

O32.1

Socio-ecological system dynamics of coral reef ecosystems in Pujada bay along city of Mati, The Philippines

Yutian Ding¹, Shigeru Tabeta¹, Katsunori Mizuno¹, Lea Jimenez²

¹The University of Tokyo, Japan. ²Davao Oriental State College of Science & Technology, The Philippines

Abstract

Mati is a typically small underdeveloped town in the Philippines, renowned for the finest beach and abundant natural resources in Pujada Bay(coral, seagrass, dugongs, mangroves). However, Pujada bay is also vulnerable to overexploitation and pollution from land-based activities.”. My research aims to predict the future condition of Pujada Bay from socio-ecological perspective in 10 years and provide scientific basis for policy-making based on modeling.

Primary data through survey interviews of local researchers and residents were conducted. Secondary data on related social-ecological systems was done as well from a literature survey. These data would support the System Dynamics Model.

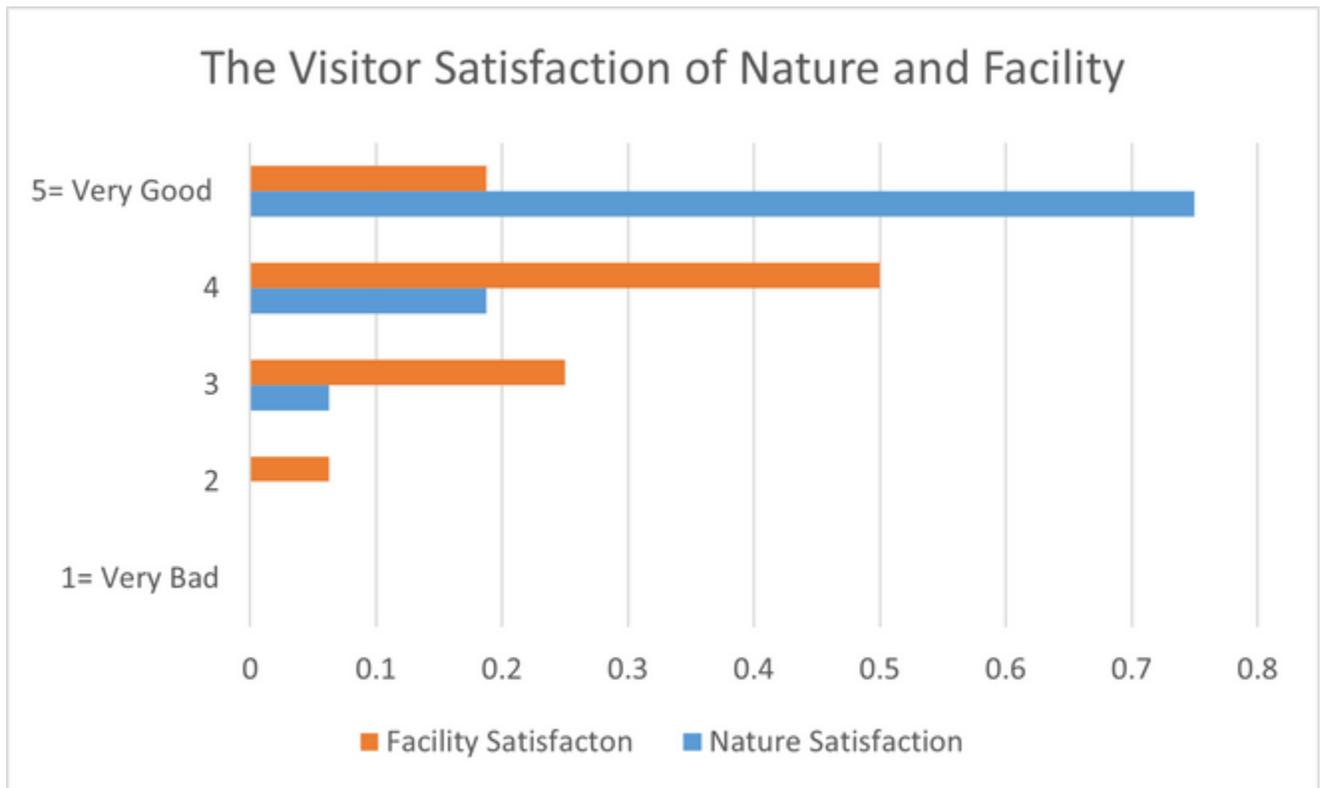


Figure 1 : Visitor Satisfaction

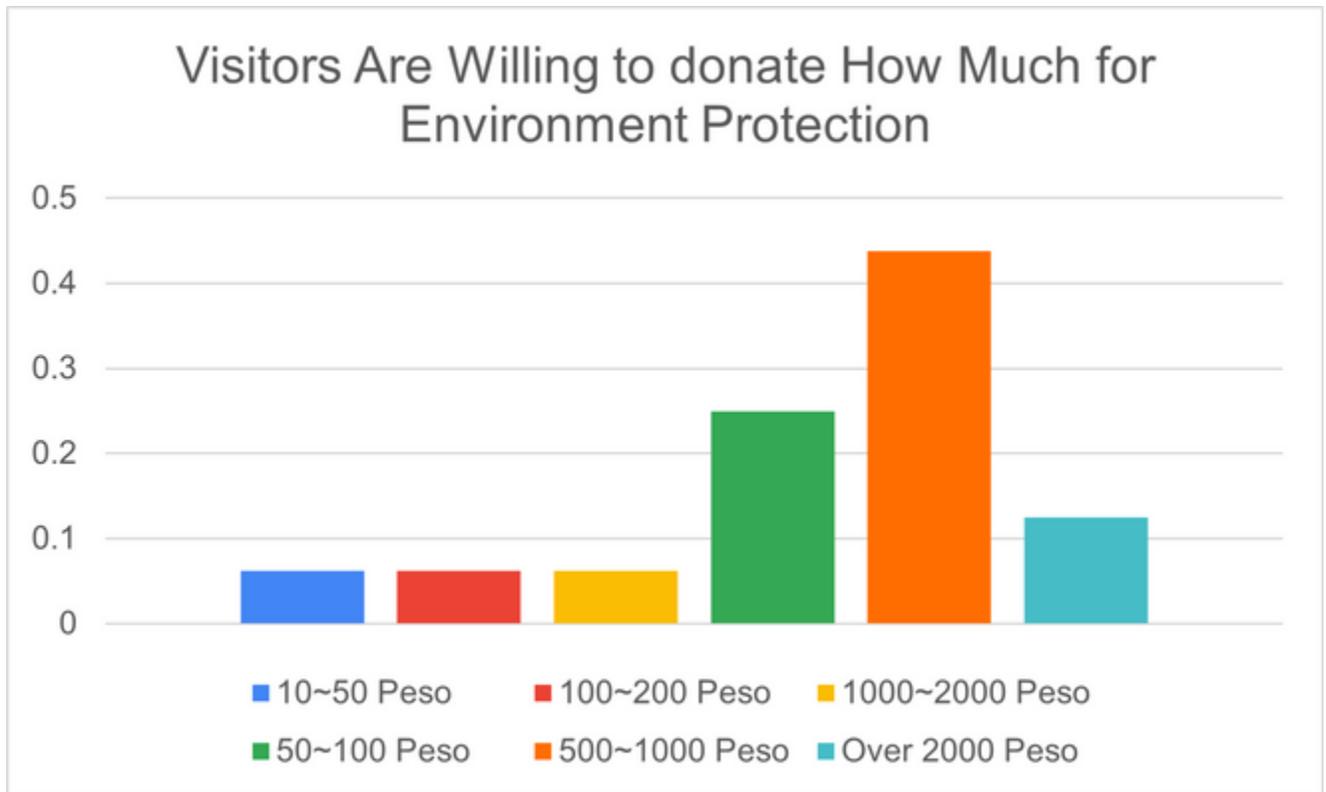


Figure 2 : Visitor Donation Awareness

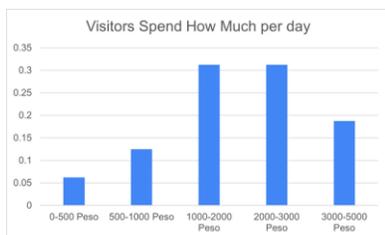


Figure 3 : Travel Cost

This System Dynamics Model completes with Socio-economic, ecological, and environmental subsystems, which variables are closely related with each other both inside and outside the model. It observes integrated coastal zone management theory and is supported by field surveys, questionnaires, and interviews. Components such as coral and algae as an ecosystem, fishery, and tourism as industries, etc. were extracted and their relationships were implemented in the model.

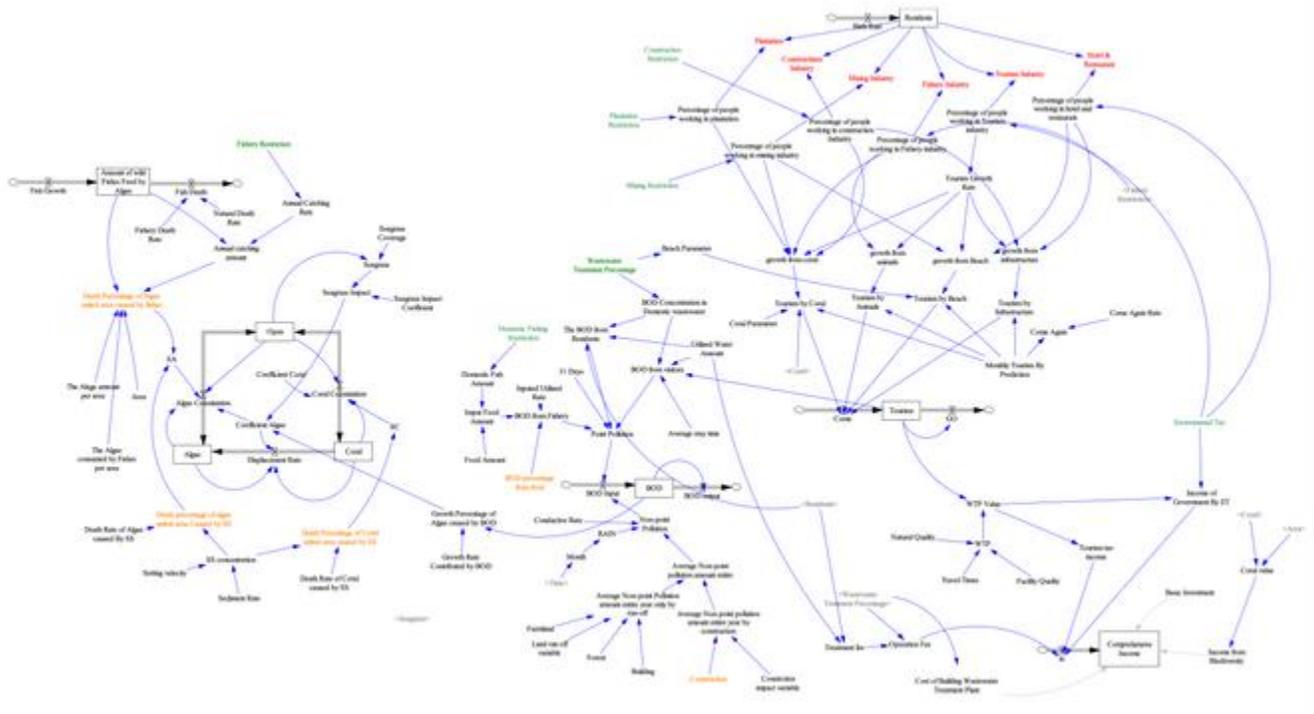


Figure 4 : Systems Dynamics Model

Coral coverage declination won't reverse if the wastewater treatment rate is low. Besides, Tourists amount is also increased with treatment rate. Comprehensive income, which combines bio-diversity value, tax, wastewater treatment construction, and operation cost, won't be positive if the treatment rate is very high.

The primary influence on ecosystem is seawater quality in Pujada Bay, which indicates by coral coverage. However, combining methods is more efficient in reducing the budget of wastewater treatment.

Natural conditions such as beach sanitation and coral abundance significantly impact Tourism. Domestic visitors are willing to pay about 20% of travel budget (\$73) on ecological restoration, which is higher than foreign visitors.

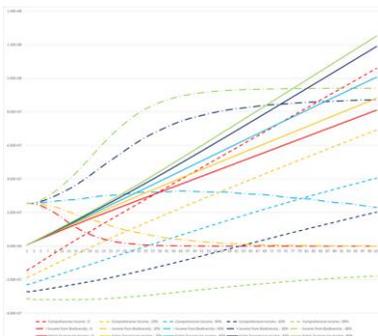


Figure 5 : Beneficial Analysis Under Different Wastewater Treatment Rate

Keywords

System Dynamics, Socio-ecological System, Coastal Tourism Management, Coral & Algae Ecosystem