ASERS

Journal of Environmental Management and Tourism

Quarterly
Volume XIV
Issue 5(69)
Fall 2023
ISSN 2068 – 7729
Journal DOI
https://doi.org/10.14505/jemt

ASERS Publishing

Fall 2023
Volume XIV
Issue 5(69)

ASERS Publishing
http://www.aserspublishing.eu
ISSN 2068 – 7729
Journal DOI: https://doi.org/10.14505/jemt

Table of Contents:

Fall 2023
Volume XIV
Issue 5(69)

ASERS Publishing
http://www.aserspublishing.eu
ISSN 2068 – 7729
Journal DOI: https://doi.org/10.14505/jemt

Call for Papers
Winter Issues 2023
Journal of Environmental Management and Tourism

Journal of Environmental Management and Tourism is an open access, peer-reviewed interdisciplinary research journal, aimed to publish articles and original research papers that contribute to the development of both experimental and theoretical nature in the field of Environmental Management and Tourism Sciences. The Journal publishes original research and seeks to cover a wide range of topics regarding environmental management and engineering, environmental management and health, environmental chemistry, environmental protection technologies (water, air, soil), pollution reduction at source and waste minimization, energy and environment, modelling, simulation and optimization for environmental protection; environmental biotechnology, environmental education and sustainable development, environmental strategies and policies.

Authors are encouraged to submit high quality, original works that discuss the latest developments in environmental management research and application with the certain scope to share experiences and research findings and to stimulate more ideas and useful insights regarding current best-practices and future directions in Environmental Management.

Also, this journal is committed to a broad range of topics regarding Tourism and Travel Management, leisure and recreation studies and the emerging field of event management. It contains both theoretical and applied research papers and encourages obtaining results through collaboration between researchers and those working in the tourism industry.

The journal takes an interdisciplinary approach and includes planning and policy aspects of international, national and regional tourism as well as specific management studies. Case studies are welcomed when the authors indicate the wider applications of their insights or techniques, emphasizing the global perspective of the problem they address.

This issue has a special importance for us, marking a new stage in the history of this journal. So, starting with Issue 5(69), Fall 2023 **Journal of Environmental Management and Tourism** will be published in Open Access system. Journal of Environmental Management and Tourism' articles are published under the Creative Commons Attribution 4.0 International License BB CY, which permits unrestricted use, distribution, and reproduction in any medium, provided the original authors and the source are credited.

Journal of Environmental Management and Tourism is indexed in SCOPUS, RePEc, CEEOL, ProQuest, EBSCO and Cabell Directory databases.

Details regarding the publication in this journal are here: https://journals.aserspublishing.eu/jemt/about

Deadline for submission:	21st October 2023
Expected publication date:	December 2023
Website:	https://journals.aserspublishing.eu/jemt
E-mail:	jemt@aserspublishing.eu

To prepare your paper for submission, please see full author guidelines in the following file:

JEMT_Full_Paper_Template.docx, then send it via email at jemt@aserspublishing.eu.

DOI: https://doi.org/10.14505/jemt.v14.5(69).18

Perception and Awareness of Marine Plastic Pollution in Selected Tourism Beaches of Barobo, Surigao del Sur, Philippines

Sherley Ann T. INOCENTE
Department of Biological Sciences, Mindanao State University Iligan Institute of Technology, Philippines
ORCID: 0009-0009-6061-8252
sherleyann.inocente@g.msuiit.edu.ph

Carlo S. GUTIERREZ
Comparative Asian Studies Program, Department of Southeast Asian Studies, Faculty of Arts and Social Sciences, National University of Singapore, Singapore
csgutierrez@u.nus.edu

Maria Pia M. SISON
Department of Sociology, College of Arts and Sciences,
Mindanao State University-Iligan Institute of Technology, Philippines
ORCID: 0000-0001-5808-6685
mariapia.sison@g.msuiit.ed.ph

John Roderick V. MADARCOS
College of Fisheries and Aquatic Science, Western Philippines University - Puerto Princesa, Philippines
ORCID: 0000-0001-6513-901X
johnvillaverde765@gmail.com

Judea Christine M. REQUIRON
Department of Biological Sciences, Mindanao State University Iligan Institute of Technology, Philippines
judeachristine.requiron@g.msuiit.edu.ph

Christine Joy M. PACILAN
Department of Biological Sciences, Mindanao State University Iligan Institute of Technology, Philippines
christinejoy.pacilan@g.msuiit.edu.ph

Shiela Mae M. GABOY
Department of Biological Sciences, Mindanao State University Iligan Institute of Technology, Philippines
shielamae.gaboy@g.msuiit.edu.ph

Jayson Leigh M. SEGOVIA
College of Forestry and Environmental Studies, Mindanao State University Main Campus, Philippines
ORCID: 0009-0003-8784-9823
jaysonleigh.segovia@msumain.edu.ph

Hernando P. BACOSA
Department of Biological Sciences, College of Sciences and Mathematics, Mindanao State University Iligan Institute of Technology, Philippines
ORCID: 0000-0002-4100-8274
hernando.bacosa@g.msuiit.edu.ph

Article info: Received 22 May 2023; Received in revised form 17 June 2023; Accepted for publication 19 July 2023; Published 1 September 2023.

Abstract: Tourism is a significant economic activity in coastal communities, but when badly managed, it degrades the health of the marine-coastal ecosystem, increasing litter pollution and repels beach visitors. This study aims to assess the tourism impact on litter pollution on four growing tourism beaches of Barobo, Surigao del Sur, Philippines. Plastic litters were sampled from four tourism sites (Cabgan Island, Turtle Island, Dapdap Beach, Panaraga Beach) of Barobo by establishing transect lines with quadrats. Those who agreed to participate in perception and knowledge tests about marine debris were interviewed at the aforementioned beaches. Respondents was generally aware of marine pollution problems, specifically marine pollution relating to human and ecological health. Respondents identified tourism as a main litter source and plastic packaging as the most common litter type, which is true based on macrolitter collection. Because tourism causes plastic pollution on all of the beaches studied, stronger regulations, educational, and awareness efforts are crucial to reduce litter pollution and avert ecological and socioeconomic consequences.

Structured Abstract: *Purpose*: Tourism plays a big role in the economic status of a country. It provides livelihood to the community and helps in poverty elevation. But tourism also brings pollution, *i.e.*, plastic pollution, if not properly managed. The primary objective of this study is to evaluate the perception and awareness of tourists on plastic pollution and its impacts on tourism.

Design/methodology/approach: The study was limited to surveys and key informant interviews (KII) since fora and assemblies are not allowed due to pandemic health protocols. Survey sampling was done simultaneously with the macroplastic collection from July 10 to August 12, 2021. Convenience sampling design was used, and data was collected on willing individuals present in the area. The awareness questionnaire used the Likert Scale method, while the individual perception used multiple choice or open-ended questions. Statistical data analysis was performed using SPSS and Microsoft excel.

Findings: A total of 105 willing individuals were legally part of this study. Of the 105 respondents surveyed, 70 of which are tourists from island beaches and 35 are from mainland beaches. Respondents were generally aware of most issues presented to them. The top issues that the respondents relate the most are related to plastic effects on health and environment. The majority of the surveyed tourists on island beaches perceived high macrolitter pollution, while those on mainland beaches perceived low pollution. This perception of respondents agrees with the litter quantities registered and collected. Furthermore, the perception of plastic packaging as the most common type of litter has been found out to be true based on sampling collections. Tourists on the beaches of Barobo are aware of the problem of marine litter and see the tourism sector as a source of waste, notably plastics.

Originality: This research paper submitted by us is an outcome of our independent and original work. We have duly acknowledged all the sources from which the ideas and extracts have been taken. The paper is free from any plagiarism and has not been submitted elsewhere for publication.

Keywords: plastic pollution; macroplastic; microplastic; perception; beach; tourism.

JEL Classification: Q51; Q53; Q54; R11; Z32.

Introduction

Studies on plastic pollution has been growing over the past decade, however there is limited data regarding marine plastic pollution in the Philippines. Studies carried out in the Philippines mostly focused on sediments and water (Arcadio *et al*., 2022; Navarro *et al*., 2022; Browne *et al*., 2011; Esquinas *et al*., 2020; Kalnasa *et al*., 2019; Paler *et al*., 2019) and living organisms (Argamino & Janairo, 2016; Abreo *et al*., 2016; Espiritu *et al*., 2019; Bucol *et al*., 2020). There are a few studies on sandy beaches (Sajorne *et al*., 2021), but none has focused on tourism as a contributing factor. Whilst there is considerable scientific literature on the abundance, physical causes and impacts of marine litter, few research to date have examined the public's views and perception regarding both the problem and the potential solutions. Furthermore, no conducted study views macroplastic pollution in the tourism sector in the Philippines. Thus, this study was carried out to determine the perception and awareness of beach users in the tourism environment of Barobo, Surigao del Sur, specifically; Cabgan Island, Turtle Island, Dapdap Beach, and Panaraga Beach.

The results of this study will be used to draft policy recommendations that will help the local government units of Barobo, Surigao del Sur for the initiatives and interventions regarding waste management for the tourism sector. Through this, tourism destinations will aesthetically improve resulting in revenue increase. Tourist and local communities will also benefit from the ecosystem services such as its provisioning and supporting services.

1. Literature Review

Plastics are regarded as one of the most problematic aspects of marine litter because of their profusion, longevity and the fact that large marine debris break down into even smaller parts termed microplastics (Law and Thompson 2014). Numerous effects of this pollutant to the marine ecosystem have been globally recognized and documented, and that includes the tourism sector. Wilson and Verlis (2017) believed that, when tourism is discussed in relation to marine litter, there is a great number to examine when it comes to the impacts of this

pollutant. Marine littering causes serious economic damages by disturbing a variety of natural environments that are considered primary ecotourism attractions. Landscape degradation by littering is not only a matter of aesthetics, but also of economy. Due to people's aversion to visiting polluted beaches, it inhibits leisure activities. As a result, this will have an influence on the local community, whose livelihood is based on beach tourism. According to Galgani *et al*. (2015), the best way to reduce marine littering is to prevent its yield from the main donors, namely; from the coastal human settlements and the beachgoers who pollute the beaches during their visitations (Santos *et al*. 2005; Sarafraz *et al*. 2016). Thus, all stakeholders must participate in making beaches as clean as possible.

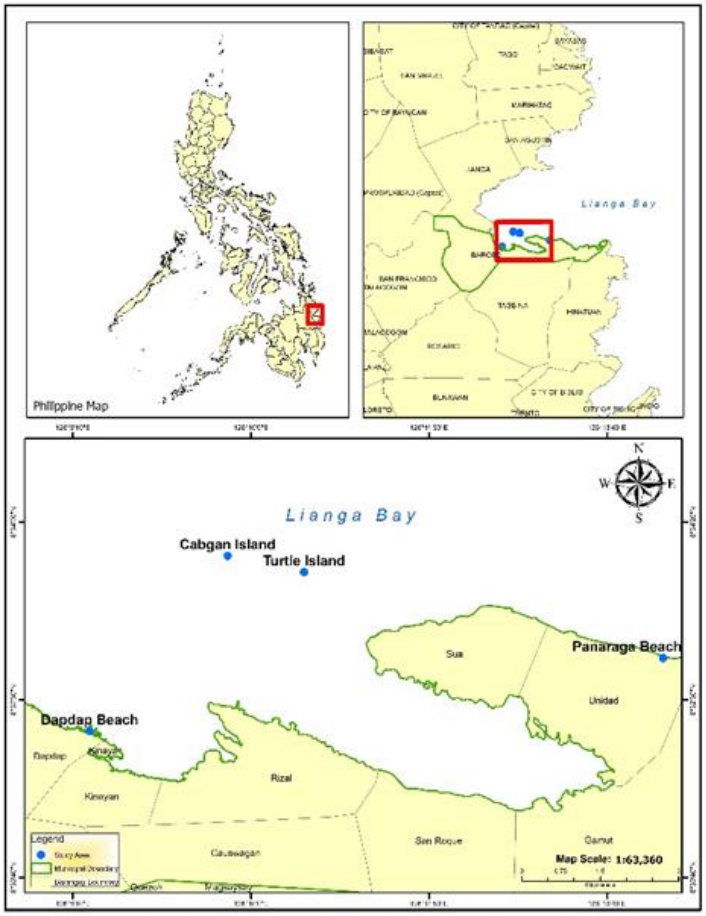
But Rees and Pond (1995) suggest that raising public awareness and initiating a change in attitude is vital for reducing the quantity of waste reaching the marine environment. The behavior of consumers is essential at all stages of a plastic life chain and it is mostly influenced by knowledge, attitudes, and level of concern about this environmental issue, along with motivation to engage in solutions (Hartley *et al*. 2015). Therefore, understanding social perception and behavior is a critical step in efforts to engage society in this plastic concern and progress towards more sustainable procuring, use and discarding of plastic materials. By involving the beachgoers and local community in the solution of this problem, it may efficiently increase their awareness, and eventually halts littering (Löhr *et al*. 2017). Several studies have suggested that hands-on or an experiential approach to marine litter is a good way to improve the awareness about this problem.

2. Materials and Methods

2.1 Study Area

The study was conducted in Barobo, a third-class municipality located in the central part of the province of Surigao del Sur, Philippines (Figure 1).

Figure 1. Map of Barobo, Surigao del Sur, Philippines showing the sampling sites



It is bounded on the north by Lianga Bay and the municipality of Lianga, on the south by the municipality of Tagbina, on the southeast by the municipality of Hinatuan, on the east by the Pacific Ocean, and on the west by the municipality of San Francisco, Agusan del Sur. It has a total land area of 24,250 hectares and 15,000

hectares of it is used for the tourism industry. According to the 2015 census, it has a total population of 49,730 people. Sampling points were located on growing tourism areas around Barobo Surigao del Sur, namely; Panaraga Beach, Dapdap Beach, Turtle Island, and Cabgan Island.

2.2 Perception and Level of Awareness

The study was limited to surveys and key informant interviews (KII) since fora and assemblies are not allowed due to pandemic health protocols. Survey sampling was done simultaneously with the macroplastic collection from July 10 to August 12, 2021. Convenience sampling design was used, and data was collected on willing individuals present on the area. Convenience sampling is a method adopted by researchers where they collect research data from a conveniently available pool of respondents. It is the most used sampling technique as it's incredibly prompt, uncomplicated, and economical. In many cases, members are readily approachable to be a part of the sample which is the best tool for tourist areas. Survey questions was modified based on the studies of Phelan *et al*. (2020) and Garcés-Ordóñez *et al*. (2020). The awareness questionnaire used the Likert Scale method, while the individual perception used multiple choice or open-ended questions.

Since the study required the participation of tourists visiting the beaches of Barobo, Surigao del Sur, certain ethical issues were addressed first. Before conducting the survey proper, free, prior, and informed consent were sought and obtained from the Office of Municipal Mayor. This was followed by a courtesy call through the Office of Municipal Environment and Natural Resources [MENRO]. The data gathering procedures and protocols were explained to them so as not to influence the perceptions of the respondents. The respondents, being a legitimate part of the study, were assured of their rights embodied in the ethical guidelines for research of the Mindanao State University – Iligan Institute of Technology [MSU- IIT] Institute Ethics Review Committee [IERC] by accomplishing the free, prior, and informed consent form to enable the respondents to decide whether or not to participate in this study, personally or through a representative. Confidentiality was also assured by not revealing their names or any of their personal information in the research. Only relevant information related to answering the research problems were included in the discussion.

2.3 Data Analysis

The data were analyzed using basic statistical computations like averaging and frequency. One-way analysis of variance (ANOVA) was also used to test the significant difference of results between island and mainland beaches. Statistical data analysis was performed using SPSS and Microsoft excel.

3. Research Results

3.1 Socio-Demographic Profile

With the use of convenience sampling, a total of 105 willing individuals were legally part of this study. From the 105 respondents surveyed, 70 of which are tourists from the island beaches and 35 are from the mainland beaches. Majority of the respondents who made themselves available are female (63%). Most respondents belonged to the active population and are commonly aged 20-29 years old. Table 1 reveals that almost 69% of the tourists are single. Religious affiliation is mostly Roman Catholic, which inclines to the recorded 2000 Census of National Statistics Office (2003 wherein three-fourths of the population were found to be Roman Catholics). Interviewed tourists was generally recorded to have 5,000 below monthly revenue, although income profile results were fairly distributed.

Table 1. Summary of socio-demographic profile of the respondents; N = 105.

Category	No.	Description	Percentage (%)
Gender	66	Female	62.9
	39	Male	37.1
Age	27	15-19	25.7
	39	20-29	37.1
	20	30-39	19.0
	15	40-49	14.3

Category	No.	Description	Percentage (%)
	4	50-up	3.8
Status	72	Single	68.6
	28	Married	26.7
	1	Widow	1.0
	3	Live-in	2.9
	1	Separated	1.0
Religion	71	Roman Catholic	67.6
	14	Born Again	13.3
	5	Jehovah's Witness	4.8
	5	Assembly of God	4.8
	10	Others	9.5
Education	2	Elementary Level	1.9
	3	Elementary Graduate	2.9
	23	High School Level	21.9
	10	High School Graduate	9.5
	27	College Level	25.7
	34	College Graduate	32.4
	6	Post Education	5.7
Employment	40	Employed	38.1
	7	Employed-Part time	6.7
	21	Unemployed	20.0
	3	Self-employed	2.9
	6	Homemaker	5.7
	26	Student	24.8
	2	Others	1.9
Income	31	5,000 below	29.5
	24	5,001-10,000	22.9
	29	10,001-25,000	27.6
	11	25,001-40,000	10.5
	10	40,001-up	9.5

3.2 Awareness of Tourists on Marine Litter Pollution

General results shows that there is no significant difference ($p=0.86>0.05$) in awareness between the island beaches and mainland beaches. Respondents were generally aware of most issues presented unto them. Table 2

shows that all remarks range from moderately aware to fully aware. The top issue that the respondents relate the most is about the negative effect of burning rubbish and plastic to human health, garnering 4.5 mean weighted average. Moreover, respondents also are fully aware that plastic waste have a negative effect into the environment making it the second issue on top. The issues that accumulated the lowest average are issues about the years that plastic litter like plastic bottle and fishing lines last in the ocean.

Table 2. Awareness of the 105 users surveyed regarding marine litter problem on the tourism beaches evaluated in this study in Barobo, Surigao del Sur. Expressed in Mean ± SD.

Issues	Location		General Remarks
	Island	Mainland	
1. Organic waste (*e.g.*, food waste, plant litter) thrown on the ground will quickly break down and disappear (become part of the soil)	**4.30** ± 0.85	**4.34**	Fully Aware
2. Snack food wrappers and other plastic packaging thrown on the ground DO NOT quickly break down or disappear	**4.14** ± 0.36	**4.37**	Fully Aware
3. Fish and other marine animals eat plastic waste	**3.97** ± 1.00	**3.97**	Aware
4. Plastic waste have negative effect on the environment.	**4.36** ± 0.23	**4.60**	Fully Aware
5. Burning rubbish, including plastic, affect human health.	**4.41** ± 0.13	**4.69**	Fully Aware
6. Rubbish left on the ground will eventually make its way into the ocean.	**4.03** ± 0.06	**4.43**	Fully Aware
7. In the ocean, a plastic bag lasts up to 20 years.	**3.57** ± 0.91	**3.54**	Aware
8. In the ocean, a plastic bottle lasts up to 400 years.	**3.37** ± 0.84	**3.43**	Moderately Aware
9. In the ocean, a fishing line lasts up to 600 years.	**3.13** ± 0.30	**3.43**	Moderately Aware
10. Plastic litter can disintegrate into more harmful substance called "microplastics"	**3.56** ± 0.87	**3.51**	Aware
11. Marine plastic litter can be transmitted in the human body	**3.60** ± 0.51	**3.43**	Aware
12. Solid Waste Management Act or RA 9003 prohibits throwing of plastics into the environment	**3.74** ± 1.00	**3.74**	Aware

5-point Likert's scale range remarks: 1.0-1.8 – Not aware, 1.81-2.60 - Slightly aware, 2.61-3.40 – Moderately aware, 3.41-4.20 – Aware, 4.21-5 – Fully aware.

3.3 Perception of users on marine litter pollution on the beaches

Most of the surveyed tourists on island beaches perceived high macrolitter pollution, while those on mainland beaches perceived low pollution (Table 3). Pearson's Chi-square test showed significant differences between the perception of macrolitter pollution and the type of beaches, indicating a probable association between these variables ($\chi 2 = 9.4198$ $P = .0242$). Respondents indicated that plastic packaging is the most common litter items on island beaches. On the other hand, respondents said that plastic bottle is the most common litter on the mainland beaches. Moreover, more than 70% of the respondents both in island and mainland beaches identified tourists as the most common source of macrolitter. More than 51% of respondents indicated that to avoid litter on the beaches they practice proper litter disposal. 69% from island beaches and 63% of mainland beach respondents manifested that yes, tourists do generate plastic waste. Both responses from island and mainland beaches said that plastic management is a problem to both beach community and plastic has indeed a negative effect to the tourism industry.

Futuristic perception results shows that respondents perceived that by the next 5 and 10 years, tourist were more likely to increase on both island and mainland beaches. Meanwhile, island beach respondents concluded that plastic waste in the years will increase tremendously but mainland respondents answered that they are not sure. Statistical results reveal that there is no significant difference between futuristic perception between two beaches ($p>0.05$).

Table 3. Perception of the 105 users surveyed regarding marine litter on the tourism beaches evaluated in this study in Barobo, Surigao del Sur; Island Beaches, n=70, Mainland Beaches, n=35.

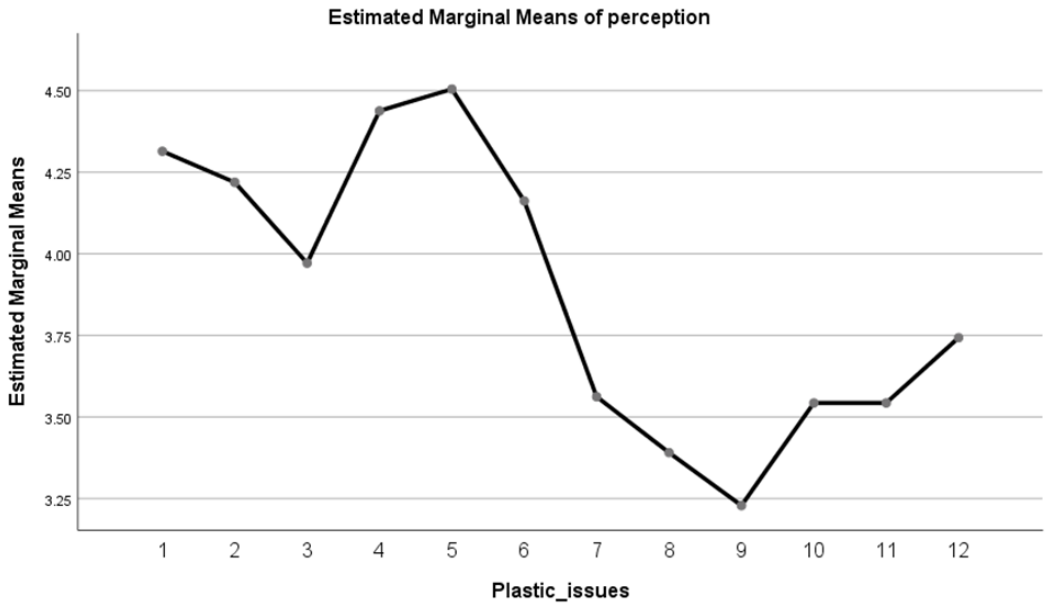
Issues	Choices	Island Beach (%)	Mainland Beach (%)
1. How much litter do you perceive on this beach?	Very Low	17.1	17.1
	Low	25.7	54.3
	High	30.0	14.3
	Very High	27.1	14.3
2. Which do you think is the most abundant litter type on this beach?	Plastic Packaging	45.7	37.1
	Plastic Bottles	31.4	40.0
	Nets and Fishery Lines	11.4	17.1
	Industrial Scrap	7.1	2.9
	Others	4.3	2.9
3. What do you think is the more common origin of litter on this beach?	Beach Tourist	72.9	71.4
	Residents	18.6	14.3
	Near Industries	4.3	2.9
	Fishing Industry	1.4	8.6
	All	2.9	2.9
4. What do you do to avoid litter on this beach?	Collects Own Litter	28.6	28.6
	Collects Others Litter	7.1	8.6
	Proper Disposal	51.4	57.1
	All	12.9	5.7
5. Do you think tourism generate plastic waste?	Yes	68.6	62.9
	No	7.1	17.1
	Not Sure	24.3	20.0
6. Do you think plastic waste increases due to tourism?	Yes	74.3	60.0
	No	10.0	17.1
	Not Sure	15.7	22.9
7. Do you think plastic management is a problem to this community?	Yes	64.3	57.1
	No	12.9	14.3
	Not Sure	22.9	28.6
8. What effect (if any) might plastic waste have on tourism?	Positive Effect	27.1	11.4
	Negative Effect	64.3	74.3
	No Effect	1.4	5.7
	Not Sure	7.1	8.6

Issues	Choices	Island Beach (%)	Mainland Beach (%)
9. Do you think this community have regular waste collection services provided by the village or local government?	Yes	45.7	57.1
	No	20.0	11.4
	Not Sure	34.3	31.4

4. Discussions

The surveyed tourists of Barobo beaches are aware of the problems caused by marine litter. Among the 12 issues identified, the three issues where respondent have higher awareness are issues number 5, 4, and 1 (Figure 3). All of which are related to plastic effects on health and environment, this could be due to IEC activities of Republic Act 9003 that the local government of Barobo has been conducting and other sources of information. This implies that respondents are aware that plastic waste have a negative effect on both human and environment's health when thrown irresponsibly. Moreover, the respondents three issues that is ranked at the bottom are issue number 8, 9, and 10. These issues were generally about the longevity of plastic life when thrown into the ocean. Furthermore, respondents noted that they are least aware of plastics being broken down further into microplastic which has more detrimental health hazards. In order to effectively address the public awareness about the issue of marine trash, it should be understood that everybody is part of both the problem and the solution (Rayon- Viña *et al*. 2019). Increasing the public's awareness regarding marine trash can be used to encourage public participation in the fight against it. An increase in the number of people who participate in public awareness efforts would also be beneficial. This increased local awareness may prompt people to take personal action against the problem in addition to asking for better administration (Bruyere and Rappe 2007; Shye 2009).

Figure 3. Estimated marginal means between 12 awareness issues presented unto 105 beach users of Barobo, Surigao del Sur.



4.1 Perception of Users on Marine Litter Pollution on the Beaches

Differences in perceptions and expectations were identified between respondents from island and mainland beaches. Most of the respondents perceived high pollution on island beaches, while low pollution on mainland beaches. This perception of respondents agrees with the litter quantities registered and collected. Furthermore, the perception of plastic packaging as the most common type of litter has found out to be true based on sampling collections (Inocente and Bacosa 2022). A clear relationship between litter pollution level and perception of beaches users also was reported by Garcés- Ordóñez *et al*. (2020) on Colombian Caribbean beaches, Rayon-Viña *et al*. (2018, 2019) on Spanish beaches, and by Kiessling *et al*. (2017) on Chilean beaches.

Respondents recognized tourists as the main marine litter source on touristic beaches of Barobo, Surigao del Sur, which is closely associated with use of different types of macrolitter by tourist that were identified in the

characterization like food packaging, cigarettes and plastic cups (Table 5). Similar results were obtained in a marine litter perception study on Chilean and Colombian Caribbean beaches, where respondents also identified visitors as the main litter source (Garcés-Ordóñez *et al*. 2020; Kiessling *et al*. 2017). Users surveyed in Barobo, Surigao del Sur also said that plastic waste increases due to tourism which supports results from other studies that tourism serves as a waste-generating sector (Gössling 2002; Biubwa *et al*. 2014; and Jang *et al*. 2014).

Table 5. Most common macrolitter items found on the tourism beaches of Barobo, Surigao del Sur, in this study.

Item type	No. of items	Possible sources
Food Packaging	411	Tourist
Ropes	42	Aquaculture
Cigarette	38	Tourist
Plastic fragments	180	Tourist, sea, river
Plastic Bags	186	Tourist, aquaculture
Styrofoam	106	Tourist, aquaculture
Nylon fishing line	32	Aquaculture
Plastic bottle (PET)	142	Tourist, sea, river
Plastic caps	79	Tourist
Plastic cups	88	Tourist
Toiletries	41	Tourist
Aluminum	38	Tourist, sea, river
Others	170	Tourist, sea, river, aquaculture

Most respondents said that by properly disposing their waste they help lessen beach pollution (51–57%), and some tourists said that they collect their own wastes. On mainland beaches, it is common to observe certain management collecting PET bottles and glass bottles for recycling and selling. However, not all of the trash generated by tourists is collected; they frequently leave the smallest litter (bottle caps, cigarette butts, etc.) on the beach, where they become buried in the sand. A high percentage of respondents (57%-64%) also said that there is plastic management problem to both island and mainland beaches. These results need proactive response from the local government units and management since, high marine debris on beaches can have both aesthetic and economic consequences, especially through reduced visitors and coastal and water-based businesses and recreational pursuits (Wilson and Verlis 2017). Which is also supported by this study's result where users concluded that plastic have indeed a negative effect to tourism.

The majority believed that there is a regular waste collection services provided by the local government. But based on the key informant interviews, only mainland beaches have the regular waste collection which happens once every month. Meanwhile, solid waste management have a hard time reaching the island beaches thus, tourist boat owners initiated to transport wastes from their visitors during their beach visits to help lessen wastes disposal on the islands. Support from private and government units is essential because mismanaged plastic waste, contributes significantly to ocean pollution in developing and developed countries (Jambeck *et al*. 2015). Most importantly, tourism cost and benefit should be seen as a stakeholders' relations among institutions on the ground (Gutierrez 2021; Requiron *et al*. 2023). Thus, the problems arising out of tourism activities need to be internalized by institutional stakeholders (the state, family, local government units, and civil society organizations) who are exposed to both the windfall of tourism and its impact to the ecology.

Conclusions and Further Research

This study provides information on the perception of beach users regarding marine pollution, which helps to understand the problem and guides local government efforts to reduce litter on the beach. Plastic packaging,

plastic bags, plastic fragments are the most abundant types of litter, and the tiniest of these are accumulating in the sand (cigarette butts and plastic caps). There is high significant difference between the number of debris collected between island beaches and mainland beaches. Tourists on the beaches of Barobo are aware of the problem of marine litter and see tourism sector as source of waste, notably plastics. There is still a lot to work on when it comes to solid waste management of tourism areas in Barobo. First, basic solid waste management strategies must be implemented or enhanced like proper waste disposal bins, warning signages, regular waste collection and adequate cleaning staff. Lastly, the local government and private beach owners must come in consortium to discuss and plan proper interventions to promote the protection and conservation of the beach ecosystem and to fulfill their roles as beach caretakers in order to reduce pollution, prevent ecological and socio-economic impacts, and develop sustainable tourism by keeping beaches litter-free.

On a related issue, beachfronts and coastal tourist areas must observe DENR policies on the minimal production of solid waste. This can be done by integrating sound community-based practices such as the usage of renewable and biodegradable materials that are culturally ingrained in the community – *i.e.*, bamboo cups instead of plastic bottles, banana leaves instead of food wrappings. The integration of laws and culture in promoting sustainable tourism is a sound option to minimize solid waste generated by tourism.

Acknowledgments

We would like to thank DOST SEI under the Bangon Marawi Scholarship for the thesis grant that made this research a success.

Credit Authorship Contribution Statement

Inocente, Sherley Ann T.: Conceptualization, Investigation, Methodology, Formal analysis, Writing – original draft, Data curation, Validation, Writing – review and editing Visualization, Funding acquisition.
Gutierrez, Carlo S.: Formal analysis, Data curation, Validation, Methodology, Writing – review and editing.
Sison, Maria Pia M.: Conceptualization, Investigation, Methodology, Formal analysis, Writing – original draft, Supervision, Data curation.
Madarcos, John Roderick V.: Methodology, Formal analysis, Data curation, Validation, Writing – review and editing, Visualization.
Requiron, Judea Christine M.: Conceptualization, Methodology, Validation, Writing – review and editing.
Pacilan, Christine Joy M.: Conceptualization, Methodology, Validation, Writing – review and editing.
Gaboy, Shiela Mae M.: Conceptualization, Methodology, Validation, Writing – review and editing.
Segovia, Jayson Leigh M.: Investigation, Methodology, Formal analysis, Writing – original draft, Data curation, Validation, Visualization.
Bacosa, Hernando P.: Conceptualization, Methodology, Formal analysis, Writing – original draft, Supervision, Data curation, Validation, Writing – review and editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Abreo, N., S. Siblos, and E. Macusi. 2020. Anthropogenic Marine Debris (AMD) in Mangrove Forests of Pujada Bay, Davao Oriental, Philippines. *Journal of Marine and Island Cultures* 9 (1). DOI:10.21463/jmic.2020.09.1.03

[2] Arcadio, C. G. L. A., C. K. P. Navarro, K. M. Similatan, S. A. T. Inocente, S. M. B. Ancla, M. H. T. Banda, R. Y. Capangpangan, A. G. Torres, and H. Bacosa. 2022. Microplastics in surface water of Laguna de Bay: first documented evidence on the largest lake in the Philippines. *Environmental Science and Pollution Research*. DOI: https://doi.org/10.1007/s11356-022-24261-5

[3] Argamino, C., and J. B. Janairo. 2016. Qualitative assessment and management of microplastics in Asian green mussels (*Perna viridis*) cultured in Bacoor Bay, Cavite, Philippines. *Environment Asia* 9 (2): 48-54.

[4] Biubwa, A., N.S.I. Sharifah, and R. Irniza. 2014. Municipal solid waste management of Zanzibar: Current practice, the challenges and the future. *International Journal of Current Research and Academic Review* 1(2014): 5-19. http://www.ijcrar.com/special/1/Biubwa%20Ally,%20et%20al.pdf

[5] Browne, M.A., P. Crump, S.J. Niven, E. Teuten, A. Tonkin, T Galloway, and R. Thompson. 2011. Accumulation of Microplastic on Shorelines Worldwide: Sources and Sinks. *Environmental Science & Technology* 45 (21): 9175–9179. DOI: https://doi.org/10.1021/es201811s

[6] Bruyere, B., and S. Rappe. 2007. Identifying the motivations of environmental volunteers. *Journal of Environmental Planning and Management* 50 (4): 503–51. DOI: https://doi.org/10.1080/09640560701402034

[7] Bucol, L.A., E.F. Romano, S.M. Cabcaban, L.M.D. Siplon, G.C. Madrid, A.A. Bucol, and B. Polidoro. 2020. Microplastics in marine sediments and rabbitfish (*Siganus fuscescens*) from selected coastal areas of Negros Oriental, Philippines. *Marine Pollution Bulletin* 150 (110685). https://doi.org/10.1016/j.marpolbul.2019.110685

[8] Espiritu, E. Q., S. A. SN. Dayrit, A. S. O. Coronel, N. S. C. Paz, P. I. L. Ronquillo, V. C. G. Castillo, and E. P. Enriquez. 2019. Assessment of Quantity and Quality of Microplastics in the Sediments, Waters, Oysters, and Selected Fish Species in Key Sites Along the Bombong Estuary and the Coastal Waters of Ticalan in San Juan, Batangas. *Philippine Journal of Science*. https://philjournalsci.dost.gov.ph/images/pdf/pjs_pdf/vol148no4/assessment_of_quantity_and_quality_of_microplastics_in_sediments_.pdf

[9] Esquinas, G.G.M.S., A.P. Mantala, M.G. Atilano, R.P. Apugan, and V.R.K.R. Galarpe. 2020. Physical characterization of litter and microplastic along the urban coast of Cagayan de Oro in Macajalar Bay, Philippines. *Marine Pollution Bulletin* 154 (11108). DOI: https://doi.org/10.1016/j.marpolbul.2020.111083

[10] Galgani, F., G. Hanke, and T. Maes. 2015. Global Distribution, Composition and Abundance of Marine Litter. *Marine Anthropogenic Litter* 29–56. DOI: https://doi.org/10.1007/978-3-319-16510-3_2

[11] Garcés-Ordóñez, O., L.F. Espinosa Díaz, R. Pereira Cardoso, and M. Costa Muniz. 2020. The impact of tourism on marine litter pollution on Santa Marta beaches, Colombian Caribbean. *Marine Pollution Bulletin* 160 (111558). DOI: https://doi.org/10.1016/j.marpolbul.2020.111558

[12] Gössling, S. 2002. Human–environmental relations with tourism. *Annals of Tourism Research* 29 (2): 539-556. DOI: https://doi.org/10.1016/S0160-7383(01)00069-X

[13] Gutierrez, C. S. 2021. Institutional interactionism and farm landholdings in Japan and the Philippines Doctoral dissertation. National University of Singapore. https://scholarbank.nus.edu.sg/handle/10635/224568

[14] Hartley, B.L., R.C. Thompson, and S. Pahl. 2015. Marine litter education boosts children's understanding and self-reported actions. *Marine Pollution Bulletin* 90 (1-2): 209–217. DOI:https://doi.org/10.1016/j.marpolbul.2014.10.049

[15] Inocente, S. A., and H. P. Bacosa. 2022. Assessment of Macroplastic Pollution on Selected Tourism Beaches of Barobo, Surigao Del Sur, Philippines. *Journal of Marine and Island Cultures* 11 (1). DOI:https://doi.org/10.21463/jmic.2022.11.1.14

[16] Jambeck, J.R., R. Geyer, C. Wilcox, T.R. Siegler, M. Perryman, A. Andrady, R. Narayan, and K.L Law. 2015. Plastic waste inputs from land into the ocean. *Science* 347 (6223): 768–771. DOI:https://doi.org/10.1126/science.1260352

[17] Jang, Y.C., S. Hong, J. Lee, M.J. Lee, and W.J. Shim. 2014. Estimation of lost tourism revenue in Geoje Island from the 2011 marine debris pollution event in South Korea. *Marine Pollution Bulletin* 81 (1): 49–54. DOI: 10.1016/j.marpolbul.2014.02.021

[18] Kalnasa, M.L., S.M.O. Lantaca, L.C. Boter, G.J.T. Flores, and V.R.K.R. Galarpe. 2019. Occurrence of surface sand microplastic and litter in Macajalar Bay, Philippines. *Marine Pollution Bulletin* 149 (110521). DOI: https://doi.org/10.1016/j.marpolbul.2019.110521

[19] Kiessling, T., S. Salas, K. Mutafoglu, and M. Thiel. 2017. Who cares about dirty beaches? Evaluating environmental awareness and action on coastal litter in Chile. *Ocean & Coastal Management* 137: 82–95. DOI: https://doi.org/10.1016/j.ocecoaman.2016.11.029

[20] Law, K.L., and R.C. Thompson. 2014. Microplastics in the seas. *Science* 345 (6193): 144–145. DOI:https://doi.org/10.1126/science.1254065

[21] Löhr, A., H. Savelli, R. Beunen, M., Ragas, A. Kalz, and F. van Belleghem. 2017. Solutions for global marine litter pollution. *Current Opinion in Environmental Sustainability* 28: 90-99. DOI:https://doi.org/10.1016/j.cosust.2017.08.009

[22] Navarro, C. K. P., C. G. L. A. Arcadio, Similatan, K. M., S. A. Inocente, M. H. T. Banda, R. Y. Capangpangan, A. G. Torres, and H. P. Bacosa. 2022. Unraveling Microplastic Pollution in Mangrove Sediments of Butuan Bay, Philippines. *Sustainability* 14 (21): 14469. https://doi.org/10.3390/su142114469

[23] Paler, M.K.O., M.C.T. Malenab, and J.R., & Nacorda, H.M. Maralit. 2019. Plastic waste occurrence on a beach off southwestern Luzon, Philippines. *Marine Pollution Bulletin* 141: 416-419. DOI:https://doi.org/10.1016/j.marpolbul.2019.02.006

[24] Phelan, A.A., H. Ross, N.A. Setianto, K. Fielding, and L. Pradipta. 2020. Ocean plastic crisis—Mental models of plastic pollution from remote Indonesian coastal communities. *PLOS ONE* 15 (7). DOI:https://doi.org/10.1371/journal.pone.0236149

[25] Philippine Statistics Authority. 2015. 2015 Census of Population. *Philippine Statistics Authority*. DOI:https://psa.gov.ph/statistics/census/2015-census-of-population

[26] Rayon-Viña, F., L. Miralles, M. Gómez-Agenjo, E. Dopico, and E. & Garcia-Vazquez. 2018. "Marine litter in south Bay of Biscay: Local differences in beach littering are associated with citizen perception and awareness." *Marine Pollution Bulletin* 131: 727-735. DOI: https://doi.org/10.1016/j.marpolbul.2018.04.066

[27] Rayon-Viña, F., L. Miralles, S. Fernandez-Rodríguez, and E., & Garcia- Vazquez, E. Dopico. 2019. "Marine litter and public involvement in beach cleaning: Disentangling perception and awareness among adults and children, Bay of Biscay, Spain." *Marine Pollution Bulletin* 141: 112-118. DOI:https://doi.org/10.1016/j.marpolbul.2019.02.034

[28] Rees, G., and K. & Pond. 1995. Marine litter monitoring programmes - A review of methods with special reference to national surveys. *Marine Pollution Bulletin* 30 (2): 103-108. DOI: https://doi.org/10.1016/0025-326x(94)00192-c

[29] Republic Act 9003. 2001. "An Act Providing for an Ecological Solid Waste Management Program, Creating the Necessary Institutional Mechanisms and Incentives, Declaring Certain Acts Prohibited and Providing Penalties, Appropriating Funds Therefor, and for Other Purposes." Philippines, January 26.

[30] Requiron, J., C. Gutierrez, S. Inocente, Pacilan. C., S. Gaboy, M. Sicon, R. Amparado, and H. Bacosa. 2023. Aquaculture Farmers' Perception and Level of Awareness of Plastic Litter in San Pedro, Dapitan City, Mindanao, the Philippines. *Journal of Sustainability Science and Management* 18 (3): 77-91.

[31] Sajorne, R.E., H.P. Bacosa, G.D.B. Cayabo, L.B. Ardines, J. Sumeldan, J.M. Omar, and L.A. Creencia. 2021. Plastic litter pollution along sandy beaches in Puerto Princesa, Palawan Island, Philippines. *Marine Pollution Bulletin* 169 (112520).DOI: 10.1016/j.marpolbul.2021.112520

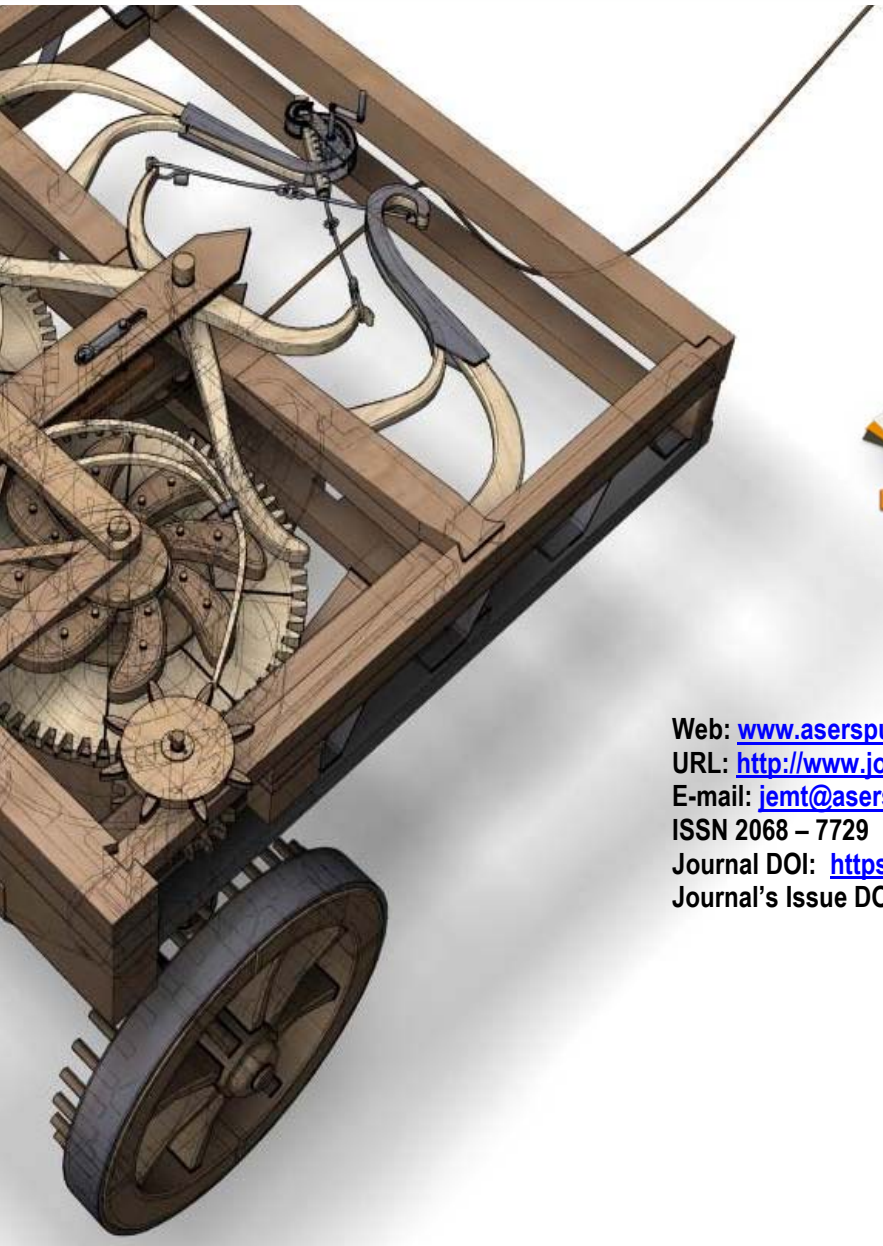
[32] Santos, I.R., A.C. Friedrich, M. Wallner-Kersanach, and G. & Fillmann. n.d. Influence of socio-economic characteristics of beach users on litter generation. Ocean & Coastal Management 48 (9-10): 742-752. DOI:https://doi.org/10.1016/j.ocecoaman.2005.08.006

[33] Sarafraz, J., M. Rajabizadeh, and E. Kamrani. 2016. The preliminary assessment of abundance and composition of marine beach debris in the northern Persian Gulf, Bandar Abbas City, Iran. *Journal of the Marine Biological Association of the United Kingdom* 96 (1): 131-135. DOI:https://doi.org/10.1017/s0025315415002076

[34] Shye, S. 2009. The Motivation to Volunteer: A Systemic Quality of Life Theory. *Social Indicators Research* 98 (2): 183-200. DOI: https://doi.org/10.1007/s11205-009-9545-3

[35] Wilson, S.P., and K.M. Verlis. 2017. The ugly face of tourism: Marine debris pollution linked to visitation in the southern Great Barrier Reef, Australia. *Marine Pollution Bulletin* 117 (1-2): 239-246. DOI:https://doi.org/10.1016/j.marpolbul.2017.01.036

ASERS



ASERS Publishing

Web: www.aserspublishing.eu
URL: http://www.journals.aserspublishing.eu/jemt
E-mail: jemt@aserspublishing.eu
ISSN 2068 – 7729
Journal DOI: https://doi.org/10.14505/jemt
Journal's Issue DOI: https://doi.org/10.14505/jemt.v14.5(69).00