



AGRICULTURE AND CLIMATE CHANGE



AGRICULTURE: POTENTIAL AND CHALLENGES

The role of agriculture in food production and income generation is fundamental. Agricultural productivity growth contributes to increased incomes, especially in countries where the sector accounts for a large share of the economy and employment, and to the eradication of malnutrition (FAO, 2014).

The Philippines is still primarily an agricultural country and is considered as an agricultural economy. With an area of 9.671 million hectares agricultural land (2014), used mainly as shown in figure 1, agriculture remains to be one of the major sources of employment in the country.ⁱ

Agricultural systems in the Philippines are classified into lowland irrigated farming, rain fed farming and upland farming systems. Irrigated farm areas mainly grow rice and sugarcane whereas rain fed areas are planted with coconut, corn and cassava. In lowland irrigated and rain fed farming systems, households generally raise chickens, ducks and or geese, or a few

pigs. Cow and/or carabao (water buffalo) are among the other animals in the households kept.ⁱⁱ

The Philippines Department of Agriculture (DA) has determined 20 major crops in the Philippines, as defined by the Department of Agriculture (DA) are: rice, corn, sweet potato, coffee, lilegumes, cacao, cassava, sugarcane, yam, taro, coconut, banana, papaya, abaca, rubber, palm oil, onion/garlic and vegetables as the country's main crops.

The most common livestock raised in the Philippines, on the other hand, include broiler chickens, carabao, cattle, ducks, goats, and swine. Livestock production contributed 12.7% to total agricultural output.ⁱⁱⁱ About 90% of cattle are raised on smallholder farms while buffalo is predominantly a backyard activity with 99.8% of the total population in the hands of smallholders, mainly the rice farmers (Moog, 2005).

LOCATION	Southeastern Asia, archipelago between the Philippine Sea and the West Philippine Sea, east of Vietnam
AREA	Total: 300,000 square kilometers Land: 298,170 square kilometers Water: 1,830 square kilometers
AGRICULTURAL LAND AREA	9.761 MILLION HA (2002 CAF)
ARABLE LAND	4.936 MILLION HA
PERMANENT CROPLAND	4.225 MILLION HA
PERMANENT MEADOWS	0.129 MILLION HA
FOREST LAND	0.074 MILLION HA
OTHER LANDS	0.307 MILLION HA

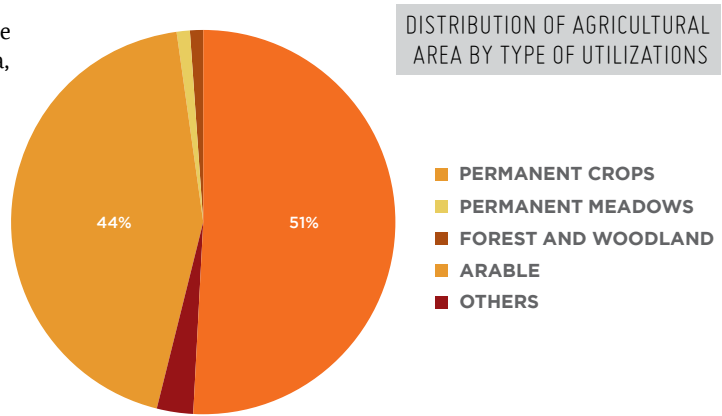


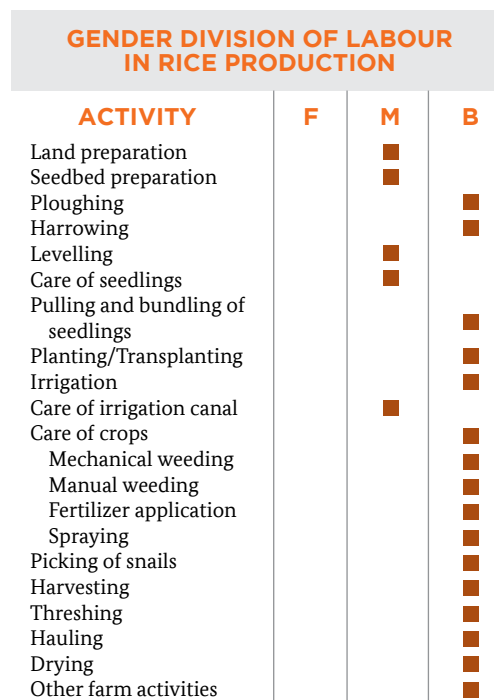
TABLE 1. AND 2. VOLUME OF PRODUCTION OF IMPORTANT CROPS AND LIVESTOCK AND POULTRY, 2008–2012

ITEM	2008	2009	2010	2011	2012
TOTAL	85,097.7	81,599.7	75,583.2	87,294.5	88,001.9
Palay	16,815.5	16,266.4	15,772.3	16,684.1	18,032.4
Corn	6,928.2	7,034.0	6,376.8	6,971.2	7,406.8
Coconut	15,319.5	15,667.6	15,510.3	15,244.6	15,862.4
Sugarcane	26,601.4	22,932.8	17,929.3	28,376.5	26,395.9
Banana	8,687.6	9,013.2	9,101.3	9,165.0	9,226.0
Pineapple	2,209.3	2,198.5	2,169.2	2,246.8	2,397.5
Coffee	97.4	96.4	94.5	88.5	88.9

ITEM	2008	2009	2010	2011	2012
LIVESTOCK	2,327.1	2,355.0	2,392.2	2,438.8	2,464.4
Carabao	140.4	140.9	148.0	147.5	142.7
Cattle	239.2	245.1	251.7	256.3	254.0
Hog	1,855.7	1,877.3	1,898.2	1,940.4	1,973.6
Goat	78.0	77.4	78.5	78.2	75.7
Dairy	13.8	14.3	15.9	16.5	18.4
POULTRY	1,320.6	1,336.8	1,386.1	1,447.4	1,513.3
Chicken	1,281.3	1,300.9	1,353.1	1,414.3	1,479.4
Duck	39.2	35.9	33.0	33.2	33.8
EGG	393.2	408.1	424.0	441.1	460.8
Chicken	350.8	368.5	387.3	403.4	421.1
Duck	42.5	39.6	36.7	37.7	39.7

SOURCE: BAS, 2013. SELECTED STATISTICS ON AGRICULTURE.

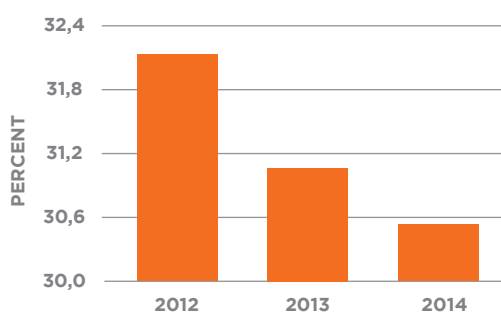
As in other countries also in the Philippines a gendered division of labor is prevalent, depending on the different crops. Challenges in the agricultural sector are inter alia the tenure system, high production costs, access to suitable technologies and know how, access to finance decreasing agricultural lands due to land conversion (e.g. housing) and limited government support ^{1, iv}



AGRICULTURE'S ROLE IN FOOD PRODUCTION AND EMPLOYMENT

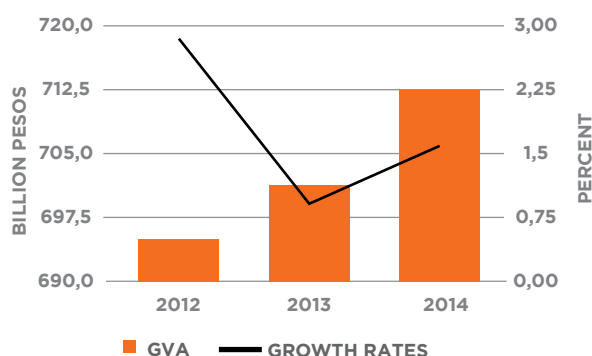
Agriculture plays a significant role in the Philippine's food security and economy. Involving about 11.80 million people of the total workforce of 38.65 million, it represents 31% of the country's total employment. However, in 2014 the sector contributed an average of 10% to the overall Gross Domestic Product (GDP). Agriculture contributes 11% to the total exports. Between the year 2000 and now, the contribution to GDP dropped by 4%, however the Gross Value Added (GVA) in of the sector went up by 1.60%. Among the subsectors that posted high production growth rate, crops accounted for 50 per cent, while livestock production contributed 12.7 per cent to total agricultural output. In the same year, agricultural exports accounted for 10.27 per cent^v of total Philippine merchandise exports. The Philippines has maintained a deficit in agricultural trade with major trading partners like USA, China, Netherlands and ASEAN member states; a trade surplus with Japan, on the other hand, was sustained. Main agricultural commodities exports include coconut oil, bananas, tuna, and pineapple and products.

SHARE IN AGRICULTURE IN TOTAL EMPLOYMENT



SOURCE: PHILIPPINE STATISTIC AUTHORITY, 2014

GVA IN AGRICULTURE (EXCLUDING FORESTRY)

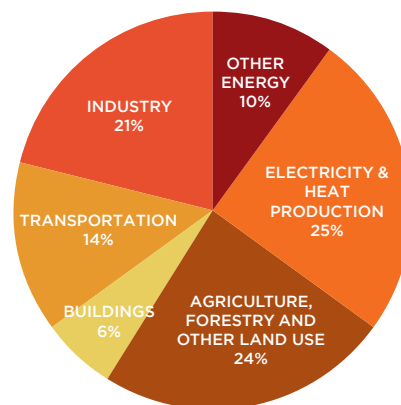


¹Philippines is dependent on food imports, lower yields competitiveness in many sectors and crops e.g. compared to Vietnam

AGRICULTURE – A MAJOR CONTRIBUTOR TO GREENHOUSE GAS EMISSIONS (GHGS) BUT ALSO MOST AFFECTED BY CLIMATE CHANGE

Agriculture is an important sector when it comes to contributions but also exposure to climate change. Thus, the sector contributes 24% of the global GHG emissions in 2010^{vi}. On the other hand it is the agricultural sector which is particularly sensitive to climatic changes, given its inherent link to natural resources (IPCC 5th Assessment Report).

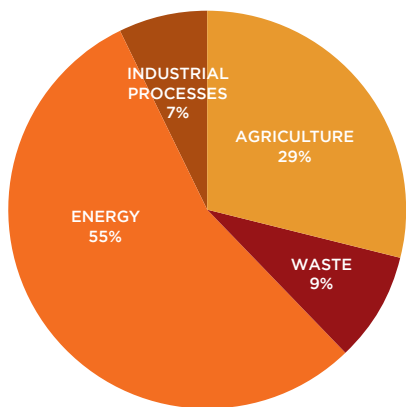
GLOBAL GREENHOUSE GAS EMISSIONS BY ECONOMIC SECTOR



SOURCE: IPCC, 2014


Based on the Second National Communication of the Philippines, using data from the year 2000, the agricultural sector contributes 29% to the total GHG emissions, constituting the second largest source after the energy sector, not including land use change and forestry (LUCF). (Philippines Second National Communication, 2000). Especially rice cultivation contributes to greenhouse gas emissions, through methane, being a greenhouse gas approximately 21 times more aggressive than CO₂.^{vii}


OVERALL CONTRIBUTION TO 2000 GHG EMISSIONS BY NON-LUCF SECTORS




SOURCE: PHILIPPINES SECOND NATIONAL COMMUNICATION, 2000

But the agricultural sector in the Philippines is also most threatened by various climate change impacts, like:

- 

Frequency of extreme weather events e.g. (flooding, storm surges, heat waves and droughts)
- 

Increased precipitation
- 

Seasonal temperature increase and heat waves

This in turn has tremendous implications on the agricultural production, such as reduction in crop yield, deriving from an increased temperature, unreliable rainfall patterns or extreme weather events; Incidence/outbreaks of pests and diseases because of changed temperature and rainfall patterns; Grain and other agricultural produce suffer shortfalls where rain patterns change or when extreme events such as floods or droughts happen more often; Climate related extremes such as heat waves can negatively affect livestock production; Insufficient food supply, which could further lead to a higher poverty level and possibly, heightened social unrest and conflict in certain areas or to migration and shifts in population, resulting to more pressure in already depressed urban areas (PAGASA, 2011). A four degrees Celsius temperature increase in the country may cause a decline in rice yield by 75% at the end of the century (PhilRice, 2011). And as water problems become more severe, the impacts on agriculture generally will draw even more attention.

The rural and poor population is especially vulnerable to climate change since their livelihoods are often highly dependent on natural resources that are sensitive to climate variability.

Although most impacts of climate change are adverse affecting the sector there are instances when impacts are favorable and could lead to increased yield for a given crop/cultivar (PAGASA, 2011). However, unforeseeable whether conditions are the other side of the coin.



SOURCE: PHILIPPINE ADAPTATION AND MITIGATION INITIATIVE FOR AGRICULTURE (AMIA)

CLIMATE CHANGE MITIGATION AND ADAPTATION MEASURES

There are various ongoing efforts in the Philippines to address climate change and its potential threats to agriculture. Agriculture, Forestry, and Other Land Use (AFOLU) activities, e.g. management of croplands can be sources of greenhouse gas (GHG) emissions but at the same time sinks. Therefore successful mitigation policies need to consider how to address the multi-functionality of the sector.^{viii}

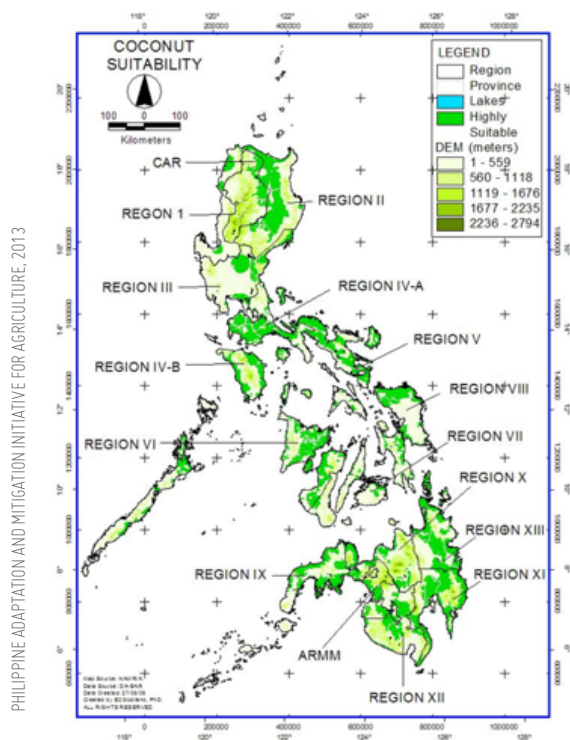


Source: International Rice Research Institute (IRRI)

Main mitigation options suggested by the IPCC 5th Assessment involve: the prevention/reduction of emissions to the atmosphere from croplands and livestock; Conservation of forests and peatlands; enhancing the uptake of carbon in land e.g. by reforestation; The substitution of biological products for fossil fuels and reduce emissions intensity by improving the efficiency of agricultural production. In addition optimization of cultivating techniques such as “Alternate Wetting and Drying” (AWD), can lower GHG emissions from rice production by 30 to 70 %, at the same saving up to 30% of the water used.^{ix}

Adaptation strategies which are recommended are the diversification of crops, farmer field schools which incorporate the use of weather/climate information in agricultural operations, including policy environment for subsidies and climate-friendly agricultural technologies, weather-based insurance, and others (PAGASA, 2011). Farmers have to respond to the impacts of climate change by introducing climate stress resilient seeds/varieties (e.g. drought, flood, or salt tolerant varieties), review and adjust their cropping calendars and diversify their crops and farm systems and follow risk mitigation (e.g. crop insurance) and adaptation strategies (Philippine Adaptation and Mitigation Initiative for Agriculture, 2013). Furthermore the optimized and reduced use of fertilizers, the promotion of legumes in crop rotations; increasing biodiversity, the availability of quality seeds; improving the control of wildfires; and promoting efficient energy use by commercial agriculture and agro-industries (IPCC 5th Assessment Report).

MAJOR NATIONAL POLICY RESPONSES



PHILIPPINE ADAPTATION AND MITIGATION INITIATIVE FOR AGRICULTURE, 2013

COLOR CODED AGRICULTURAL GUIDE MAP

To determine which crop is best suitable specific area based on geographic, climatic and soil type conditions

CLIMATE CHANGE ACT OF 2009
An Act Mainstreaming Climate Change into Government Policy Formulations

DISASTER RISK REDUCTION AND MANAGEMENT ACT OF 2010
An Act Strengthening the Philippine disaster risk reduction and Institutionalizing the DRRM

AGRICULTURE AND FISHERIES MODERNIZATION ACT OF 1997
An Act Prescribing Urgent Related Measures to Modernize the Agriculture and Fisheries Sectors of the Country

ADAPTATION AND MITIGATION INITIATIVE IN AGRICULTURE OF 2012.
To adjust development programs/projects and approaches to address climate change risks and to mainstreaming Climate Change in the DA Programs, Plans and Budget (Philippine Adaptation and Mitigation Initiative for Agriculture, 2013).

REMAINING CHALLENGES



While the Philippines economy grew by 7% in the second quarter of 2016, the performance of the agriculture sector remains dismal at -2.1 % due to the severe effects of El Nino and La Nina. This highlights the urgency of crafting holistic agriculture development policies that include climate change adaptation and disaster resiliency aspects. For La Nina, the Department of Agriculture is already crafting an action plan that identifies the most vulnerable municipalities, focusing on appropriate interventions, preparedness, response, immediate recovery and rehabilitation.^x

But there are still challenges which have to be addressed:

- Meeting the rising demand in food production while the agricultural production in the Philippines is currently declining (Philippine Adaptation and Mitigation Initiative for Agriculture, 2013).
- Decreased yields and inadequate job opportunities in the agricultural sector could lead to migration, resulting to more pressure in already depressed urban areas, particularly in mega cities
- Food security will largely be affected, especially if timely, effective and efficient interventions are not put in place
- Insufficient food supply could further lead to more malnutrition, higher poverty levels, and possibly, heightened social unrest and conflict in certain areas in the country, and even among the indigenous tribes (PAGASA, 2011: 48).
- Conflicting land use policies that overlap within a certain geographic area
- Conversion of agricultural lands to settlement, housing and industrial purposes
- Absence of security of tenure. Control over land for a sufficient period of time is necessary to recover large investments in ranching (Moog, 2005).
- Making the sector more resistant to climatic extremes, e.g. through research in stress tolerant varieties of agricultural crops.
- New business models for smallholder agriculture and rural development
- Coherent policies at all levels that stimulate behavior change to more climate-smart practices,
- Support sustainable intensification of agriculture and food systems to decrease GHG emissions per unit of food produced (Sustainable Development Solutions Network, 2013).



GOVERNMENT INITIATIVES

The agricultural sector shows a high vulnerability to climate change and therefore threatens food security as it affects the productivity of most agricultural systems. The government plays an active role in achieving food security as outlined in the 2011-2016 Philippine Development Plan (PDP), the country's economic blueprint.

The Department of Agriculture, as the main responsible agency for the promotion of agricultural development, ensures that policies and measures to address climate change are integrated in development planning and sectoral decision-making as mandated by the Climate Change Act

of 2009, through a Climate Change Systems-wide Program.

The objectives are:

- ✓ To increase the adaptive capacity and productivity potentials of agriculture;
- ✓ Redefine the agriculture development planning framework based on climate change vulnerabilities and risk assessments (NCCAP, 2011-2028).
- ✓ Enhanced Farmers Field Schools in order to adopt the practices and technologies most suitable to the various farming systems;
- ✓ E.g. promoting Agroforestry

MOVING FORWARD

Responding to climate change as foundations for achieving sustainable rural development and growth it is necessary to adjust the agricultural sector. Policies and strategies have to be reviewed to fulfill the challenging requirements the sector is facing in the light of its vulnerability and uncertainty due to climate change. Thereby it is important to collaborate across sectors, ministries and institutions applying an integrated approach as agriculture includes more interrelated factors

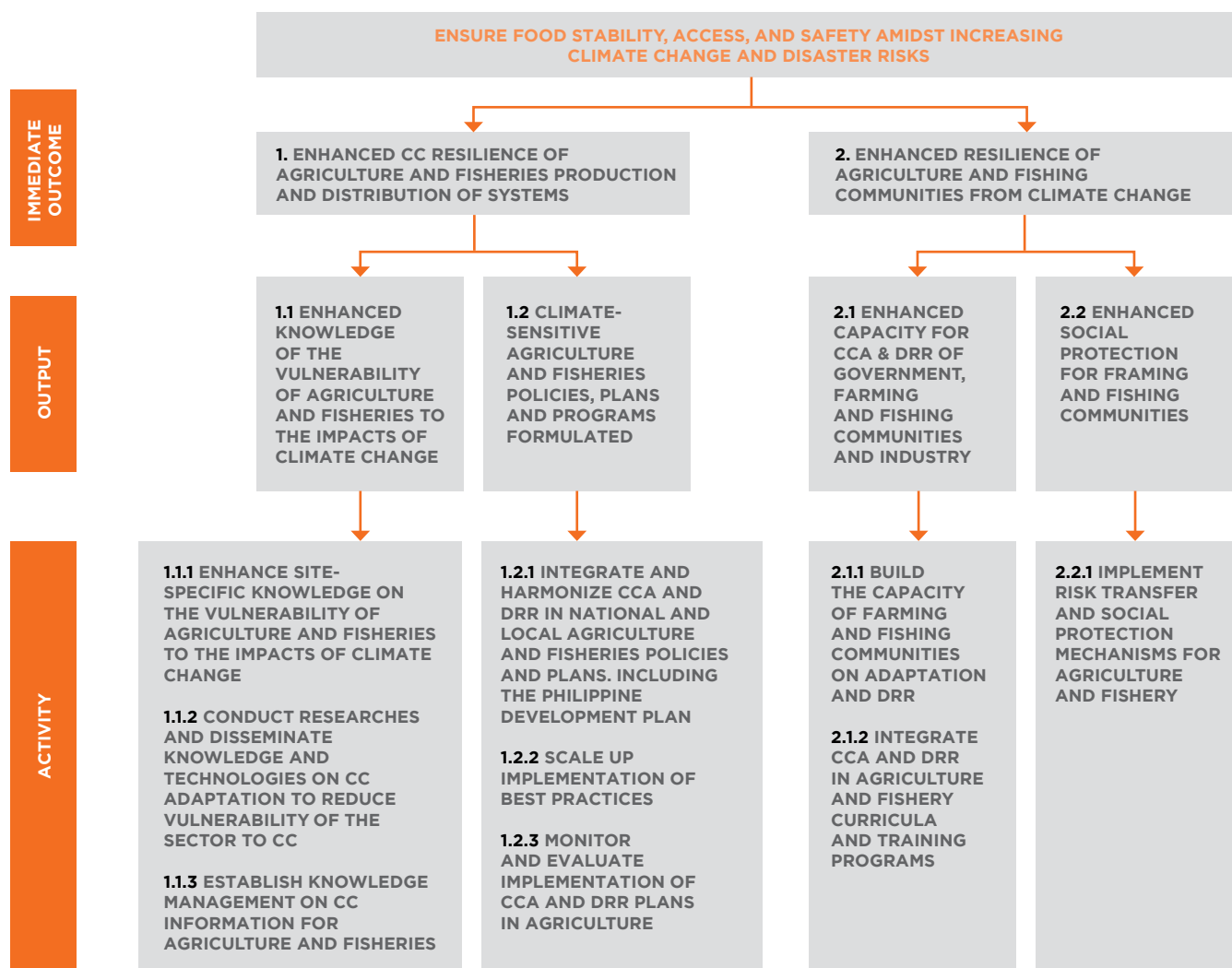
to be combined. A good way forward is taking into account climate-smart agriculture and ecosystem based adaptation approaches. Additionally, still more research on the impacts of climate change on agriculture in general but also on specific crops is needed to develop specified and tailor-made adaptation measures. Policy interactions should be synergistic (e. g., research and development investments).

Financing and risk transfer instruments on climate change are further needed to provide emergency support to farmers in affected production areas. The Department of Agriculture (DA) develops innovative financing schemes to help farmers access crop insurances. These initiatives have to be complemented by the private sector such as by insurance companies, to develop smallholder farmer friendly, accessible and affordable insurance products.

Awareness raising measurements on sustainable agricultural practices for farmers to enhance knowledge on the vulnerability on the sector is also crucial. Creating platforms for knowledge sharing and disseminate adaptive tools, technologies, and practices, which farmers can use through the extension services of the country is another objective of the DA. Furthermore, a close alignment on mitigation strategies of the DA and DENR should be assured.

All these efforts contribute in achieving the objective of the National Climate Change Action Plan (NCCAP) 2011-2028 strategic priority on Food Security which is “to ensure availability, stability, accessibility, and affordability of safe and healthy food amidst climate change.”^{xi}

The strategic actions on Food security of the NCCAP can be seen below.



SOURCE: NCCAP 2011-2028

END NOTES

ⁱ<http://countrystat.psa.gov.ph/?cont=3>

ⁱⁱ<http://ftp.fao.org/docrep/fao/008/ae946e/ae946e00.pdf>; <http://countrystat.psa.gov.ph/?cont=3>

ⁱⁱⁱ<http://ftp.fao.org/docrep/fao/008/ae946e/ae946e00.pdf>

^{iv}<http://ftp.fao.org/docrep/fao/008/ae946e/ae946e00.pdf>

^vPSA data, AHTN 2012 categorized processed by M.E. Pia Astilla

^{vi}<https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>

^{vii}<https://www.welt.de/wissenschaft/article1158493/Methan-aus-Reisanbau-ist-ein-Klimakiller.html>

^{viii}http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf

^{ix}http://agris.fao.org/agris-search/search.do;jsessionid=A9EFF9E723415358B92575C763F61E4C?request_locale=ru&recordID=PH2014000878&query=&sourceQuery=&sortField=&sortOrder=&agrovocString=&advQuery=¢erString=&enableField=

^x<http://philippinebritish.com/>

^{xi}http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter11.pdf

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IMPRINT

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