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REVUE EUROPEENNE D ETUDES EUROPEAN JOURNAL OF MILITARY STUDIES
Social Science Journal

Coastal Community Profiling and Environmental Assessment of Manila Bay Areas in Cavite City

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Abstract

Institutionalized Coastal Management or ICM is the modern way of accomplishing coastal management which lies on raising awareness on the importance of coastal management system. In the continuous *rise of population and industrial development in Cavite City particularly in Manila Bay Areas, a participatory approach for coastal management is a key for sustainability. There were 449 coastal residents surveyed, coastal mapping and water quality standard testing was also conducted. Using multiple linear regression, results show that sex has moderate collective significant effects on perception while living situation, age, year of residency and educational attainment has strong significant effects on perception. Sex and living situation have strong significant effects on involvement, age has weak non-significant effects and residency, and educational attainment has moderate non-significant effects on involvement. Sex and living situation have weak non-significant effects on willingness, age has strong significant effects and residency, and educational attainment has moderate non-significant effects on their willingness to participate in coastal management. Sex, living situation and age has moderate non-significant effects to perceived coastal threat experience while residency has weak non-significant effects and educational attainment has strong collective significant effects. Sex and living situation have strong collective significant effects on perceived factors of degradation while age has weak collective non-significant effects; residency and educational* attainment *has moderate collective non-significant effects. The water quality test passed the results on dissolved oxygen, conductivity, salinity, resistance, total dissolved solids, ORP and physico-chemical but failed on standard ph., temperature, and microbiological results particularly the fecal coliform and E. Coli. Cavite City should seriously consider replanning for coastal management.*

Index Terms: Coastal Community Profiling, Coastal Management, Coastal Mapping, Environmental Assessment and Water Quality.

I. Introduction

Based on the records, 832 municipalities out of 1,541 (or 54% of the total) are in coastal areas. It was shown that most cities are in coastal locations, with 62% of the people living in the coastal zone. Some of the problems encountered in coastal areas in the Philippines include

the loss of coastal ecosystems for fish, overfishing, which has had a negative impact on the number of fish and the deterioration of water quality (CRMP Experience, 2019).

With all the problems and challenges caused by various activities within coastal zones, such as decreased numbers of fish and other marine resources, endangered mangrove forests, water pollution, and increasing poverty levels among residents, the Philippines is now confronted with the task of managing coastal and marine resources. Coastal management initiatives began two decades ago in the Philippines with projects and programs carried out in the communities. To address the issues that arise from coastal zones, the country is planning and implementing integrated coastal management. The Department of Environment and Natural Resources used a new technique for coastal resource management, which is being carried out by the United States Agency for International Development. This highlighted the necessity of engaging government bodies in CRM support. CRM adheres to the sustainability thrust, that elaborates on the long-term impacts of coastal management initiatives. The necessity of coordinating CRM operations at the local and national levels is emphasized to coordinate with resource structure management at all levels of government. An effective and structured framework for assessing efforts and performance at the level of local government applying optimal results for coastal resource management is described. The significance of teamwork, focus penetration, awareness, and communication on project integration responsibilities was emphasized.

It is also vital to promote the use of multidisciplinary approaches and beneficiaries to address multidimensional development concerns. The collaboration of stakeholders is required for an efficient management system (PEMSEA, 2019).

II. Human-Environmental Interactions

Human Natural Connections are communications that occur between human and environment. Human social frameworks and settings are perplexingly complex and diverse frameworks (Marten, 2001).

A. Human social system

To examine Human Natural Connections, it is necessary to understand the specific characteristics of the human social system. The type of society has a significant impact on people's attitudes toward nature, their behavior, and, as a result, their impact on the environment. Population size, social affiliation, values, innovation, abundance, training, and information are all important characteristics of human social structures. Particularly, esteems and information have a strong influence on people's "perspectives on life" and hence characterize how they act. The available innovation then limits the decision of potential activities.

Individuals change the environment to achieve their goals and gain benefits (Biological System Administrations). These Environment Administrations are critical for human success and include, for example, the arrangement of assets like water, wood, food, energy, data, cultivable land, and so on. Individuals clearly influence the environment from a variety of perspectives by utilizing these resources. Furthermore, people routinely reorganize current surroundings to achieve new ones that appear to be more convincing in meeting their needs.

B. Coevolution and Coadaptation

Coevolution and coadaptation are concepts that describe the never-ending interaction of shared change and change between human social systems and the environment. The activities of individuals have an impact on the environment. However, the environment also has an impact on human activities. Human social frameworks must adapt to their specific climate. Individuals are compelled to respond when natural phenomena such as tempests and seismic earthquakes occur. These everyday wonders can be directly or indirectly caused by human actions, and they have an impact on human behavior as people react to new situations.

C. Drivers-Pressures-State-Impact-Response

The European Ecological Office (EEA) developed the Drivers-Pressing factors State-Effect Reaction (DPSIR) model, which is used to evaluate and manage ecological issues. This logical structure was adopted by several public and European organizations. It identifies the various causal chains of linkages between human activities and environmental degradation.

III. Integrated Coastal Management

The primary goal of the integrated coastal management (ICM) method is to integrate and coordinate various coastal and marine management operations. ICM covers the management of human activities affecting the long-term utilization of goods and services produced by coastal and marine environments. Through the following strategies, this method overcomes the constraints of traditional sectoral management: 1. Increasing awareness of the distinctiveness of the coastal resource system. ICM informs all stakeholders, through an integrated management strategy, that various sectors are involved in protecting the preservation of coastal areas, since their collective actions affect the overall environment. Single-sector management, on either hand, often seeks to account the numerous effects of various usage of coastal resources. 2. Bringing together ecological, social, and economic resources. This guarantees that ICM management plans are considerate of the various users and uses of coastal resource systems. 3. Promoting interdisciplinary methods and collaboration between users and recipients to handle challenging development issues. Coastal management activities by stakeholders involved are seldom duplicated or contradictory because of coordination, helps in effective and efficient management system (PEMSEA, 2020).

IV. Hypothesis

The study of coastal resource attitudes and expectations shows that, while there have been proven successes in community-based integrated coastal management initiatives throughout the Philippines, potential and difficulties remain to be fully realized the benefits recognized by local people (Wagner, 2012).

Stated in the Mainstreaming Coastal Resource Management in Local Governance, the first steps in mechanism of CRM are the coastal environment profiling which includes existing information and data complied, participatory coastal resource assessments completed, scientific biophysical assessment completed, and coastal environment profile completed (CRM DENR, 2019).

H1 Socio-demographic variables has no significant effects to coastal management perception, involvement, and willingness to participate.

H2 Socio-demographic variables has no significant effects participants perceived coastal threats experienced and factors of degradation

V. Coastal Mapping and Environmental Assessment

A. Coastal Mapping

The technique of mapping coastal ecosystems illustrates features, processes, and evolution. For individuals studying coastal systems, this visual representation of the coastlines provides an essential knowledge in marine sciences, geosciences, and engineering. Coastal ecosystems are dynamic systems with a variety of energy and dynamic sources. The common ground for shoreline and coastal topography mapping is the shaping of landforms and occurrences because of activities and processes that have drawn on various types of coasts throughout thousands of years.

Shore and coastal terrain maps may serve diverse functions, but they all serve the same purpose: to promote clear communication. Maps, whether hard copy or digital, and regardless of the output, create a platform for data handling. Furthermore, it allows for the display of all synthesized information, the interpretation and analysis of the past and present, and the prediction of future coastal or living environment (Perez-Alberti, 2021).

B. Coastal Environment Assessment

Water Quality In-situ Parameters. The measuring of chemical and physical properties in a water body during the time of sampling is referred to as in situ water quality sampling. Because the measured parameters change so quickly, this is usually done (for example temperature). If the field instruments are validated, the data is just as reliable as data acquired in a laboratory. In situ data are frequently necessary to help interpret other water quality results. A multi-parameter water quality instrument is the most often used way of assessing in situ water quality. A multi-parameter water quality instrument's sonde is a group of probes that measure individual parameters. While probe configurations differ depending on the instrument, the most frequent are Dissolved oxygen (DO), temperature, pH, electrical conductivity (EC), turbidity, and depth are all factors to consider. There are probes available that detect chlorophyll, oxidation reduction potential (ORP), ammonia, ammonium, and other factors chloride and nitrate (Environmental Protection (Water) Policy 2009, 2018 Version).

Water Quality Laboratory Parameters

Physico-Chemical Laboratory Parameters

Routine physical and chemical analysis of drinking water includes determination of the following parameters: color, odor, turbidity, pH, alkalinity, calcium, chloride, conductivity, iron, magnesium, sulfate, total dissolved solids (TDS), total hardness, and calcium and magnesium hardness (DOEH, 2014).

a. Physico-Chemical Laboratory Parameters

Microbiological water analysis looks for biological indicators as an indication of fecal contamination instead of testing for specific pathogens. Routine microbial testing of water sources, recreation waters, and environment waters is vital for public health protection (rapidmicrobiology.com, 2022).

VI. Methodology

The variables included in community profiling was based on participatory tool: socio-economic survey including the roles of residents in coastal management utilized in surveys are based on Coastal Management Guidebook Series.

Regression was used to analyze the significant effects of socio-demographic variables to awareness, involvement, and willingness to participate in Coastal Management; the same with perceived coastal threats experienced and factors of degradation.

Coastal Environmental Assessment are mainly based on Coastal Resource Management Planning implemented by Department of Environment and Natural Resources in 2004 including existing information and data compiled, participatory coastal resource assessments, scientific biophysical baseline assessments and coastal environment profile.

There were 449 residents surveyed. The researchers considered one household representative per house of every 1st to 4th or 10th house that lies within 2 kilometers range along Manila Bay Shoreline in Cavite City, defending on number of houses per barangay.

Coastal Mapping in 15 Barangays was conducted including the including the water sampling location map. Water Quality In-Situ Parameters and Water Quality Laboratory Parameters including Physico-Chemical Laboratory Parameters and Microbiological Laboratory Parameters were also conducted.

VII. Results and Discussion

Socio-demographic Profile

The participants are dominated by male, which belongs to a family living with children, mostly are aged 18-26 and 27-36, usually has 4-7 members in family and lived more than 10 years in Cavite City. They perceived that their property is permanently owned which made from half wood and cement, and the main source of power is electricity. Their water source is mostly deep well that they owned. Their toilet is water sealed and they use LPG for cooking. Their primary source of income is from fishing. They mostly belong to ethnic group Tagalog and speak Tagalog, most are high school graduate, and their house and lot was owned. Family is usually headed by men, with the monthly family income of 5,000 to 9999; where foods, water and electricity are major expenditures.

They pay for the waste disposal 2-3 times a week where most of their waste are leftovers, plastic bottles and recyclable cups and bags. They have poured flush sanitary facilities and they dispose water waste in canal and sea.

They daily consume rice, hence eat breads, vegetables, fruits, meat, fish/seafoods, eggs and processed foods every other day. They eat rice cakes and milk 3 times a week and others for one per week. City market is primary food source and mobile phone as main source of communication.

Coastal Environment Situation

They believed that their current sea situation is good, and canal as common coastal

establishment and infrastructure hence believed that the cleanliness of sea can still be maintain and marine resources is perceived as important. They have varieties of fish catch, mussels and oysters are primary shellfish and catches squids. They also seen fish cages in their sea.

The participants perceived highly agree on the concept of coastal management hence slightly involved in the activities of coastal management. They believed that it increases and protect the coastal resources, generate income and protection for disaster. They were very willing to participate in coastal management.

Threat and Factors of Degradation

Poor water quality, litter, endangered species, and loss of catch as serious problems that they usually address by barangay officials. They believed that increased migration and population growth are reasons why the problems arise.

Regression results

Using multiple linear regression, result shows that sex has moderate non-significant effects on perception, presented as X1, X2, and Y, ($F(1, 11) = 5.63$, $p = .037$, $R2 = 0.34$, $R2adj = 0.28$), Living situation presented as X1, X2, X3, X4, and Y, ($F(1, 11) = 10.14$, $p = .009$, $R2 = 0.48$, $R2adj = 0.43$, age presented as X1, X2, X3, X4, X5, X6, X7, and Y, ($F(1, 11) = 13.77$, $p = .003$, $R2 = 0.56$, $R2adj = 0.52$, year of residency presented as X1, X2, X3, X4, and Y, ($F(2, 10) = 7.12$, $p = .012$, $R2 = 0.59$, $R2adj = 0.5$) and educational attainment presented as X1, X2, X3, X4, X5, and Y, ($F(1, 11) = 6.19$, $p = .030$, $R2 = 0.36$, $R2adj = 0.3$) has strong significant effects on perception. Sex presented as X1, X2, and Y, ($F(1, 11) = 13.9$, $p = .003$, $R2 = 0.56$, $R2adj = 0.52$) and living situation presented as X1, X2, X3, X4, and Y, ($F(2, 10) = 8$, $p = .008$, $R2 = 0.62$, $R2adj = 0.54$) have strong significant effects on involvement, age presented as X1, and Y, ($F(1, 11) = 1.31$, $p = .276$, $R2 = 0.11$, $R2adj = 0.03$) has weak non-significant effects and residency as X1, X2, X3, X4, and Y, ($F(1, 11) = 3.19$, $p = .102$, $R2 = 0.22$, $R2adj = 0.15$), and educational attainment presented X1, X2, X3, X4, X5, and Y, ($F(1, 11) = 5.27$, $p = .042$, $R2 = 0.32$, $R2adj = 0.26$) has moderate non-significant effects on involvement. Sex presented as X1, X2, and Y, ($F(1, 11) = 2.06$, $p = .179$, $R2 = 0.16$, $R2adj = 0.08$) and living situation presented as X1, X2, X3, X4, and Y, ($F(1, 11) = 1.89$, $p = .197$, $R2 = 0.15$, $R2adj = 0.07$) have weak non-significant effects on willingness, age presented as X1, X2, X3, X4, X5, X6, and Y, ($F(1, 11) = 15.98$, $p = .002$, $R2 = 0.59$, $R2adj = 0.56$) has strong significant effects and residency as X1, X2, X3, X4, and Y, ($F(1, 11) = 5.95$, $p = .033$, $R2 = 0.35$, $R2adj = 0.29$), and educational attainment presented as X1, X2, X3, X4, X5, and Y, ($F(1, 11) = 3.86$, $p = .075$, $R2 = 0.26$, $R2adj = 0.19$) has moderate non-significant effects on their willingness to participate in coastal management. Sex presented as X1, X2, and Y, ($F(1, 11) = 0.23$, $p = .642$, $R2 = 0.02$, $R2adj = -0.07$), living situation presented as X1, X2, X3, X4, and Y, ($F(1, 11) = 2.63$, $p = .133$, $R2 = 0.19$, $R2adj = 0.12$) and age as X1, X2, X3, X4, X5, X6, X7, and Y, ($F(1, 11) = 2.02$, $p = .183$, $R2 = 0.16$, $R2adj = 0.08$) has moderate collective non-significant effects to perceived coastal constraints while residency as X1, X2, X3, X4, and Y, ($F(1, 11) = 1.57$, $p = .236$, $R2 = 0.13$, $R2adj = 0.05$) has weak collective non-significant effects and educational attainment as has strong collective significant effects. Sex represented as X1, X2, and Y, ($F(1, 11) = 4.52$, $p = .057$, $R2 = 0.29$, $R2adj = 0.23$) and living situation as X1, X2, X3, X4, and Y, ($F(2, 10) = 5.75$, $p = .022$, $R2 = 0.53$, $R2adj = 0.44$) have strong collective significant effects on perceived factors of degradation while age as X1, X2, X3, X4, X5, X6, X7, and Y, ($F(2, 10) = 10.92$, $p = .003$, $R2 = 0.69$, $R2adj = 0.62$) has weak collective non-significant effects; residency as X1, X2, X3, X4, and Y, ($F(1, 11) = 5.99$, $p = .032$, $R2 = 0.35$, $R2adj = 0.29$) and educational attainment as X1, X2, X3, X4, X5,

and Y, (F(1, 11) = 3.73, p = .080, R2 = 0.25, R2adj = 0.19) has moderate collective non-significant effects.

Coastal Mapping and Environmental Assessment

The study area covers 15 barangays located in Cavite City. These barangays are Barangay 8, 11, 13, 14, 29, 29-A, 30, 36, 36-A, 37, 37-A, 48, 48-A, 49 and 49-A (Figure 1). Its shoreline extents 4.42 kilometers from Barangay 8 to Barangay 49, Cavite City.

Water Quality of Coastal Area in Cavite City

Water Quality Assessment is necessary to determine the suitability of a water body for its intended use. Cavite City was classified as Class SB Marine Water. In line with this, water quality test intend to determine if the pointed sampling sites meet the standard provided in the DENR Administrative Order 2016-08 "Water Quality Guidelines and General Effluent Standards of 2016" which defines the usage of Class SB Marine Water that it is intended for Fishery Water Class II which are suitable for commercial propagation of shellfish and intended as spawning areas for milkfish (Chanos chanos) and other similar species; tourist zones intended for ecotourism and recreational activities; and recreational water class I which intended for primary contact recreation such as bathing, swimming, skin diving, etc. The result of the data will suggest the extent of treatment that needs to be done to conserve the marine water.

Water Quality Parameters Used in Coastal Area of Cavite City

The water quality parameters to be measured were categorized as primary. Primary parameters are the required minimum water quality parameters to be monitored for each water body. These are Color, Dissolved Oxygen, Fecal Coliform, Nitrate as NO3-N, pH, Phosphate, Temperature and Total Suspended Solids and added the E. coli pathogen.

To support the result of the water quality parameters, knowledge, attitude, and practices of the residents were also determined to assess if there is a significant correlation between to results from KAP survey and water quality test results. Also, the assessment of coastal land uses was determined which will be correlated to the result of the water quality test.

Water Quality In-situ Parameters

Collecting of water samples through grab water quality method and an on-site water quality test was conducted in the surface water of the coastal area during the wet season but in a sunny day. Based on the table below, there are eight (8) in-situ parameters conducted in the three points of coastal area in Cavite City namely barangay 8, 13 and 49 using the calibrated handheld monitoring probes. According to the computed averages of the results, the dissolved oxygen ranges 8.5 to 9.0 with passed standard for the Class SB (Water Quality Guidelines for Primary Parameters, 2016). Conductivity has consistent value of 48.0 while Salinity has 33.2 to 33.7 % where in the two parameters has a normal range of marine water from which conductivity has an indirect measurement with the salinity of the water. In addition, the two parameters are the indicators of the dissolved ions in the water. Also, TDS (total dissolved solids) range with 24.0 to 24.1 g/L where in salt water has more than 10,000 mg/L (Texas Water Development Board, n.d.) which has a normal range for marine water. The electrical resistivity of water has a consistent value of 0.023 Ωm from which the water with high value of dissolved salts has a lower resistivity (Aqua read, 2020). pH or power of hydrogen range from 8.5 to 8.6 from which barangay 13 and 49 passed the SB standard while Barangay 8 was

failed to the set standard for class SB (Water Quality Guidelines for Primary Parameters, 2016). In line with this, the alkalinity of the ocean is governed by the balance between the ions that was generated through the process of mineral weathering and removal of ions via the formation of the calcium carbonate. Oxidation-Reduction Process (ORP) has a range of -112 to -103.33 from which measure the relative oxidizing power of the marine water (Holmes-Farley, n.d.). It was justifying that the lower the pH of water usually result with a high ORP readings (Sensorex, 2020) and negative ORP values indicates that a substance is a reducing agent where in sodium is known as a reducing agent while chlorine are oxidizing agent (Encyclopedia Britannica, 2022) from that was the two often ions present in the sea water (Helmenstine, 2019). Temperature ranges 31.40 ˚C to 32˚C from which failed with the set standard for class SB. The major source of heat in the ocean is sunlight (Lindsey and Dahlman, 2020) but some causes of high temperatures in ocean is the absorption on most of the heat from the greenhouse emissions that affect the marine species and ecosystem (IUCN, n.d.).

Water Sampling Stations in Coastal Area of Cavite City

Water sampling stations were established in Brgy. 8, Brgy. 13 and Brgy. 48 of Cavite City. In-situ parameters were gathered such as Dissolved Oxygen (DO), conductivity, Total Dissolved Solids (TDS), salinity, resistance, pH and ORP. Water samples were also collected for testing to third party accredited water testing laboratory wherein physico-chemical parameters such as color, nitrate, phosphate, and Total Suspended Solids (TSS) and microbiological parameters which includes fecal coliform and E. coli.

Water Quality Laboratory Parameters

a. Physico-Chemical Laboratory Parameters

The water samples were collected during the wet season through grab sampling method and delivered to DOST-Cavite Water and Wastewater Testing Center. Physico-chemical properties of water indicates the exact information about the quality of the water and will compare to the obtained results with the provided standard values (Patil et al., 2012). Based on the results of the water quality, color has a consistent value of <1 which passed to the standard for Class SB (Water Quality Guidelines for Primary Parameters, 2016). Color of water indicates the presence of a range of chemical and organic pollutants such as algae, rust from iron pipes, bacteria etc. and an effective way to determine the nature of water pollution (State Water Resources Control Board, n.d.), however in the samples conducted in the coastal area of Cavite City, it is turbid with presence of particulates. Total Suspended Solids (TSS) ranged from 38 to 40 mg/L which has passed the Class SB (Water Quality Guidelines for Primary Parameters, 2016), these parameters indicate both organic and inorganic particles of all sizes that contributes to the suspended solid concentration of water and important factor in observing water clarity (Fondriest Environmental Learning Center, 2022). Phosphates level in the coastal area of Cavite City ranges from <0.06 to 0.08 which has passed in the set standard for Class SB (Water Quality Guidelines for Primary Parameters, 2016) which was supported by Karl and Bjorkman, 2015 stated that the dissolved organic phosphorus concentration ranges between 0.06 and 0.54µM in the ocean surface waters but can be elevated or affected due to the enhanced productivity in the coastal waters as mentioned by Lin et. al, 2012 (Naush et. al, 2018). Lastly, Nitrate values of the coastal water in Cavite City ranges from 0.27 to 0.28 mg/L which also passed in the set standard of class SB (Water Quality Guidelines for Primary Parameters, 2016) this parameter is a major nutrient responsible for the photosynthesis. In addition, it is essential as plant nutrient, but in excess amounts may cause significant water quality problems together with nutrient like phosphorus (US EPA, 2012). All the mentioned

parameters were passed to the Class SB of DAO 2016-08 (Water Quality Guidelines for Primary Parameters, 2016).

Microbiological Laboratory Parameters

Water samples were collected through grab sampling method using the sterile water bottles. Microbiological analysis in the water quality indicates the organisms as a sign of fecal contaminations rather than testing a specific pathogen, though during the ocular field survey the researchers noticed the domestic set-up of the residents in the coastal area and added the E. coli as one of the important pathogens to distinguish. Based on the results below, Fecal Coliform test ranges from 2400 to 9200 MPN/100 mL which resulted to a failed value based on the class SB standard for primary parameters (Water Quality Guidelines for Primary Parameters, 2016). Fecal coliform is an indicator of a fecal contamination from the warm-blooded animals (New York State Department of Health, 2017) from which the class SB was intended for recreational purposes, swimming in waters with high levels of fecal coliform bacteria increases the chances of developing illnesses such as fever, nausea, or stomach from the exposure to the pathogens present in the water (Water Research Center, 2020). Furthermore, the E. coli values in the coastal area ranges from 2400 to 5400 MPN/100mL which means that the specific pathogen has a high level of contamination from feces, or stool, of human or animals. According to WHO drinking water risk assessment, 100 MPN/100ml is adjudged as high risk (as mentioned by Ondonkor and Mahami, 2020) and as class SB is intended also for recreation purposes, increasing risk of exposure to the pathogens can cause illnesses (Clean Lakes Alliance.org, n.d.).

VIII. Conclusion

This research contributes to generating knowledge in profiling a coastal community as well as conducting coastal assessment such as mapping tool and water quality testing based on predetermine standard. This also provide education on connecting quantitative data from survey to mapping tools and laboratory results such as water quality assessments.

This research determines the following

1) The results of water quality test particularly in Microbial Laboratory Parameters such as the high level of fecal coliform and E. Coli is associated with the water waste disposal of the coastal community in Cavite City. In present, there are no water waste treatment facilities available in coastal barangays which made the people to dispose their water waste in canal that also connected to Manila Bays or directly dispose it to the sea.
2) There is wide understanding about the concept of coastal management and the coastal community positively believed that the coastal resources can still be sustain so it can still be beneficial to community. Hence, in the past campaign and implementation of government regarding coastal management, full involvement of residents wasn't fully achieved. It is because the positive short- and long-term impact of coastal management has not yet realized by the residents. Fortunately, the people show high level of willingness to participate in coastal management.
3) The increasing population due to migration and others particularly in coastal barangays that lies in Manila Bay Cavite City leads to water pollution as solid and water waste directly dispose to sea. An increase in population may lead to continuous consumption

of aquatic resources, may lead to saturation leading to extinction of available catch or coastal resources.

4) The study determined that some demographic profile is an indicator that has collective significant effects on the perception, involvement, and willingness to participate in coastal management. In this way, this can be used as strategy on how government persuade and involved community participation, widen engagement, and extend their approaches.

IX. Recommendation

Based on logical analysis of the results, the researchers come up with the following recommendation.

Cavite City should be concern on the high level of fecal coliform and E. Coli in the sea, since it is one of the major sources of economic activities of the community that resides along with it, replanning on coastal management is necessary. Particularly, in identifying the effective and efficient water waste treatment facilities, to preserve the bays and all its bounty resources.

Awareness on Coastal Management is already achieved, the next step is the effective implementation. Involvement is necessary particularly the participation of residents. A mechanism for monitoring and evaluation should be established. The government should ask help from the participation of academe, industry, and other organizations as requirements. It is also important to establish the incentives and motivations for the participants to fully engaged themselves in this coastal management.

In present the city has reclamation plan for the overpopulated coastal community. Even it is not yet implemented the city should start strict regulations on solid and water waste management. The barangay officials should have weekly coastal clean-up, planting of coral reefs, planting of sea grass, meetings, monitoring and reporting activities.

Living situation has effects on perception of coastal management then the government start campaigning coastal management that reach family level such involvement of members and relatives. In terms of age, then they can do a campaign in the academe, industries, organizations etc. In terms of resident status then they can reach out barangays to do the campaigning involving voters to campaign activities. In educational attainment then, government should reach out of school youth to educate them. In terms of involvement, sex and living situation has strong effects; then barangay Gender and Development Unit can also advocate for the activities of coastal management. If age has a significant effect on willingness to participate then the activities should be aligned with physical activity associated with age, for example extreme activities should be for youth, waste management is for middle age and decision making is for elder. If educational attainment has strong effect on perceived coastal threats, then literacy on coastal management should be well established and shared. Then if sex and living situation affects the perceived factors of degradation of coastal resources then barangay official should also reach community in monitoring and evaluation of coastal environment and give them to chance to participate in meetings, planning and evaluation.

The researchers would like to thank Cavite State University for funding this CRG research for international dissemination.

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