Bayug Island Aquasilvi Program: An Eco-Governance Strategy for Climate Change Adaptation and Mitigation

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ABSTRACT

This is an evaluation study of an intervention program that seeks to mitigate the impact of climate change in Bayug Island, an 82-hectare delta at the estuaries of the Mandulog River in Iligan. During Typhoon Sendong on December 16, 2011, the entire island was inundated and many inhabitants perished. Originally estimated at 122.50 hectares, it shrunk into its present size due to erosion that allowed sea water to advance more than 100 meters inland in two decades. In 2010, a portion of its municipal waters was declared Marine Protected Area. In February 2011, the Bayug Mangrove, Rehabilitation and Reforestation Project of MSU-IIT was organized. In nine months, 21,000 propagules were planted along its coastline. A seaweed plantation was also established to provide alternative livelihood for fisherfolks. After Sendong, Iligan City declared Bayug Islalnd as danger zone based on the assessment of the Mines and Geo-Science Bureau, DENR, Region 10. Power and water reconnections were not permitted. But extension service volunteers of MSU-IIT returned in February 2012 to continue rehabilitating its denuded coastline. With the support of the Bureau of Fisheries and Aquatic Resources, 75,000 propagules were planted and six aquasilvi projects were established as of July 2014. On April 26, 2013, a City Ordinance establishing the Bayug Island Aquamarine Park was approved. Interventions in Bayug Island are designed to mitigate the impacts of Climate Change. However, typhoons like Sendong (2011), Pablo (2012), Zoraida

(2013) and Agaton (2014) were great impediments. But for extension service volunteers, these are temporary setbacks that pushed for the improvement of strategies for disaster mitigation.

***Keywords**: aquasilvi project, climate change, mitigation, sustainable development*

INTRODUCTION

Bayug Island is the site of the longest continuous extension program of MSU-Iligan Institute of Technology. The program began in 2005 as an accreditation strategy, and it has been sustained since then. The longevity of the Bayug extension program can be attributed to the ability of its proponents to adapt to contextual changes that brought challenges that demanded immediate responses. Originally it started as a social development intervention that sought to alleviate poverty (MSU-IIT Extension and Community Involvement Team, 2005). But due to disastrous events attributed to climate change that occurred in 2009 and 2011, its focus transformed into environmental integrity and ecological governance. This shift has drawn the participation of many organizations. This study which was conducted through participant observation and interview of stakeholders is an effort to document the program which is now entering its tenth year. The program is a work in progress and the data presented here were those taken up to July 31, 2014.

Bayug Island, known as the site of the first Christian community in Iligan is a sitio of Barangay Hinaplanon, Iligan City (Maria Ines, 1994). It has eight puroks of which Purok 3 (Mauswagon) and Purok 8 (Malipayon) were the sites of the first Institutewide extension program of MSU-IIT. Its historical significance and strategic location made it an interesting place for development workers and researchers. Prior to December 17, 2011, it had one elementary school with 351 pupils.

Bayug Island is actually a delta formed at the forked estuaries of the Mandulog River as it drains into Iligan Bay, one of the richest fishing grounds in northern Mindanao up to the 60s. Its fertile soil once supported thick vegetation, including a mangrove forest, along its shoreline. It used to teem with marine resources, the most famous of which are the juvenile fishes known as ***hipon*** and the ***moli*** that

seasonally appear following a spawning period. Until the 80's, ***hipon*** and ***moli*** seasons were times for celebration for many people of Iligan. These seasons were part of nature's ritual, wherein the ***anga,*** the parent fish of the hipon and the ***iswil,*** the parent fish of the moli, both fresh water fishes from the Mandulog River lay their eggs that go downstream to hatch. After hatching, then growing into a few centimeters, they turn back for their rhythmic journey upstream. As they approach the mouth of the river, the fishermen wait with their nets to catch them. Until the 80's, tons of hipon and moli were harvested during their seasons. These affordable sources of protein were prepared for the dining table by the locals as "kinilaw," "inun-on," and "ginamos."[1]

At present the people of Bayug testify that they only get a few kilos of *hipon* and moli every season.[2] There are even times when they fail to appear. The decimation of mangrove cover, the use of poison in catching anga and iswil, the relentless quarrying, the siltation and the progressive pollution of the bay have led to the sharp decline of the fish population in the river and in the bay.[3] Batteries of mechanized quarrying along Mandulog River that use heavy equipment removed and crashed the rocks which provided the natural habitat for anga and iswil. This habitat destruction was aggravated by massive siltation caused by upstream erosion, which buried sea grasses and destroyed corals in Iligan Bay. The Mandulog River is a source of first class A sand and gravel that feed the unquenchable need of the construction industry in Iligan, Lanao del Norte and Misamis Oriental. Quarrying has become a very lucrative industry for powerful entities which regulatory agencies of the government dare not offend.

Many old inhabitants of Iligan still remember the vast mangroves that once lined the coast of Bayug Island. Even now, stumps of trees are seen along its coastline during low tide. Some old inhabitants can pinpoint the original shoreline, which is already more than hundred meters from the farthest reach of water during high tide. A chunk

1 Personal interview with Mr. Erlito Echavez, president of the Sea Warriors Fisherfolks Association in Bayug Island in his residence in Bayug Island on July 21, 2011

2 Personal interview with Mr. Rolando Nadayag, president of Bayug Mangrove Rehabilitation and Reforestation Association in his residence in Bayug Island on January 6, 2013.

3 Personal interview with Mr. Rogelio Taburada, a fisherman in his residence in Bayug Island on March 13, 2014.

of Bayug Island has been swallowed by the sea, which continues to advance inland. From its original 122.50 hectares area, it had shrunk into approximately 82 hectares.[4]

For decades, Bayug Island has caught the interest of many development workers due to its strategic location and the poverty of its inhabitants, majority of whom are tenants. In the 1980's, the Franciscan Missionaries of Mary provided scholarships, supported livelihood development, and assisted some residents through a micro-lending program. The Seventh Day Adventists and the Couples for Christ also initiated development activities in the area while the Radio Mindanao Network (RMN) and the Serviamus also introduced other micro-lending programs (MSU-IIT Extension and Community Involvement Team, 2005). With no apparent success, all of these were later discontinued by their proponents. Nevertheless, some institutions continued to pay visits to Bayug before Tropical Storm Sendong. La Salle Academy occasionally had its Community Development Participation (COPAR) in Bayug Island. The Colleges of Nursing of the Mindanao Sanitarium and Lyceum of Iligan used to visit to conduct immunization of children, first aid trainings and other paramedical activities. All of these, too, were later discontinued after 2011.[5]

In 2005, Bayug Island's eight puroks has a population of 13,367 (MSU-IIT Extension and Community Involvement Team, 2005). A purok is an administrative subdivision of a barangay, the smallest political unit of a local government in the Philippines. The rapid growth of the population of the island was caused partly by the decision of the city to make it a resettlement site and by the effort of some land owners to convert their real estates into subdivisions, despite the fact that the island has no piped water supply and no functional waste management program. Most residents have no sanitary toilets and they dispose their wastes into the river and into the sea. There is no paved road network in the island, only expanded footpaths that connect the puroks.

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4 Personal interview with Prof. Hermelinda Tobias, PhD, Coordinator for Philippie National Aquasilvi-culture Program (PNAP), joint program of the Bureau of Fisheries and Aquatic Resources and MSU-Iligan Institute of Technology in Bayug Island on October 24, 2013.

5 Personal Interview with Cirila Bacuaja, Secretary of the Bayug Mangrove Rehabilitation and Reforestation Association in Bayug Island on September 23, 2011.

On April 1, 2005, members of College Extension and Community Involvement Committees of four colleges, the College of Arts and Social Sciences (CASS), College of Business Administration and Accountancy (CBAA), College of Education (CEd), and the School of Computer Studies (SCS) of MSU-IIT met to discuss the new accreditation scheme of the Accrediting Agency of Chartered Colleges and Universities in the Philippines (AACCUP). The College of Arts and Social Sciences and the College of Education were then preparing for their third level accreditation. On April 2, 2005 an ocular inspection was made at Bayug Island, after which a meeting with Chairperson Isaac Catayas of Barangay Hinaplanon was held. On April 9, 2005, eight faculty members from CASS, CBAA and CED visited Purok 3 and Purok 8 for an environmental scanning and initial dialogue with some residents. Due to the depressed conditions of the two puroks, MSU-IIT decided to adopt them as the sites for its institutional extension program. On April 14, 2005, a Participatory Rapid Appraisal (PRA) was conducted. This was participated in by 43 of the 56 households in the two puroks.

On July 29, 2005, after a series of preparatory activities, MSU-IIT launched its extension and community involvement program in Bayug through a Memorandum of Agreement (MOA) signing with the Pag-amuma sa Bayug Peoples' Organization (PASABIPO) and the chairperson of Barangay Hinaplanon. Dr. Alice Diel, the director of extension of the Capitol University of Cagayan de Oro and the president of Region 10 Philippine Association of Extension Program Implementers and Engr. Christine Orbe, the acting chief of Iligan City Waterworks were guests during the occasion. The initial concern of this extension and community involvement program was the economic security of the residents of the two puroks. Planned interventions were directed towards the improvement of the livelihood of the residents.

On October 22, 2005 MSU-IIT student volunteers helped facilitate the registration of PASABIPO with the Department of Labor and Employment (DOLE). A meeting was held on October 26, 2005 at the residence of Mrs. Wilma Gonzaga, the president of PASABIPO to get the names and signatures of members to be submitted to the DOLE. The registration forms were notarized by Atty. Felicidad Gadiano on December 19, 2005 and the Department of Political Science paid the P70 registration fee on May 3, 2006.

After all the delays, the Certificate of Registration, dated May 3, 2006 was picked up from the DOLE on May 17, 2006 by volunteer Political Science students. Initially oriented towards poverty alleviation interventions, the program's focus shifted to intervention efforts toward environmental integrity and eco-governance as challenges of Climate Change became more apparent.

METHOD

This is a longitudinal study of a university extension program. Data were gathered from personal interviews with key participants of the program, members of Peoples' Organization (PO) partners, local government officials and key informants from the Department of Agriculture (DA), Department of Environment and Natural Resources (DENR), Bureau of Fisheries and Aquatic Resources (BFAR), and the Army. Also, some data were gathered through participant observation from 2005 to the present. Secondary data were taken from compilations of activity reports made on the project, particularly by the Department of Political Science of the College of Arts and Social Sciences and the Regional Center for Human Rights Education of the Office of the Vice Chancellor for Research and Extension of MSU-IIT.

The participatory community development approach was used as the framework of analysis. This approach looks into the participation of stakeholders (i.e. local government units, national government agencies, private sector, and civil society organizations) in identifying community problems, drawing actions plans or projects, implementation, monitoring, assessment and evaluation (Bracamonte Nimfa, 2007). The researchers were involved in many activities related to the program, including the participatory rapid appraisal conducted on April 15, 2005 which marks the beginning of the program. The analysis is focused on the participation of the local government, peoples' organizations and national government agencies in this extension program, as well as the transformation of its objective from economic security of its first partner Peoples' Organization, the PASABIPO, to its present focus of eco-governance of the island and its conversion into a nature park.

RESULTS

This is a discussion of the program's transformations from 2005 to the present. The program which started as an extension and community involvement of MSU-Iligan Institute of technology was conceived to help the residents of Purok 3 and Purok 8, two of the eight puroks of Bayug Island, a sitio of Barangay Hinaplanon, Iligan City. Since its inception nine years ago, it has undergone three stages, which this paper classified as: Community Development, Environmental Integrity and Ecological Governance. The classification was based on the focus of intervention at a certain period in time.

Community Development

This is the period spanning from 2005 to 2010. It was a time of MSU-IIT's intermittent engagements with the program. During this time, the PASABIPO was the only PO partner of MSU-IIT. The barangay leadership was not actively involved. Seven colleges from MSU-IIT initially participated in the program, with the College of Arts and Social Sciences and the College of Education being the most active, because the extension program was related to their efforts to undergo AACCUP's Level III Accreditation. There was a limited participation by the other colleges and the Department of Extension, under the Vice Chancellor for Research and Extension. This is due mainly to the problem of coordination. Some colleges were used to doing their own extension programs and they are not familiar in dealing with an integrative program which demands much coordination among participating colleges.

Through the PRA that was conducted on April 14, 2005 at Echavez Beach Resort, the needs of the two puroks were identified. Although only 3.7 kilometers from the Poblacion, they had no piped water supply. Most of the residents were very poor, with majority of the families earning only Php3,000 or less per month. Livelihood was a concern because majority of the residents had no secure jobs. Some were doing backyard gardening, small-scale farming as tenants, carpentry and other construction works, driving trisikad, selling tuba, fishing, operating sari-sari stores and retailing. Sanitation was a serious problem. Only a quarter of the residents had sanitary toilets and the rest disposed their wastes in the Mandulog River, Iligan Bay,

under coconuts and mangroves. Many had no power supply because they could not afford to pay connection charges and their monthly consumptions. Their access road was a muddy trail, a portion of which goes under water during high tides. They needed a functional bridge to connect them with Barangay Sta. Felomina which was separated from Bayug Island by the old estuary of the Mandulog River.

To identify their concerns and their priorities for 2005 until 2007, the members of the PASABIPO were gathered in a workshop on April 25, 2005. They agreed to participate in all phases of the program's activities, from identification of problems and solutions, implementation, evaluation and monitoring. As early as 2005, the need for environmental rehabilitation was already recognized as a major concern. In fact, the target from 2005 to 2008 was to plant 200 mangroves: 100 trees at the river bank and 100 at the shoreline. There was also a plan to plant 100 fruit trees inland. However, these plans were not pursued due to the inability of MSU-IIT to procure needed seedlings and lack of initiative among the members of PASABIPO.

Aside from planting of trees, there were activities designed to empower the residents, one of which was a basic leadership training conducted by the Department of Political Science on May 23, 2006 that was participated by 26 PO members at the Echavez Beach Resort. The training intended to develop the ability of participants to manage their organization. On June 18, 2006 a gender sensitivity training was conducted by the College of Arts and Social Sciences and the College of Education. Said training was designed to address gender related issues affecting development. Also in 2006, skills training were conducted by the College of Education. Dressmaking was taught, and three sewing machines were donated. However, the sewing business was not able to take off due to lack of capital and inability to get job orders. Efforts were also made in trying to assist residents put up livelihood in vegetable gardening, cooking, detergent making, pedicure, manicure and reflexology. Corresponding trainings were provided but very few trainees were able to practice what they have learned due to lack of entrepreneurship skill. A plan to establish a cooperative was also made but did not prosper.

MSU-IIT requested from the local government several truckloads of limestone for road improvement, and later, a wooden bridge was constructed at the depressed portion of the road that gets submerged during high tide. Efforts were also made to negotiate

for a potable water supply for the entire island. On April 18, 2005, three faculty and three leaders from Purok 8 held a meeting with Atty. Moises Dalisay, the chairman of the Water Committee of the City Council and Engr. Christine Orbe, the acting chief of the Iligan Waterworks to discuss the water problem in Bayug Island. This was followed up by a visit to the chief of the maintenance division of the Iligan Waterworks on May 9, 2005. While negotiations continued with no tangible results, the residents of Bayug continue to cross the Mandulog River in order to fetch their drinking water because the city government failed to respond to their demand for potable water which later became moot and academic when the Mines and Geoscience Bureau (MGB) completed its study 2010 which classified Bayug Island as a "danger zone" leading to the official policy of the city of not giving permit for utility connections/reconnections in Bayug after Tropical Storm Sendong.

From 2005 to 2006 student volunteers from the Department of Political Science were actively involved in the program. During a community consultation on August 24, 2005, 13 students helped document the proceedings and they joined a committee formed to undertake mangrove planting. From October 22, 2005, student volunteers started facilitating the registration of the PASABIPO to the Department of Labor and Employment (DOLE) which took more than half a year due to the difficulty in gathering the requirements. In some occasions, the Department of Political Science has to raise the transportation of the officers so that they can attend meetings. The registration forms of the group was notarized for free by Atty. Felicidad C. Gadiano on March 1, 2006 before it was finally submitted to the DOLE on May 3, 2006. The Department of Political Science paid the PhP70 registration fee. On May 17, 2006, the Certificate of Registration of PASABIPO was finally taken by some Political Science students from the DOLE

Not much was done in 2007-2008, except for follow-ups on the livelihood trainings provided, like cooking, food processing and gardening. Rug making and vegetable gardening were introduced but did not prosper. With no training or experience in any entrepreneurial activity, housewives complained that there is no market to sell their products. In 2009, the bridge connecting Bayug and Barangay Santa Felomina was constructed. This provided the third connection of Bayug to rest of Iligan in addition to the hanging bridge at the

south and the submarine bridge at the northwest. In 2010, due to lessons learned from typhoons Ondoy and Pepeng, climate change became an urgent issue which had to be addressed (World Bank, 2010). Moreover, with the assumption of President Benigno Aquino into office by the last half of 2010, integrity of the environment and climate change adaptation, became one of the five key result areas set by his administration.

Environmental Integrity

In January 2011, the plan for environmental intervention at the seaboard of Bayug Island, was made by the Regional Center for Human Rights Education (RCHRE) of MSU-IIT's Office of the Vice Chancellor for Research and Extension (OVCRE), with the help of the Community Environment and Natural Resources Office-Iligan (CENRO-Iligan) and the Iligan Bay Advocates for Ecological Sustainability (IBAES).

On February 7, 2011, a proposed program called *Bayug Mangrove Rehabilitation and Reforestation Program* (BMRRP) was approved by the Sangguniang Barangay of Barangay Hinaplanon and a week later, on February 14, 2011, CENRO-Iligan conducted an orientation on mangrove planting at MSU-IIT for some faculty members and students. This was followed by an ocular inspection and survey of the project site.

On February 19, 2011, the first 1,200 propagules provided by the CENRO-Iligan were planted in Bayug Island under the BMRRP. This was followed by the first clean-up and maintenance activities on Febuary 25, 2011. Meetings for consultation were conducted to sell the program to the community and to seek the support of the island's residents in the implementation of the program.

On March 19, 2011, the second batch of propagules were planted. That time, the POs Bayug Mangrove Reforestation/Protection and Rehabilitation Association (BMRRA) and Bayug Island Sea Warriors Fisherfolks Association participated. Barangay Chairperson of Barangay Hinaplanon, Mr. Veronico Echavez, Kagawad Marlene L. Young and Kagawad Rudy Marzo of the Sangguniang Panlungsod of Iligan were also present. That same day, the Memorandum of Cooperation was signed by the partners, which included CENRO-Iligan, IBAES, Local Government of Barangay Hinaplanon, the Committee on Civil, Political, Human Rights and Responsibilities

of the Sangguniang Panlungsod of Iligan City, the Bayug Mangrove Reforestation/Protection and Rehabilitation Association**,** and the Regional Center for Human Rights Education. The program was formally named the Bayug Mangrove Rehabilitation and Reforestaion Program (BMRRP). The program gave MSU-IIT the lead role in upholding the environmental integrity of Bayug Island. It was tasked to coordinate with the other groups and supervise their participation to ensure effectiveness and sustainability.

On March 18, 2011, the management of La Farge Cement Inc. pledged 500 bamboo poles, which were to be used as stakes and wave breakers. That marked the entry of the private sector into the program. On March 21, 2011, MSU-IIT formally adopted the BMRRP as its institutional extension program in Bayug following an Institutewide orientation and planning workshop attended by representatives from the different colleges in the Institute, partner Peoples' Organizations (POs), non-governmental organizations (NGOs) and the local government of Barangay Hinaplanon.[6]

The growing popularity of the program attracted many organized groups. On April 1, 2011, the 43rd Infantry Battalion, 601st Brigade of the 8th Infantry Division of the Philippine Army joined the program. The battalion was able to plant 2,000 propagules. Soon, the Dayang Dayang Jaycees, the Eagles and some other organizations also started planting. To ensure sustainability, MSU-IIT and CENRO-Iligan decided to integrate these newcomers into the BMRRP. However, since many participants were only concerned with planting, and did not pay attention to maintenance, the CENRO-Iligan which is mandated to protect the natural resources of the City, stopped entering into separate Memorandum of Agreements (MOA) with other groups and advised them to coordinate with MSU-IIT instead, so that MSU-IIT would maintain their plants. The strategy improved the survival rate of the propagules from 35% to 85%.[7]

The BMRRP also adopted existing patches of mangroves, some of which were already seven years old, for rehabilitation. In September 2011, the BMRRP partners teamed up with the Department of Agriculture to support a seaweed plantation for the fisherfolks. The

6 This orientation and planning workshop was authorized by Chancellor Marcelo P. Salazar, DM through Special Order No. 00229-IIT, series of 2011, dated March 16, 2011.

7 Personal interview with Mr. Alvin Cayamama, MSU-IIT PNAP Community Organizer in Bayug, August 25, 2012.

Bureau of Fisheries and Aquatic Resources (BFAR) and the MSU-IIT National Multi-Purpose Cooperative (MSU-IIT NMPC), through its committee on Cooperative Social Responsibility, provided the materials for planting. Aside from being a livelihood project, it was designed as a protective barrier to prevent fishermen from passing through the mangrove planted area and causing destruction to the young trees.

In October 2011, a portion of Bayug waters was declared a marine protected area (MPA) by the city government and was placed under the supervision of the City Environment Management Office. Fishing within the protected area and its buffer zone was prohibited.

By November 2011, the BMRRP had already planted at least 21,000 propagules. On the evening of the 16th of the following month, Tropical Storm Sendong hit Iligan and the entire Bayug Island went under water for hours. When the flood water receded, debris, including logs, floated at the coast line of Bayug for at least three days. The combination of strong waves and floating debris decimated at least 80% of the mangroves.

Ecological Governance

In November 2011, the Bureau of Fisheries and Aquatic Resources (BFAR) introduced the Philippine National Aquasilviculture Program (PNAP) to MSU-IIT for possible partnership. The implementation of this program requires the participation of a state college or university. On January 27, 2012, MSU-IIT and CENRO-Iligan planted 120 assorted fruit trees in Bayug Island in a symbolic gesture of the desire to continue the BMRRP. On February 14, 2012, 300 mahogany seedlings were planted while the Memorandum of Agreement with BFAR for the PNAP was being processed. The PNAP has three components: mangrove rehabilitation, aquasilviculture and hatchery. As a partner, MSU-IIT was to plant 183,300 trees, and put up one hatchery and 16 aquasilvi ponds in Iligan and Lanao del Norte. Bayug Island was selected as one of the project sites in Iligan.

The PNAP was launched in Bayug Island on August 2012 during the visit of BFAR's Secretary General, Atty. Asis Perez and Regional Director, Visa T. Dimerin. Mayor Lawrence Cruz and Barangay Chairperson Nick Echavez were also present. On August 16-17, 2012, the planting of mangroves started. It was continued on October 13-17, 2012 and November 8-20, 2012. A total of

46,107 propagules were planted in 2012 in an estimated area of 11 hectares. The POs that participated in the mangrove planting were the Masagana Farmers and Fisherfolks Association (MFFA), Maharlika Fisherfolks Association (MFA), Kasadya Fisherfolks Association (KFA), Makugihon Fisherfolks Association (MFA), Bayug Mangrove Restoration/Protection and Rehabilitation Association. (BMRRA), and Isla Grande Fisherfolks Association (IGFA). In October of 2012, graduate students of Environmental Sustainability and their professor, Dr. Hermelinda Tobias, presented a proposal to the city council of Iligan for the establishment of an Aquamarine Park in Bayug. This was enacted into City Ordinance No. 13-6022 by the city council on April 26, 2013. Among others, the ordinance aimed for the rehabilitation of the mangroves at the coastline of the island, the introduction of aquasilviculture and other alternative livelihood programs, the enhancement of agricultural activities in the island and the establishment of a participative coastal resource management system. The enactment of this ordinance provided support to various initiatives from different sectors which in effect strengthened the ecological governance of the island. Ecological governance includes among others, the formulation of responsive policies that protect the environment and provide opportunities for the successful implementation of community initiatives like provision of alternative livelihood and tree planting activities (Amparado, 2006).

On December 2012, Typhoon Pablo struck Iligan, causing much damage to the newly- planted mangroves and leaving only an approximated 41.725%. Those lost to the typhoon were gradually replaced by the PO partners. Other groups also participated in the replanting, using the propagules stocked by MSU-IIT. It was found out that the rate of survival of propagules is higher if they are temporarily planted inland and transferred later when they have already started to grow roots. A visit to the project site in September 2013 showed that all those destroyed by Pablo had already been replaced, and more than 95% of those planted were alive. This could be credited partly to the participation of more than twenty groups in planting, monitoring and maintaining them under the supervision of MSU-IIT, Barangay Hinaplanon, DA, BFAR and DENR. However, before 2013 ended, Typhoon Zoraida[8]came and early in 2014 Agaton also made its landfall. These typhoons were not very strong but they brought so much precipitation and the sustained strong waves they created

8 All names of typhoons mentioned in this study are local names.

uprooted many young plants. Many of those survived were broken so they have to be replaced. Immediate replanting was made and as of July 31, 2014, a total of 75,000 propagules were planted in Bayug under the PNAP.

The six PO partners in Bayug were given one aquasilvi pond each as part of PNAP, and on March 2013, they began developing them. Each pond is approximately 2,000-2,500 m^2. By the end of September 2013, all of them were already provided with crablets and bangus fingerlings.[9] Aquasilviculture is a strategy for food production that does not infringe on the integrity of the environment. It is a mangrove-friendly aquaculture (Primavera, 2000). It requires the protection and rehabilitation of mangroves.

DISCUSSION

The Bayug Island Extension Program has been operating for nine years now. It began with the limited objectives of fulfilling a requirement of AACCUP accreditation and of intervening to ensure the economic security of the residents of Purok 3 and 8 of Bayug Island. Since then, the objectives have expanded to include environmental protection. The focus has shifted from community development to ecological governance. Tropical Storm Sendong wiped out Purok 3 and Purok 8 in December 17, 2011; not a single house was spared and the few survivors were sent to permanent resettlement. As early as 2010, Bayug Island was declared a danger zone by the Mines and Geo-hazard Bureau (MGB) (Sinsuat, 2010). On February 27, 2012, City Ordinance No. 12-5815, an ordinance declaring certain areas in Iligan City as danger zones, was enacted to enforce the findings of the MGB. Nevertheless, some residents insisted on returning, but the city, in a proactive move, refused to give them permits for power reconnection. In doing so, the government exercised its authority to reduce the exposure of its people to hazards in pursuance with Section 2(g) of RA 10121, the ***Philippine Disaster Risk Reduction and Management Act of 2010,*** which requires the "mainstreaming of disaster risk reduction and climate change in development processes such as policy formulation, socioeconomic development planning,

9 From the third quarter of 2013 PNAP report by Mr. Alvin Cayamama and Prof. Hermelinda Tobias dated October 3, 2013 which was prepared for submission to the Bureau of Fisheries, Region 10 in Cagayan de Oro City.

budgeting, and governance, particularly in the areas of environment, agriculture, water, energy, health, education, poverty reduction, land-use and urban planning, and public infrastructure and housing, among others." The local government has also changed its policy from opening Bayug for resettlement to preventing the return of many inhabitants into the island after Sendong. The declaration of Bayug as an Aquamarine Park in 2013 through City Ordinance No 13-6022 has changed the land use of the island.

Bayug Island is threatened by massive erosions which progressively reduce its size. During Sendong, its surface was scoured bare by flood, revealing its extreme vulnerability. To enhance its resiliency, there is a need for massive intervention, like that which was begun in 2011 when at least 21,000 propagules were planted through the BMRRP program. Most of them were destroyed in December 17, 2011 but 46,107 propagules were planted in 2012 to replace them. Typhoon Pablo destroyed approximately 58% of the plants in December 2012, but replacements were planted so that by the end of 2013, not only were those destroyed been replaced but more were planted in addition. By July 2014, approximately 75,000 propagules were planted. Moreover, more than 1,000 trees, including mahogany, talisay, jackfruits, guavas and a beach tree locally called balok-balok, were planted. In 2013, due to climate change awareness and the efficiency of social networking, particularly through facebook, participants in environmental interventions in Bayug Island more than doubled their number in 2012. Moreover, it should be noted that in February 2014, Miss Earth Malaysia 2013 and Miss Earth Indonesia 2012 visited to plant mangrove in Bayug. In May 2014, Miss Earth Indonesia 2012 came back in Bayug. With her were Miss Earth Indonesia 2013, Miss Earth Philippines 2014 and Miss Earth Nepal 2014. These visits which were orchestrated by Environment Online (ENO) had drawn big crowds of advocates and bystanders who have seen the coastline of Bayug Island for the first time. The growing interest of both local and international stakeholders emanates from the growing awareness among stakeholders on the need for international regime to deal with climate change (Roanica Cabading, 2002). Moreover, the participation of ENO is symbolic because it opened the entry of an NGO into the project. Although there is a growing number of national government agencies (NGAs), Peoples' Organizations (POs), local government units (LGUs), schools and socio-civic organizations, no NGO participated prior to ENO. This is

significant because NGOs are important players in the development process due to the realization that neither the state nor the market are sufficient to address the problems confronting us at present (Behera, 2002).

Since the beginning of MSU-IIT's engagement in Bayug, the local government has always been a partner. Likewise, national agencies such as DENR, BFAR, and the DA have been involved, and the fisherfolks mobilized together with other POs. In 2011, the city government also joined in, with the participation of its council members. The involvement of all these groups is part of a participatory development strategy in ecological governance, at least at the awareness level. Admittedly, there were participants who participated only to identify themselves with the Bayug program, which became popular through social networking among high school and college students.

In 2012, six POs participated in mangrove reforestation. They represented most of the remaining inhabitants of Bayug Island. They were given aquasilviculture projects as sustainable livelihood in harmony with the environment. The aquasilviculture is a strategy of raising crabs, fish, and crustaceans in a sustainable mode. Mangroves are integral parts of aquasilviculture, thus it needs the protection of existing mangroves and reforestation if necessary

CONCLUSION

The participation of the local government is critical in the success of an extension program of a university. During the *Community Development* stage of the program, the very slow response of the local government to grant the request for potable water for Bayug Island residents did not help the extension workers in helping improve the lives of the people in the island. During this stage interventions were not regularly provided because of the difficulties in coordinating the participating colleges in doing complementary tasks in the program.

There was also the problem of strategies. Some intervention efforts were strange to the recipients. It took them much time to digest and internalize livelihood programs that were introduced to them. It is important that intervention efforts should begin with what the recipients have. The introduction of tailoring and vegetable

gardening did not prosper because it takes time to develop markets for their products. The lack of entrepreneurship is also a problem because the absence of this makes it extremely difficult to develop recipients into self-employed individuals.

The shift of the focus of the program after Sendong is made possible by a thorough understanding of the challenges and options brought by climate change. Although most of the accomplishments by the *Environmental Integrity* stage were negated by Sendong in 2011, this stage was to some extent successful because of the involvement of many groups including peoples' organizations. The popularity of the social media was partly responsible in marketing the program in Iligan which lead to the participation of many organizations, both public and private.

The *Ecological Governance Stage* is the most successful stage of the program. The participation of the national government through the BFAR, DA, and DENR brought needed resources and expertise into it. The momentum that developed through the social media continued and the program went international with the support of the **Environment Online.** Based on the experiences of the program especially during the *Ecological Governance* Stage, it could be deduced that participation of organizations to include local, national and international is crucial to the success of a program on ecological governance. The issues addressed by ecological governance are mostly global like climate change and disaster management, hence, international participation is necessary. This affirms the proposition of Roanica Cabading (2002) for the necessity of an international regime in dealing with climate change.

Although an extension program may begin from mere local concerns, contextual changes must be addressed responsively. An extension program should not be limited in its original objectives; it must adapt to contextual or environmental changes. When the partner communities of MSU-IIT were wiped out by flood, the program could have ended because the target beneficiaries were gone. Every time the young plants were uprooted by strong waves, proponents were tempted to give up. However, new factors that appear into the program equation could bring new challenges. Proponents and implementers of an extension program should be creative in weaving the objectives and operations of the program into emerging opportunities that determine its relevance and sustainability. This is implementation as evolution

(Koenig, 1986). According to Louis W. Koenig (1986), "Policy continues to evolve as it moves across the spectrum of implementation and new circumstances are encountered that must be coped with… During implementation policy can be altered significantly."

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