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RESEARCH ARTICLE

Green governance - An integrated programs of local government units: A case of Northern Iloilo, Philippines

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Abstract

Objectives : To develop a framework for green governance encompassing enterprise, government, social organizations, the public, and nature. **Methods:** This research used a case study to unveil the programs and projects of Northern Iloilo municipalities on green governance. The methods utilized were interviews, documentary analysis, and observation. All municipal and barangay officials in-charge of the environment were purposively selected as informants of this study. Northern Iloilo Polytechnic State College, with its seven campuses within the 5th District of Iloilo, served as partners in strengthening programs, projects, policies, and ordinances from its programs such as fisheries, criminal justice, political science, and biology. **Findings/application:** The eleven towns of the 5th District of Iloilo are facing various environmental problems and issues such as garbage disposal, cutting trees, and coastal destructions. To mitigate this concern, the Local Government Units (LGUs) initiated different projects and programs and policies and ordinances for protection and preservation of natural resources. Among these municipalities, the municipalities of Barotac Viejo and Lemery as the main venue of the study were found out to have Environmental Code as a general policy for safeguarding and maintaining the environment. Even though that all local government units in northern Iloilo had adopted the national programs and laws of the government, still problems on the environment existed because the commitment of different stakeholders is weak. With this, the green environment practices made every entity of the community be encouraged to join the quest for a pollution-free environment. However, only a few participated. Northern Iloilo Polytechnic State College, as a lone tertiary learning institution in the district, pledged to help green governance through research, extension, and instruction. However, the political-will of each leader was required to implement these programs effectively. The people must work together with the LGUs to achieve free from climate change. A collaborative effort is a key to success in green governance.

Keywords: Green Environment; local government unit; 5th district of Iloilo; projects; ordinances

1 Introduction

The world is facing a gradual increase in temperature both on the earth's land and water surfaces. Thus, the climate changes persistantly. The world's climate changes rapidly, and in a unique way starting in the late 1700s during the Industrial Revolution. From then on, the average global temperature increased to 1.4 degrees in 1880 and drastically, around 2 to 11.5 degrees in the next 100 years [1]. This occurrence is called global warming—for instance, the burning of fossil fuel increases the amount of carbon dioxide (CO_2). CO_2, together with methane and nitrous oxide, stays and shields the atmosphere that causes gradual heating of the earth [2]. In the US, fossil fuels can generate electricity but produce about two billion tons of carbon dioxide per year [3]. The continuous efforts of environmental experts failed to address climate change and in the 2018 report showed fossil fuels continue to increase exponentially [4]. Hence the outcomes of rising temperature like heavy rains, intense hurricanes and typhoons, droughts, and heatwaves [3]. Global warming and climate change are synonymous with each other; climate change apart from the rise in temperature it also denotes the status of biodiversity, escalating sea levels as well as other impacts on the environment [4].

Almost all countries are affected by climate change. The Philippines blessed with abundant natural resources [5] that helps the sustainance of the nation. These bountiful assets vanished quickly because of human intervention. Due to the rapid increase of population with an estimated 103 million [6], the nation is rapidly being depleted of its natural resources. The excessive deforestation for infrastructure development and increased and indiscriminate fertilizer usage to provide sufficient supplies, over exploitation of aquatic organisms are examples of human intervention that tend to rise atmospheric carbon dioxide ultimately spoiling our atmosphere [7].

Consequently, the Philippines is the most vulnerable country for extreme weather conditions; around 20 typhoons and coupled with El Niño and La Niña hit the country annually [8]. The Typhoon Haiyan or commonly called Yolanda on November 8, 2013, damaged different mangrove ecosystems that adversely affect livelihood and coastal protection. The strong storm surge of Typhoon Haiyan is linked to climate change due to human influence. However, for the past decades, typhoons were connected to environmental destruction [9]. The Philippines, composed of more than 7,000 islands, lack natural barriers. Mangrove which serves as a bumper for storm surge and steadying the soil has disappeared significantly [10]. Province of Iloilo often affected by the typhoon; the LGUs worked to protect the islands. Continued efforts concentrating northern Iloilo with seven coastal municipalities and mangrove ecosystems is essential. The national government must give importance to these ecosystems through Local Government Units(LGUs).

All countries of politicians, experts, scientists, academe, etc., should come together to mitigate the issues and problems linked to the environment. On June 24, 2014, a general congress of 193 UN states and stakeholders in Nairobi convened for UN Environmental Assembly for Global Environmental Policy. Furthermore, in an International Environmental Law (IEL) composed of two declarations: Declaration of the United Nations Conferences on the Human Environment and The Rio Declaration on Environment and Development were evolved. The IEL attempts to regulate pollution as well as natural resources for sustainable development [11].

Each country created laws and policies related to environmental protection and preservation. In the Philippines, the Department of Environment and Natural Resources (DENR) enshrined with the major Environmental Laws which are [12];

1. Republic Act No 9003 – Ecological Solid Waste Management Act of 2000.
2. Republic Act 9275 – Philippine Clean Water Act of 2004.
3. Republic Act No 8749 – The Philippines Clean Air Act of 1999.
4. Republic Act No. 6969 – Toxic Substance and Hazardous and Nuclear Waste Control Act of 1990.
5. Presidential Decree No 1685 – Environmental Impact Statement.

Thus, this study attempted to create a framework for green governance concentrated on enterprise, government, social organizations, the public, and nature.

1.1 Local government units in the Philippines

The Philippines is a republic ruled by a presidential form of government. The elected officials, together with nominated and appointed executives, equally manages the system. The Philippine government composed of three branches; the executive, legislative, and judicial [13]. These three branches of government play a vital role in check and balance. Figure 1 shows the government structure of the Philippines.

The institutions of Senate and the House of Representatives are the legislative branches authorized to make laws. Elected by the people, the twenty-four senators serve six years with two terms, and two hundred fifty members of Congress serve for three years with three terms, enact legislation, and confirm or reject the presidential appointment. While the executive branch is composed of an elected president and vice president with six years term can appoint cabinet members to help them run the government. And the judicial branch functions to apply laws and to solve legal problems and issues in the country [14].

From the Head of national government, the arrangement is followed by provincial-level headed by the Governor, Vice Government, and Sangguniang Panlalawigan members then followed by municipal level controlled by the Mayor, Vice Mayor and Sangguniang Bayan Members, and the lowest form of government is the barangay level regulated by Barangay Captains and Kagawad [15] .

Local Government Unit of LGU is a body of government delegates to do programs on good governance, economic development, and public fiscal administration for the benefits of their respective constituents. Also, they are authorized to generate income through taxes, regulatory fees, and other charges under the policy of local autonomy [16] . Under the Local Government Code of the Philippines, the LGUs tasked to apply good governance to confirm excellent performances. Through this, the national and local governments provide fundings for projects

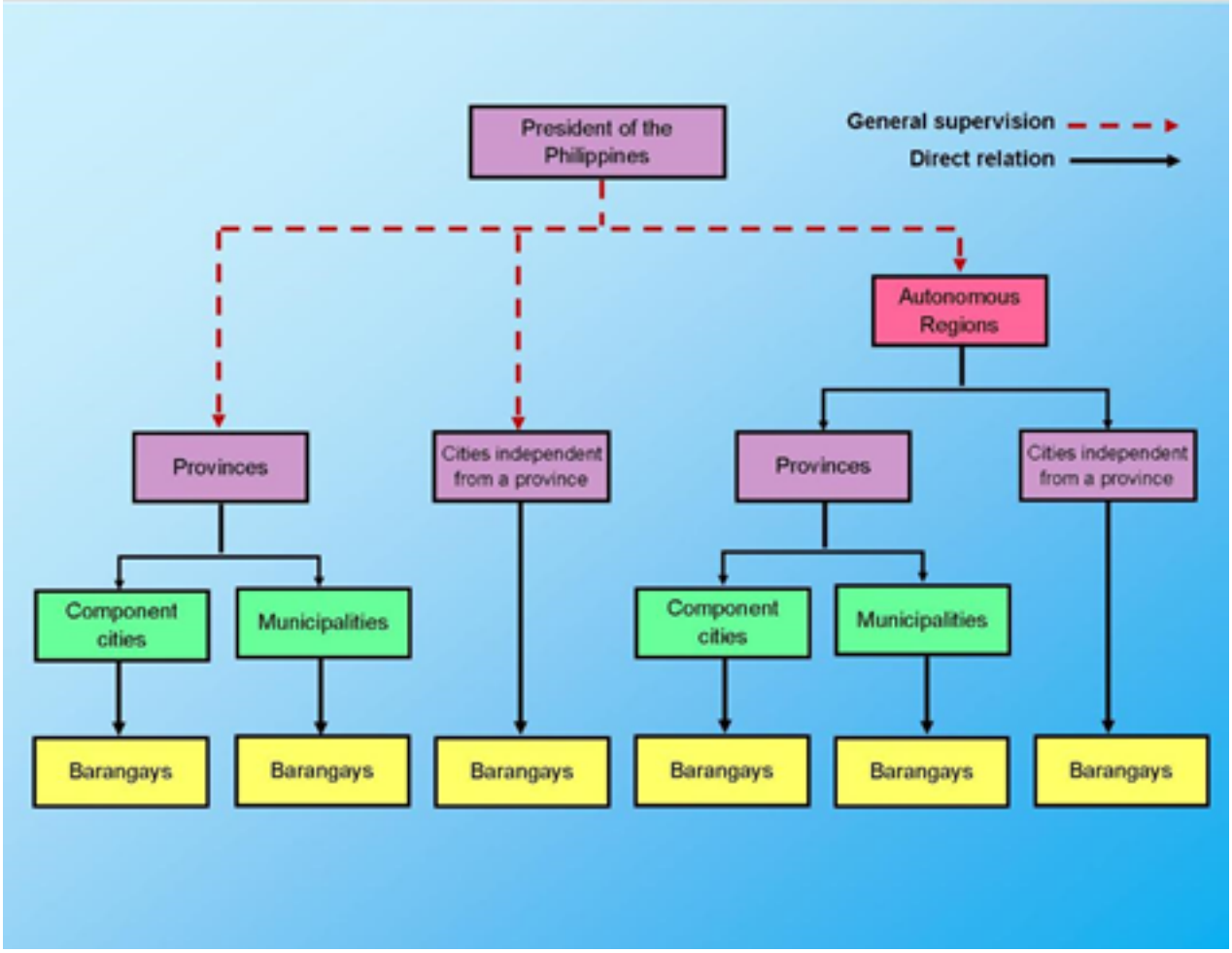

Fig 1. Structure of the Philippine Government

and programs [17]. Good governance correlated with economic development. Specifically focused on poverty alleviation, livelihood programs, and the availability of basic needs are the main factors for economic growth. LGU serves as a partner of the government to attain national goals. For system decentralization, LGUs are given the powers, authority, responsibilities, and resources to achieve the national projects and programs as well as the laws of the national government [18]. Having rules, communities obliged to follow for peace and order. Thus, to protect and preserve our natural resources and to implement green governance, regulations required to create.

LGU elements like vision, leadership, and citizen engagement are the crucial factors for a makeover. These elements aid system enhancement, culture transformation, and human and program development [19].

LGUs are expected to do various projects and plans for the benefit of residents. To ensure projects and programs implemented, the Department of Interior and Local Government or DILG organized a Performance-Based Incentive Policy. The adoption of good housekeeping linked to good governance and incentives and grants. These funds are open to province, cities, and municipalities in the entire archipelago as capital investment projects aligned with the national priorities [19]. The plans of the national governments are education and health infrastructure, land reclamations, industrial and tourism estates, and government building and housing projects. Also, markets, slaughterhouses, and related facilities, warehouses, and post-harvest facilities, and public fish ports and fish ponds are essential for the fast population growth of the country. But in terms of environmental protection and preservation, projects like solid and ecological waste management and climate change mitigation and adaptations are also given importance [20].

Twenty-seven cities headed by Muntinlupa banned the use of plastic because it blocked the drainage system and caused flood during rainy seasons in Metro Manila. The ban on plastic fully implemented in 2013 [21]. During a disaster, LGUs are tasked as front liners to safeguard the general welfare of the locals, as stipulated in the Local Government Code of 1991. The National Disasters Reduction Management Council (NDRRMO) asked LGUs to form Local Disaster Risk Reduction, and Management Plan (LDRRMP) focused on disaster preparedness, responses, prevention, and mitigation, and rehabilitation and recovery [22].

Table 1 shows the major environmental laws in the Philippines.

Table 1. Major Environmental Laws in the Philippines [23].

Major Environmental Laws
Republic Act 9003 – Ecological Solid Waste Management Act of 2000
Republic Act 9275 – Philippines Clean Water Act of 2004
Republic Act 8749 – Philippine Clean Air Act of 1999
Republic Act 6969 – Toxic Substance, Hazardous and Nuclear Waste Control Act of 1990
Presidential Decree 1685 Environmental Impact Statement (EIS) 0f 1978

For sustainable development, the government of the Philippines considered the balanced environment as stated in the 1987 Constitution, "The State shall protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature." The Philippines started addressing issues of climate change in 1991; as a result, the national government adopted Philippine Agenda 21 [24]. From then on, various agencies tasked to work closely with different institutions, both private and public, to guarantee environmental protection and preservation. As early as 1970s, the Philippines has already sound policies and legislation on environment and natural resources [25].

Ordinance labels as local law is passed by elected officials as uniform rules within the municipality. A prescribed and consistent procedure was enacted, followed by residences, establishments, and others [26]. The laws and ordinances aimed to protect the resources of particular places in the country [27]. These ordinances come from national legislation and pass through the barangay level. Upon the enactment of laws by the elected LGU officials, the Barangays are encouraged to adopt and implement.

1.2 Green Governance

The main focus of this study was on the green environment towards governance. The green background is about environmental conservation to enhance the health of the situation—the green environment is a community for a sustainable earth. Thus, the green environment refers to conditions of major components such as land, water, atmosphere, climate and weather, and food chain as being conserved and protected [28]. Nowadays, there is green energy by replacing conventional energy from fossil fuels to clean power. The clean sources generated using the natural source of energy available on the planet. These are renewable enabling "go green" because it releases zero emissions to the environment. The commitment to being environmentally friendly,consciously acts as a model for sustainability. But to "go green," humans need to become responsible [29]. Walking in the park amongst greenery and good air and living in a greener community has positive health outcomes regardless of status in life. In a greener setting, people are generous and friendly [30].

Green governance, as an emerging field, attracts experts and policymakers; however, the limitation of the concepts resulted in the center of green production, green management, green supply, and green administration [31]. Thus, a subject like open innovation is left behind.

Global green governance issue is one crucial research agenda. This study attempts to create a framework for green governance concentrated on enterprises, governments, social organizations, the public, and nature. Thus, all countries utilized the frame to develop guidelines for a sustainable environment in the future [32]. Political will is essential to establish green governance. Empowering local governments to take green ingenuities within their areas is endorsed. Furthermore, this initiative towards the green government is achieved by integrated approaches of various stakeholders [31].

2 Methods

2.1 Research Design

The effectiveness of green governance among 11 municipalities in northern Iloilo is the subject of this study. Thus, a case study employed to identify these events which took place from 2010-2020 in these seven coastal and four agricultural towns in the 5th District of Iloilo. Specifically, this focused on the in-depth study of various projects and programs and policies and ordinances.

This study employed methods such as interviews, document analysis, and observations. Interviews utilized to get the insights of the informants about the implementation of green governance in their respective municipalities. The interview conducted five times in every informant to capture all the need responses of the study. One -on- one interviews used in this study. Also, the document analysis related to projects and programs, policies, and ordinances from 2010-2020 were collected. A site visit about mangrove and tree projects, Material Recovery Facilities, dumping sites, etc. to have a first-hand experience of the programs implemented were organized. Every visit, the researchers stayed in each area for almost 6 hours.

2.2 Epistemology of the Study

Hence, this study anchored on Agency Theory. The partnership of Northern Iloilo Polytechnic State College (NIPSC), various stakeholders, and the 11 LGU in the 5th district as agents to protect and preserve the natural resources. One of the main thrusts of the college is research, but the LGUs are most focused on governance; the two can work together as partners in mitigating problems of global warming and climate change. Agency theory, or also called a principal-agent method, is a classic approach in the organizational economics literature [32]. The two

parties' goals to examine the specific optimal contracts and conditions for a harmonious relationship. State Universities and Colleges (SUCs) in the country always play an instrument in all government agencies. SUCs work with projects and programs as well as researches and extensions for the LGUs.

The Agency theory, as the oldest theory in management and economics, emphasized on how to reduce problems in various entities [33]. This study used this theory because of LGU as sole jurisdiction in the multiple ecologies and NIPSC as tertiary learning institutions in the district. LGUs are unit governments function to safeguard the ecosystem within their locations. NIPSC, as academic institutions offering programs like governance, biodiversity, education, criminal justice, technology, and others, can support through research, extensions, and education campaign. Both public and private institutions tapped NIPSC as an implementor of their programs and projects for past decades. Thus, all agencies working together for the benefit of our environment is one big solution to reduce problems and issues concerning the current situation of our ecosystem. Therefore, the formulation of this study concentrated on programs and projects, and policies and ordinances of 11 municipalities in northern Iloilo, the Philippines towards green governance to help the current issues and problems of the environment.

2.3 Study Area

Explicitly, Iloilo is on the island of Panay bordered by Antique and Capiz. The Province of Iloilo is composed of five congressional districts. One of them is the northern Iloilo or 5th district consisting of 11 municipalities. These are Ajuy, Balasan, Barotac Viejo, Batad, Carles, Concepcion, Estancia, Lemery, San Dionisio, San Rafael, and Sara. There are around seven towns located in the Visayan Sea [34].

Fig 2. Map of Northern Iloilo, Philippines.

While NIPSC is a tertiary education composed of 7 campuses, the college is offering fisheries and allied sciences, technology, education, engineering, criminal justice, hotel, and restaurant management, computer studies, and entrepreneurship. The main thrust of Northern Iloilo Polytechnic State College (NIPSC) is research, extension, and instruction.

2.4 Data Collection

Table 2 shows theinformants in this study. The purposively selected informants were Sangguniang Bayan (SB) members in-charge of environment, Municipal Environment and Natural Resources Officers, SB secretary, Barangay Captain, and Barangay Officials. A total of 146 joined in the study.

The instrument utilized in this study was five items open-ended ready-made-questionnaire act as a guide during the interview. A tape recorder was used in the conversation to capture all the details of the responses of the informants. The meeting lasted for 30 minutes to 1 hour, and the researchers visited the informants in their respective offices. Each informant interviewed individually.

The study was initiated in May 2016 ended in August 2017, then in 2018, all data collected were evaluated, assessed, and analyzed. The replies from the interviews were transcribed, coded, theme, and triangulated. The observations and documents were also analyzed.

Table 2. Informants of the Study

Municipality	SB Member	SB Secretary	MENRO	Brgy, Captain	Brgy. Kagawad
Ajuy	1	1	1	10	15
Balasan	1	0	1	2	4
Barotac Viejo	1	1	1	4	4
Batad	2	0	1	5	6
Carles	1	1	1	7	9
Concepcion	2	1	1	8	10
Estancia	1	1	1	4	6
Lemery	1	0	1	2	4
San Dionision	1	1	1	6	6
San Rafael	1	0	1	2	2
Sara	1	1	1	8	10
Total	13	7	11	48	67

2.5 Ethical Consideration

A permit required in this study and distributed to eleven mayors for approval. A courtesy call organized to inform each one of them about the purpose of the study. The informants have given a codename to hide their identity. All the data collected were destroyed after the completion of the study.

3 Results and Discussion

3.1 Features and Common Issues in Eleven Municipality in Northern Iloilo

Table 3 shows the features of the eleven municipalities in northern Iloilo and current issues encountered related to the environment.

Table 3. Common features and issues in environment of eleven municipality

Municipality	**Class**	**Feature**	**Environmental Problems and Issues**
Ajuy	2nd	Agricultural Coastal Island Mountains	• Proper Waste Disposal • Illegal Fishing • Conversion of mountain areas for corn plantation • Rice Field converted into housing
Balasan	4th	Agricultural Freshwater Mountain	• Proper Waste Disposal
Barotac Viejo	3rd	Agricultural Coastal Mountain	• Proper Waste Disposal • Illegal Fishing
Batad	5th	Agricultural Coastal	• Proper Waste Disposal • Conversion of some mountains for corn plantation • Dumping site near the creek • Cutting of trees
Carles	2nd	Coastal Island	• Proper Waste Disposal • Maintenance of the Dumping Site • Illegal Fishing

Continued on next page

Table 3 continued

Concepcion	3rd	Agricultural Coastal Island	• Proper Waste Disposal
Estancia	2nd	Coastal Island	• Dumping of garbage at the ocean • Conversion of some areas to housing
Lemery	4th	Agricultural Mountain	• Cutting of Trees for Development • Burning of rice haul
San Dionisio	4th	Agricultural Coastal Island	• Waste Disposal dumped at drainage • Illegal Fishing • Destruction of Marine habitat • Some areas converted for corn plantation
San Rafael	5th	Agricultural	• Waste Disposal • "Kaingin" or for charcoal
Sara	2nd	Agricultural Forest Reserve	• Waste Disposal • Hunting at the forest reserve

One common problem is cutting trees for road widening and housing as well as corn farming in the mountains. The cutting of trees for infrastructure without any solutions is alarming. The highlands are converted to the dwelling facilities after Typhoon Haiyan in 2013. During the road widening in northern Iloilo, thousands of trees even some of them are century-old were affected by this project. The effect of tree-cutting increases climate change and harder-hitting climate-related natural disasters [35]. Cutting of trees also disturbs animal species and harms the ecosystem [36].

Also, the dumpsite of each municipality is not appropriately organized. The dumpsites in northern Iloilo are located near the creek, in the mountain with lush vegetation, and others are inside the community. As the standard of the national government, each municipality has Material Recovery Facilities (MRF) as a site for segregation, but some are just for compliance. The dump trucks were only for the town proper; thus, other barangays have no garbage collection procedures; furthermore, biodegradable and non-biodegradable methods of collecting garbage are not appropriately followed in most of the municipalities. In barangay levels, one complaint gathered was about the collections of waste. Most towns pledged to collect all the garbage in the barangay levels. The lack of facilities and personnel hindered the plan.

The municipality mountains and rice fields were further converted into housing due to the swelling population as well as for protection during natural calamities. Then, development occurred just like urbanized cities in Metro Manila due to overpopulation and subsequently became vulnerable to problems such as solid waste, water, and air pollution [37].

Table 4 summarizes the response of the participants on the common problems identified in northern Iloilo. The lack of education among stakeholders is a common problem.

Table 4. Responses of the participants about their solutions to two major problems in their municipality

Issues	Responses
Cutting of Trees	"We already discussed the problem with DPWH and DENR. We required them to have solutions to this problem." "We encourage schools to conduct tree planting activities yearly, both coastal and land." "We even asked the students to plant trees in their backyard." "The students are not allowed to graduate without one tree planted." "The Northern Iloilo Polytechnic State College (NIPSC) was tapped to conduct researches about the trees, corns as well as solid waste management." "The barangay officials in specific housing were asked to encourage the community to plant trees."
Garbage Disposal	"The community was encouraged to participate during clean-up drive to educate them on proper disposal." "The schools were also tapped to educate the students on how to dispose of garbage properly." "We designate areas for disposal." "We are now planning to rehab our garbage site." "We collect garbage not only in Poblacion but also in NHA housing and schools. "We teach them how to segregate. The policy is no segregation, no collection."

Continued on next page

Table 4 continued	
Coastal Resources	"There is overfishing in some areas." "Others are also doing illegal fishing." "The overuse of different marine resources causes depletion of the organisms in the Visayas Sea." "The improper disposal of garbages by the locals also polluted the ocean." "Cutting of trees also destroyed our coral reef." "But above all, the oil spilled during Typhoon Haiyan destroyed our natural marine resources.

During the closed season from August to November in the Visayas Sea Visible Infrared Imaging Radiometer Suite (VIIRS) detected illegal fishing activities in Carles, Concepcion, Barotac Viejo, and Ajuy [38]. Closed Season in the Visayas Sea is not allowing any fishermen to catch fish within five months to enable small marine organisms to grow. The non-compliance of fisherfolks during the closed season because of no alternative programs provided by the government is a common problem in the Visayan Sea [39] .

Furthermore, the mangrove ecosystem around 4 hectares in Batad was severely affected by heavy oil coming from bunker fuel from Estancia during the Typhoon Haiyan [40].

The lack of political will and resourcefulness among local officials is also one of the biggest problems in the implementation of the programs. Leadership is an instrument to achieve the goal of sustainable development. LGU leaders must be risk-takers. Their strong political will and bravery can safeguard their constituents and also the local marine resources. They also encourage community participation in all activities [41].

Each Municipality in the Philippines is required to have landfills for solid waste disposal but safe for the local community. Incorrect management of LGU of their dumpsites can be hazardous to human health [41]. The attitude of the people as well as frail local government units' abilities, and lack of options to landfilling have worsened the situation [42]. Garbage left in different places within locality becomes propagation places for flies and other insects that spread contagious diseases. Also, garbage in drainage and canals blocked the sewerage system that causes floods even with minimal rainfall. The burning of waste resulted in air pollution.

The Philippines exposed to different environmental problems such as deforestation, mining impact as well as the loss of biodiversity in all forms of ecosystems despite the move of the national government to create programs to protect and preserve natural resources [43]. The lack of education caused many impacts to LGUs natural resources. Students were contributors to inappropriate waste disposal inside school premises. Thus, educational campaigns highly recommended and the role of government for strict compliance among these groups of individuals [44].

3.2 Programs and projects towards green environment

Table 5 shows the programs and projects of LGUs in northern Iloilo on the environment.

Table 5. Projects and programs of LGUs in Northern Iloilo on the environment.

Municipality	Clean and Green	Coastal Resources	Solid Waste Management
Ajuy	Tree Planting Clean-up Drive	Mangrove Planting Coastal Clean Artificial Coral Reef Close Season	Proper Segregation Campaign per barangay Educational Awareness Material Recovery Facilities (MRF) Collection of all non-biodegradable both mainland and island barangays
Balasan			
Barotac Viejo	Tree Planting	Mangrove Planting	
Batad	Tree Planting	Mangrove Planting Coastal Clea-up	
Carles		Mangrove Planting Protection of Islands Prohibiting fishing during a closed season	Collection of Waste Purchased of Dump Truck
Concepcion	Clean-up drive	Planting Mangrove per graduate in all levels Protecting marine ecosystem	Proper Waste Disposal

Continued on next page

Table 5 continued

Estancia		Mangrove Planting Coastal Clean-up Protection Managed and Unmanaged Marine Ecosystem	Proper Waste Disposal
Lemery	Tree Planting		Solid Waste Activities sponsored by Saemau of South Korea
San Dionisio	Clean-up Drive	Mangrove Planting Prohibiting fishing for natural resources Coastal Clean-up	
San Rafael	Clean-up drive Tree Planting		
Sara	Tree Planting Saving Sampunong Bolo Wildlife Sanctuary		Garbage collection

Out of the world's total 65 mangrove species, 50% are found in the mangrove forests of this country [(5)] But because of human activities and natural disturbances, mangroves in the entire archipelago are vanishing. Thus, the Philippine government initiated a Mangrove and Beach Forest Development Project (MBFDP) under the National Greening Program (NGP) with a total of P400 M as funding to protect the mangrove ecosystem. This project includes coastal areas in Northern Iloilo, especially in the municipalities of Carles, Estancia, and Concepcion as recipients of the program. Around 857 hectares from a proposed 910 hectares of mangrove plantation was established according to the Provincial Environment and Natural Resources Office (PENRO)-Iloilo. In the Office of Extension of Northern Iloilo Polytechnic State College in Estancia, Iloilo also accepted programs and projects related to mangrove restoration initiated by the national government, and non-government organization (NGO). The participation of residents in the recovery of the mangrove ecosystem improve the relationship among the people and help them function as a member of the society effectively. Also, restoring the natural habitat provide livelihood programs to the locals [(45)].

Furthermore, the Province of Iloilo created Action for Re-Greening and Transformation or ART to help restore the mangrove ecosystem in the province. Some of the municipalities in the north are coastal of Barotac Viejo, Ajuy, Concepcion, San Dionisio, Batad, Estancia and Carles because mangroves act as seawall that protects shorelines. But also private organizations like London Zoological Society project in tie-up with Municipality of the Ajuy and provincial government.

Ajuy is one of the very active municipalities in terms of the tree planting activity. They linked to various local and international organizations. In the Municipality of Lemery, the local executive encouraged the Department of Public Works and Highway (DPWH) to work together in replacing the affected mahogany trees. In Municipality of Batad, all stakeholders conducted various tree planting activities in some identified barangays and plant coconut trees in Alaspaco Dam. More than 4000 pieces of Coconut Seedlings planted at Alapasco Dam.

All barangays are required to have an MRF. One evidence found in the Municipality of San Dionisio beside the Community Environment and Natural Resources Office of northern Iloilo. Municipality of Ajuy topped the primary education sector in 2003 to work together in the execution of numerous activities, such as advocacy-cum training – workshop among high school and college students on robust management program and used waste products as instructional materials. Also, they organized a committee to inform the public about the three Rs (Recycle, reused, and reduce). Recently, together with the municipal employee, they conduct activities to inspire the local community to take part in the importance of proper waste disposal and to generate income through collecting garbage in the communal areas.

NIPSC – Lemery Campus, municipal and barangay officials together with Korean partnership, conducted various activities on solid waste management programs. In Municipality of Carles, they purchased dump trucks for the collection of garbage Barangay Poblacion and including Barangay Bancal, and provided garbage receptacles.

Municipality of Carles has constructed its Materials Recovery Facility (MRF), which contains permanent nursery, eco-park, and vermin-culture. With the fast increase of volumes of plastics, they purchased a shredder machine. In San Nicolas, San Dionisio, Iloilo, you can see the only barangay operating an MRF which has a communal garden that produces organic farming. Also, in the Municipality of Estancia, local initiatives, like putting garbage bin made of local materials, were found around town plaza.

The Philippines has a good solid waste management law, but implementation is poor. Seventeen years after the enactment of the "Ecological Solid Waste Management Act of 2000" or RA 9003, 50 complaints filed with the Office of the Ombudsman for non-compliance with the law. There are six areas used for effective Solid Waste Management (MWS) strategies, only 4 out of 12 municipalities operative approaches. Technology for composting was considered the most critical strategy to lessen problems in the garbage adopted by other LGUs. The number

of households, as well as status, play a significant contribution to the volume of waste materials produced [46]. Thus, an educational campaign organized by the LGUs can help residents the appropriate proper waste disposal to our environment and also to the health. They concluded that political will and commitment are essential for the implementation of SWM [47].

The proper operation of a robust waste management program has a positive effect on the environment and health. Residents can sell bottles, newspapers, or scrap, and stop using hazardous chemicals. Furthermore, LGU provides dump trucks to collect garbage regularly and acquirement of landfills. Also, garbage-free areas are pandemic free [48].

The banning of plastics is the trend in almost all municipalities instead used alternative eco-friendly materials. They encouraged residents to bring bag during market day. The anti-plastic ordinance in Batangas City is about prohibiting the use of plastic and Styrofoam but no cooperation and not executed adequately among the people. Planning for valid enactment of the ordinance was recommended [49].

There were many coastal activities conducted within the coastal areas in the 5th District of Iloilo. One of that was coastal clean-up drives and mangrove planting of different schools as part of their science activities. The primary purpose of this endeavor is to help clean our coastal areas to have a cleaner habitat for our marine lives as well as better recreational activities among local and international tourists. Another project in Ajuy was about preventing erosion among coastal areas. This project sponsored by BPFA and SLP of the Department of Social Welfare and Development. Universities like UP and WVSU also conducted researches to evaluate the current status of marine resources in northern Iloilo. Coastal municipalities within the district also created artificial reefs for fishes. With the help of the Bureau of Fishery and Aquatic Resources (BFAR) also implement the close season in November to February to prevent fishing of sardines, herrings, and mackerels.

"Limpyo Iloilo," a clean-up drive activity spearheaded by the Provincial Government Environment and Natural Resources Office (PGENRO), participated by various sectors in February 2020. The eleven municipalities in the 5th District of Iloilo, with the help of different stakeholders, joined in this activity [50].

Almost all municipal hall in the district adopted big class windows to attract sunlight, and electricity seldom uses. Also, at 3 p.m., all departments switch off air conditions to lessen the usage of electric power. Even other public and private establishments forced to join in this activity. Municipal plazas turned green by planting trees and ornamental plants to absorb carbon dioxide. Inside the municipal hall, plants are everywhere. Green infrastructures are building and roads with trees and vegetation [51].

3.3 Policies and Ordinances of the Municipalities on Green Environment

Table 6 reviews the policies and ordinances of the 11 municipalities in northern Iloilo.

Table 6. Ordinances on Solid Waste Management of the Municipalities in 5th District of Iloilo

Municipality	Solid Waste Management
San Rafael	An Ordinance Prohibiting Wanton Scattering Of Rubbish/Waste Products in Both Open And Covered Public/Private Spaces And Imposing Penalties for Violation An Ordinance Regulating Proper Waste Disposal In The Market Places And Nearby Stores, Restaurants or Coffeeshops, Schools and in the Different Barangays in the Municipality of San Rafael, Iloilo
Barotac Viejo	None
Ajuy	Solid Waste Management
Concepcion	Enacting the Comprehensive Solid Waste Management Ordinance of the Municipality of Concepcion Enacting the Comprehensive Solid Waste Management Ordinance of the Municipality of Concepcion Revised Comprehensive Solid Waste Management Ordinance of the Municipality of Concepcion
Sara	An Ordinance Adopting the Solid Waste Management of Sara, Iloilo
Lemery	None
San Dionisio	Comprehensive Solid Waste Management Ordinance
Batad	The Comprehensive Solid Waste Management Ordinance of the Municipality of Batad
Estancia	No Records
Balasan	Municipal Integrated Ecological Waste Management Ordinance

Continued on next page

Table 6 continued

Carles	An Ordinance Establishing A Comprehensive Solid Waste Management and Adoption of a Ten Year Solid Waste Management Plan

All the municipalities have an ordinance on solid waste management programs because they were very aware that mismanagement of waste products among the public has serious environmental effects. The LGUS' directives on solid waste are under the Ecological Solid Waste Management Act of 2000. The ordinances enacted to provide a framework for managing the growing problem of solid waste in the country. Furthermore, Republic Act 9003 gives prime importance to the roles of LGUs in achieving their respective solid wastes [52].

The implementation of the Ecological Solid Waste Act of 2000 established the National Solid Waste Management Commission (NSWMC). The NSWMC is the coordinating bodies under the National Solid Waste Management Framework, and Solid Waste Management Board (SWMB). This agency directed to formulate a 10-year local Ecological Solid Waste Management Plan in each local government unit (LGU) [53].

Table 7 Representing the two municipalities who executed environmental code.

Table 7. Municipalities in Northern Iloilo with Environmental Code

Municipality	Environmental Code
San Rafael	None
Barotac Viejo	Environment Code of the Municipality of Barotac Viejo
Ajuy	None
Concepcion	None
Sara	None
Lemery	Environment Code of the Municipality of Lemery
San Dionisio	None
Batad	None
Estancia	None
Balasan	None
Carles	None

According to Presidential Decree No. 1152 (1977) signed by former President Ferdinand E. Marcos, the Philippine Environmental Code is a law about specific environment management policies and prescribes environmental quality standards. This environmental code of each municipality taken from Republic Act No. 9003, Republic Act No 8749, Republic Act No. 7586, Presidential Decree No. 705, Presidential Decree No. 953, Presidential Decree No. 984 (1977), Presidential Decree No. 1067, Presidential Decrees No. 1151, Presidential Decree No. 1198, Presidential Decree No. 1586, Executive Order 113, Executive Order No. 247, s 1995, Letter of Instruction 1260, DENR Administrative Order No. 78, s of 1987, and DENR Administrative Order No. 1979, s of 1990. The ordinances crafted by different stakeholders in the municipality to create a general guideline to protect the environment. The Environment Code developed to consolidate the municipal's laws governing the protection of the situation, natural resources, and sustainability.

Table 8 reviews the ordinances of 11 municipalities in northern Iloilo.

Table 8. Other related ordinances on the coastal marine resources of municipalities in Northern Iloilo

Municipality	Other Related Ordinances
San Rafael	None
Barotac Viejo	None
Ajuy	None
Concepcion	An Ordinance Declaring Portions of the Municipal Waters of the Municipality of Concepcion, Specifying 3 Kilometers Radius of Baliguian Island as Marine Protected Area An Ordinance Providing for the Sustainable Management Conservation and Development of Coastal and Fishery Resources of the Municipality of Concepcion, Province of Iloilo Amending for such Purpose the Existing Fishery Ordinances of this Municipality An Ordinance Declaring the First Thursday of July Every Year as Arbor Day and Environmental Day of Concepcion, Iloilo and For Other Purposes An Ordinance Declaring Portions of the Municipal Waters of the Municipality of Concepcion as Marine Protected Area An Ordinance Mandating Elementary, Senior High School, and Collegiate Graduating Students to Conduct Mangrove Planting Activity as a Requirement Before the Graduation

Continued on next page

Table 8 continued

	An Ordinance Amending Fishery Ordinance No. 1 Series of 2008 of the Municipality of Concepcion, - Providing for the Sustainable Management Conservation and Development of Coastal and Fishery Resources of the Municipality of Concepcion, Province of Iloilo Amending for such Purpose the Existing Fishery Ordinances of this Municipality
	An Ordinance Declaring Portion of the Municipal Waters Fronting Barangay Maliog-Liog as Marine Protected Area
	An Ordinance Regulating The Gathering, Taking, Removing or Collecting of Nylon Shells And Fan Shells Or Tarab In The Territorial/Municipal Waters of the Municipality of Concepcion and Providing Penalty for Violation Thereof
	An Ordinance Regulating the Gathering, Taking, Removing or Collecting of Nylon Shells and Fan Shells or Tarab in the Territorial/Municipal Waters of the Municipality of Concepcion and Providing Penalty for Violation Thereof, as Rectified
	An Ordinance Declaring Portions of Municipal Waters Fronting Barangay Igbon, Concepcion, Iloilo as Marine Protected Area
	A Municipal Ordinance Declaring Portions of the Municipal Waters of the Municipality Of Concepcion as Marine Protected Areas
Sara	None
Lemery	None
San Dionisio	An Ordinance Establishing and Providing for the Operation And Maintenance of the Takot Lutaw Fish Sanctuary and Reserve
	An Ordinance Providing for the Sustainable Management, Conservation and Development of Coastal And Fisheries Resources of the Municipality of San Dionisio, Province of Iloilo
Batad	An Ordinance Providing for the Sustainable Management, Conservation and Development of Coastal And Fisheries Resources of the Municipality of Batad, Province of Iloilo
	An Ordinance Declaring October 1 Of Every Year as a Regular Date for Tree Planting Activity in the Municipality of Batad, Province of Iloilo
Estancia	None
Balasan	None
Carles	None

These ordinances are all focused on coastal marine resources. Activities like overfishing, illegal fishing, as well as the destruction of marine habitats triggered the population to decline. Then, LGU planned annual declaration of the closed season, but the fish stocks have not recovered [51].

But currently, northern Iloilo's marine resources were significantly affected by these illegal activities. Many species of sardines vanished. Some seagrasses, as well as mangroves, were also affected by the oil spill in 2013. Garbage disposal within coastal areas by the local community also disturbs local quality and upset marine biodiversity. The pledgees of the elected officials to maintain the natural marine habitat was low. There were ordinances created for the past decades, but the implementation is poor.

3.4 NIPSC – Contribution to green governance

NIPSC, as an academic institution, starts with evaluating all the programs and projects of the eleven municipalities through research. It is essential to document all the activities properly for further studies and innovations. The faculty formulates more research proposals related to biodiversities, policy-making, changes, etc. in the district. Furthermore, all these research outputs shared with all the community through extension programs—the community trained to become responsible green warriors. Lastly, all the useful findings implementation of green governance integrated into all curricula. Faculty of the entire NIPSC system tapped and trained on how to embed in the subject areas. Then, educational campaigns like video, fliers, teaching materials, etc. developed for public awareness. The LGUs, with the help of experts from the NIPSC, enhanced for sustainable implementations of the projects and programs and policies and ordinances related to a green environment.

They adopted the policy of limiting the usages of electricity per day. They start planting within the campus to help climate change. Students encouraged to join in the programs in Solid Waste Management, Tree planting, and others to help our environment. The use of all forms of plastics inside the campus is prohibited. The students' government requested to formulate policies about the green governance for their fellow students. Strict compliance with these policies recommended adequately.

4 Conclusions

The entire archipelago is affected by climate change. All parts of the country are suffering from the effects of Global Warming. Strong typhoons every year are evident results of human activities towards mother earth. In northern Iloilo, cutting of trees, improper waste disposals, destructions to coastal resources are common issues and problems. The LGUs are composed of eleven municipalities which enacted ordinances as well as the Environmental Code to protect the environment. Projects and programs such as tree planting in coastal and mountainous areas are sponsored by both public, private, and NGOs organized for the past years. The Solid Waste Management Programs in all barangays were implemented effectively little by little. Mangrove planting increased in number, and the MENRO monitored the areas properly. There were also tree plantings in different areas in the municipalities. All the stakeholders must work in unity to achieve the goals of a green environment for a

sustainable future spearheaded by NIPSC as academic institutions. All faculty are encouraged to conduct research, do community extension programs, and enhance knowledge about the green environment through educational activities. All the projects implemented must have close monitoring to ensure the effectiveness of all the applications. There must be an assessment of every movement to see the positive and negatives aspects of the project.

In the future, stakeholders, together with residents of the eleven municipalities, will be assessed on how these local executives implement an active green environment for effective green governance. It is also vital that the residents enthusiastically support the projects and programs of the LGUs.

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Competing interest

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