

# The Initiatives of Local Government Units (LGUs) in Batangas on Climate Change

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## ABSTRACT

The local government units in the Philippines are at the forefront of disaster management including responding to the impacts of climate change. With the necessity to address this problem, this study aimed to determine the initiatives of the local government units (LGUs) in Batangas on climate change. The study made use of descriptive research which involved quantitative and qualitative methods in gathering data. Research triangulation was used. The subjects of the study were the Disaster Risk Reduction Management and planning officers of three component cities and twenty-seven municipalities of Batangas. Frequency counts, percentages, and average weighted mean were used in the statistical analysis of data. Results of the study revealed that LGUs in Batangas comply with the provisions of Republic Act No. 10121, otherwise known as Philippine Disaster Risk Reduction and Management Act of 2010. LGUs to organize disaster risk reduction and management councils at the local level. Likewise, cities and municipalities of Batangas implement policies through local ordinances to adopt and strengthen RA 9003. They are implementing initiatives that encourage businesses to promote climate-smart services and practices. Assessment of farming

practices, extension services and linkages with GOs, NGOs and other agencies in the implementation of climate change initiatives needs to be improved.

**Keywords** - Social Science, climate change, triangular approach, Batangas City, Philippines

## INTRODUCTION

Climate change is a crucial issue that must be addressed within the global and local context. It is a serious (Jiang et al., 2014), urgent global priority (Papa, 2015), and is one of the most difficult challenges facing the world caused by human activities on earth (Yahaya & Nwabuogo, 2016). The atmosphere's surface temperature (Merchant et al. (2013) environmental conditions in the Arctic region have changed rapidly (Zábori et al., 2013) and the ocean is becoming increasingly warmer, and the sea level has risen (Hughes, 2014), and the amount of ice on the earth is decreasing over the oceans Binti Sa'adin, Kaewunruen, & Jaroszewski, (2016). The earth warming was due to the increasing concentration of greenhouse gases (GHGs) in the atmosphere (Sa'adin, 2016), which destroys the environment and makes it unhealthy for living beings (Yahaya & Nwabuogo, (2016). Large areas of cooling have been observed in the Southern Ocean during the past few decades, whereas West Antarctica and several sub-Antarctic islands have warmed more rapidly than other parts of this continent (Chambers et al. 2013). Its impact worsens and contributes to food shortage, infrastructure damage and degradation of the natural resources upon which livelihoods are based.

The Philippines like any other developing countries in the world is highly vulnerable to the adverse impacts of climate change because it is located in the Pacific typhoon belt thus, exposed to climate-related risks such as tropical cyclones, drought, flood and climate variability (Yumul, Cruz, Servando, & Dimalanta, (2011). According to the study of the United Nations University's Institute for Environment and Human Security and the German Alliance Development Works, Philippines ranks third in the list of countries most vulnerable to climate change with 24.32 percent disaster risk. Typhoon Sendong (Washi) in 2011 and Yolanda (Haiyan) in 2013 which landed in the Philippines caused tremendous damage to infrastructure and loss of lives mainly due to the storm surge and strong winds (Lapidez, Tablazon, Dasallas, Gonzalo , Cabacaba, Ramos , Suarez , Santiago , Lagmay, and Malano, 2018) and left Tacloban City and other

municipalities in the region entirely devastated. Vietnam's surface heat is predicted to rise between 1 °C and 2 °C by 2050 because of climate change (Akpalu, Arndt, & Matshe, 2015). Extreme weather has affected railway operations and safety, including fatalities, injuries and property damage in Malaysia (Sa'adin, 2016). On 19 May 2016 temperatures exceeded 50 °C in a region on the India–Pakistan border. Excessive temperature can injure human health, resulting in heat cramps, exhaustion, and severe heat strokes (Oldenborgh et al., 2018). By 2020, between 75 and 250 million people in Africa are projected to be exposed to greater water quantity challenges due to the effects of climate change (Ojomo, Elliott, Amjad, & Bartram, 2015). These were the grave indication of how extreme weather conditions have become more frequent and more intense due to climate change.

Some programs and policies have been made and implemented, and yet property losses and casualties are increasing. Efforts to avoid substantial losses are unsuccessful and could not cope with the intensifying climate change impacts. The local government units in the Philippines are at the forefront of disaster management including responding to the impacts of climate change in their respective localities. However, many of the local government units are not aware of the climate change phenomenon and can't assist and respond to the affected communities on the actual event. Their knowledge and awareness of impending disasters, their impacts, their mitigation, preparedness, and adaptation is lacking (Piracha, Tariq, 2015). Adaptation strategies and alternative policy options that have been recommended to the LGU's have not yet been institutionalized. The local leaders are critical actors in drafting, implementing, and evaluating development programs that address adverse problems of climate change both strategic and short-term considerations of local government units. However, their perceptions of necessity and urgency are grounded in how much they know about the issue and concern. It is crucial that current and future decision makers are knowledgeable about climate change and its effects to achieve effective adaptation and mitigation (Ojomo, Elliott, Amjad, & Bartram, 2015). Much has been written on climate change but there is still limited literature and investigation on the initiatives of the local government units to combat the problems on climate change. This study would be beneficial to other locality to enlighten them formulate and adopt their climate change initiatives applicable to their community thereby enhance local climate change adaptation and improve safety and well-being among the population.

## **OBJECTIVES OF THE STUDY**

The study determines the initiatives of the local government units (LGUs) in Batangas on climate change specifically along policy framework, knowledge and capacity development, health and social protection and agriculture and fisheries. It further investigates the problems encountered by the LGUs in the implementation of identified initiatives with the end view of proposing development initiatives on climate change for LGUs in Batangas.

## **FRAMEWORK**

Climate change adaptation requires reshaping and redesigning of developing social and economic practices to respond effectively to anticipate environmental changes. Likewise, disaster risk reduction seeks to influence development decision-making and protect development aspirations from envisioned environment relate to risk. This research work was anchored on the National Framework Strategy on Climate Change (2010-2022) and Sendai Framework for Disaster Risk Reduction (2015-2030). The study was focused on climate change initiatives relative to the policy framework, knowledge and capacity development, health and social protection and agriculture and fisheries. The researcher believes that these are vital components for the local government units in dealing with problems of climate change. The national framework strategy on climate change envisions a climate risk-resilient Philippines with healthy, safety and self-reliant communities. It recognizes the roles of agencies and their respective mandates as provided by the law as well as the local governments as front-liners in addressing climate change. The framework also recognizes the value of forming multi-stakeholder participation and partnership in climate change initiatives including the civil society, private sector, and local governments, especially with indigenous peoples and other marginalized groups most vulnerable to climate change impacts. The national framework was formulated within the context of the country's sustainable development goals/institutional factors that affect the country's ability to respond to climate change. As climate change has myriad impacts in all sectors of the society and the economy adaptation measures will require resources and the cooperation of all sectors. Further, it was focused on cross-cutting strategies: capacity development; knowledge management; IEC and advocacy; gender mainstreaming, research and development and technology transfer.

The Sendai Framework for Disaster Risk Reduction was the first major agreement of the post-2015 development agenda and an international document which was adopted by UN in March 2015 at the World Conference on Disaster Risk Reduction held in Sendai, Japan and was endorsed by the UN Assembly in June 2015. The Sendai Framework is a fifteen-year voluntary, non-binding agreement which offers four priorities for activities such as understanding the risk; strengthening disaster risk governance to manage disaster risk; investing in disaster risk reduction for resilience, and enhancing disaster preparedness for effective response. In achieving the goal of the framework, several targets have been identified: substantially reduce global disaster mortality by 2030, reduce the number of affected globally, reduce direct disaster economic loss in relation to global gross domestic product, reduces damages in infrastructure and disruption of basic services, health and educational facilities and increase availability and access to multi-hazard system and enhance international cooperation.

These two frameworks serve as the inspiration of the researcher to the present study since they are both focused on taking proactive measures towards reducing risks and adapting instead of simply responding to the events. They both aimed at reducing people's vulnerability to hazards by improving methods to anticipate, resist, cope with, and recover from their impact and seek to rebuild resilience in the context of sustainable development. With similar aims and mutual benefits, the researcher recommended development initiatives for LGUs in Batangas to enhance climate change resilience and reduce the risks; thus, cooperation and collaboration of all the stakeholders in the community is needed to make it fully realized.

## METHODOLOGY

### Research Design

This study made use of the descriptive research which involved quantitative and qualitative methods for gathering data. Research triangulation was used. The use of triangulation as a method facilitate the integration of qualitative and quantitative findings, help researchers to clarify their theoretical propositions and the basis of their results thus offer a better understanding and empirical findings (Östlund, Kidd, Wengström, & Rowa-Dewar, 2011). Data were made available through a survey questionnaire, documentary analysis and interview. Questionnaires were answered according to the priority of concern by using pre-determined sets of questions with pre-defined ranges of answers as to avoid

conflicting series of response. Informed consent was sought during the conduct of research. Further, the respondents of the study were assured of the strictest confidentiality of the data provided and that it will only be used for the purpose of conducting the study.

**Participants**

The subjects of the study were the heads of the city and local Disaster Risk Reduction Management Office and Planning Officer of the three component cities and twenty-seven municipalities of Batangas. Frequency counts, percentages, and average weighted mean were used in the statistical analysis of the data.

**Instrumentation**

The survey questionnaire was the major instrument used in gathering necessary data. It composed of two parts. The first part covered the climate change initiatives of the local government units along policy framework, knowledge and capacity development, health and social protection and agriculture and fisheries. The last part delved on the problems encountered by LGUs in the implementation of climate change initiatives. The survey questionnaire was presented to experts for validation; the dry run was administered to test the validity of the instrument. The questionnaire was set for reliability testing using Cronbach alpha Test. The result revealed that it contained high internal efficiency level of 0.871 which was interpreted as reliable and the options are appropriate for utilization. An interview was also conducted to substantiate the discussion and to validate the data gathered from the questionnaire. Accomplishment reports, plan of activities, policies, and ordinances relative to climate change initiatives were also analyzed. The responses were tallied, scored and tabulated for statistical treatment. The following continuum was employed to describe the weighted mean verbally:

Options	Range	Verbal Description
4	3.50 – 4.49	Very Highly Evident/Very Serious
3	2.50 – 3.39	Highly Evident/ Serious
2	1.50 – 2.49	Moderately Evident/Moderately Serious
1	1.00 – 1.49	Not Evident/Not Serious

## RESULTS AND DISCUSSION

### **Initiatives of Local Government Units in Batangas on Climate Along Policy Framework**

The Planning and Development Officers and Disaster Risk Reduction Management Officers revealed that it was highly evident that the LGUs in Batangas implemented policies and local ordinances to adopt RA 9729 otherwise known as Climate Change Act of 2009 with a weighted mean of 3.35. The LGUs conducted activities which include tree planting, mangrove rehabilitation, use of solar panels and other energy saving devices among government offices and bring your bayong (BYOB) campaign which aimed to reduce the use of plastic. Mangroves provide important ecosystem services. This affirmed by the study of Abbas, S., Qamer, Hussain, Saleem, & Nitin, (2011) who stressed that mangroves provide nursery habitat for marine fish including coastal stabilization. On the other hand, entering into Memorandum of Agreement/Memorandum of Understanding with GOs and NGOs for climate change adaptation and disaster risk reduction rated as moderately evident with the lowest weighted mean of 2.43. Uneke, Ezeoha, Uro-Chukwu, Ezeonu, Igboji (2018) in their study suggested that there is a need to strengthen institutions and mechanisms that can more systematically promote interactions between researchers, policy-makers and other stakeholders and recognize the value of coming together for a symbiotic relationship.

To help farmers increase their agricultural production in times of drought and flood caused by extreme weather conditions, policies on the provision of drought and flood resistant seeds and fertilizer rated very highly evident with a weighted mean of 3.59. Agricultural crop productions are vulnerable to climate change. Most of the time, crops are being damaged by the strong typhoon and during drought. This was reinforced by the study of De-Graft, & Kweku, (2012) who stressed that climate change tends to have negative effects on crop yield through its influence on crop production. Meanwhile, policies establishing linkages and networking to conduct research studies on agricultural technologies that are climate change resilient rated moderately evident with the weighted mean of 2.33.

The respondents indicated that it was moderately evident that the LGUs formulated and implemented ordinances creating the Comprehensive Land Use Plan (CLUP) for climate change adaptation and disaster risk reduction with a weighted mean of 2.47. The LGUs created an appropriations act for budget

allocation for the activities, programs and projects for climate change adaptation in all barangays obtained the lowest weighted mean of 2.25. Climate Change Act of 2009 provides for the mainstreaming of climate change into government policy formulation and the establishment of a framework strategy and programs on climate change.

The Planning and Development and DRRM officers disclosed that it was very highly evident that the LGUs implemented NO smoking policy in government offices and public places which garnered a weighted mean of 3.83. On the other hand, policies on the construction of the green building and climate-smart practices shown in weighted mean of 2.33 interpreted as moderately evident.

The respondents revealed that it was very highly evident that the LGUs in Batangas comply with the provisions of the Republic Act No. 10121, otherwise known as Philippine Disaster Risk Reduction and Management Act of 2010 requiring local government units to organize disaster risk reduction and management councils at the local level with a weighted mean of 3.85. The conduct of training and educating the different committee on pre-disaster phase and during disaster phase to respond and reduce disaster risks obtained the lowest weighted mean of 2.32.

### **Along Knowledge and Capacity Development**

Results of the study showed that regarding knowledge and capacity development the LGUs initiatives were rated by the respondents moderately evident as reflected in the average weighted mean of 2.43. As assessed by the disaster risk reduction officers and planning development officers in reference to conducting comprehensive strategies for broadest education of all sectors in the community, collaboration with the schools in the integration of climate change adaptation and disaster risk reduction in elementary, secondary and tertiary curriculum rated moderately evident as expressed in average weighted mean of 2.47. Distribution of pamphlets and brochures on climate change and disaster risk reduction were also conducted. On the other hand, collaboration with local media for publication of articles, discussion and education on climate change and disaster risk reduction were perceived to be the least implemented development with the lowest weighted mean of 2.35. Effective risk management depends on the informed participation of all stakeholders. This was supported by the study of Almario-Desoloc (2014) who stressed that mobilization of people through seminars and training raised the awareness of action during and after a calamity.

To educate the vulnerable community on the impact of climate change,

the conduct of training, seminars, and workshops rated by the respondents moderately evident as expressed in a weighted mean of 2.28. Educating the about climate change is very important not only to raise their awareness but to enable them to respond to the disasters brought by climate change. This was in congruence with the study of Vicerra, Salvador, & Capili, (2018) who said that knowledge on disaster preparedness boosts confidence and preparedness, but it also conditions people on how to act and what to do if ever such an unfortunate event strikes. The respondents confirmed that disaster preparedness and training program such as earthquake flood, tsunami and landslide evacuation drills were rated moderately evident among the initiatives of LGUs with the second highest weighted mean of 2.25. However, the conduct of climate change awareness month and slogan, poster, and essay making contest were rated 2.32 interpreted as moderately evident. Results of the study revealed that the LGUs in Batangas are exploring different avenues to educate people about climate change.

On the other hand, of the different development initiatives implemented by the LGUs in Batangas on the provision of early warning devices in vulnerable areas, installation of rain gauge and storm signal alert were rated highly evident as observed in a weighted mean of 3.47. It has to be noted that this equipment is being installed within the nation by the Department of Science and Technology as one of their projects. On the other hand, the conduct of orientation and workshop on family disaster preparedness obtained the lowest initiatives implemented by the LGUs with the weighted mean of 2.37 interpreted as moderately evident. Climate change is a complex issue that needs to be cascaded and understood down to the community level. Public awareness, active community participation, and strong political will of the local leaders can create enhanced resilience of the stakeholders and reduced cost and magnitude of climate change impacts to especially those in vulnerable sectors.

The LGU disclosed it was highly evident that LGUs in Batangas have formulated GIS mapping on flood-prone areas, landslide-prone areas and tsunami and sea level rise prone areas, shown in the weighted mean of 3.46. Provision of GIS mapping on landslide-prone areas, flood-prone areas and tsunami and sea level rise prone areas is essential to reduce possible casualties during the occurrence of strong typhoons that may cause flood, landslide or sea level rise.

### **Along with Health and Social Protections**

To promote health and social protection of the vulnerable sectors to climate change sensitive diseases, the respondents remarkably revealed that the conduct of

medical missions and consultations was very highly evident among the initiatives of the LGUs with a weighted mean of 3.72. However, provision of health care card and medical assistance was rated highly evident among the initiatives of the LGUs which obtained a weighted mean of 3.48. Climate change is adversely affecting human health. Frequent extreme weather events mean more potential deaths and injuries for those in the vulnerable sectors. This was supported by the study of Swaminathan, Lucas, Harley, & McMichael, (2014) who emphasized that climate change sensitive exposures and conditions will subtly impair aspects of the human immune response, thereby altering the distribution of vulnerability within populations—particularly for children—to infection and disease.

To provide social protection to the communities located in the hazard-prone areas the planning development officers revealed that provision of contingency planning was highly evident with a weighted mean of 3.48. This is to ensure the safety of the people affected by the calamities. On the other hand, they gave the lowest rating that LGUs built evacuation centers shown in a weighted mean of 2.43 described as moderately evident.

The respondents indicated that it was highly evident that the LGUs conducted clean-up drive activities to safeguard the health and lives of the people in vulnerable communities to climate change with a weighted mean of 3.48. This includes “Linis Kanal at Ilog” campaign and coastal clean-up. It has to be noted that canals are the breeding ground of mosquitoes and other disease-causing organisms. Maintaining the cleanliness of the canal could prevent the spread of diseases such as dengue, leptospirosis and the like. This was affirmed by the study of De Vries, Visser, Nagel, Goris, Hartskeerl, & Grobusch, (2014) who asserted that leptospirosis is one of the health problems affecting Filipinos especially during the rainy season that causes death if not properly treated. However, the respondent gave the lowest rating that the LGUs conducted feeding programs and medical missions as shown in the weighted mean of 3.41 which is interpreted as highly evident. In general, the initiatives of the LGUs in Batangas along health and social protection was rated highly evident with a composite mean of 3.33.

### **Along Agriculture and Fisheries**

The respondents indicated that it was very highly evident the LGUs provided livelihood program to farmers and fishers which are climate change resilient which obtained in a composite mean of 3.53. Agriculture remains to be an important activity of the population in Batangas. Palay, coffee, sugar cane, pepper, banana, corn, coconut and vegetables were the main crops in the province. Climate

change may worsen its impact (Thomson, Alderman, Tuck, & Hobday, (2015) on agricultural production. The farmers feel the above impacts because those can lead to a decrease in production which was affirmed by Sumastuti, (2015) who claimed that climate change and the global warming like changes in the pattern and distribution of the rainfall could lead to a decrease in production even in the crop failure. Remarkably noted by the respondents, that it was highly evident that the LGUs conducted training and seminars to local farmers and fishers on sustainable livelihood programs with a weighted mean of 3.83. On the other hand, the respondents gave the lowest rating on collaboration with the various institutions to conduct research and climate change technologies on agriculture and fisheries with a weighted mean of 2.41.

### **Problems Encountered by the Local Government Units in the Implementation of Initiatives on Climate Change**

Results of the study show that the local government officials encountered serious problems in the implementation of the development initiatives on climate change. This was shown by the overall weighted mean value of 3.32.

Inadequate knowledge of the community on how to cope with climate change adaptation and disaster risk management was the most serious problem encountered by the government officials followed by the limited participation of the community on climate change adaptation and mitigation programs and activities. Average weighted mean values of 3.49 and 3.47 were computed respectively, descriptively rated as serious problems.

Poor extension services, limited information dissemination and campaign material on climate change, and limited training and seminars conducted relative to climate change were also found a serious problem in the implementation of climate change development initiatives by the government officials.

Lack of local policies and ordinances relative to climate change adaptation and disaster risk reduction was also a serious problem encountered by government officials. Likewise, limited partnerships to government and non-government institutions for the implementation of climate change development initiatives was also a serious problem encountered by the government officials in the implementation of climate change development initiatives. On the other hand, lack of budget allocation and support from the government was a moderately serious problem.

Results of the study show that there is a need to improve extension services and linkages or partnership with GOs, NGOs and other agencies officials in

the implementation of climate change development initiatives. Likewise, local legislatures should formulate laws and ordinances on climate change to implement the different enacted laws on climate change.

### **Development Initiatives for Local Government Units (LGUs) in Batangas on Climate Change**

The development initiatives are proposed to respond to the challenges that humanity is facing nowadays brought by massive climate change. This development initiative will help address the problems and impacts of climate change which may contribute to food shortages, infrastructure damage and the degradation of natural resources upon which livelihoods are based.

**Education, Information, and Communication (EIC).** Education, information, and communication (IEC) action can lead to better-informed decision sand enlightened choices concerning climate change. Information, education, and communication (EIC) combine strategies, approaches, and methods that enable individuals, families, groups, organizations and, communities to play active roles in climate change adaptation. Embodied in EIC is the process of learning that empowers people to make decisions, elucidate perceptions of climate change held by the general public and create an understanding of the factors responsible for climate change to promote behavioral change at the individual/household level.

Channels might include interpersonal communication (such as individual discussions, or group discussions and community meetings) or mass media communication (such as radio, television and other forms of one-way communication, such as brochures, leaflets and posters, visual and audiovisual presentations and some forms of electronic communication).

### **Comprehensive Land Use Plan and Risk Mapping**

Another proposed addition to the EIC is the Comprehensive Land Use Planning and Risk Mapping. CLUP is the long-term physical plan that allocates land to specific uses taking into account the best use of land after analysis of competing uses, locational strengths, and environmental constraints. The Comprehensive land use planning is an integral instrument for local government units to effectively address existing risks, and avoid the creation of new risks to people, assets, and economic activities by rationalizing distribution and development of settlements, and the utilization and management of natural resources.

## **Collaboration and Networking**

Collaboration and linkages to strengthen efforts to combat climate change are necessary. Linkages and collaboration with other agencies should be strengthened not only in the conduct of activities promoting risk reduction and climate change mitigation but also in the conduct of researches. This would bring local leaders, researchers, academicians, industry representatives and other GO, and NGOs to advance and mainstream climate change adaptation. This could be done through the MOA and MOU.

The researcher strongly believes that collaboration and networking is one of the best ways to share best practices, raise finances and develop technologies solve problems relative to climate change.

## **Organization of Disaster Risk Reduction Management Team and Rescue Squad**

Alongside with the developed plan and framework, there is a need for the local leaders to organize disaster risk reduction management team and rescue squad. The team shall facilitate and oversee the implementation of the climate change initiatives and DRRM activities in their community specifically on preparedness and response. Active participation and involvement of various stakeholders could safeguard lives in vulnerable areas and avoid damages to properties and infrastructures.

## **CONCLUSIONS**

Climate change impact on the environment can lead to severe damage to agriculture, destruction of property and infrastructure and loss of lives. It is a global phenomenon which calls for everybody's attention and collaboration from various agencies around the globe and the local government as they are the critical actors in responding to the impact of climate change and natural disasters.

The LGUs in Batangas implemented various initiatives to combat its adverse impact along policy framework, knowledge and capacity development, health and social protection and agriculture and fisheries. The initiative among local leaders specifically in Batangas on climate change is a good indication that they are extremely aware of its adverse effects. There is growing evidence that the community could benefit from the creation and implementation of localized climate change policies and indigenous activities. Institutionalizing and localizing climate change policies and activities could increase the knowledge of the

community, encourage the involvement of all stakeholders, reinforce agriculture and business and improve human health. Addressing their encountered serious problems in the implementation of climate change initiatives would give way in developing more better guidelines and legal frameworks. This study has provided a substantial contribution to the local government units to mitigate the problems of climate change. Putting an end to human activity contributing to the climate change will need a strong political will thus, employing a variety of significant measures like the formulation of policies, strictly monitoring and implementation of the law, education of the community, and support from various agencies are needed. This could serve as valuable input the local planners and policymakers in enhancing environmental program policies based on the current strategies adopted by the government to mitigate the impacts of climate change.

It is, therefore, important for all local government units to institutionalized various environmental policies and strictly implement the same to address the issues and problems encountered on climate change.

### **TRANSLATIONAL RESEARCH**

The findings of this study could be translated through journal article for international publications, brochures, manuals, leaflets, newsletters, social media and other information devices for education and information diffusion to enable revisit the local government policies and programs on climate change. This could be further translated by authorities into comprehensive policies and ordinances to provide better elucidations and long-term programs to address problems on climate change.

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