

Awareness and Practices on Household Solid Waste Management among the Coastal Communities Along Banate Bay

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ABSTRACT

This study assesses the level of awareness and practices on household solid waste management among the coastal communities along Banate Bay, located in the Philippines. Due to environmental and health concerns associated with improper waste management, this investigates the challenges faced by these communities especially about pollution of marine ecosystems. A descriptive design that involves household heads from municipalities surrounding Banate Bay- Anilao, Banate, Barotac Nuevo, and Barotac Viejo. A researcher-made questionnaire was administered among household heads measuring socio-demographic factors, awareness and practices related to solid waste management. Results revealed that a significant number of respondents lack formal education and training in waste management, with organic waste being the most prevalent type of waste generated. Moreover, while awareness of proper waste disposal and recycling is evident, the communities are less informed about the legislation, local authorities' initiatives and health risks of poor waste management. Common practices such as open dumping and burning of waste are widespread. Thus, the need for quality training among community members, establishment of waste management infrastructure to mitigate the negative effect of household waste on both human and marine environment and improved waste management strategies may be provided.

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1. Introduction.

Household solid waste (HSW) has both direct and indirect effects on the environment and human welfare, Hakami and Seif (2015). Improper household solid waste management causes serious health effects in daily life. Poor waste management, inadequate collection, and improper disposal of the waste facility could lead to various diseases, infections, and infestation. Further, improper waste management can have profound and detrimental impacts on coastal resources. These effects can manifest in various ways, affecting marine ecosystems, human health, and the socio-economic conditions of coastal communities.

Coastal communities face unique challenges regarding solid waste management due to their proximity to marine ecosys-

tems. Effective waste management is essential for maintaining environmental health, preserving biodiversity, and promoting sustainable livelihoods in these areas. This research aims to assess the level of awareness and the practices related to household solid waste management among coastal communities along Banate Bay.

Banate Bay, located in the Philippines specifically in the Province of Iloilo, is composed by four (4) municipalities (Barotac Nuevo, Anilao, Banate and Barotac Viejo), is surrounded by various coastal communities that rely heavily on marine resources for their livelihoods. However, the increasing population and inadequate waste management practices have led to severe environmental issues, including pollution of marine ecosystems. Understanding community awareness and practices regarding solid waste management can help develop targeted interventions to improve waste management and protect the coastal environment.

According to World Bank (2020), Coracero, et. al. (2021),

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about 2.01 billion tons of municipal solid waste is produced annually and 33% of these wastes are disposed of improperly and eco-unfriendly while about 20% is recycled and composted. It was estimated that global solid waste generated will increase up to 70% by 2050 (Industry Dive, 2020). In the Philippines, an estimated amount of 35,580 tons of garbage per day is generated (Castillo & Otoma, 2013) or about 14.66 million tons annually in 2014 (Department of Environment and Natural Resources [DENR], 2018). It has increased up to 16.6 million tons based on the 2018 data making the Philippines the “third-largest generator of solid waste per year among Southeast Asian countries (Romero, 2020). The continuous rise in garbage amount is brought by increasing population, leveling up of living standards, and urbanization also leading to problems associated with the excessive wastes (Senate Economic Planning Office [SEPO], 2017). Thus, dictating the need for immediate response in addressing issues on solid waste management in coastal areas.

2. Objectives.

1. To determine the level of awareness about solid waste management among coastal communities along Banate Bay.
2. To assess the level current practices of household solid waste management among coastal communities along Banate Bay.
3. To provide recommendations for improving solid waste management strategies in coastal communities along Banate Bay.

3. Methodology.

Descriptive study design was used to determine the awareness and practices of household solid waste management among the coastal community members. The study was conducted from January 2024 to July 2024. All the households along Banate Bay were invited to participate in this study, purposively selecting the household head or head of the family. The municipalities of Barotac Nuevo, Anilao, Banate, and Barotac Viejo surround Banate Bay in the northern part of Iloilo Province, Philippines. According to the Banate Bay Resource Management Council (BBRMC), there are thirty-one (31) barangays and twelve thousand sixty (12,060) houses along Banate Bay. The total population size was twelve thousand sixty (12,060) household heads. Participants were aged 18 years old and above, both male and female, who had been living in the barangay along the bay for at least one year, were conscious, mentally alert, and able to cooperate and willingly participate in this study.

A researcher-made questionnaire based on a literature review was used to determine the awareness and practices of household solid waste management. The questionnaire underwent validity and reliability testing. This instrument was divided into three parts: 1) Socio-demographic questionnaire; 2) Awareness of Household Solid Waste Management questionnaire; 3) Practices of Household Solid Waste Management questionnaire.

The Socio-demographic questionnaire: A 4-item socio - demographic questionnaire was used to measure the characteristics of the household heads. This section included education, family income, types of solid waste, problems on household solid waste management, and training on household solid waste management.

Awareness of Household Solid Waste Management Questionnaire: A 10-item Awareness of Household Solid Waste Management questionnaire using a 3-point Likert scale was used to assess the awareness level of household solid waste management among the household heads, ranging from 1 = Not aware to 3 = Aware. A high mean score indicated a high level of awareness regarding household solid waste management.

The 9-item Practices of Household Solid Waste Management Questionnaire: A 9-item Practices of Household Solid Waste Management Questionnaire was used to measure the household heads' level of practice, developed by the researcher. The household heads were asked to rate using a 3-point Likert scale, ranging from 1 = Never practiced to 3 = Always practiced. A high mean score indicated a high level of practice.

The data collection was carried out by the researcher, assisted by research assistants composed of students and faculty members. Permission was secured from the local government heads of the different coastal communities. The principal investigator highly considered the human rights of the participants in this study. The researcher explained the procedure and benefits of the study to the household heads. The anonymity and confidentiality of the participants were strictly maintained. Data were collected from January 2024 to July 2024. A written informed consent paper was obtained from the target respondents. The data were collected from the target respondents through face-to-face interviews. After completion of data collection, the data were checked to manage errors. The collected data were analyzed using computerized statistics. Descriptive statistics, such as frequency, percentage, mean, and standard deviation (SD), were used to measure the variables.

4. Results.

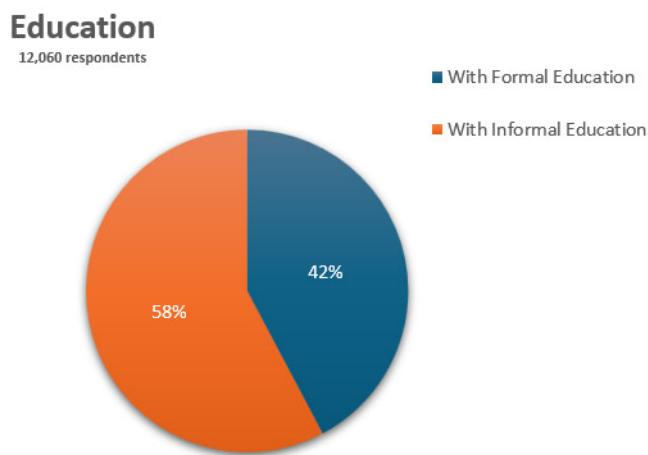
This section presents the major results of the investigation. These include:

- socio-demographic characteristics of the target participants,
- awareness level on household solid waste management of household heads, and
- level of practice on household solid waste management of household heads.

The findings are described in detail below.

In terms of education, of all 12,060 respondents, more than half of the respondents (58%) reported having informal education while the remaining 42% had received formal education.

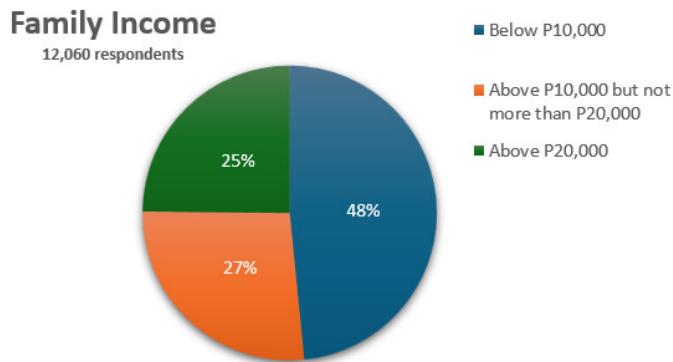
Figure 1: Presents the percentage for the education of coastal community members along Banate Bay.



Source: Author.

As to family income, 48% of the respondents stated earning below P10,000. Meanwhile, 27% indicated above P10,000 but less than P20,000 and the remaining 25% earned above P20,000.

Figure 2: Presents the percentage for the family income of coastal community members along Banate Bay.



Source: Author.

In terms of Training on Household Solid Waste Management, majority of the respondents (68%) indicated that they did not receive any training. In contrast, 32% indicated they had received training.

Additionally, the types of solid waste that can be found in the coastal communities in Banate are ranked by frequency (f) as follows: organic waste (biodegradable) (f=12,059); plastic waste (f=10,258); textile waste (f=9,253); paper waste (f=9,129); glass waste (f=8,450); other waste categories (e.g., nappies / diapers, household items, and construction debris) (f=8,000); metal waste (f=7,950); electronic waste (e-waste) (f=7,855); and hazardous waste (f=7,253).

Figure 3: Presents the percentage for the training on household solid waste management of coastal community members along Banate Bay.



Source: Author.

Table 1: Types of Solid Wastes.

Statement	Frequency (f)	Rank
Organic Waste (<i>Biodegradable</i>)	12,059	1
Plastic Waste	10,258	2
Paper Waste	9,129	4
Glass Waste	8,450	5
Metal Waste	7,985	7
Electronic Waste (<i>E-waste</i>)	7,855	8
Textile Waste	9,253	3
Hazardous Waste	7,253	9
Other (<i>nappies/diapers, household items, and constructions debris</i>)	8,000	6

Source: Author.

Furthermore, problems on Household Solid Waste Management, ranked by frequency are as follows: insufficient waste collection system (f=12,035; R=1); waste segregation challenges (f=10,520; R=2); poor recycling system (f=10,353; R=3); lack of public awareness and education (f=10,120; R=4); financial constraints (f=9,653; R=5); lack of government support (f=9,653; R=6); limited disposal options (f=9,245; R=7); environmental and health impacts (f=9,121; R=8); and waste accumulation due to seasonal or tourism-driven factors (f=8,756; R=9).

Table 2: Problems on Household Solid Waste Management.

Statements	Frequency	Rank
Insufficient Waste Collection Systems	12,035	1
Waste Segregation Challenges	10,520	2
Poor Recycling Systems	10,353	3
Limited Disposal Options	9,245	7
Environmental and Health Impacts	9,121	8
Lack of Public Awareness and Education	10,120	4
Financial Constraints	9,898	5
Lack of Government Support	9,653	6
Waste Accumulation Due to Seasonal or Tourism-Driven Factors	8,756	9

Source: Author.

4.1. Level of Awareness about Solid Waste Management among Coastal Communities along Banate Bay.

The findings reveal that the communities along Banate Bay demonstrate awareness on the following statements: solid waste can be reused or recycled ($M=2.56$), surroundings must be free and clean of solid waste ($M=2.75$), incineration is an effective disposal mechanism for household solid waste ($M=2.95$), delays in household solid waste disposal are common ($M=2.78$), and proper collection and disposal of household solid waste is practiced ($M=2.56$).

However, there is lack of awareness regarding the following: the community having a household solid waste management committee ($M=1.65$), local authorities' initiatives in household solid waste management ($M=1.89$), the health risks of improper waste management ($M=1.95$), awards for proper household solid waste management ($M=1.68$), and legislation on solid waste management for coastal households or residents ($M=1.75$).

Table 3: Level of Awareness about Solid Waste Management among Coastal Communities along Banate Bay.

Statements	Mean	Interpretation
1 The community has a household solid waste management committee.	1.65	Not Aware
2 The local authorities have initiatives to play in the household solid waste management.	1.89	Not Aware
3 The improper waste management can cause diseases and harmful among residents.	1.95	Not Aware
4 Solid wastes can be reuse or recycle.	2.56	Aware
5 Awards for proper household solid waste management.	1.68	Not Aware
6 A legislation on solid wastes management on coastal households/residents.	1.75	Not Aware
7 The surroundings must be free and clean of solid wastes.	2.75	Aware
8 Incineration is the effective disposal mechanism for household solid waste management.	2.95	Aware
9 The delay of disposal in household solid waste disposal is common among households.	2.78	Aware
10 There is proper collection and disposal of household solid wastes.	2.56	Aware

(Interpretation: 1.0 to 1.99- Not Aware, and 2.0 to 3.0- Aware)

Source: Author.

4.2. Level of Practices about Solid Waste Management among Coastal Communities along Banate Bay.

The study found distinct patterns of practices on solid waste management among Coastal communities along Banate Bay: Specifically, respondents indicated the following as practiced: Respondents reported frequently reusing plastic grocery bags instead of buying new ones ($M=2.50$); practicing open dumping of waste ($M=2.58$); throwing waste into open fields, particularly along the shoreline ($M=2.78$); collecting waste in a single plastic bag or container ($M=2.89$); and burning solid waste, especially in bulk ($M=2.80$).

In contrary, the following practices are not widely adopted: using specified garbage bins for solid waste disposal ($M=1.75$), composting biodegradable waste ($M=1.89$), segregating waste into biodegradable and non-biodegradable at home ($M=2.80$), and disposing of solid waste at a material recovery facility (MRF) ($M=1.87$).

Table 4: Level of Practices about Solid Waste Management among Coastal Communities along Banate Bay.

Statements	Mean	Interpretation
1 use specified garbage bins for solid waste disposal.	1.75	Not Practiced
2 practice composting for bridgeable waste.	1.89	Not Practiced
3 reuse plastic (grocery) bags than buying a new one.	2.50	Practiced
4 practice open dumping waste.	2.58	Practiced
5 throw waste to open field specifically in the shoreline.	2.78	Practiced
6 collect the waste in plastic bag or container just in one.	2.89	Practiced
7 practice waste segregation into biodegradable and non-biodegradable at home.	1.89	Not Practiced
8 practices burning of solid wastes specifically if they in bulk,	2.80	Practiced
9 dispose the solid waste in the material recovery facility (MRF).	1.87	Not Practiced

(Interpretation: 1.0 to 1.99- Not Practiced, and 2.0 to 3.0- Practiced)

Source: Author.

Discussion & Conclusions.

A significant number of respondents from coastal communities along Banate Bay indicated that they did not receive formal education. This finding aligns with the study conducted by Sholeh et al. (2021) on school dropouts in coastal communities, which shows high dropout rates especially in coastal areas like Gili Re in Indonesia. Majority of the children only reaches primary school with many other students dropping out from high school due to lack of educational facilities, poor economic conditions and the views of both parents and children on the importance of education.

Additionally, as to family income, a considerable portion of the respondents are living in poverty. The result is supported by the study of Alfien (2015) which he mentioned similar economic hardships of families living in Tumbak Village Bay in Indonesia. Particularly, out of 1,010 population, 241 families and 171 heads of households were considered poor as most of them are working as fisherman and are relying to traditional methods of fishing. Moreover, according to Amal, (2017), poverty is one of the classic problems faced by coastal communities. People who live in coastal areas are always regarded as poor people. They don't have their own houses as most of them are still renting for years. Furthermore, they are heavily in debt and hardly able to afford basic necessities.

Meanwhile, in terms of training on Household Solid Waste Management, the results indicate that a large number of respondents did not receive training on that particular subject. Although Kurniawati et al., 2024, did not specifically address in his study the training status of families living in coastal areas. Nevertheless, he highlighted the importance of raising awareness of good and sustainable waste management practices. Similarly, Abusamah et al., (2023), conducted training and outreach programs to help the community identify and sort waste types with economic value that could provide additional income to support their families. This signifies a need for more comprehensive training to improve waste management practices.

Consequently, organic waste (biodegradable) constitutes the highest type of solid waste. Consistent with previous studies

conducted by (Akuoko, 2018; Shivan et al., 2016; and Dharmendra, 2022), where organic waste was also a dominant component in coastal areas. For instance, in Tertrem Ghana, organic waste was made up 48.07% of the total waste. Similarly, biodegradable organic waste significantly contributes to marine pollution both rural and urban coastal communities due to its putrefying nature.

Notably, the most significant problem identified in this study is the insufficient waste collection system. This finding aligns with Putera (2024), who identified inadequate waste collection and recycling as major issues. He noted that local authorities rely on basic waste collection systems that cannot manage increasing waste volumes, leading to improper disposal, particularly plastics, which contribute to marine pollution. Similarly, Kasim et al. (2023) highlighted insufficient waste collection systems in coastal areas, such as Buluh Island, Indonesia, where plastic waste accumulation degrades the marine ecosystem and threatens tourism. Thus, local authorities should enhance waste collection, implement recycling program and increase public awareness on proper waste disposal to reduce environmental impact especially in coastal areas.

On the other hand, the findings reveal that communities along Banate Bay are aware that solid waste can be reused or recycled, surroundings should be clean, incineration is an effective disposal method, delays in waste disposal are common, and proper collection and disposal are practiced. Similarly to the study conducted by Ronnick (2023), the level of awareness on solid waste management of brgy Cawilan, Surigao Del Norte was high which means that community members are aware of the program. Additionally, he noted that segregation and disposal were practiced, the reuse practices were highly practiced. However, the recycle was less practiced.

The findings indicate that there is limited awareness among communities along Banate Bay regarding the existence of a household solid waste management committee, local authorities' initiatives in waste management, the health risks of improper waste management, awards for proper waste management, and legislation on waste management for coastal households. This is supported by the study conducted by Ricksterlie et al., (2024), where in community members in coastal areas lack familiarity with legal and regulatory frameworks and local ordinances related to Solid waste Management. This necessitates a need for increased community engagement and awareness program to educate the residents about proper waste management, and the role of local authorities in addressing these issues.

Moreover, the study found distinct patterns in terms of solid waste management practices. Respondents commonly reused plastic grocery bags instead of buying new ones, practiced open dumping of waste, disposed of waste in open fields near the shoreline, collected waste in single plastic bags or containers, and burned solid waste, especially in bulk. Consistent with the result of Le et al., (2024) where many respondents reuse plastic grocery bags instead of purchasing new ones, indicating a degree of resourcefulness but also a lack of awareness regarding the environmental impact of plastic waste. Additionally, open dumping of waste is prevalent, with waste often disposed in

open fields near shorelines, contributing to coastal pollution and affecting marine ecosystems negatively (Verzosa et al., 2024).

Furthermore, the findings suggest that practices such as using designated garbage bins, composting biodegradable waste, segregating waste at home, and disposing of waste at a material recovery facility (MRF) are not widely adopted in the communities along Banate Bay. A similar issue was documented by Hukmiah et al. (2023), where communities showed minimal attention to waste management despite having educational resources. This lack of understanding of waste segregation and recycling led to poor practices. Nkuh et al. (2023) also found that inadequate waste management facilities in Buea municipality in Cameroon, led to waste being dumped in drainage channels, roadsides, and pits, resulting in waterborne diseases such as diarrhea, dysentery, cholera and typhoid fever affecting the population. Hence, an establishment of better waste management facilities, more effective educational initiatives and stronger community engagement is a must to promote proper waste segregation and recycling practices.

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