



Contents lists available at ScienceDirect

## Ocean &amp; Coastal Management

journal homepage: [www.elsevier.com/locate/ocecoaman](http://www.elsevier.com/locate/ocecoaman)

# A game theory approach to fishers' strategic behavior vis-à-vis hotel-based water sports operators – The case of the Balaclava Marine Park project in Mauritius

Sanjeev K. Sobhee<sup>a,\*</sup>, Roshan Ramessur<sup>b</sup>, Augendra Bhukuth<sup>c,d</sup>

<sup>a</sup> Department of Economics and Statistics, University of Mauritius, Réduit, Mauritius

<sup>b</sup> Department of Chemistry, Faculty of Science, University of Mauritius, Réduit, Mauritius

<sup>c</sup> IPAG Business School, Paris, France

<sup>d</sup> International Institute of Social Sciences, Antananarivo, Madagascar

## ARTICLE INFO

### Article history:

Received 23 June 2016

Received in revised form

11 April 2017

Accepted 20 June 2017

Available online xxx

### Keywords:

Fisheries

Marine park

Marine resources

Management of resources

Responsibility

Strategic behaviors

Game theory

Recreation

Mauritius

Island states

## ABSTRACT

Using a game theory framework, this paper models the behavior of two stakeholder groups who are concerned with the implementation and enforcement of a marine park at Balaclava, situated in the North-West of the island of Mauritius, located in the Indian Ocean. These two stakeholders are artisanal fishers and hotel-based pleasure craft/water-sports operators who often have to compete spatially within the lagoon to carry out their activity. Nash equilibrium results show that fishers and pleasure craft operators may reach a sub-optimal outcome, leading to unsustainability of marine resources. Empirical verification of strategic motives, attitudes and perceptions, using a questionnaire-based survey, actually revealed that there is little convincing evidence that both parties would be able to collaborate and co-manage the park successfully despite the fact that they agree that a marine park is vital for protecting marine resources. While 81.3 per cent of the fishers and 90.1 per cent of the hotel water-based sports operators were in favor of a marine park, only 28 per cent of the hotel sports operators would be willing to work in collaboration with fishers and 46 per cent of the fishers would be willing to work with their counterparts. One of the major policy recommendations that emanates from this study is that the authorities should come up with an effective action plan to foster more dialogues among all concerned stakeholders and emphasize the virtues of co-management for the sustainability of the park.

© 2017 Published by Elsevier Ltd.

## 1. Background

Poverty alleviation and environmental protection are often viewed as conflicting objectives in developing countries (Kunzmann, 2004; Rozelle et al., 1997; Scherr, 2000). Particularly in island states and coastal regions, the fisheries sector is often subjected to severe environmental degradation. The latter thus constitutes a direct threat to sustainable livelihoods for the fishing communities. As common property resources, coastal and marine resources are often under the control of multiple stakeholders, who are simply interested in maximizing their own benefits, even if it is to the detriment of the environment. (Sobhee, 2004a, 2006) have shown that beach-based tourism, in the context of Mauritius and

small island states, has largely favoured the construction of several hotels and related unsustainable built-up areas along the coastline, thereby impacting severely the coastal and marine environments. On the other hand, there are fishing communities who, due to their large populations, low educational attainment and limited scope for alternative economic activity, tend to overexploit marine resources, eventually depleting fish stocks (Sobhee, 2004b). In addition, there are people who are not registered fishers but who actually contribute to environmental degradation by overpractising fishing as a recreational activity. In fact (Cooke and Cowx, 2004, 2006), reported that, alongside commercial fishing activity, recreational fishing activity is also contributing to the degradation of marine resources. Moreover, there are pleasure craft operators who use high speed boats to carry mainly tourists and local visitors to do para-sailing, wind-surfing, snorkeling, and kiting amongst others. The latter do as well contribute to further environmental degradation by damaging corals and animal habitats.

\* Corresponding author.

E-mail addresses: [sksobhee@uom.ac.mu](mailto:sksobhee@uom.ac.mu) (S.K. Sobhee), [ramessur@uom.ac.mu](mailto:ramessur@uom.ac.mu) (R. Ramessur), [augendra@gmail.com](mailto:augendra@gmail.com) (A. Bhukuth).

Clearly, unchecked recreational activity exacerbate environmental damages to coastal and marine resources. In a socioeconomic setting, in which there are several stakeholders involved in sharing marine resources, it is hardly possible to avoid the so-called ‘tragedy of the commons’ (Hardin, 1968, 1998). In the absence of any co-operation, it is difficult to reach consensus on how to allocate resources in a fair or equitable manner especially when property rights are ill-defined and multiple stakeholders are involved as indicated by (Coase, 1960). However, to ensure sustainable livelihoods in the long run, the concept of a marine park, as a protected area, could possibly be a solution (see for instance (Suman et al., 1999; Ostrom et al., 2008; Wolfenden et al., 1994) on the benefits of a marine park). It is worth noting that this solution is only viable if and only if all stakeholders actively participate and co-operate in the process of implementation and in the effective management of such a park to optimize collective opportunities and benefits. Co-operation as pointed out by (Ostrom et al., 2008) is primordial and constitutes the social capital in developing countries to circumvent the problems related to the ‘tragedy of the commons’. Communication gaps among stakeholders may jeopardize the entire process as emphasized by (Ostrom et al., 2008).

In principle, conflict occurs when there is major disagreement between two or more groups that have a common interest in a given venture. In the present case, conflict between hotel sports operators and fishers is emphasized since the two often have to share the limited marine space as it is really difficult for both parties to carry out their activities simultaneously within the lagoon. Sports operators can provide kite surfing, surfing, snorkeling, fishing and other activities within the lagoon using high speed boats. Fishers on the other hand rely on their artisanal techniques; using mostly, pirogues, fishing baskets and traps to earn a living. Disagreements over the frequency of trips that both parties need to undertake and the intensity of each activity (duration of fishing activity or duration of sports activity during a day) are common. Actually there exists no law that could address any sort of conflict between these two stakeholders when it comes to sharing the marine environment. Everything relies on a mutual understanding and co-operation between the stakeholders.

Marine Protected Areas (MPAs) such as parks can be seen as a possible solution to the “tragedy of the commons” as they are guided by two main principles; they aim at conserving/maintaining biodiversity and intrinsic ecosystem services and contribute towards sustainable fisheries. Dayton et al. (1995) and Bohnsack (1996) make it clear that there are several distinct reasons for establishing MPAs. Among these arguments are the protection and effective management of local marine resources, maintenance of biodiversity and promotion and control of beach-based tourist activity. In fact, MPAs are considered as efficient mechanisms for protecting marine habitats, promoting biodiversity and increasing the stock of species. As such, they help preventing the extinction of species and ensuring sustainable livelihoods of fishers (Dayton et al., 1995; Bohnsack, 1996). According to (Bohnsack, 1996), the effectiveness of marine protected areas depends on the extent to which the objectives are planned. MPAs are also spaces to reduce conflicts, to nurture responsible attitudes among stakeholders and provide a common platform for them to voice out their interest and opinion.

This paper particularly focuses on these aspects and highlight the scope and challenges involved in uniting different stakeholders in the context of a marine protected area. The research is considered from a small island developing state perspective, carried out in the island of Mauritius, located in the Indian Ocean. Local authorities are interested to implement a marine park at Balaclava in the northern part of the island to address the degradation of marine resources, preserve the ecosystem of the area and ensure

sustainable exploitation of the resources. The paper also relates to an interesting case study involving two major stakeholders, namely, hotel water-sports operators and the local fishermen. Their strategic behaviors are modeled using game theory, with a little more emphasis on fishers’ behavior. A survey is then carried out to provide empirical evidence on the behavior of both stakeholders against the predictions of the theoretical model.

In so doing, this paper extends the literature on ocean and coastal zone management by providing exclusive insights into an island’s perspectives. Mauritius is actually a favorite tourist destination<sup>1</sup> for many European and high-income countries. Being of volcanic origin, the island offers wonderful beaches and landscapes, but at the same time, it has very fragile ecosystems. The literature on the public’s attitudes towards marine parks remains scanty (see (Suman et al., 1999)) and any country experience may therefore contribute to additional knowledge by capturing specific features (see for instance (Wolfenden et al., 1994; Farrow, 1996; Bazin et al., 2008; Shaffer and Benzaken, 1988)). Such research and findings do help to formulate policies towards sustainable management of marine and coastal resources.

The increasing number of tourists in Mauritius, which exceeded one million in 2016, has led to the construction of several hotels along the coastline –often viewed as unsustainable built-up areas (See (Sobhee, 2004b)). The island has a population of 1.2 million and is categorised as an upper-middle income country with a current per capita income of US \$ 9400 in 2016. While tourism is a major income generating recreational activity, it contributes towards employment creation and foreign exchange reserves but has severe repercussions on the physical environment. Damages to corals, removal of mangroves, sand-dredging and over-fishing have largely exacerbated the problem of environmental degradation. The lack of enforcement of environmental laws and regulations has speeded up such degradation. It is within this context that the government has proclaimed Balaclava (a highly touristic area) as a marine protected area (MPA) in the region of Pointe aux Piments in 2007. Since then, little has been done to implement the marine park or enforce it. In recent years, accentuated marine and coastal degradation, and pressure from Non-Governmental Organisations (NGOs), have revived interest in this MPA.

One of the main objectives set for this paper is to analyse the complexity and challenges of co-management of the park that would determine sustainable resource exploitation and sustainable livelihoods in the end. The willingness to work with each other group and the degree of collaboration would clearly provide insights into the success of the participatory process of managing the park once the latter would be established. In this respect, the behavior of two concerned major stakeholders, the registered fishers and the hotel water-sports operators is analysed. The authors words attempt to capture their perceptions and attitudes towards the marine park to determine the robustness of their eventual participation in this process. The rest of the paper comprises a conceptual framework based on theory of games linked to ill-defined property rights that circumscribe the park, followed by a discussion on the location of the protected area and its characteristics. Empirical evidence is also provided based on a survey to test the veracity of the model. The last section provides policy recommendations and concludes. In the present context, the application of game theory is fully justified given that previous studies have been mostly confined to addressing conflicts through survey methods directly and identifying gaps in laws and policies in place. Studies on island economies focus mostly on marine environment

<sup>1</sup> Tourism in Mauritius is essentially beach-based. Among the tourists, most of them are from European countries with France as the leading market.

Download English Version:

<https://daneshyari.com/en/article/8060987>

Download Persian Version:

<https://daneshyari.com/article/8060987>

[Daneshyari.com](https://daneshyari.com)