. Salaries of Personnel to be Hired		50,653,860	50,653,860	50,653,860	50,653,860	50,653,860	253,269,300
C. Training Allowance of AEWs/IDOs/SWRFTs		27,000,000	27,000,000	27,000,000	27,000,000	27,000,000	27,000,000
Sub-Total for PS		79,031,460	79,031,460	79,031,460	79,031,460	79,031,460	395,157,300
II. Maintenance and Other Operating Expenses (MOOE)							
A. Travel		3,780,000	3,780,000	3,780,000	3,780,000	3,780,000	18,900,000
B. Communications		252,000	252,000	252,000	252,000	252,000	1,260,000
C. Supplies		1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	5,000,000
D. Training and Updating of FFS Manual	81,577,000	23,044,000	23,044,000	23,044,000	23,044,000	23,044,000	196,797,000
F. Other MOOE		0	0	0	0	0	0
Sub-Total for MOOE	81,577,000	28,076,000	28,076,000	28,076,000	28,076,000	28,076,000	221,957,000
III. Equipment Outlay (EO)	4,865,000						4,865,000
IV. Administrative Cost	8,157,700	10,710,746	10,710,746	10,710,746	10,710,746	10,710,746	61,711,430
TOTAL	94,599,700	117,818,206	117,818,206	117,818,206	117,818,206	117,818,206	683,690,730
Total (US$)	2,199,993	2,739,958	2,739,958	2,739,958	2,739,958	2,739,958	15,899,784
TOTAL + 1% Inflation Starting at Year 2	94,599,700	117,818,206	118,996,388	118,996,388	118,996,388	118,996,388	688,403,458
Total Cost of AMIA Training and Management (US$)	2,199,993	2,739,958	2,767,358	2,767,358	2,767,358	2,767,358	16,009,383

Table 12. Budget Requirements for Personnel Services

Particulars	Quantity	₱/unit	No. of Months	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
					TOTAL				
I. Personnel Complement/ Project Staff (PhilRice)									
a. Service Payment of Permanent Staff									
AMIA Implementation Leader	1	15,000	12		180,000	180,000	180,000	180,000	180,000

Table 12. Budget Requirements for Personnel Services (continued)

Particulars	Quantity	₱/unit	No. of Months	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Assistant Implementation Leader	1	12,000	12		144,000	144,000	144,000	144,000	144,000
Leader/ FFS-Training	1	8,800	12		105,600	105,600	105,600	105,600	105,600
Leader/Water Management	1	8,800	12		105,600	105,600	105,600	105,600	105,600
Senior Water Management Specialist	1	6,400	12		76,800	76,800	76,800	76,800	76,800
Senior Training Specialist	1	6,400	12		76,800	76,800	76,800	76,800	76,800
Sub-Total					688,800	688,800	688,800	688,800	688,800
b. Salaries of Personnel to be Hired									
Senior Training Specialist	1	45,000	12		540,000	540,000	540,000	540,000	540,000
Senior Water Management Specialist	1	45,000	12		540,000	540,000	540,000	540,000	540,000
Junior Training Specialist	2	30,000	12		720,000	720,000	720,000	720,000	720,000
Junior Water Management Specialist	2	30,000	12		720,000	720,000	720,000	720,000	720,000
Crop Specialist (Rice Sufficiency Officers)	150	25,723	12		46,301,400	46,301,400	46,301,400	46,301,400	46,301,400
Monitoring and Evaluation Specialist	1	25,723	12		308,676	308,676	308,676	308,676	308,676
Report Officer	1	25,723	12		308,676	308,676	308,676	308,676	308,676
Database Manager	1	22,259	12		267,108	267,108	267,108	267,108	267,108
Clerk III	2	17,000	12		408,000	408,000	408,000	408,000	408,000
Driver	3	15,000	12		540,000	540,000	540,000	540,000	540,000
Sub-Total					50,653,860	50,653,860	50,653,860	50,653,860	50,653,860
II. Personnel Complement/ Project Staff (NIA/ BSWM)									
a. Service Payment of Permanent Staff									
AMIA Implementation Leader	1	15,000	12		180,000	180,000	180,000	180,000	180,000
Assistant Implementation Leader	1	12,000	12		144,000	144,000	144,000	144,000	144,000
Leader/ FFS-Training	1	8,800	12		105,600	105,600	105,600	105,600	105,600

Table 12. Budget Requirements for Personnel Services (continued)

Particulars	Quantity	₱/unit	No. of Months	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Leader/Water Management	1	8,800	12		105,600	105,600	105,600	105,600	105,600
Senior Water Management Specialist	1	6,400	12		76,800	76,800	76,800	76,800	76,800
Senior Training Specialist	1	6,400	12		76,800	76,800	76,800	76,800	76,800
Sub-Total					688,800	688,800	688,800	688,800	688,800
b. Training and Communication Allowance									
IDO/SWRFT	150	7,500	12		13,500,000	13,500,000	13,500,000	13,500,000	13,500,000
Agriculture Extension Worker (AEW) from LGUs	150	7,500	12		13,500,000	13,500,000	13,500,000	13,500,000	13,500,000
Sub-Total (Training Allowance)					27,000,000	27,000,000	27,000,000	27,000,000	27,000,000
Sub-Total (a+b)					27,688,800	27,688,800	27,688,800	27,688,800	27,688,800
TOTAL (I + II)					79,031,460	79,031,460	79,031,460	79,031,460	79,031,460

Table 13. Budget Requirements for Maintenance and Other Operating Expenses

Particulars	Quantity	₱/ unit	No. of months/ days/	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
A. Travel									
Fuel and Oil (3 vehicles x 12 months a year; 10 trips per month)	3	30,000	12		1,080,000	1,080,000	1,080,000	1,080,000	1,080,000
Per Diem[a]	15	1,500	120		2,700,000	2,700,000	2,700,000	2,700,000	2,700,000
Sub-Total					3,780,000	3,780,000	3,780,000	3,780,000	3,780,000
B. Communication	21	1,000	12		252,000	252,000	252,000	252,000	252,000
C. Office Supplies for Project Management Staff (Various)					1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
D. Training									
D.1. Writeshop (Training Manual)									
Service Payment (Resource Persons)	14	6,500	3	273,000					
Service Payment (Support Staff)	5	6,500	3	97,500					

Table 13. Budget Requirements for Maintenance and Other Operating Expenses (continued)

Particulars	Quantity	₱/ unit	No. of months/ days/	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Office Supplies (various)				50,000					
Editing and Layout of Manual				75,000					
Printing of Manual	500	200		75,000					
Miscellaneous (15 per cent of the total cost)									
Sub-Total				570,500					
D. 2. Farmers Field School									
Registered Seeds (160/IA)[b]	160	450	2		144,000	144,000	144,000	144,000	144,000
Long Sleeve Shirts	8,000	150	0		1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
T-shirts with Collar	8,000	200	0		1,600,000	1,600,000	1,600,000	1,600,000	1,600,000
Training Materials for Farmers	8,000	200	5		8,000,000	8,000,000	8,000,000	8,000,000	8,000,000
Observation Wells	8,000	100			800,000	800,000	800,000	800,000	800,000
Snacks (2 Cropping Seasons)	8,000	50	8		3,200,000	3,200,000	3,200,000	3,200,000	3,200,000
Field Day (2 Cropping Seasons)	150	40,000	1		6,000,000	6,000,000	6,000,000	6,000,000	6,000,000
Sub-Total					20,944,000	20,944,000	20,944,000	20,944,000	20,944,000
D.3. Staff Training									
D.3.1 Training of Rice Sufficency Officers (RSO)									
Service Payment (Resource Speakers)	12	1,400	1,760	29,568,000					
Meals	210	500	60	6,300,000			0	0	0
Lodging	150	300	60	2,700,000			0	0	0
Use of Training Facilities	5	3,000	110	1,650,000			0	0	0
D.3.2 Training of NIA Staff (SWRFT) and LGU Extension Workers				0					

Table 13. Budget Requirements for Maintenance and Other Operating Expenses (continued)

Particulars	Quantity	₱/ unit	No. of months/ days/	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Service Payment (Resource Speakers)	12	1,400	1,760	29,568,000					
Meals	210	500	60	6,300,000					
Lodging	150	300	60	2,700,000					
Use of Training Facilities	5	3,000	110	1,650,000					
Sub-Total				81,006,500	0	0	0	0	0
E. 4 Project Management and Implementers Meeting									
Attendance at Conferences, Meetings and Seminars					0	0	0	0	0
End-Season Review and Planning Workshop (2 Times a Year)	300	2,500	2		1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Monthly Meeting for Progress Monitoring and Reporting (4 Months per Season; 2 Seasons a Year)	300	250	8		600,000	600,000	600,000	600,000	600,000
Sub-total					2,100,000	2,100,000	2,100,000	2,100,000	2,100,000
D. Other MOOE (i.e Utilities)									
Electricity and Water	12	0			0	0	0	0	0
Office Space rental	12	0			0	0	0	0	0
Sub-Total					0	0	0	0	0
GRAND TOTAL				81,577,000	28,076,000	28,076,000	28,076,000	28,076,000	28,076,000

Notes:

a. Per diem based on prevailing rate. At least 3 times a week field work x 22 days/month x 10 months/year x 21 pax (18 tech staff + 5 drivers).

b. Irrigators Association (IA)

Table 14. Budgetary Requirements for Equipment

Particulars	Quantity	₱/unit	Year 1
			Total
Vehicle			
Pick-up Double Cab	2	1,200,000	2,400,000
Van - 10 Seater	1	1,500,000	1,500,000
Computers			
Desktop	6	50,000	300,000
Laptop	4	50,000	200,000
Tablet with GPS	5	35,000	175,000
Printer Copier	1	50,000	50,000
LCD Projector	2	40,000	80,000
Camera (SLR)	1	60,000	60,000
Portable Sound System with Lapel Accessories	1	100,000	100,000
SUB-TOTAL			4,865,000

The total costs of this component are estimated to be approximately US$16 million. It is proposed that the costs in the preparatory year (Year 0) and the first year of AMIA implementation will be covered completely by donors, with local coverage increasing to 50 per cent in the second year and 70 per cent in the third year. From the fourth year, the training costs will be completely covered from local sources, namely from the Philippine Government budget. On this basis, it is expected that total donor support for this component up to 2020 will be approximately US$7.153 million, against US$8.855 million of local funds.

The total costs for both components are summarized below.

Table 15. Allocation of Funding between Donors and Local Participants

Particulars	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Total Cost of AMIA Training and Management (US$)	2,199,993	2,739,958	2,767,358	2,767,358	2,767,358	2,767,358	16,009,383
Donor Coverage (US$)	2,199,993	2,739,958	1,383,679	830,207	0	0	7,153,838
Local Coverage (US$)	0		1,383,679	1,937,151	2,767,358	2,767,358	8,855,545
Donor Payment for Reduction in the Irrigation Service Fee (US$)	0	0	2,965,116	5,930,233	4,447,674	2,372,093	15,715,116
Total	2,199,993	2,739,958	5,732,474	8,697,591	7,215,032	5,139,451	31,724,499

"The payments for reduction in the ISF are assumed to be made with one year delay following the verification of the results of the AMIA implementation.

6.3.3 Costs of Support Package Implementation

It is planned that the cost of the support package will be borne by an additional budget to be allocated to the AMIA implementer for organizing special training. Most of the funding is expected to be sourced through the Department of Agriculture and no donor support is currently required. As the support package is voluntary, its scale is difficult to estimate, but the target is to cover at least half of the farmers in the participating IAs.

Chapter 7: AMIA Implementation Structure

7.1 Participants in the AMIA Implementation Structure and their Roles

Under the current institutional structure in the Philippines, AMIA implementation is supervised by the Climate Change Commission of the Philippines (CCC).[24] The CCC will be the focal point for negotiations with potential AMIA investors and will also monitor the congruence between AMIA implementation and the Philippines' national sustainable development goals of the Philippines. The current AMIA can therefore become a AMIA only after approval by the CCC.

The actual implementation of the AMIA will be supervised by a Rice Sector AMIA Supervisory Board, consisting of representatives of the Government of the Philippines (the CCC, DENR, DA and others), donors and stakeholders (such as IRRI and environmental NGOs). The Supervisory Board will provide guidance to the AMIA implementer, issue rules and procedures for the Rice Sector AMIA's operations and screen its outcomes, including the rate of adoption of AWD, GHG emission reductions and financial performance. The Supervisory Board will also approve the inclusion of any new projects in the AMIA.

Actual AMIA implementation will be carried out by the AMIA implementer. The AMIA implementer should possess the up-to-date technical knowledge of AWD and have experience in the implementation of government and donor funded programmes and projects.

The AMIA implementer will be in charge of the day-to-day management of the AMIA, the training of field officers, supervision of AWD implementation and the execution of the MRV for the AMIA. The AMIA implementer will also deliver the training under the AMIA support package.

The Department of Agriculture (DA) will play several roles in AMIA implementation. Although it will not be involved in the direct execution of the AMIA, the DA will provide funds for the implementation of the AMIA capacity-building component, AMIA management and the implementation of the AMIA support package through existing and new budget lines. The DA will also provide advice to the AMIA implementer, PhilRice, on overall AMIA execution with a view to achieving synergies and guaranteeing that the activities are in line with the overall policy for the agricultural sector development.

The National Irrigation Administration (NIA) will play a central role in the execution of the AMIA on the ground and in channeling funds for AMIA implementation. NIA will co-fund the local portion of the AMIA through its climate change budget. Furthermore, NIA will provide field officers to PhilRice for training in the implementation of the AMIA. In this way, NIA will become the engine for the dissemination of AWD, as most of the 150 trained field officers who will work directly with the IAs will be its employees.

24 http://climate.gov.ph. Ms. Joyceline Goco of the CCC is the designated AMIA approver as of March 1, 2015. See, http://unfccc.int/files/co-operation_support/AMIA/application/pdf/AMIA-approver.pdf.

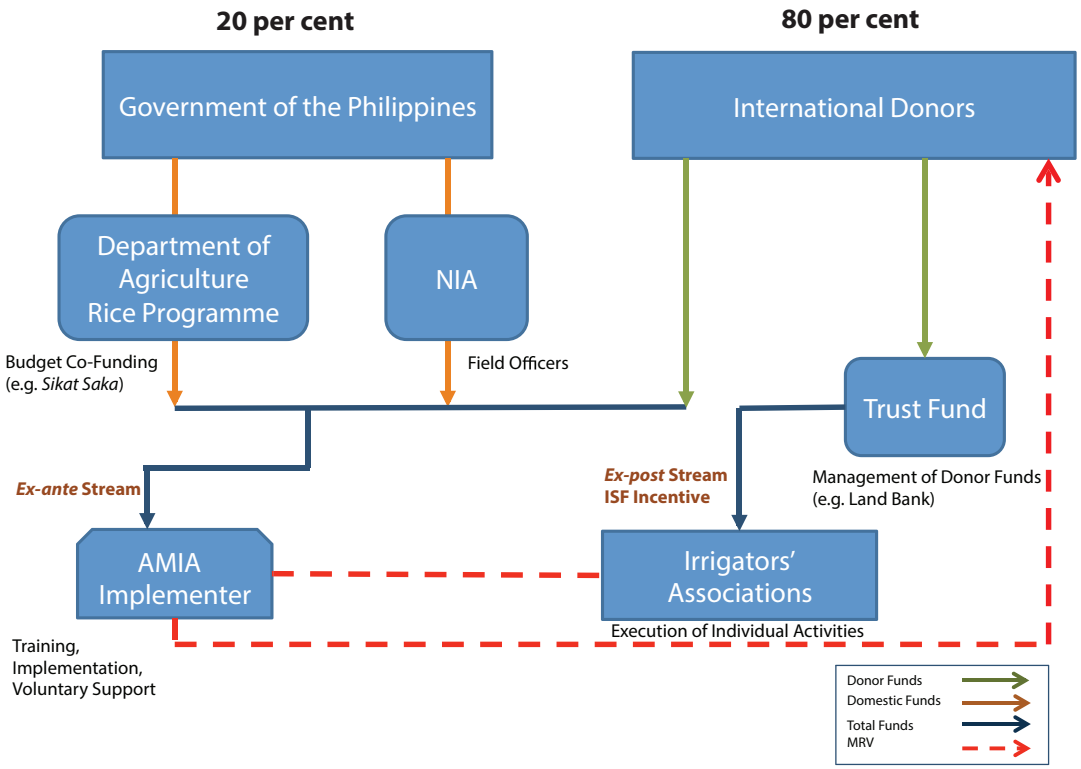
The Bureau of Soils and Water Management (BSWM) will also participate in AMIA implementation and will provide some field officers for areas that are under its jurisdiction.

The Land Bank of the Philippines (LBP) will play a pivotal role in channeling donor money to the AMIA through the establishment of a trust fund. The bank is a specialized government-owned bank for the support of agricultural activities and with extensive experience in trust fund operations. Box 4 in Chapter 9 raises the possibility of the Land Bank of the Philippines being accredited under the Green Climate Fund.

7.2 Financial Flows

The management of the financial assistance under the proposed AMIA is presented in the figure below.

Figure 6. AMIA Financial Assistance



As discussed in the preceding chapter, the financial flows will consist of an ex-ante stream which will be provided to the AMIA implementer for capacity-building services and management and an ex-post stream which will be provided to the IAs based on the actual irrigated area that has switched to AWD.

The ex-ante stream will be financed by international donors and the Government of the Philippines through its existing programmes and channels. The national funds will be channeled through the Department of Agriculture and the National Irrigation Administration and will be combined with the funds from international donors to support the capacity-building services provided by the AMIA implementer. The funds will be disbursed based on

an annual AMIA management and capacity-building plan, which will be prepared by PhilRice and presented to donors every year up to the end of the third year of the AMIA implementation after which the donor funding for this component is expected to stop. Any subsequent capacity-building needs for increasing the scale of the AMIA beyond the currently projected 750,000 ha of irrigated rice fields will be funded from domestic sources.

The ex-post stream will be based on a payment against delivery principle. PhilRice and IAs will constantly monitor and collect data on the areas that have been converted to AWD under the AMIA, following the prescriptions of the MRV methodology. The monitored data will be supplied to the donors who will evaluate it. Once the data have been approved by the donors, they will issue instructions to the AMIA trust fund to disburse payments to the participating IAs equivalent to the value of the ISF discount. IAs will collect only the discounted ISF from participating farmers, and will pay the full ISF to NIA using donor funds. In the first two years, donor payments will be sufficient to cover completely the ISF discount. After that donor payments will decrease gradually and will be withdrawn completely after the fourth year of the operation of the AMIA.

There are several options for dealing with the ISF discount after donor support is reduced and eventually withdrawn. One option is to make regulatory changes and incorporate the ISF discount into the ISF system. Such a change in the regulatory system will be justified once an increase in the ISF collection rate from participating farmers has materialized.

Another option is to keep the ISF at the current level, but to have the ISF discount for farmers adopting AWD subsidized internally. The discount can be funded internally through increased ISF collection, but will require special internal regulations within NIA allowing for such a mechanism.

In any case, the withdrawal of donor support is expected to become a stimulus for the swift and efficient implementation of AWD and ISF reform, so that sufficient local funds will come available towards 2020.

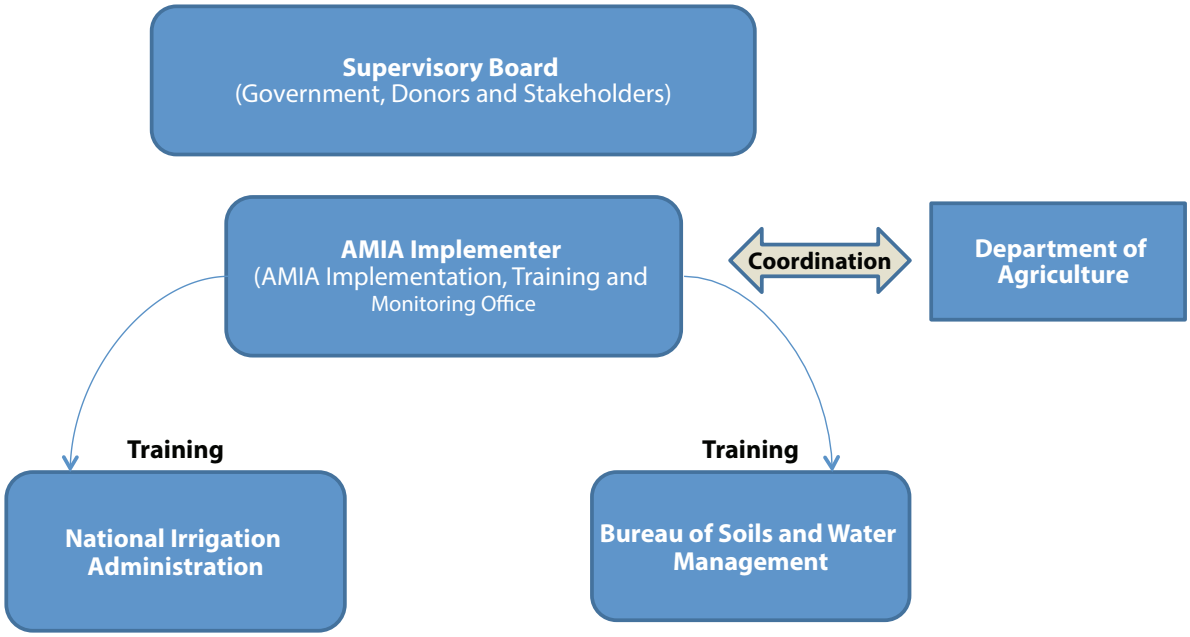
7.3 Technical Assistance Flows

Technical assistance will be provided by PhilRice, the AMIA implementer. The content of the technical assistance will be agreed with the Rice Sector AMIA Supervisory Board and will be fine-tuned in regular consultations with the DA.

The AMIA implementer will develop an AWD Manual and will train approximately 150 field officers for the National Irrigation Administration and the Bureau of Soils and Water Management. The manual will be prepared at a special Writeshop (a manual writing workshop), where experts from PhilRice, IRRI and other entities will be invited to participate.

Once the field officers have finished their training, they will begin a series of training sessions and field schools for Irrigators' Associations and farmers together with the AMIA implementer. The training will be conducted in groups of up to 50 participants. During the training, irrigation calendars will be developed for each IA, and farmers will learn how to control the level of water in their fields. During the cropping season, field officers will work with farmers every day and provide on-the-spot support and practical guidance on adopting AWD. The overall structure of the technical assistance flow is described in the figure below.

Figure 7. AMIA Technical Assistance



7.4 The Project Approval Process under the AMIA

As already discussed, the AMIA will be implemented in every IA. The activities of each IA under the AMIA will be considered a separate AMIA project.

At the beginning of every year, the AMIA implementer will discuss with DA and NIA the annual budget for AMIA implementation and the number of new IAs to be included in the AMIA during the year. Once the budget is agreed, the AMIA implementer will begin collecting proposals from IAs to join the AMIA.

Before an IA can launch its project within the AMIA, it has to prepare a Project Information Note and submit it to the AMIA implementer. The note should include the following data:

- Name of the IA
- Copy of the IA registration certificate
- List of the farmers who have confirmed their participation in the project
- Irrigated area by each participating farmer
- Confirmation that AWD is currently not practiced by the farmers participating in the project
- Confirmation that the IA fully understands its responsibilities under the AMIA and is willing to cooperate with the AMIA implementer in introducing AWD.

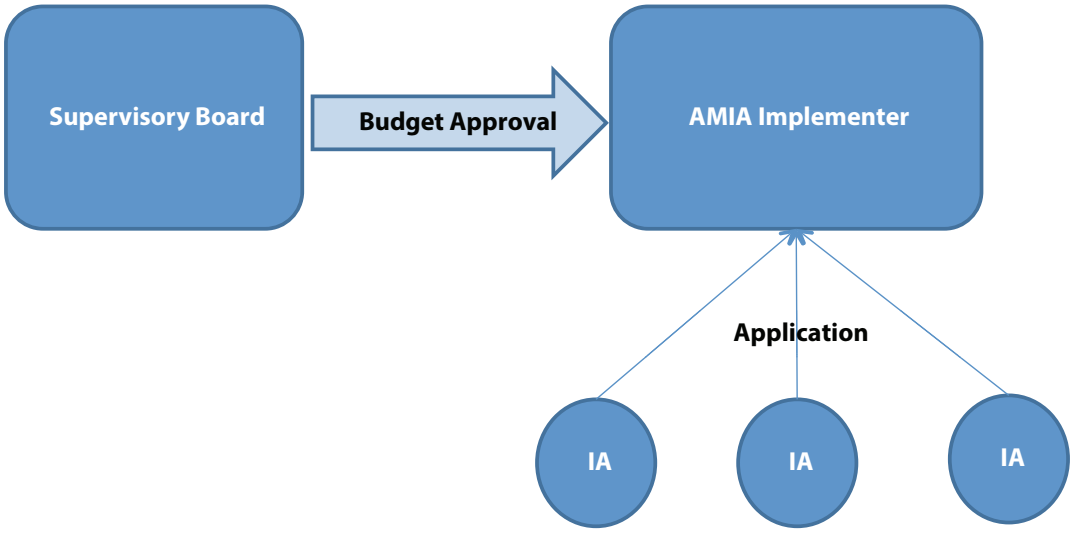
The information in the Project Information Note will be entered into the AMIA database and will be used for the MRV of the emission reductions as well as for the distribution of the ISF subsidy.

PhilRice will review the Project Information Note for each project and, having established that the project documents are complete, will add the project to the AMIA database. Following that, the AMIA implementer will assign a field officer to take charge of the project, provide an indicative date for the AMIA operation to begin, and start discussing the structure of training for the particular IA.

In case the AMIA implementer receives more applications in a particular year than can be approved under the available budget, it can either delay the project implementation for a particular IA to the next year or request additional funds from the DA and NIA.

The AMIA project approval structure is presented in the figure below.

Figure 8. AMIA Project Approval Structure



Chapter 8: AMIA Measurement, Reporting and Verification

8.1 Overview

A credible and transparent MRV framework is essential if the impact of this AMIA on the nationally appropriate improvements (NAI), greenhouse gas emissions and SD co-benefits is to be assessed effectively. It would provide the country with an accurate and credible information framework that can serve as a basis for understanding the impact of such holistic mitigation actions and for identifying areas needing more targeted effort. On the international level, a strong MRV framework would help the country receive due recognition for its contributions to GHG emission reduction and the transformation to low-emission sustainable agriculture, while also increasing the likelihood of its accessing international financial support.

The basic MRV concepts are explained below. Annex 2 contains a copy of the MRV tool for GHG emission reductions, developed in MS Excel format, which should be consulted when reading this chapter.

8.2 MRV System for GHG Emissions

The MRV system for this AMIA is designed based on the approved Standardized Baseline ASB0008 "Standardized Baseline for Methane Emissions in Rice Cultivation in the Republic of the Philippines".[25] The SB was developed by the Philippine Designated National Authority for CDM (DNA) in cooperation with the United Nations Development Programme (UNDP) and Mitsubishi UFJ Morgan Stanley Securities (MUMSS).

The SB developed Philippines-specific seasonal default values derived from the results of Global Environment Facility (GEF) funded research on greenhouse gas emissions from rice cultivation executed by the International Rice Research Institute (IRRI) and Philippine Rice Research Institute (PhilRice) during the period 1994-1999. The default emission factors provide the value of emissions per area per season ($kgCH_4$/ha/season), allowing emission reductions to be estimated only from the area of the rice fields on which AWD has been adopted.

25 https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150226173410083/G%3A%5CSDM%5CClean%20Development%20Mechanism%20%28CDM%29%5CCDM02-Methodology%5CStandardized%20baseline%5CApproved%20Standardized%20Baselines%20-ASBs%5CASB0008%5CASB0008.pdf.

8.2.1 Baseline Emissions

Baseline emissions are calculated on a seasonal basis using the following formula:

$$BE_y = \sum_s BE_s \quad \textbf{(2)}$$

$$BE_s = \sum_{g=1}^{G} EF_{BL,s,g} * A_{s,g} * 10^{-3} * GWP_{CH4} \quad \textbf{(3)}$$

Where:

BE_y	Baseline emissions in year y (tCO_2e)
BE_s	Baseline emissions from project fields in season s (tCO_2e)
$EF_{BL,s,g}$	Baseline emission factor of group g in season s ($kgCH_4$/ha per season, use default values)
$A_{s,g}$	Area of project fields of group g in season s (ha)
GWP_{CH4}	Global warming potential of CH_4 (tCO_2e/tCH_4, use value of 25)
g	Group g, covers all project fields with the same cultivation pattern (G = total number of groups)

The baseline emission factors are calculated using the following formula adapted from IPCC (2006):

$$EF_{BLs,g} = EF_c \; x \; SF_p \; x \; SF_w \; x \; SF_o \quad \textbf{(3)}$$

Where:

$EF_{BL,s,g}$	Baseline Emission Factor
EF_c	Baseline emission factor for continuously flooded fields without organic amendments in the Philippines
SF_p	Scaling factor to account for the differences in water regime in the pre-season before the cultivation period
SF_w	Scaling factor to account for the differences in the water regime during the cultivation period
SF_o	Scaling factor to account for the organic amendments

The baseline emission factors for continuously flooded rice fields for the dry and wet seasons are determined as follows:

Table 16. GHG Baseline Emission Factors
($kgCH_4$/ha/season)

Dry Season	EF_c	Baseline			
		$SF_{BL,w}$	$SF_{BL,p}$	$SF_{BL,o}$	Emission Factor (EF_{BL})
For regions where double cropping is practised	171.40	1.00	1.00	2.88	493.63
For regions where single cropping is practised	171.40	1.00	0.68	1.70	198.14

Wet Season	EF_c	Baseline			
		$SF_{BL,w}$	$SF_{BL,p}$	$SF_{BL,o}$	Emission Factor (EF_{BL})
For regions where double cropping is practised	297.42	1.00	1.00	2.88	856.56
For regions where single cropping is practised	297.42	1.00	0.68	1.70	343.81

8.2.2 Project Emission Factors and Emission Reduction Factors

Using the same approach as the calculation of baseline emissions and determination of baseline emission factors, the project emission factors and emission reduction factors are determined as shown in the following table.

Table 17. Emission Reduction Factors ($kgCH_4$/ha/season)

Dry Season	EF_c	Baseline				Project Scenarios	Project				Emission Reduction Factor (EF_{ER})
		$SF_{BL,w}$	$SF_{BL,p}$	$SF_{BL,o}$	Emission Factor (EF_{BL})		$SF_{P,w}$	$SF_{P,p}$	$SF_{P,o}$	Emission Factor (EF_P)	
For regions where double cropping is practiced	171.40	1.00	1.00	2.88	493.63	Scenario 1: change the water regime from continuously to intermittent flooded conditions (single aeration)	0.60	1.00	2.88	296.18	197.45
						Scenario 2: change the water regime from continuously to intermittent flooded conditions (multiple aeration)	0.52	1.00	2.88	256.69	236.94
For regions where single cropping is practiced	171.40	1.00	0.68	1.70	198.14	Scenario 1: change the water regime from continuously to intermittent flooded conditions (single aeration)	0.60	0.68	1.70	118.88	79.26
						Scenario 2: change the water regime from continuously to intermittent flooded conditions (multiple aeration)	0.52	0.68	1.70	103.03	95.11

Wet Season	EF_c	Baseline				Project Scenarios	Project				Emission Reduction Factor (EF_{ER})
		$SF_{BL,w}$	$SF_{BL,p}$	$SF_{BL,o}$	Emission Factor (EF_{BL})		$SF_{P,w}$	$SF_{P,p}$	$SF_{P,o}$	Emission Factor (EF_P)	
For regions where double cropping is practiced	297.42	1.00	1.00	2.88	856.56	Scenario 1: change the water regime from continuously to intermittent flooded conditions (single aeration)	0.60	1.00	2.88	513.94	342.62
						Scenario 2: change the water regime from continuously to intermittent flooded conditions (multiple aeration)	0.52	1.00	2.88	445.41	411.15
For regions where single cropping is practiced	297.42	1.00	0.68	1.70	343.81	Scenario 1: change the water regime from continuously to intermittent flooded conditions (single aeration)	0.60	0.68	1.70	206.29	137.53
						Scenario 2: change the water regime from continuously to intermittent flooded conditions (multiple aeration)	0.52	0.68	1.70	178.78	165.03

8.3.3 GHG Monitoring Parameters

Based on the approach described above, the required monitoring parameters for the calculation of actual GHG emission reductions are reduced to only one—area where AWD is applied. A summary of the monitoring parameters is provided in the table below.

Table 18: Monitoring Parameters

Parameter	Description	Unit	Measuring methods and procedures
$EF_{BL,\,s,\,g}$	Baseline Emission Factor	$kgCH_4$/ha per season	As per Standardized Baseline emission factors.
$EF_{P,\,s,\,g}$	Project Emission Factor	$kgCH_4$/ha per season	As per Standardized Baseline emission factors.
$A_{s.\,g}$	Aggregated project area in a given season. Only compliant farms are considered.	ha	To be determined by collecting the project field sizes in a project database. The size of project fields shall be determined by GPS or satellite data. Should such technologies not be available, established field size measurement approaches shall be used provided that uncertainties are taken into account in a conservative manner.

8.2.4 Monitoring of Farmers' Compliance with AWD Practice

In order to determine whether the participating rice fields are correctly applying AWD and can participate in the emission reduction calculations, the following protocol is proposed.

- A cultivation logbook shall be used and maintained, and at least the following shall be documented:
  - Total area planted (in ha);
  - Sowing or transplanting (date);
  - Fertilizer, organic amendments, rice straw management and crop protection application (date, quantity and active ingredients);
  - Water regime on the field and in the rootzone (e.g. "dry/moist/flooded") and dates where the water regime is changed from one status to another through the use of an observation well (see Section 1.2 above);
  - Total number of irrigation events
  - Yield.
- Farmers should make a statement that they have followed fertilization recommendations provided by rice crop manager.
- It should be established that only those farms that actually comply with the project cultivation practice are considered.
- A database should be set up which holds data and information that allow the unambiguous identification of participating rice farms, including the name and address of the rice farmer, size of the field and, if applicable, additional farm-specific information.

The database and the compliance system will be set up by the AMIA implementer. The Irrigators' Associations will collect the data from their members and forward it to the AMIA implementer on a monthly basis. Government entities, such as DA and BAS, will publish the compliance data in the national statistics and provide additional support for this component of the MRV, if needed.

8.3 Monitoring of Sustainable Development Benefits

In addition to GHG emissions, the MRV system of the AMIA will cover sustainable development benefits. The monitoring parameters are summarized in the table below.

Table 19. Monitoring SD Indicators*

Serial number	1	
Indicator Name	Food security (Access to land and sustainable agriculture)	
Domain	Social	
Parameter Name	Rice Production	
Baseline Value	18,000,000	
Unit	t	
Way of Monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	NAMA Implementer
Project Value	20,382,000	
QA/QC Procedures		
	QC check done	NAMA Implementer

Serial number	2	
Indicator Name	Food security (Access to land and sustainable agriculture)	
Domain	Social	
Parameter Name	Irrigated Land Area	
Baseline Value	1,700,000	
Unit	ha	
Way of monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	NAMA Implementer
Project Value	1,925,000	
QA/QC Procedures		
	QC check done	NAMA Implementer

Serial number	3	
Indicator Name	Provides vulnerable groups access to local resources and services	
Domain	Social	
Parameter Name	Irrigated Land Area	
Baseline Value	1,700,000	
Unit	ha	
Way of Monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	NAMA Implementer
Project Value	1,925,000	
QA/QC Procedures		
	QC check done	NAMA Implementer

Serial number	4	
Indicator Name	Access to sustainable technology	
Domain	Growth and Development	
Parameter Name	Number of IAs and individual farmers to whom additional services have been provided	
Baseline Value	0	
Unit	ha	
Way of Monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	NAMA Implementer
Project Value	1,700,000	
QA/QC Procedures		
	QC check done	NAMA Implementer

Serial number	5	
Indicator Name	Capacity-building	
Domain	Growth and Development	
Parameter Name	Number of Irrigation Officers, IAs and individual farmers who have been trained	
Baseline Value	0	
Unit	ha	
Way of monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	NAMA Implementer
Project Value	150	
QA/QC procedures		
	QC check done	NAMA Implementer

Serial number	6	
Indicator Name	Education	
Domain	Growth and Development	
Parameter Name	Farmers who have received training on alternative cropping and praactice it	
Baseline Value	0	
Unit	ha	
Way of monitoring	How	NAMA Implementer
	Frequency	Annual
	By whom	NAMA Implementer
Project Value	200,000	
QA/QC procedures		
	QC check done	NAMA Implementer

Serial number	7	
Indicator Name	Income generation/expenditure reduction/Balance of payments	
Domain	Economic	
Parameter Name	ISF cost per hectare	
Baseline Value	4,250	
Unit	PHP	
Way of monitoring	How	NIA ISF approved/published values
	Frequency	3 years
	By whom	NAMA Implementer
Project Value	to be determined	
QA/QC procedures		
	QC check done	NAMA Implementer

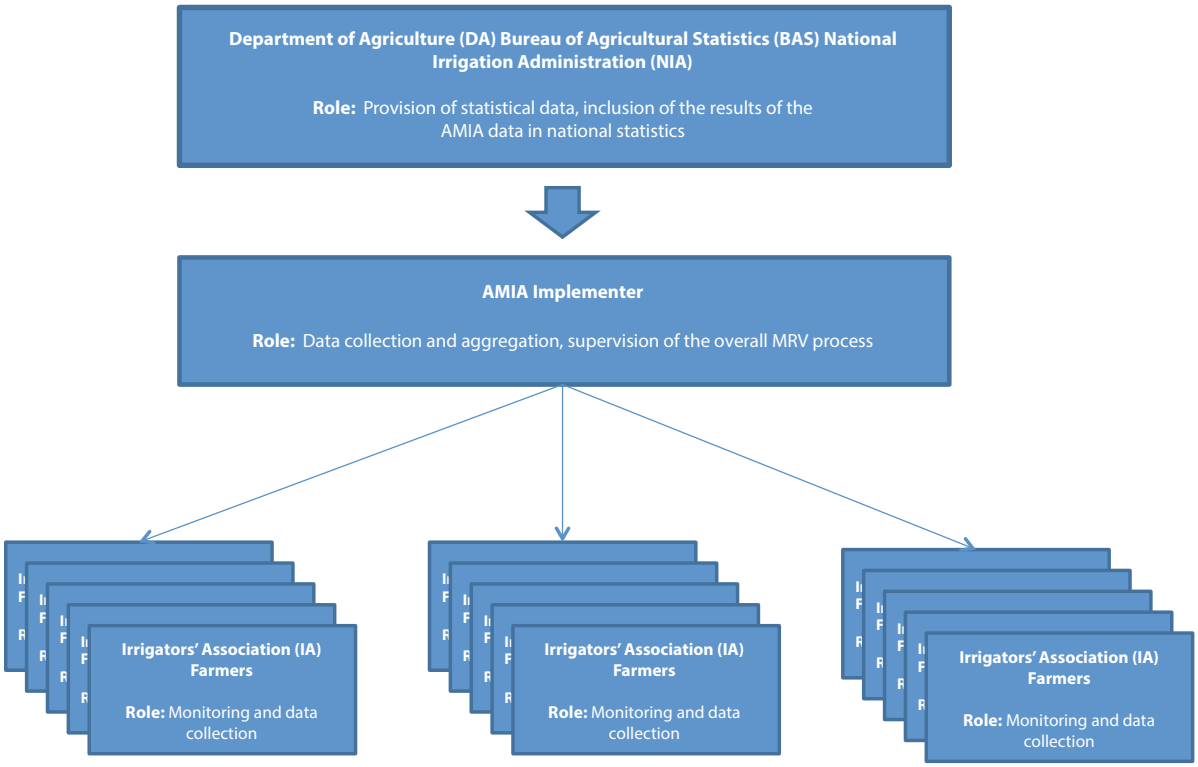
Serial number	8	
Indicator Name	Income generation/expenditure reduction/Balance of payments	
Domain	Economic	
Parameter Name	Percentage of ISF collection	
Baseline Value	70	
Unit	%	
Way of monitoring	How	NIA Statistics
	Frequency	3 years
	By whom	NIA
Project Value	100	
QA/QC procedures		
	QC check done	NAMA Implementer

*An SD Tool is provided in Annex I.

8.4 Monitoring and Reporting Structure

The proposed monitoring and reporting structure for the AMIA is presented in Figure 9 below.

Figure 9. Monitoring and Reporting Structure



Data collection starts from the individual rice farmers who adopt AWD as their water management practice. With the assistance of CSs/RSOs, a Farmer Monitoring Sheet is filled in by the farmer during each rice planting season, recording information necessary to determine the area where AWD is being applied, as well as a data sheet where information on water status in the field is recorded in order to confirm the farmer's compliance with the AMIA implementation requirements. During the end of every cropping season, the completed Farmer Monitoring Sheet will be collected by the farmer's Irrigators' Association (IA) and submitted to the CS/RSO. The CS/RSO collates the individual data collected from their member farmers and enters it on the Irrigators' Association Monitoring Sheet. This information is forwarded to the AMIA implementer for data processing, aggregation and archiving. The reporting forms for each level, i.e. individual farmers, Irrigators' Associations and the AMIA implementer (PhilRice/NIA/BSWM), has been prepared on a separate worksheet and can serve as template forms during implementation. It is also possible to consider the integration and addition of monitoring parameters to the existing database system of the government, for example, the PSA-BAS database. This has to be done in coordination between DA, PSA and NIA.

For SD parameters all other data can be accessed through the national statistical databases managed by the BAS and NIA. Therefore, the existing data collection system of the government may continue to be used as a data

source in the MRV framework for the AMIA. If the monitoring of some parameters requires additional information, new entries can be added to the existing statistical and data-collection forms.

8.5 Verification

Verification rules for NAMAs are usually based on the requirements of the NAMA funding agencies, as well as host country requirements. Same rules are expected to apply for AMIAs. Before developing domestic capacity for verification, it is recommended to use some of the existing CDM auditors[26] or ISO 14000[27] certification bodies with experience in the agricultural sector and a good understanding of local conditions in the Philippines, but NAMA or AMIA-specific verification rules should be developed in the future.

Below is a summary of the possible scope of AMIA verification, based on the NAMA verification approach adopted by Social Carbon[28]:

- Selection of Methods for Verification
- Document Review
- Interviews or Focus Group Discussions
- Site Visits
- Avoidance of Double Counting
- Adherence to the MRV approach
- Assessment of GHG emission reductions
- Assessment of SD Benefit Improvement against the SD benchmarks
- Non-Permanence Risk Analysis

26 Available from http://cdm.unfccc.int/DOE/list/index.html.
27 Available from http://www.iso.org/iso/home/standards/management-standards/iso14000.htm.
28 See http://www.socialcarbon.org.

Chapter 9: AMIA Implementation Plan

It is planned that the AMIA will be implemented over five years, during which 750,000 ha of irrigated rice fields will be converted from continuous flooding to AWD. The first steps will include the preparation of an AWD Manual and the training of 150 Extension Workers and Rice Sufficiency Officers. Once that is done, the extension workers will be dispatched to the IAs and will start to train the farmers. The details of the implementation plan are described below.

9.1 Approval of the AMIA and Establishment of the Institutional Structure for AMIA Implementation

Once approval of the AMIA is granted, the institutional set-up for AMIA implementation should commence. The first step will be the creation of the inter-agency Rice Sector AMIA Supervisory Board by September 2015. The Supervisory Board will formalize the rules for the AMIA implementation, nominate the AMIA implementer and establish a framework for inter-agency cooperation, as well as for cooperation with donors on technical and financial aspects of the AMIA. The AMIA implementation structure is expected to follow the outline described in this proposal, but will be fine-tuned based on the consultations among the members of the Supervisory Board.

9.2 Securing Donor Support and Domestic Funding

Early stage consultations with donors are essential for securing sufficient donor funding. Awareness of the development of the AMIA already exists among donors, especially after webinars and publications on the standardized baseline and the AMIA study in 2014. Therefore, formal approaches to donors should start as soon as the AMIA is approved, while informal distribution of the AMIA proposal can begin once it is finalized.

Potential donors who already actively fund NAMAs and NAPs, and respectively AMIAs, are the German and British Governments through the NAMA support facility,[29] the Global Environmental Facility (GEF)[30] through its executing agencies, the Green Climate Fund (GCF)[31] (see Box 4, below), EU Governments, and the Japanese Government through the Japan International Cooperation Agency (JICA).[32]

Regarding domestic funding, PhilRice, DA and NIA, as the agencies that will most actively participate in AMIA implementation, should start discussing the budget for the AMIA once the proposal is finalized. A secured budget for the domestically funded component of the project will provide a strong signal to potential donors of commitment to AMIA implementation. Discussions to date have shown that budget resources are available for some of the activities targeted under the AMIA, thus securing domestic funding is expected to be a question of budget reallocation rather than of securing new funds.

29 See http://www.AMIA-facility.org/start.html.
30 See http://www.thegef.org/gef/.
31 See http://news.gcfund.org/ .
32 See http://www.jica.go.jp/english/index.html.

Box 4. Cooperation with the Green Climate Fund

The GCF is a newly established international facility for funding climate change projects related to adaptation and mitigation. For channeling funds from the GCF, each country has to establish a National Designated Authority (NDA), while National Implementing Entities (NIEs) need to receive accreditation from the GCF. In the context of this AMIA, as well as to facilitate access to climate change financing generally, the Land Bank of the Philippines should be considered as a potential candidate for the role of National Implementing Entity. A summary of the national structure required by the GCF is provided below.

1. National Designated Authority

The NDA is the coordinating entity in the recipient government. The NDA serves as the central contact point for the GCF Secretariat. The NDA helps ensure that GCF projects/programmes are consistent with national plans; this consistency is ensured through a transparent no-objection procedure. In addition to granting a letter of no-objection for proposed projects/programmes, the NDA also issues letters of no-objection for entities applying to be NIEs. The decision on the government institution in which the NDA is to be located is left to the discretion of the national government.

2. National Implementing Entity

The GCF offers the possibility of direct access through NIEs in recipient countries, as well as through regional and international implementing entities (IEs). NIEs must be accredited by the GCF Board. There is no limit to the number of NIEs which may be accredited in a recipient country. NIEs receive funds from the GCF and then often transfer the funds to Executing Entities (EEs). NIEs are held accountable to the GCF Board on the basis of the GCF Results Management Framework.

The GCF Board decided that entities accredited by the GEF, the Adaptation Fund, and or the European Union (EU) Development and Cooperation (DEVCO) that meet the prerequisites may be eligible for the fast-track accreditation process.

3. Executing Entity

Executing Entities (EEs) are entities which conduct the operational implementation of activities under GCF projects/programmes. EEs are held accountable to the NIE/IE, which provides the EEs with support.

9.3 Implementation of Technical Assistance

Once the AMIA implementer is formally assigned, the actual implementation of the AMIA can begin. The first step will be the development of a AMIA training manual that will be used for training the first 150 rice field officers. The manual will be prepared as part of a four-day workshop with the participation of renowned Philippine and international experts in the field of rice cultivation and irrigation. Five hundred copies of the manual will be printed and distributed to the CSs/RSOs as trainers, to serve as their guide and reference. The manual may also be provided to participating Irrigators' Associations.

The training of the officers should start immediately after the completion of the training manual. The training can take place at the training facilities of PhilRice in Nueva Ecija or other appropriate locations. The field officers can be drawn from field officers already working for NIA/BSWM or can be new recruits hired specifically for the AMIA. The training will continue for two months and will include theoretical preparation and practical training.

Before implementation begins, PhilRice and the DA will conduct an information campaign among IAs and farmers about the AMIA and its benefits. IAs and the field officers can start preparing project proposals for AMIA implementation after that. As the AMIA is expected to start in 2016, the first batch of proposals should be collected by the end of November 2015. Based on the proposals received, the AMIA implementer will prepare a concrete annual technical assistance plan; engage, assign and dispatch field officers; and start discussions with the individual IAs.

Currently each field officer is expected to cover approximately four IAs per season for two cultivation seasons annually. This will allow 150,000 ha of rice fields to adopt AWD each year.

At the end of every year IA will collect data on the operation of the AMIA, including the area where AWD has been adopted, farmers' compliance and so on. Most of the data have already been described in the MRV section, although further data may be required, for example, by donors making payments to cover the ISF payments discount.

Towards the end of the fifth year of AMIA implementation, it is expected that 750,000 ha of rice fields will have adopted AWD as their standard irrigation practice. The donor funds will have been completely retired and the AMIA will be implemented entirely with domestic funding and support, chiefly from the annual budgets of the DA and NIA. There will be a reduction in emissions of approximately 12 million tCO_2e annually, significantly mitigating the impact of the rice sector on climate change. Additionally, there will be improvement in the efficiency of the national and communal irrigation systems, increase in the rice yield across the areas adopting AWD and an increasing number of rice farmers planting alternative crops.

Furthermore, by 2020, the Philippines will have a more resilient rice production sector capable of withstanding many of the challenges of climate change.

Figure 10. AMIA Implementation Schedule

Intervention	Specific deliverables	Requirement		Year 0	Year 1				Year 2				Year 3				Year 4				Year 5			
1. Provision of FFS Manual on Water Management	Updating of FFS Manual to highlight AWD implementation (measurement and monitoring of water level or moisture adequacy, possible effects on pests and diseases, nutrient management, mechanization, micro climates, etc.)	14 subject matter specialists and 4 support/ writeshop staff	Writeshop for 4 days; allocation for lodging, meals and honaria; cost of layouting and proofreading of the final draft; cost of printing of 500 copies of the manual	Q1-4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
				5 working days																				
2. Training of 150 Field Officers	150 persons trained for work in the field for five years	Trainers/ resource persons, training facilities	Training for two months to incorporate AWD principles with respect to the PalayCheck system	44 working days																				
3. Conduct of Fieldwork	Fieldwork conducted for one year for each IA	Each RSO/ AEW to handle four IAs per season	To cover all the IAs under the NIS, IS (under NIA) and SWISA (under BSWM) (150 field officers x 4 IAs per year x 250 ha per IA x 5 years = 750,000 ha)		Batch 1				Batch 2				Batch 3				Batch 4				Batch 5			

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Annex I: Sustainable Development Tool

Table A1-1: SD Indicators

Domain	Indicator	Relevance to SDGs and targets	Selected (Yes/No)	Identified impacts	Explanation of chosen indicator	Effect on Indicator	Monitoring done (Yes/ No)
Environment	Air pollution/quality	Goal 11, Target 11.6				Positive	Yes
	Water pollution/quality	Goal 6, Target 6.6 Goal 11, Target 11.6 Goal 12, Target 12.4	Yes	Increased water savings	AWD leads to sognificant water savings as a result of improved irrigation	Positive	No
	Soil pollution/quality	Goal 2, Target 2.4 Goal 11, Target 11.6 Goal 12, Target 12.4	Yes	Improves soil quality	AWD involves periodic aeration of the soil which results in higher zinc availability, as well as increased plant root anchorage and lodging resistance.	Positive	No
	Others (Noise/visibility)	Goal 11, Target 11.6					
	Biodiversity and Ecosystem balance	Goal 14, All targets Goal 15, All targets					
Social	Health	Goal 3, All Targets					
	Livelihood of poor, poverty alleviation, peace	Goal 1, All targets Goal 2, Target 2.1 Goal 16, Target 16.1	Yes	Provides livelihood for poor/poverty alleviation; Decrease conflicts among farmers	Water savings from the implementation of AWD results in increased total irrigated land area. As a result, more farmers and farm helpers are required, providing additional livelihood for the poor farming communities; Because of the availability of more irrigation water for downstream farmers due to AWD, irrigation conflicts between upstream-downstream farming communities are decreased.	Positive	No
	Affordability of electricity	Goal 7, Targets 7.1					
	Access to sanitation and clean drinking water	Goal 6, Tagets 6.1, 6.2, 6.4, 6.5					

Domain	Indicator	Relevance to SDGs and targets	Selected (Yes/No)	Identified impacts	Explanation of chosen indicator	Effect on Indicator	Monitoring done (Yes/No)
Social	Food security (Access to land and sustainable agriculture)	Goal 2, All Targets Goal 12, Target 12.3	Yes	Increase in rice production; Increase in irrigated land	Water savings from the implementation of AWD results in increased total irrigated land area. Proportionately, increase in total number of rice fields results in the increase in rice yield.	Positive	Yes
	Quality of employment	Goal 8, Targets 8.2, 8.3, 8.5, 8.6, 8.7, 8.8					
	Time savings/time availability due to project	Goal 1					
	No child labour	Goal 8, Target 8.6					
	Provides vulnerable groups access to local resources and services	Goal 6, Targets 6.4, 6.5, 6.6, 6.a, 6.b	Yes	Increase access to water resources	AWD is a water management practice in rice cultivation promoting the efficient use of water resources. This provides vulnerable groups access to water resources and services which were not previously available to them, resulting in increased total irrigated land area.	Positive	Yes
Growth and Development	Access to clean and sustainable energy	Goal 7, Targets 7.1, 7.2, 7.3					
	Education	Goal 4, All targets		Increased capacity for growing alternative crops	The AMIA will allow a large number of farmers to gain the necessary skills for growing alternative crops and practice alternative cropping.	Positive	Yes
	Empowerment of women	Goal 4, Targets 4.3, 4.6 Goal 5, All targets					
	Access to sustainable technology	Goal 4, Target 4.3 Goal 7, Targets 7a, 7b Goal 9, Target 9b	Yes	Access to sustainable technology	The AMIA implementer will be providing the required capacity-building for the implementation of the AWD nationwide through direct interaction with the farmers and IAs. Being the country's authority on rice research, participating farmers and IAs will have the opprotunity to access other available sustainable technologies from PhilRice, such as variety development, pest and nutrient management, devising decision support tools, water harvesting and conservation, diversified/integrated farming, area mapping, and vulnerability studies.	Positive	Yes
	Energy security	Goal 7, Target 7.1, 7.2, 7.3					
	Capacity-building	Goal 4, Target 4.3, 4.5 Goal 6, Target 6.a	Yes	Knowhow transfer	The AMIA implementer will provide proper training and knowhow transfer of AWD implementation to the irrigation officers, irrigators associations and individual farmers.	Positive	Yes
	Equality (quality of jobs given, job conditions for men/women)	Goal 4, Targets 4.1, 4.2, 4.3, 4.7 Goal 5, All targets Goal 10, Target 10.4					

Domain	Indicator	Relevance to SDGs and targets	Selected (Yes/No)	Identified impacts	Explanation of chosen indicator	Effect on Indicator	Monitoring done (Yes/ No)
Economic	Income generation/ expenditure reduction/ Balance of payments	Goal 8, Targets 8.1, 8.2, 8.3, 8.4 Goal 10, Target 10.1	Yes	Increase income for farmers; Increase collection of ISF	Increased income for the farmers as a result of the lower rice production cost (ISF); Increased income for the NIA and IAs as a result of increased collection rate of the ISF. It is expected that more farmers would be willing to pay the ISF because of better satisfaction with irrigation services.	Positive	Yes
	Asset accumulation and investments	Goal 7, Targets 7a, 7b Goal 9, All targets Goal 17					
	Job Creation (number of men and women employed)	Goal 8, All targets	Yes	New jobs created	Water savings from the implementation of AWD results in increased total irrigated land area. As a result, more farmers and farm helpers are required, providing more jobs.	Positive	No

Table A1-2: SD Targets

Domain	Indicator	Parameter Selection				Measurement value	Measurement type	Baseline Value	Target value estimated (ex-ante)	Intervention Value monitored (ex-post)	Unit	NAIs estimated (ex-ante)	NAIs monitored (ex-post)	Evaluation of Project Success
		Number of parameters selected per indicator	Parameter name	Other Parameters	Effect									
Environment	Air pollution/quality				+									
	Water pollution/quality				+									
	Soil pollution/quality				+									
	Others (noise/visibility)													
	Biodiversity and Ecosystem balance													

Domain	Indicator	Parameter Selection				Measurement value	Measurement type	Baseline Value	Target value estimated (ex-ante)	Intervention Value monitored (ex-post)	Unit	NAIs estimated (ex-ante)	NAIs monitored (ex-post)	Evaluation of Project Success
		Number of parameters selected per indicator	Parameter name	Other Parameters	Effect									
Social	Health													
	Livelihood of poor, poverty alleviation, peace													
	Affordability of electricity													
	Access to Sanitation and clean drinking water													
	Food security (Access to land and sustainable agriculture)	2	Rice Production		+	National values	Indirect	18,032,525	18,702,349	18,702,349	tons	4%		
			Harvested Land Area		+	National values	Indirect	4,690,061	4,915,061	4,915,061	ha	5%		
	Quality of employment													
	Time savings/time availability due to project													
	Provides vulnerable groups access to local resources and services	1	Harvested Land Area		+	National values	Indirect	4,690,061	4,915,061	4,915,061	ha	5%		
											Domain Average	4%		
Growth and Development	Access to clean and sustainable energy													
	Education	1	Farmers who have Received training on Alternative Cropping and Practice it		+	Area over which alternative cropping is practiced	Direct	0	750,000	750,000	Persons	100%		
	Empowerment of women													

Domain	Indicator	Parameter Selection				Measurement value	Measurement type	Baseline Value	Target value estimated (ex-ante)	Intervention Value monitored (ex-post)	Unit	NAIs estimated (ex-ante)	NAIs monitored (ex-post)	Evaluation of Project Success
		Number of parameters selected per indicator	Parameter name	Other Parameters	Effect									
Growth and Development	Access to sustainable technology, Capacity development	1	Additional Services		+	Number of IAs and individual farmers to whom additional services have been provided	Direct	0	750,000	750,000	ha	100%		
	Energy security													
	Capacity building	1	Trainings		+	Number of Irrigation Officers, IAs and individual farmers who have been trained	Direct	0	150	150	Persons	100%		
	Equality (quality of jobs given, job condition for men/women)													
											Domain Average	100%		
Economic	Income generation/ expenditure reduction/ Balance of payments	1	ISF cost			ISF cost per hectare	Direct	4,250	3,400	3,400	₱/ha/ season	20%		
			ISF collection percentage		+	Percentage of ISF collection	Direct	70	100	100	Percentage	43%		
	Asset accumulation and investments													
	Job Creation (number of men and women employed)													
											Domain Average	31%		
											TOTAL AVERAGE	45%		

MRV Intervention

Serial number	1	
Indicator Name	Food security (Access to land and sustainable agriculture)	
Domain	Social	
Parameter Name	Rice Production	
Baseline Value	9,000,000	
Unit	t	
Way of Monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	AMIA Implementer
Project Value	10,000,000	
QA/QC Procedures		
	QC check done	AMIA Implementer

Serial number	2	
Indicator Name	Food security (Access to land and sustainable agriculture)	
Domain	Social	
Parameter Name	Harvested Land Area	
Baseline Value	750,000	
Unit	ha	
Way of Monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	AMIA Implementer
Project Value	975,000	
QA/QC Procedures		
	QC check done	AMIA Implementer

Serial number	3	
Indicator Name	Provides vulnerable groups access to local resources and services	
Domain	Social	
Parameter Name	Harvested Land Area	
Baseline Value	750,000	
Unit	ha	
Way of Monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	AMIA Implementer
Project Value	975,000	
QA/QC Procedures		
	QC check done	AMIA Implementer

Serial number	4	
Indicator Name	Access to sustainable technology	
Domain	Growth and Development	
Parameter Name	Number of IAs and individual farmers that have been provided additional services to	
Baseline Value	0	
Unit	ha	
Way of Monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	AMIA Implementer
Project Value	1,700,000	
QA/QC Procedures		
	QC check done	AMIA Implementer

Serial number	5	
Indicator Name	Capacity building	
Domain	Growth and Development	
Parameter Name	Number of irrigation officers, IAs and individual farmers that has been trained	
Baseline Value	140,000	
Unit	ha	
Way of Monitoring	How	Obtained from national rice statistics values
	Frequency	3 years
	By whom	AMIA Implementer
Project Value	1,700,000	
QA/QC Procedures		
	QC check done	AMIA Implementer

Serial number	6	
Indicator Name	Education	
Domain	Growth and Development	
Parameter Name	Farmers who have received training on alternative cropping and practice it	
Baseline Value	0	
Unit	ha	
Way of monitoring	How	AMIA Implementer
	Frequency	Annual
	By whom	AMIA Implementer
Project Value	2000,000	
QA/QC prodecure		
	QC check done	AMIA Implementer

Serial number	7	
Indicator Name	Income generation/expenditure reduction/Balance of payments	
Domain	Economic	
Parameter Name	ISF cost per hectare	
Baseline Value	4,250	
Unit	PHP	
Way of Monitoring	How	NIA ISF approved/published values
	Frequency	3 years
	By whom	AMIA Implementer
Project Value	to be determined	
QA/QC Procedures		
	QC check done	AMIA Implementer

Serial number	8	
Indicator Name	Income generation/expenditure reduction/Balance of payments	
Domain	Economic	
Parameter Name	Percentage of ISF collection	
Baseline Value	70	
Unit	%	
Way of monitoring	How	NIA Statistics
	Frequency	3 years
	By whom	NIA
Project Value	100	
QA/QC procedures		
	QC check done	AMIA Implementer

Calculations & Monitoring

	Parameter	Unit	Baseline		Project					
			Value applied	Baseline value	Value applied	Year 1	Value applied	Year 2	Value applied	Year 3
1	Rice Production	tons		18,000,000						
2	Harvest Land Area	ha		1,700,000						
3	Additional Services	ha		0						
4	Trainings	Persons		0						
5	ISF cost	PHP/ hectare/ season		2,000						
6	ISF collection percentage	Percentage		70						
7	Area over which alternative cropping is practiced	ha		0						

Annex II: Emission Reduction Calculation and MRV Tool

Formulas

Baseline Emissions

$$BE_y = \sum_s BE_s$$

$$BE_s = \sum_{g=1}^{G} EF_{BL,s,g} * A_{s,g} * 10^{-3} * GWP_{CH4}$$

Where:

BE_y	Baseline emissions in year y (tCO_2e)
BE_s	Baseline emissions from project fields in season s (tCO_2e)
$EF_{BL,s,g}$	Baseline emission factor of group g in season s ($kgCH_4$/ha per season, use default values)
$A_{s,g}$	Area of project fields of group g in season s (ha)
GWP_{CH4}	Global warming potential of CH_4 (tCO_2e/tCH_4, use value of 25)
g	Group g, covers all project fields with the same cultivation pattern (G = total number of groups)

$$EF_{BLs,g} = EF_c \; x \; SF_p \; x \; SF_w \; x \; SF_o$$

Where:

$EF_{BL,s,g}$	Baseline Emission Factor
EF_c	Baseline emission factor for continuously flooded fields without organic amendments in the Philippines
SF_p	Scaling factor to account for the differences in water regime in the pre-season before the cultivation period

SF_w	Scaling factor to account for the differences in the water regime during the cultivation period
SF_o	Scaling factor to account for the organic amendments

Project Emissions

$$PE_y = \sum_s PE_s$$

$$PE_s = \sum_{g=1}^{G} EF_{P,s,g} * A_{s,g} * 10^{-3} * GWP_{CH4}$$

Where:

PE_y	Project emissions in year y (tCO_2e)
PE_s	Project emissions from project fields in season s (tCO_2e)
$EF_{BL,s,g}$	Project emission factor of group g in season s ($kgCH_4$/ha per season, use default values)
$A_{s,g}$	Area of project fields of group g in season s (ha)
GWP_{CH4}	Global warming potential of CH_4 (tCO_2e/tCH_4, use value of 25)
g	Group g, covers all project fields with the same cultivation pattern (G = total number of groups)

Standardized Baseline - Methane Emissions from Rice Cultivation in the Republic of the Philippines

Table A2-1. Specific Emission Factors for Baseline, Project and Emission Reductions ($kgCH_4$/ha/season) for Dry Season

Dry Season	EF_c	Baseline				Project Scenarios	Project				Emission Reduction Factor (EF_{ER})
		$SF_{BL,w}$	$SF_{BL,p}$	$SF_{BL,o}$	Emission Factor (EF_{BL})		$SF_{P,w}$	$SF_{P,p}$	$SF_{P,o}$	Emission Factor (EF_P)	
For regions where double cropping is practiced	171.40	1.00	1.00	2.88	493.63	Scenario 1: change the water regime from continuously to intermittent flooded conditions (single aeration)	0.60	1.00	2.88	296.18	197.45
						Scenario 2: change the water regime from continuously to intermittent flooded conditions (multiple aeration)	0.52	1.00	2.88	256.69	236.94
For regions where single cropping is practiced	171.40	1.00	0.68	1.70	198.14	Scenario 1: change the water regime from continuously to intermittent flooded conditions (single aeration)	0.60	0.68	1.70	118.88	79.26
						Scenario 2: change the water regime from continuously to intermittent flooded conditions (multiple aeration)	0.52	0.68	1.70	103.03	95.11

Table A2-2. Specific Emission Factors for Baseline, Project and Emission Reductions ($kgCH_4$/ha/season) for Wet Season

Wet Season	EF_c	Baseline				Project Scenarios	Project				Emission Reduction Factor (EF_{ER})
		$SF_{BL,w}$	$SF_{BL,p}$	$SF_{BL,o}$	Emission Factor (EF_{BL})		$SF_{P,w}$	$SF_{P,p}$	$SF_{P,o}$	Emission Factor (EF_P)	
For regions where double cropping is practiced	297.42	1.00	1.00	2.88	856.56	Scenario 1: change the water regime from continuously to intermittent flooded conditions (single aeration)	0.60	1.00	2.88	513.94	342.62
						Scenario 2: change the water regime from continuously to intermittent flooded conditions (multiple aeration)	0.52	1.00	2.88	445.41	411.15
For regions where single cropping is practiced	297.42	1.00	0.68	1.70	343.81	Scenario 1: change the water regime from continuously to intermittent flooded conditions (single aeration)	0.60	0.68	1.70	206.29	137.53
						Scenario 2: change the water regime from continuously to intermittent flooded conditions (multiple aeration)	0.52	0.68	1.70	178.78	165.03

Table A2-3. Emission Reduction Estimates based on 2013 Data

2013 Data		
1,526,057	ha	Total irrigated area harvested during DRY season (double-crop)
140,000	ha	Total irrigated area practicing AWD
1,386,057	ha	Total irrigated area harvested in DRY season without AWD (double-crop)
1,710,280	ha	Total irrigated area harvested during WET season
1,570,280	ha	Total irrigated area harvested in WET season without AWD
1,386,057	ha	double-crop, wet season, without AWD
184,223	ha	single-crop, wet season, without AWD
Emission Reduction		
8,210,309	tCO_2e	Dry season
14,246,933	tCO_2e	Wet season, double-crop
760,058	tCO_2e	Wet season, single-crop
23,217,300	tCO_2e	Total emission reduction for the year 2013
Baseline Emission		
18,003,398	tCO_2e	Dry season
31,239,960	tCO_2e	Wet season, double-crop
1,583,443	tCO_2e	Wet season, single-crop
50,826,800	tCO_2e	Total baseline emission for the year 2013
Project Emission		
9,793,089	tCO_2e	Dry season
16,993,026	tCO_2e	Wet season, double-crop
823,385	tCO_2e	Wet season, single-crop
27,609,500	tCO_2e	Total project emission for the year 2013

Table A2-4. GHG Monitoring Summary Sheet

No.	Parameter / Description	Unit	Baseline	Year 1	Year 2	Year 3	Year 4	Year 5
1	Total irrigated area harvested during DRY season	ha	1,526,057	1,526,057	1,526,057	1,526,057	1,526,057	1,526,057
2	Total irrigated area practicing AWD during DRY season	ha	140,000	290,000	440,000	590,000	740,000	890,000
3	Total irrigated area harvested during WET season	ha	1,710,280	1,710,280	1,710,280	1,710,280	1,710,280	1,710,280
4	Total irrigated area practicing AWD during WET season	ha	140,000	290,000	440,000	590,000	740,000	890,000
	Emissions during DRY season	tCO_2e	18,003,398	17,114,873	16,226,348	15,337,823	14,449,298	13,560,773
	Emissions during WET season	tCO_2e	32,823,402	31,281,590	29,739,777	28,197,965	26,656,152	25,114,340
	Total emissions for the year	tCO_2e	50,826,800	48,396,463	45,966,125	43,535,788	41,105,450	38,675,113
	Baseline Emission	tCO_2e		50,826,800	50,826,800	50,826,800	50,826,800	50,826,800
	Project Emission	tCO_2e		48,396,463	45,966,125	43,535,788	41,105,450	38,675,113
	Emission Reduction	tCO_2e		2,430,337	4,860,675	7,291,012	9,721,350	12,151,688

Farmer Monitoring Sheet / Lagdaan ng Magsasaka

Name / Pangalan : _____

Address / Tirahan : _____

Size of ricefield / Sukat ng palayan : _____(hectares / ektarya)

Irrigation type / Uri ng patubig : ____ pump/de-bomba ____ gravity/agos

Sowing date / Petsa ng pagtanim : _____

Yield / Ani : _____(kilograms / kilos)

Irrigation information / Impormasiyon tungkol sa patubig :

Date / Petsa	Remarks (wet, dry, water added, etc.)

Fertilizer, organic amendments, and crop protection / Pataba (natural at kimikal), at pesticides :

Date / Petsa	Description / Paglalarawan	Amount / Dami

Statement / Pahayag :

This is to certify that all provided information in this form are true and correct, and that fertilization recommendations provided have been followed.

Ito ay patunay na lahat ng impormasiyong inihayag dito ay totoo at tama, at ang mga tagubilin sa paggamit ng fertilizer ay sinunod.

_____

Signature over printed name / Pangalan at lagda

_____

Date / Petsa

Irrigators' Association Monitoring Sheet

Year: _____

Cropping season: _____

Irrigators' Association: _____

City/Town: _____

Province: _____

No.	Name	Farm size (hectares)	Yield (kg)	Compliance (Yes/No)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
TOTAL		**0**	**0**	**0**

Compiled by:

Signature over printed name / Date

Approved by:

Signature over printed name / Date

AMIA Implementer Monitoring Sheet

Year: _____

Cropping season: _____

No.	Irrigators' Association	Land area adopting AWD (hectares)	Yield (kg)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
TOTAL		**0**	**0**

Compiled by:

Signature over printed name / Date

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