

# Proposed Coastal Resource Management Program for An Island Municipality

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**Abstract** – *This study aimed to assess the implementation of Coastal Resource Management ((CRM) in the Island Municipality in the Province of Batangas. Specifically, it attempted to attain the following objectives: to determine the extent of implementation of CRM with respect to solid waste management, marine protected areas and climate change adaptation as to financial and human resources, maintenance and monitoring; to assess the problems encountered in the implementation of CRM; to test significant difference between the extent of implementation of CRM and the problems encountered by the two groups of respondents; to find out significant relationship between the extent of implementation and the problems encountered in the implementation of CRM; and to propose a sustainable Coastal Resource Management Program to enhance its implementation. The study utilized the descriptive method. The participants of the study were LGU administrative officials and department heads and barangay officials, and the coastal community members composed of the residents, business owners and all other stakeholders in the island Municipality of Tingloy, Batangas. The researcher identified 390 participants out of 19,000 population - 11 municipal elected officials, 10 department heads, 130 barangay officials, and 239 community members.*

*Findings revealed that Coastal Resource Management Programs in terms of solid waste management, marine protected areas, and climate change adaptation were all implemented in the Island Municipality. Most common identified problems are on Financial Resources in the areas of Solid Waste Management and Climate Change Adaptation; and on Human Resources with respect to Marine Protected Areas. . There were significant relationships between implementation and problems encountered in the areas of solid waste management and climate change adaptation.. A program to enhance the implementation of CRM in terms of Solid Waste Management, Marine Protected Areas and Climate Change Adaptation was proposed.*

**Keywords** – Coastal Resource Management(CRM); Solid Waste Management (SWM) Marine Protected Areas(MPAs); Climate Change Adaptation (CCA)

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## INTRODUCTION

Coastal resource management (CRM) is the sustainable use, development and management of coastal resources. CRM is also an approach that involves the cooperation of the community and stakeholders that benefit from various coastal resources, for appropriate management and sustainable development of these resources. The support and participation of the community, government and other sectors is also directly required towards the planning and discerning appropriate use of the coastal resources. Also factors such as economics, political, social and cultural must be put into consideration in abstracting an applicable and fitting CRM.

Since the objectives of CRM are aligned towards the welfare and development of coastal areas, the environment that surrounds it must also be put into consideration, such as the land, mountains and sea that directly affect the coastal resources, in order to maintain the balance of order among natural ecosystems. Therefore, in order to attain appropriate CRM program, there is a need for municipalities to 1) organize appropriate programs and practices on solid waste management, 2) establish and identify marine protected areas, and 3) implement climate change adaptation strategies. Coastal Resource Management Program (CRMP) therefore has been created to teach people to rehabilitate and preserve coastal and marine resources, needs to be evaluated in terms of its stated and realized goals involving principal stakeholders [1].

The central focus of this study is come up with an enhanced and sustainable CRM program for the Municipality of Tingloy with regards to its solid waste management program, marine protected areas and climate change adaptation, to protect and conserve its coastal resources.

The Ecological Solid Waste Management Act (Republic Law No. 9003) in the Philippines consolidated the management system and required Local Government

Units (LGUs) to implement new comprehensive solid waste management systems (SWMs). As of today, most of the coastal municipalities still lack on the ability and awareness on implementing an effective solid waste management system.

Another activity that should be considered in implementing CRM is the establishment of Marine Protected Areas (MPA). MPAs is a portion of the ocean where the government has set human activity restrictions. In the Philippines, about 500 MPAs are currently recorded although less than 10% of these are effectively managed [2]. Without effective management, local anthropogenic threats which are inevitable, like increased in population and coastal settlement, habitat modification, coastal pollution, Illegal fishing and destructive fishing pose greater risk to MPAs.

In the past few years there were collaborative efforts and initiatives from government, non-government organizations and local communities that aims toward preservation and maintenance of coastal resources especially the marine protected areas. Similar to other coastal areas in the Philippines and the world, the coast of Tingloy may suffer a tremendous threat if the community and stakeholders neglect the suitable coastal resource management. Also, the researcher wants to find out the status of the coastal area and the CRM practices conducted by the community. It is hoped that the findings will serve as basis of the Local Government Unit of Tingloy in creating a Sustainable Coastal Resources Management Plan.

Results of the study will be the basis for developing and organizing a CRM program that is appropriate and applicable for a fifth-class island municipality with concerns to its resident's socio-economic status, man power and geographical location, draft and implement policies concerning CRM and to make all of the sectors of the community involve from local government officials, and non-government organization, stakeholders, business owners and local residents.

#### **OBJECTIVES OF THE STUDY**

This study aims to assess the implementation of Coastal Resource Management (CRM) of the Municipality of Tingloy, Batangas. Specifically the study aims to attain the following objectives: to determine the extent of implementation of CRM with respect to solid waste management, marine protected areas and climate change adaptation as to financial and human resources, maintenance and monitoring; to assess the problems encountered in the implementation of

CRM; to test significant difference between the extent of implementation of CRM and the problems encountered by the two groups of respondents; to find out significant relationship between the extent of implementation and the problems encountered in the implementation of CRM; and to propose a sustainable Coastal Resource Management Program to enhance its implementation.

#### **MATERIALS AND METHODS**

##### **Research Design**

The researcher used quantitative approach under descriptive method of research to acquire adequate data, figures and facts relevant to the study. As cited by Almanzor et. al [3] descriptive design supports presentation of facts concerning the status and nature of anything through a given set of conditions.

It is deemed significant to use this method in gathering data because the study involves survey and description of existing facts on coastal resource management implementation and problems encountered in the coastal areas of Tingloy, in terms of financial resources, human resources, maintenance and monitoring. The method is also appropriate for the interpretation of data and information collected

##### **Participants of the Study**

The researchers used random sampling in determining the appropriate number of respondents for this study. The researchers identified 390 participants: 11 municipal elected officials, 10 department heads, 130 barangay officials, and 239 community members were identified out of 390.

##### **Instrument**

The questionnaire was used to gather data as regards to the respondents' notions in the study. To establish content validity and reliability of the questionnaire. The first part of the questionnaire aims to gather data on the extent of practice of coastal resource management in the municipality of Tingloy, Province of Batangas. The second part aims to cover the status of coastal areas of the said municipality. The third part is concerned with the coastal areas in the municipality can be prospected as tourist destination. In constructing the questionnaire, the researcher made some readings on related published and unpublished literatures to the study.

##### **Data Gathering Procedure**

To seek for permission to administer the questionnaire in the fifteen (15) barangays of Tingloy, a researcher made and sent a letter to the Municipal Mayor

and to each Respective Barangay Chairperson. After the approval of the Municipal Mayor and of the (15) barangay chairpersons the questionnaire was administered to the target respondents. The responses of the Tingloyeños on the items in the questionnaire were measured using 4-point scale with 4 as the highest and 1 as the lowest with corresponding verbal interpretations.

### Data Analysis

The needed data were tallied, encoded and interpreted using different statistical tools. These include frequency count and mean which was use to present the profile of the councilors and the eextent of iimplementation of ccoastal rresource mmanagement pprogram and the pproblems eencountered in the ccoastal rresource mmanagement pprogram. Inferential statistics was also used such as Independent Sample t-test, Analysis of Variance and Pearson Product Moment Correlation. In addition, al data were treated using a statistical software known as SPSS version 26 to further interpret the results of the study.

### Ethical Considerations

The respondents participating in this study had an informed consent and were given assurance that the necessary ethical considerations shall be observed, more importantly that their responses would be treated with utmost confidentiality and be used only for the purpose of this study only.

## RESULTS AND DISCUSSION

**Table 1**  
**Implementation of Coastal Resource Management Program**

	Weighted Mean	Verbal Interpretation	Rank
1. Solid Waste	2.81	Implemented	3
2. Marine Protected Areas	2.93	Implemented	2
3. Climate Change Adaptation	2.96	Implemented	1
<b>Composite Mean</b>	<b>2.90</b>	<b>Implemented</b>	

Legend: 3.50 – 4.00 = Highly Implemented; 2.50 – 3.49 = Implemented; 1.50 – 2.49 = Less Implemented; 1.00 – 1.49 = Not Implemented

As taken from the table above, when it comes to the extent to which Coastal resource Management programs

are implemented the data revealed that to an extent it was implemented comprising a weighted mean of 2.90. The extents to which CRM programs are implemented are analyzed into three categories – solid waste, marine protected areas and climate change adaptation. Based on the data, among the three categories listed down, ‘Climate Change Adaptation’ ranked the highest with 2.96 weighted mean. This is because the municipality has been keen ever since about the effects and possible changes brought about climate change. Many initiatives has been formulated about coastal resource management program in terms climate change adaptation. There is also a need for municipalities to attain appropriate CRM program, which includes implementation of climate change adaptation strategies.

Furthermore, Dumaop [4] recognized the World Wide Fund for Wildlife (WWF)-Philippines, known locally as Kabang. Since 1998 Kalikasan ng Pilipinas (KKP) has been carrying out conservation activities at Tingloy. It began with the establishment of the Mabini-Tingloy Coastal Area Development Council, a Community-based, multi-sectoral, intermunicipal council (MATINGCADC) which it envisages as the one which ultimately manages the rich marine resources in the region. To ensure this further, the project reinforced the coastal law enforcer "BantayDagat" organized by the local council. "BantayDagat" patrols the municipal waters of Mabini and Tingloy every night until wide daylight to increase the level of safety and the area 's protection from illegal fishermen. In addition, the Municipality of Tingloy on Maricaban Island in Batangas Province recently designated 22.01 hectares (54.4 acres) of thriving coral reef habitat as a marine protected area (MPA), only the second MPA to be established in the municipality. Located within the most biologically diverse waters on Earth, the new MPA protects against localized threats while bolstering an emerging ecotourism industry. The new protected area was championed by the local government and community of Tingloy, under the leadership of Mayor Mark Laurence F. Alvarez, along with several collaborating institutions, including the California Academy of Sciences, De La Salle University-Manila, and the local non-profits Pusod Inc. and the SEA Institute - VIP.

Meanwhile, solid waste management ranked last comprising 2.81 weighted mean. This is because there is no consistency in the implementation of solid waste management. Although several measures and initiatives are laid down the implementation of such lacks stability and regularity. In accordance with this, it has been a

difficult task for the municipality to manage solid waste as mandated by the National Solid Waste Commission. Tingloy has a very limited source of income and is very dependent on Internal Revenue Allotment (IRA) from the national government to support the basic needs of our constituents. It also does various fund sourcing from different Non-Government Organizations (NGOs) and National Government Agencies (NGAs) just to comply to the needs of our community and to adjust with the fast growing population. Until now, the rate of compliance is quite low. It needs a lot of passion, acceptance of the responsibilities and a very strong political will to make the salient provisions doable at the local level.

In addition, the LGU aims to sustain the establishment of MRFs in every barangay or cluster of barangays based on the applicability and preference of the barangays. In line with the Medium Term Philippine Development Plan, the LGU aims to achieve 50% waste diversion from disposal facilities through the implementation of waste avoidance, segregation, recovery and recycling. The LGU have plan to establish a waste disposal facility but most preferably an Sanitary Land fill Category I. Diapers and napkins shall be collected, shredded as means to manage special waste in which there will be a collection point on selected areas to be put a shredder machine in which they will be collected and shredded and will be done to Vermi Composting in which the end product will be a Soil Fertility Enhancer.

following indicators are a problem encountered in the coastal resource management program. Among the following item, solid waste gains the highest weighted mean of 2.80, which the respondents assessed as a problem encountered in the coastal resource management program. As a fifth class and an island municipality, solid waste management as required by the National Solid Waste Commission has been a challenging task for the municipality. Tingloy has an extremely small income source and is very dependent on the Internal Revenue Allocation (IRA) of the national government. Aside from not enough funds, Tingloy island and its coastal region are prone to transform into solid waste landfills because of the people who throw their garbage on the coast. The increasing population in Tingloy means an increasing number of solid wastes that the people produce. This support by the study of WACS in 2014 [5] covered nine (9) barangays representing the Households and Non-households Samples. Collection, weighing, and sorting of wastes was done on November 21-23, 2014. Based on the WACS, most of the wastes came from residential waste covering 87.28%. The commercial waste, however, only covers 6.97%, and the remaining 5.57% came from institutional waste. WACS also revealed that 55.63% of this waste is biodegradable, 18.66% are residual with a potential for diversion, 15.94% are recyclable, 9.02% are residual for disposal, and the remaining 0.75% are special waste. It was stated that most of the solid waste came from residential waste.

However, Climate Change Adaptation got the least mean value of 2.56, but still, the respondents agree that it is a problem in coastal resource management. Climate change adaptation as part of coastal resource management means that the most appropriate climate change adaptation activities vary from one local context to another due to variations in geography, socio-economic conditions, and political environment is added to this dynamic decision-making structure. In Tingloy Island, where climate change adaptation is a problem because the LGU doesn't have enough funds to support the strategic formulation and climate change adaptation plan as a response to climate change, not only on the people's health but also on their livelihood. Other problems concerning the inability of Tingloy to formulate an adaptation plan are centered on the following impacts of climate change perceived by the local government and partner stakeholders; typhoons-strong cyclones from the Pacific indicated by extreme winds; monsoon rains-an indirect effect of all rainy days leading to typhoons that trigger many rainy days leading to low-lying areas submerged.

**Table 2**  
**Problems Encountered in the Coastal Resource Management Program**

	<b>Weighted Mean</b>	<b>Verbal Interpretation</b>	<b>Rank</b>
1. Solid Waste	2.80	Agree	1
2. Marine Protected Areas	2.65	Agree	2
3. Climate Change Adaptation	2.56	Agree	3
<b>Composite Mean</b>	<b>2.67</b>	<b>Agree</b>	

*Legend: 3.50 – 4.00 = Highly Implemented; 2.50 – 3.49 = Implemented; 1.50 – 2.49 = Less Implemented; 1.00 – 1.49 = Not Implemented*

Table 2 the problem encountered in the coastal resource management with the composite mean value of 2.67, signifying that the respondent agrees that the

**Table 2**  
**Relationship Between Implementation of Coastal Resource Management Program and the Problems Encountered in the Coastal Resource Management Program**

Solid Waste	r-value	p-value	Interpretation
Solid Waste	-0.092	0.065	Not Significant
Marine Protected Areas	-0.091	0.070	Not Significant
Climate Change Adaptation	0.090	0.071	Not Significant
<b>Marine Protected Areas</b>			
Solid Waste	0.139**	0.005	Significant
Marine Protected Areas	0.034	0.500	Not Significant
Climate Change Adaptation	0.186**	0.000	Highly Significant
<b>Climate Change</b>			
Solid Waste	0.192**	0.000	Highly Significant
Marine Protected Areas	0.102*	0.041	Significant
Climate Change Adaptation	0.251**	0.000	Highly Significant

Table 3 presents the association between the extent of implementation of coastal resource management program and the problems encountered. With regards to marine protected areas and the problems encountered, the resulted r-values indicates a weak positive correlation but the computed p-values were less than 0.01 alpha level. This means that there was a significant relationship exists and implies that the greater the extent of implementation, the more problems experienced on solid waste and climate change adaptation.

The significance between the two variables are consequences of some particular principles on the Tingloy Climate Change Action Plan anchored on the National Framework on Climate Change (NFSCC). Principles five and six which states 5) framework is risk-based and strategies / activities shall be formulated, with decisions made based on the causes, magnitude and impact risks; 6) climate change knowledge is science based, and shall draw from scientific contributions and best practices from communities taking considerations local circumstances. The significance between the implementation and problems are manifestations that the program implementations under marine protected areas

is both addressing the evident and underlying problems of solid wastes and climate change adaptation.

Furthermore, The Coral Conservation and Education Foundation cited that bridges the concept of collective recognition and actions to problems posed to CRM. Together with the collaboration of community members, private and public organizations assisted in the implementation of the national fisheries code and supports the bantaydagat, the local sea patrol. Which in this case, proves that with high extent of implementation of programs in MPAs it is expected that problems in solid waste management and climate change adaptation will surface significantly.

In relation to Burke's [6] concept that monitoring allows the general government and the research world to realize whether there are major changes, and action or implementation strategies may be enforced more rapidly if necessary. As programs are being implemented, problems arise as a sign that particular programs in MPAs are being discovered and addressed. This is a good significance that would benefit both the environment and the people in the community of Tingloy. Inputs in research development will open the implementation strategies for creating more effective and efficient solutions that shall address waste management and climate change mitigation.

As Tetrattech [7] shed light that worldwide coastal ecosystems are vulnerable to changes in the coastal zone including population increase, overexploitation of fisheries, marine habitat depletion and global climate change. Tetrattech's findings are evident to the presented results. Problems in both solid wastes and climate change adaptation are peeking due to changes in the coastal landscapes. It is even more significant to say that higher correlation in solid waste and climate change adaptation are true reflection of what the respondents have observed and experienced in Tingloy, Batangas.

Moreover, Wynn et al., [8] pointed out that several rapid marine resource assessment studies have been carried out since 1996 but it wasn't until 1999 that more extensive and systematic studies were carried out using structured methods. This proves the significance between the extent of the implementation of programs for CRM to solid wastes and climate change adaptation are byproducts of an extensive and systematic studies that sought to find problems in CRM program implementation and structural method recalibration.

The objectives of CRM and guidelines for municipalities to attain appropriate CRM programs are dedicated to 1) organize appropriate programs and practices on solid waste management, 2) establish and

identify marine protected areas, and 3) implement climate change adaptation strategies. The results projected what is lacking from MPAs program implementation to solid wastes and climate change problems. Yet, the extent of the implementation of CRM to marine protected areas are found to be not significant, proving the effectiveness of current CRM programs in MPAs strategies in promoting the welfare and development of coastal areas.

In addition, there were significant relationship observed between climate change and the problems encountered on solid waste (0.000) and climate change (0.000). The result reveals that the greater the extent of implementation on climate change, the more problem encountered on solid waste and climate change.

Climate change programs are implemented in a great extent that problems on solid waste and climate change adaptation surfaces. According to the study conducted by Hoa [9] revealed that Community Based Coastal Resource Management (CBCRM) has the potential to positively contribute to certain economic and sociocultural goals however several challenges were identified regarding these two sectors. Economic and sociocultural goals both touches the concept of solid waste management particularly non-biodegradable waste such as plastics, construction and demolition wastes, and electronic wastes. Waste collection, disposal and treatments relates on how should solid waste be handled as it significantly intensifies the effects of climate change. Moreover, the establish sociocultural goals of the municipality of Tingloy for climate change mitigation are affected by the extent of implementation of climate change CRM programs.

Furthermore, the significant relationship between climate change CRM programs to solid waste and climate change adaptation shares the findings of Wynn et al., [8] that there are many local issues that concern coastal resource management including: lack of compliance, open access to fishery resources, destructive fishing, resource user disputes, park size, fragmented coastal zone security, and local beliefs. As the extent of implementation for CRM programs stretches to its full extent the more problems are discovered and underlying causes for these problems challenges the climate change adaptation plan drafted by the municipality of Tingloy, Batangas.

Likewise, Turingan et.al [10] on their study on Performance of Community-Based Coastal Resource Management (CBCRM) Programs in the Philippines: A meta-analysis, conclude that the CBCRM programs in the Philippines were perceived to have a significant

positive impact. Results proves through the significance of the variables that CRM programs are posing significant positive impact with regards to the implementation of CRM in climate change while recognizing problems that are connected to solid waste and climate change adaptation.

Apart from Kitolelei and Sato [11] belief that there is limited evidence that shows that there are linkages between knowledge, perception and collective actions to attain sustainable resource management. The significant relationship between the variables can be a way to link knowledge and perception towards collective actions that shall attain future sustainable resource management. The problems encountered from solid waste and climate change adaptations can be used to understand and relate possible solutions in the implementation of CRM with regards to climate change.

Thus, the results show that there is a significant relationship between the extent of implementation of CRM program in climate change and the problems encountered in the CRM program in relation to solid waste, marine protected areas, and climate change adaptation. In relation of the study to studies, there is a great significance in developing a plan in achieving a better outcome for sustainable coastal resource management program and the objective to explore the sustainability of Community-Based Coastal Resource Management as a contributor in meeting the specific sustainability goals while focusing in the primary needs of the community.

## **CONCLUSION AND RECOMMENDATION**

Coastal Resource Management Programs in terms of solid waste management, marine protected areas, and climate change adaptation are all implemented in the island Municipality in the Province of Batangas. Most common identified problems are on Financial Resources in the areas of Solid Waste Management and Climate Change Adaptation; and on Human Resources with respect to Marine Protected Areas. There were significant relationships between implementation and problems encountered in the areas of solid waste management and climate change adaptation.

A program to enhance the implementation of CRM in terms of Solid Waste Management, Marine Protected Areas and Climate Change Adaptation is proposed.

The Local Chief Executive may establish a task force to strictly implement policies on fishing such as equipment and strategy restrictions, and require permits for fishing and tourism operations. The local government may establish and strengthen institutional structures and

mechanisms such as Municipal DRRM Council, BDRRMCs and volunteers through local government funded capacity building workshops and trainings. The local government together with the barangay officials may established and identify a material recovery facility (MRF) in each barangay. The local government and the Municipal Environment and Natural resources office may spearhead and conduct capacity building workshops and trainings on the management of solid waste and create campaigns for education on environmental impact. The local government may require each barangay to create barangay committee on solid waste management. The local government may table the proposed program for the enhancement of CRM to be implemented and evaluated thereafter. Other researchers may do follow up studies focused on problems and other variables related to Solid Waste Management, Marine Protected Areas and Climate Change Adaptation.

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