

Adaptation to Climate Change: Implications to Farming, and Community Health in Marilog District Davao City

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Abstract:

This paper reviewed the process of developing the Climate Resilient Agriculture Adaptation and Mitigation Initiative in Agriculture (CRA AMIA) as a strategic program approaches in responding to climate changes with a vision of a Philippine agriculture and fisheries sector that enabled local communities to cope with climate risks while pursuing sustainable resilient livelihoods. The paper aimed to understand the different project interventions such as technologies and practices, institutional and social innovations and accessing climate-relevant support services (e.g. community’s health, policies, etc.) and drew some lessons learned by the farmer stakeholders and determined challenges brought by this irrevocable event in the project site.

Researchers found out that communities’ coordination, linkages institutional mechanisms, climate farmers field schools(CRFS), access to health services, information to climate services and policies are significant factors in making farming communities adapted to climate changes and minimize their risks to climate hazards.

Finally, stronger linkages and policy reforms and communities coordination are needed between the farming organizations and government agencies facilitating and supporting CRAs and suppliers of climate information, particularly addressing the translation of climate change information and services to the community level.

Keywords — Adaptation, Climate Change, Implications, Farming, Community Health, Marilog District, Davao City

I. INTRODUCTION

Climate change poses a major threat on sustaining the productivity of the agriculture and

fisheries sector in the Philippines. Climate data for the past 50 years showed trends in increasing temperatures, changes in rainfall and increasing

number of extreme events like typhoons, flooding and drought. Degradation of natural resources will be further aggravated by the changing climate.

The country's food basket, Davao Region was known to be blessed with good and favorable climate. But with the on-set of climate change, it is no longer spared from the effect of El Niño phenomenon and devastating typhoons such as Pablo, which badly hit the provinces of Compostela Valley and Davao Oriental in 2012.

Using climate suitability model Max Ent Software with baseline using climate risk vulnerability and future condition (yr 2030 and yr 2050), Aceres, et al.,(2017) found out that province of Davao del Sur and Davao City had the very high vulnerability in terms of sensitivity, hazard, and adaptive capacity. The impacts of climate change are felt by urban dwellers, farmers and fisher folks. The poor on the other hand, are the most vulnerable groups with natural resources and majority of the population are heavily affected by the consequence of this phenomenon.

With these impacts of climate changes in the agricultural farming and community's health, the Department of Agriculture has crafted a strategic action plan in adaptation and mitigation in the localities.

A. Context

Climate change is a pervasive concern of everyone, considered to be greatest environmental trend threatening humanity. Studies showed report that climate change is already culpable for destroying approximately 315, 000 people's live every year. The science had already anticipated the ripple effects of this phenomenon. There will be more flooding, more droughts, more diseases, more famine and massive competition among limited resources that will eventually lead to creating hundreds of millions of refugees and massive destruction of the whole ecosystems and loss of species therein.

Philippines, being a developing country, is so much expose to the hazards of climate change.¹ The country was listed as number one most affected country by the climate (Global Climate Risk Index 2015).Climate change is caused by a natural and antropogenic factors, however, these antropogenic factors, commonly referred to "Human activities" are largely to blame in raising temperatures which causes climate change, more specifically with reference to the agricultural activities that paved way to more formidable effects of climate change.

In 2015, Department of Agriculture reported that the country's agriculture fisheries sector has been a perennial casualty of climate-related risks. It recorded from the period of 2010 - 2014, loss and damages from climate/weather-induced disasters have reached a total of Php136 billion or an average of Php27 billion annually affecting the agricultural sector.

The Davao Region as being the country's food basket was not known much to have been affected by typhoons, but due the climate change, this is already enlisted.²Major typhoons such as Pablo in 2012 had leave huge damages to properties and wreck havoc to people in the provinces. On the contrary, the region was not also spared from the long dry season caused by "el niño" phenomenon significantly destroying habitat and food crops.

Using Climate suitability model Max Ent Software with baseline using climate risk vulnerability and future condition (yr 2030 and yr 2050) for the climate risk vulnerability assessment

¹Climate Change in the Philippines (2017, April). The Philippines: a climate hotspot. Retrieved on November 25, 2018 from <http://www.greenpeace.org/seasia/ph/Global/seasia/report/2007/4/the-philippines-a-climate-hot.pdf>

¹Climate Change in Region XI (2018). Retrieved on November 25, 2018 from http://www.ph.undp.org/content/philippines/en/home/operations/projects/environment_and_energy/TwinPhoenix.html

²Climate Change in Region XI (2018). Retrieved on November 25, 2018 from http://www.ph.undp.org/content/philippines/en/home/operations/projects/environment_and_energy/TwinPhoenix.html

(CRVA) Aceres, et al, 2017 found out that province of Davao del Sur and Davao City had the very high vulnerability in terms of sensitivity, hazard, and adaptive capacity. The impacts of climate change are felt by urban dwellers, farmers, and fisherfolks. The poor on the other hand, are the most vulnerable groups with natural resources and majority of the population are heavily affected by this phenomenon.

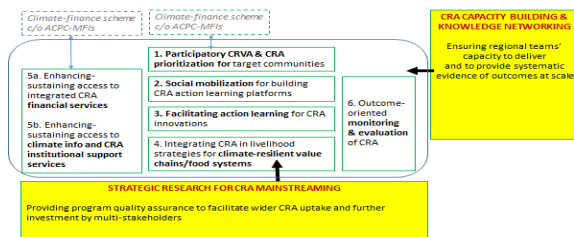
World Climate data have revealed that Davao City and Province of Davao del Sur were predicted to experience an intense rainfall pattern while temperature increase by 2⁰ Centigrade and daily maximum temperature may reach up to 32.7⁰ centigrade. Furthermore, due to these extreme climatic conditions, the distribution of suitability of crops will decrease quite seriously by the year 2030 – 2050. (CIAT, 2015).

B. Approach

The Department of Agriculture Systems-wide Climate Change Office (DA-SWACCO) has launched a strategic program on Climate Resilient Agriculture Adaptation and Mitigation Initiative (CRA-AMIA) in 2014 which aims to focus on addressing climate change with a vision of a Philippine agriculture fisheries sector enables local communities cope up climate risks while pursuing sustainable resilient livelihoods.

As overall approach, CRA-AMIA internationally related to “Climate Smart Agriculture”, develops and promotes climate-resilient agriculture (CRA), through implementing technologies and practices, introducing institutional and social innovations, and accessing climate-relevant support services to help agriculture-fishery communities manage climate risks from extreme weather events to long term climatic shifts.

Figure 1. Conceptual Model (Adapted from DASWCCO, 2015)



CRA AMIA refers to participatory methods in developing decision-support tools, models for community action research, and recommended guidelines for provision of climate information services to be able to develop the communities address and cope the hazards, vulnerabilities and strengthen capacities in support of community-based disaster risk reduction (DASWCCO 2015).

C. Case Study

Geographical background and farming system in the piloted barangays of Suawan, Tamugan, Magsaysay in Marilog District, Davao City under the Suawan Kulafu subwatershed.

DENR 2016 report that Suawan Kulafu Subwatershed in Marilog District, Davao City had a total area of 22,749 hectares with two (2) major rivers, Suawan river located in Barangay Suawan and Kulafu River located in Barangay Magsaysay. The whole watershed is also known as the headwater source of potable water that is supplying the Davao City’s metropolis. It is also identified as the nesting site of Philippine Eagle at Mt. Sinaka and the forested area of Dalag-lumot and Salaysay. A 200 hectares DENR Academy site and University of the Philippines reservation area of 4,100 hectares are also located in the watershed. These areas are inhabited by Indigenous People comprised of Obo-Manuvu, Matigsalog, Tinanaon, Tagalog, Cebuano, Ilonggo, Boholano, Leyteno, Waray, and Ilokano.

Among the natural hazards and climate change impacts noted in these areas are landslide due to earthquake and heavy rainfall, Suawan-Kulafu subwatershed natural feature where barangay Suawan Tamugan and Magsaysay were the most vulnerable to flooding and erosion (Aceres, et al., 2017).

The piloted farming communities, known as CRA AMIA Villages which served as the project site. It is located in the Suawan Kulafu subwatershed in Marilog District of Davao City. The project area is characterized by type 4 climatic

conditions. The topography is undulating to hilly and observed to have high vulnerability to climate hazards. Community Participatory Resource Assessment (CPAR), using a focus group discussion-workshop among the communities conducted by the Department of Agriculture Researchers in 2015,transcribed these salient information:

Barangay Suawan was first established in year 1940's were Aloy and Cabagtukan Sumaliday were the very first inhabitants in the area near a river called Tuli means " Sapang Buhí Naas a Dakong Linao"because of its features which is endowed with serenity. In 1950's, more families move in, both Christian and natives from other areas of Marilog but decided to live outside Tuli Proper forming another sitio called Tuli Suawan which was under Tamugan,Baguio District and first Teniente del Barrio an Ilocano Fermin Coloma was then elected.

Among the major disasters hit the barangay were Typhoon Titang in year 1957, flashfloods happened in 1962 and 2011, insect and rat infestation in year 1967 and 1995, dry spells and drought in year 1977.

and pesticides in farming.	
1980's - the communities started to receive health assistance from City Health Office such as immunization and the health team was also present. Department of Environment and Natural Resources Region XI started to penetrate the area and started forestry program	1986 - affected by Typhoon Rosing where some houses were partially damage.
1985 - Water Shed program started	1995 - Insect pest infestation occurred in corn crops.
1986 - Department Agrarian Reform started to penetrate the area and implemented agrarian reform community projects.	2011 - another was a flash flood occurred in the highland eroding crops and loss livestocks
1987 - Farmers started to use fertilizers and pesticides in farming	2015 - dry spells for 6 months
1990's - Comprehensive Agrarian Reform Program program started	2017 - Arm conflict between AFP and NPA in the interior part of the Barangays
1991 - Suawan Multipurpose Cooperative was built. Cooperative Development Authority (CDA) started their interventions in the barangay.	
1992 - Barangay Suawan was officially created.	
1993 - Started to receive interventions from the City Agriculture's Office. Projects such as irrigation, seedlings, livestock and cover crops from Southern Mindanao Agricultural Program (SMAP) were implemented	-
1997 - Bridge going to Barangay Suawan was built.	
2000 - Water and electrical system was operationalized.	
2006 - Suawan High School was built.	
2010 - DSWD/CCSSDO started to penetrate the barangay	
2012 - Aguila Farmers Association was founded.	
2013 - Moab Farmers Association was founded. Department of Interior and Local Government started their interventions in the area. Regional Convergence Initiative of government agencies was started through the Suawan Kulafu subwatershed	
2014 - The barangay received a solar pump from DA-Bureau of Soils and Water Mgt.	
2015 - Department of Science and Technology started their interventions in the barangay.New gymnasium was built.DA-BUB projects such as nursery started.Received nursery and fermentary facilities and rain shelters from Department of Agriculture.Lions Farmers Association was founded. During this year also, the DA Climate Resilient Agriculture AMIA Villages pilot project was started in the barangays where individual and communal farming area were supported and established.	
2016 - New barangay hall was built; Segovia Foundation started their drinking water project in the barangay. Minland	

Community Historical Timeline	
Positive Events	Negative Events
1947 -1950's - Barangay Suawan was first established and was then called Sitio Tuli part of Baguio District. It was very peaceful there was no arm conflicts. With abundant clean drinking water	1947 - There was no electricity, people used traditional source of lights such as lamps.
1950 - The first Tiñente del Barrio (Barangay Captain) was elected.	1957- Roads were not passable with any kind of vehicles except by human.Hit by typhoon Titang were plants were almost uprooted.
1963 - Barangay roads were rough and passable only by trucks hauling logging and timbers	1962 - There was flashflood, some houses were destroyed and washed out.
1970 - Catholic church was built	1967 - There was a rat infestation were crops such as rice, corn, banana, sweet potato and cassava were affected.
1977 - Nobody used synthetic fertilizers	1977 - dry spell for 7 months

(NGO) strated their DRR interventions in the barangay.Received ramp pump irrigation system from DA-BSWM.Lawaan Farmers Association was founded.Received Shredded and Vermie brewer from DA.	
2017 – Biaong Farmers Association was founded.Received Farm Tractor from Department of Agriculture.Road from National high way to Suawan High School was concreted.	

The three barangays were mountainous and surrounded by creeks and rivers . Crops planted by the farmers were asuete, banana, lansones, coffee, and vegetables. Livestock raised were swine, goat, cows, native chicken, and horses.

Short term cash crops planted by the farmers are peanut, corn, upland rice, gabi, vegetables such as eggplant, tomato, sweet pepper, finger pepper, cucumber, and pechay. While long term crops planted are coffee and cacao .

As hazard prone areas, the area is very prone to flash floods while upland interior sitios were prone to landslides, drought, and armed conflicts.It was also affected when Typhoon Pablo hit Davao Oriental Province.The community also raised swine, native chicken, goat and carabao. Native pigs are commonly raised for food and carabao is utilized for farming purposes.

The major farming problems encountered and shared by farmers were mostly the drought and less rainfall experienced during dry seasons where production of most crops are affected. While during heavy rainfall season on the other hand, erosion and flashfloods were the culprits destroying food crops and livestock. Improper cultivation practices also triggered massive soil erosion and loss of soil fertility. Use of synthetic inputs though help in good yield, but destroyed food habitats.

Illness and natural disasters are among the most feared by the community members because for them these things are beyond their control all

they can do is be prepared and ask for government’s assistance for post disaster needs.

Based on problem analysis financial, education, and health problems are most prevalent but participants recognized that they somehow have control over these things but sometimes they asked help from the outside such as government assistance for worst cases of health problems.

On the livelihood analysis, farming, livestock raising, broom making from tiger grass and small enterprises were identified as sources of income. Participants strongly recognized that they have the most control over these matter but they also depend from government assistance for the technical and input assistance such as seedlings.

In terms of health, most common illness experienced by the community were sore eyes and mumps during sunny months, flu and cough are most common during rainy months.

The establishment of the CRA-AMIA Villages in the three piloted barangays. Started in 2015, CRA AMIA villages was established with five farming associations which were closely coordinated by the Department of Agriculture Region XI Research Team and office of the Municipal Agriculture Support services were provided through provisions of farm inputs to support the farming; conducted a series of climate resilient field schools (CRFS) training workshop at their own field and exposed farmers to technologies in various research stations and farm tours. Capacitated farmers with relevant information to climate changes and livelihood.

The community in return, started to establish their own communal gardens where they collaborate in growing various field crops and livestock. These communal gardens are also becoming their learning sites where farmers conducted their farm demonstration and apply their

learning during workshops. They in turn develop their own individual farms. Other inter-agencies started support through agro-forestry and processing which helped farmers do value adding and marketing their produce. City ordinances and programs of various agencies were also shared and featured during series of consultations at the barangay hall.

Of the three barangays covered at the pilot sites, five farmer-associations was covered involving 120 members. These association are the lower Tamugan Integrated Rice Farmers Association (LOTIRFA), Upper Tamugan Integrated Farmers Association (UTIFA) and Datu Ulama Farmers Association (DUFA) of Barangay Tamugan, and Indangan Bagobo Womens Association (IBWA) and Magsaysay Marketing Cooperative (MMC) of Barangay Magsaysay.

D. Success Factors

One key factors noted in the success of project implementation was building a strong partnership with local partners and stakeholders which enhanced collaboration and coordination. This was reinforced by the periodic meetings with the stakeholders to achieve the project goals assign roles and responsibilities or even share the responsibilities of the project.

Participants put forward their suggestions, ideas and knowledge to have a clearer vision on the targets as factors in successful project conduct. On top of that, their knowledge on climate variability and ability to anticipate extreme climate events and modify farming decisions was enhanced.

E. Challenges

It was emphasized that the Climate Resilient Agriculture project is not only a project to battle climate change effect on the agricultural sector but it also promotes and encourages the farmers to cope and become resilient in their farming activities.

Government's challenge is to encourage young farmers to invest and till our lands. On the part of the farmers, sharing of experiences and technology and trust-building interventions will make all these goals possible.

II. METHODOLOGY

Farming associations with 150 farmers in the barangays of Suawan, Tamugan and Magsaysay, in Marilog District, Davao City served as participants in the study. Community Participatory Resource Appraisal (CPAR) through Focus Group Discussion (FGD) was done to elicit feedback. A major part of the data collected dealt on the communities historical timeline; agricultural farming cropping calendar; information on climatic events; and institutions established in their localities. Secondary data were collected from government agencies which supplemented the data gathered on demographic and other pertinent information.

III. RESULTS AND ANALYSIS

The findings of the study would show that the CRA AMIA villages in the piloted barangays has benefited immensely from the different programs implemented integrated farming system, soil and water conservation, climate resilience farming field school and provision of inputs to farming. To participate in the planning and implementation process, the community supported by the local agriculture office and barangay councils, organized farming associations. Furthermore several training sessions and on-field lectures on climate resilience agriculture, sustainable farming and enterprise were held.

IV. CONCLUSIONS

The study has shown with varieties of effects, ranging from direct effects to farming community, and their livelihood linked to the development of Climate Resilient Agriculture, institutional mechanisms and social interventions also played significant role.

The finding of the study imply that actions to adapt and mitigate climate change not only look in externalities of the natural causes, but would also dwell on the internalities of the stakeholders, the people who are the most affected on this alarming phenomenon.

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