

Waste Management System and its Effects on the Water Quality of an Ecotourism Destination in Caramoan, Camarines Sur, Philippines

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Abstract

Caramoan is a municipality located in the far eastern end of Camarines Sur in the region of Bicol, Philippines. The islands of Caramoan has been the site of several editions of the international reality TV show Survivor since 2008. After being featured in the show, its popularity spread like wildfire and the volume of tourist visitors escalated. The tourism industry boosted the municipality's economy and brought income generating opportunities to its communities. Changes in the physical, environmental and social dynamics became noticeable over the years. Resorts were intensively built in shorelines, farmers shifted to tourism-related business and services and problems on waste management emerged. The worsening problem on wastes became the most challenging in one community of the municipality. This study was conducted to assess the waste management of the community and how it affects the coastal water quality. Results showed that the community and tourists gave high importance on proper waste management but the local government unit showed weak policy implementation. As an additional validation, coastal water quality tests on DO, BOD, pH, TC and TFC were done for two distinct seasons. Results showed that water is still within the standards of the Environmental Management Bureau (EMB) – DENR, Philippines.

Keywords: Caramoan, ecotourism, waste management, water quality

1. Introduction

Philippines is an archipelago of more than 7,107 islands and is rich in natural heritage resources. Considered as "Pearl of the Orient Seas", it has been one of the top 18 mega-diverse countries in the world. Bestowed with luscious natural resources all over the country, tourism industry placed a great reliance on these assets. Being one of the fastest growing industry in the world, demand for tourism became one of the major sources of income and employment particularly in one ecotourism site in Camarines Sur, Philippines. However, parallel to the increasing demand for ecotourism is the deterioration of the environment. Two of the observed problems of the author during her preliminary visit to the site were the waste management system of the community and the accumulation of accommodations near the shorelines which can be likened to what is happening on the coastlines of a similar tourist destination of the country

which is Boracay. As a result, the study was conducted to explore the present waste management practices of the community and the accommodation providers; document its effects to the perceptions of tourists and assess the quality of the coastal waters through water quality tests.

Generally, the result of the study may serve as baseline information in decision making particularly on municipal or island-level strategy for sustainable development and management of coastal ecotourism. In like manner, the recommendations that will be made from this study will be useful in formulating programs and projects that will intensify the involvement of the community as well as tourists in conserving the environment through effective waste management.

2. Methodology

The study was conducted in a coastal barangay in the municipality of Caramoan, Camarines Sur from April to October, 2015 (see Figure 1). The research site serves as the tip-off point of the tourists to the different island-destinations. It is also considered as the tourist service center with 21 accommodation houses thus creating the first impact of impression to the tourists.

Interview for household, accommodations providers and tourist visitors. Using Slovin's formula, a total of 112 households were interviewed while forty and thirteen random interviews were carried out among tourists and resort owners from June to October 2015 respectively. Key informants such as barangay, municipal, and provincial agriculture and tourism officials were also interviewed. Secondary data were likewise gathered to support the study.

Coastal water quality analysis. Water quality sampling was conducted for two seasons, peak and off-peak, for the purpose of comparing the differences of each result. The first water sampling was conducted during the end of the peak season (June 24, 2015) while the other was conducted during middle of the off-peak season (October 7, 2015). Four sampling stations were identified using point source method. The standards of the Department of Environment and Natural Resources (DENR) Administrative Order No. 34 s. 1990 or the Revised Water Usage and Classification/Water Quality Criteria was the basis of assessing the results of the water quality tests. The coastal water of Caramoan belongs to Class SB. DO, BOD, pH, TC and TFC were the parameters analyzed for the study.

The analysis was performed by the DOST-Regional Standards and Testing Laboratories, an accredited laboratory in Rawis, Legazpi, Albay.

Slovin's Formula:

$$n = \frac{N}{1 + N * e^2} \quad n = \frac{336}{1 + 336 * 0.077^2}$$

where:

N – total number of household
e – significance level
n – sample size

$$n = 112$$

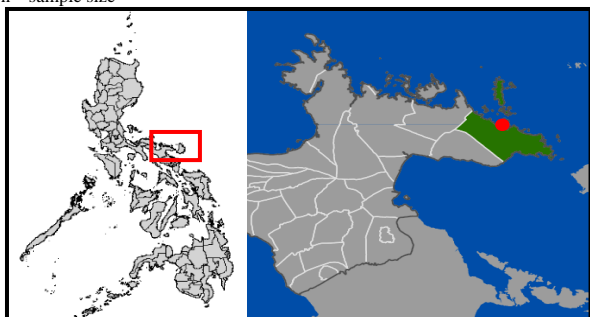


Figure 1. Location map of the coastal community (barangay) in Caramoan, Camarines Sur.

3. Results

Households. Results showed that only 66% from households are practicing waste segregation. The most common segregation practice is by biodegradable and non-biodegradable (90%) while only 59% knows about recycling and 35% knows about reusing. A Municipal Waste Ordinance on waste management and collection was implemented and 88% of the households participates in this program. However, the collection of waste includes a Php20 fee and 65% were willing to pay for this service.

Resort Owners. Resort owners recognizes the importance of waste and environmental management however they fail to include these integral component in their business operations. Only few of them are practicing proper waste disposal. Also, it was found out that the hotels have no accreditations from the Dept. of Tourism (DOT).

Tourists. Tourists were relatively satisfied with the waste management system of the barangay. They have suggested few recommendations to improve the ecotourism services of the area including putting of signages on proper waste disposal and provision of properly labelled trash bins in strategic locations. Tourists were also keen with the waste management practices of their lodging houses. They have noted that trash bins are not provided in their rooms.

Water Quality. Generally all parameters conform to the DENR standards for both peak and off-peak samplings. However, there is a notable increase in fecal coliforms during the off-peak sampling and this is attributed to the rainy season experienced by the region between June to November.

Table 1. Summary of water quality results.

PARAMETER	UNIT	CLASS SB	PEAK (Result)	OFF-PEAK (Result)
pH (range)		6.0–8.5	Ave. 7.9	Ave. 8.2
Dissolved Oxygen (min)	mg/L	5.0	>5.0mg/L	>5.0mg/L
Five-day 20 °C BOD	mg/L	5	<1mg/L	<1mg/L
Total Coliforms	MPN/100 mL	1,000	<18MPN/100 mL	<1000MPN/100 mL
Fecal	MPN/	200	<18MPN	*

Coliforms	100 mL	/100 mL
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*Station 1-3 were within the standard however, station 4 exhibited >200MPN/100 mL

4. Conclusion and Recommendations

Tourism in Caramoan has become a major source of income and employment particularly for the community in Paniman. However, due to the high demand of this industry, the environment of the place has been at risk. The waste management system needs to be strengthened through participation and efforts from the community is needed to protect the environment and its tourism services which gives them source of livelihood. The recommendations derived from the study include encourage community-based tourism; strict implementation of policies on waste management and involvement of households for its effective implementation; strengthen information education campaigns (IEC); encourage backyard composting; setting up of tourist information center; establishment of proper sewage treatment facility; provide tourism-related trainings to improve accommodation services; resort accommodations compliance with the accreditation standards of the Department of Tourism; and peak and off-peak season conduct of water quality test for monitoring purposes.

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