Multicriteria Decision Making Approach As A Tool For Sustainable Marine Protected Area (MPA)

Madhavan Balan Nair, a Sridar Ramachandran, b Vikneswaran Sekaran Nair
a Institute of Tropical Forest and Forest Products, University Putra, Malaysia
b Faculty of Forestry, University Putra, Malaysia
c Taylor’s University, Malaysia

Abstract

Marine protected areas in Malaysia are becoming increasingly exposed to tourism and fishing activities. With greater accessibility, tourism has become an important contribution to the marine destinations. The over exploitation caused by tourism and fishing activities have caused negative impacts to the natural resource of the destination. Management of the marine protected areas becomes essential to the continuum of the biodiversity of that area which makes it attractive for tourist to visit. Management of the marine protected area is complex as the involvement of multiple stakeholders needs to be considered such as government agencies, non-government organizations, tourist operators, local community and interested parties. In this paper, the suitability of multi-criteria decision-making where the opinions of multiple stakeholders is investigated for the management of Tun Sakaran Marine Park (TSMP). The first section introduces the current development of marine protected areas in Malaysia. The second section explores the use of multi-criteria decision-making approach in the management of marine protected areas. The use of this approach is significant as there is a growing number of literature that justifies the inclusion of multiple stakeholders opinion in the decision making process. In the third section, Tun Sakaran Marine Park management policies are explored and the suitability of using a multi-criteria approach in its management are explored. The multi-criteria approach using Analytical Hierarchical Process (AHP) appears to be a right approach as it uses a hierarchical structure to breakdown the problems into smaller manageable units. In the final section, the applicability of using a multi-criteria approach in marine protected area is concluded.

Introduction

The destruction of natural environment is clearly associated with the effects of human economic activities and development (Middleton and Hawkins 1998). The United Nations has viewed tourism as a key sustainable development issue in light of the industry’s both beneficial and destructive nature. Tourism is a service delivered by
people that involve the transportation of participants, their accommodation and entertainment, giving rise to potentially disruptive side effects. The growth of tourism as an economic enterprise and a cultural phenomenon has been dramatic and it had a major impact in tourism sectors in Malaysia. Arrival of tourists in the year 2008 and 2009 averaged to around 22 million while tourism receipt was over RM50 billion. However, in the year 2010 alone tourism receipt increased by 5.8% to RM56.5 billion. Tourist arrivals are expected to balloon to 40 million by the year 2015. Tourism contributes close to 9% towards the Malaysian gross domestic product (GDP). In 2009 alone, the state of Sabah recorded 2,246,068 arrivals that generated an estimated RM3.8 billion in tourism receipts. Nature based attraction attracted 51% of the international tourist whilst 25% of them visited cultural attractions. According to (Parks 1996) tourism related areas in Sabah have the highest potential of growth. Tun Sakaran Marine Park and Sipadan Island in Semporna district in Sabah was identified as one of the major nature and adventure based attraction. In preparing the Sabah Tourism Master Plan (Parks 1996), eco based tourism was identified to capitalize on the state’s natural beauty and its rich heritage and culture. This shows tourism sectors in its natural setting or rural are more appreciated among tourist.

Tourism continues to grow and it continues to be changed by on going events such as pollution, change in mode of transportation and altered social, economic and political conditions. However, tourism initiatives introduced in Malaysia’s rural setting have neglected to provide in-depth attention to the incubation of cultural understanding, adaptability and appreciation of cultural differences(Liu 2006). Rural tourism has been defined differently by various literature (Sharpley 2002; Liu 2006; Weaver and Lawton...
What is common in the literature is the natural setting of the destination and the perceive benefits of the tourism industry to the local community. Marine protected area fit into this definition as the locality of the site is habitually remote and the community living in the area are classically natives. The professed need to develop the rural economy has led to the development of policies in tourism and recreation out of its natural setting. This was also perceived to benefit the local community economically and create more employment opportunity. The other side of this argument, however, is that tourism can supply the needed infrastructure, income and employment, which will boost destination economies and raise the standard of living (Graci and Dodds 2010). In addition, if planned properly, tourism can also help protect resources and help finance conservation. Ideally, tourism activities in remote areas should be developed using the inherent characters and resources of their natural environment setting. Tourism by itself is not a destructive industry but its destructive phenomenon is caused by the lack of awareness amongst tourism stakeholders. Tour operators, hoteliers and tourism business unit’s primary concerns are direct economic benefit. Presently, they only look at tourism purely at a commercial perspective where monetary returns are easily measurable (Iorio and Corsale 2010). The effect to the environment becomes a secondary issue as that responsibility is left to state authorities or non-government agencies. However, these stakeholders fail to understand that the very reason a tourist visits that destination is to experience its natural setting which is more nostalgic in a rural setting (Cawley and Gillmor 2008). Stakeholders need to be convinced that running their business responsibly brings long-term economic and social benefits.
According to the World Travel and Tourism Council (Council 2011), managing tourism responsibly will involve:

i.) Establishing partnerships at all levels of tourism product;

ii.) Empowering local residents through consultation and participation so that sustainability strategies are accepted and upheld;

iii.) Influencing consumers to effect change since they have an integral role to play in driving the demand for, and development of, sustainable tourism products;

iv.) Creating the necessary policy framework to enable tourism and encourage it to thrive;

v.) Investing in technological systems and applications to encourage and promote sustainability – as well as incentivizing industry to do so;

vi.) Ensuring a level playing field free of restrictions to trade;

vii.) Consulting the industry in designing and developing environmental policy infrastructure, which could potentially impact its livelihood.

The above criteria involve the participation of multiple stakeholders. Stakeholders can be grouped into four categories: the host population, the tourist, tourism organization and natural environment (Iorio and Corsale 2010; Stubelj Ars and Bohanec 2010). The tourism organizations such as tour agents and hoteliers have to be convinced that responsible rural tourism (RRT) is beneficial to them economically in the long run. Although the authorities such as the tourism ministry can give a guideline and advantage of RRT, the above stakeholders find difficulties in deciding which direction of RRT would be the best for them if various alternatives were presented. This is clearly a
problem of choice. Responsible tourism draws multi-disciplinary information base. However, current decision-making approaches have little guidance on how to integrate or judge the relative importance of contending criteria.

**A Multi-Criteria Approach**

There has been growing number of literature in the tourism sector attempting to solve multi-criteria decision problems (Beedasy and Whyatt 1999; James F 2001; Mendoza and Prabhu 2003; Noor, Ahm et al. 2010). There are various criteria such as tourist preference, attractions, activities, resort location etc. that need to be considered before embarking into the available options of RRT. Tourism is a product where the destination delivers the experience to its visitors. There are many stakeholders who are responsible to deliver this experience namely tourism enterprises, the public sector, destination management organizations, local dwelling and other subsidiary industries and organizations (Hassan 2000; Cawley and Gillmor 2008; Crouch 2011). The involvement of multiple stakeholders in delivering the tourism experience requires a multi criteria approach in developing a decision making model. Stakeholders must have the ability to evaluate the kind of criteria trade-offs that are commonly encountered in RRT (Lin and Juan 2009; Bonilla Priego, Najera et al. 2011). There have been attempts to mitigate this effect by introducing policies related to responsible or sustainable tourism (Stefan 1999; Cawley and Gillmor 2008; Hall 2011). Policy change and policy adaptation is seen as a key factor that can influence tourism implementation direction. This is significant for RRT implementation as policies need to be regulated by the governing agencies and the effect of such policy must be measured to see its effectiveness. If a measurement is in place,
then it is possible to see such an effect. The regulators can use this to make changes or add on more criteria to the policy.

According to (Heck, Dearden et al. 2011), the effective management of marine protected areas (MPA) can be achieved by identifying MPA performance indicators in the beginning of the planning process. The identified indicators are essential for collection of baseline data that can be used to measure the performance of the protected area. The outcomes of the plan can be realized by measuring the difference between the initial state and after the establishment of the MPA performance indicators. Analytical Hierarchical Process (AHP) converts relative importance of judgment to a set of overall measurable weight. The advantage of this approach is the ability to factor in quantitative and qualitative attributes. The method allows structuring a complex problem into a hierarchy making the decision-making manageable. Fig. 1 shows how a common goal can be of responsible Management of TSMP can be achieved by eliciting judgment of individual criteria from the perspective of social, economic, resource and environment. Each identified criteria will have its measurable or subjective indicators using a nine-point scale. The criteria are then compared using a pair-wise method to elicit judgment for the individual criteria (Saaty and Alexander 1989). This method simplifies multidimensional scaling problems into single one (Hamalainen, Kettunen et al. 1999). If the goal is to identify what tourism activity is suitable for the park, the possible alternatives must be stated and the model can be used to find the activity that produces the highest weightage based on the criteria stated in the model. The responsibility of park management could also be an alternative. This could be government agencies, private entities, non-government organisations, local community or a combination of any possible agencies.
The alternatives must be clear and realistic to achieve the selected goal. Studies (De Freitas 2003; Mendoza and Prabhu 2003; Mardle, Pascoe et al. 2004; Kiker, Bridges et al. 2005; Heck, Dearden et al. 2011) have shown identification of suitable criteria can lead to optimal decision making in environmental related issues where multiple stakeholders are involved.

Fig. 1. TSMP Criteria Hierarchy using AHP

The Study Site

The Tun Sakaran Marine Park is part of Semporna district located of the east coast of Sabah Malaysia. It is the largest MPA in Malaysia covering an area of 340 square kilometres of sea and coral reef with a land area of 10 square kilometres consisting of eight islands (Fig. 2). Recognizing the significance of the marine environment, the park
was gazetted as a MPA in July 2004. The park is managed by Sabah Parks that is a foundation under the purview of the Sabah state government.

The area is rich with natural marine life that includes rocky reefs and rich diversity of corals. It is filled with biodiversity with more than 528 species of reef fish, 240 marine invertebrate and 255 coral species recorded in this park. Six sea grass species have also been identified in this area with highest abundance recorded in two islands, Bohey Dulang and Selakan. Terrestrial lives are also recorded in this region. The abundance of birds such as the Pied Hornbil, mammals such as the bearded pig and reptiles such as sea snakes, vipers and lizards (Large Tokay). The park is also reach with fauna, where some species of plants such as *Selaginella Tamariscinall* a small plant that grow on rocks and *Cheilanthes Javensis* are endemic to this region.

Fig. 1. Tun Sakaran Marine Protected Area
Management Issues Of Tun Sakaran Marine Park

Although there have been attempts to regulate activities and protect the MPA with establishing the necessary policies, the challenges are greater than expected. Government agencies are often slow to react to the management needs of the park as it has to consider multiple stakeholders (Kriwoken and Haward 1991). One teething setback is the presence of illegal immigrants. Due to the close proximity of the islands to Philippines, the presences of illegal immigrants are quite rampant in the islands. One of the damaging activity conducted by the migrants are destructive methods of fishing such as fish bombing.

There has also been unregulated use of terrestrial land by locals and illegal migrants to create settlement and cultivation of crops. Islands that is isolated from the mainland face issues with solid waste management and sewage management. Without proper waste management, serious damage to reef and marine life can be expected.

Poverty may be one of the root problems of over exploitation in the MPA. Socioeconomic concerns of the locals must be taken into consideration to elevate their income or find other sustainable source of income. One possible option is to allow Mari culture such as seaweed farming or aqua farming for edible species that may reduce dangerous fishing methods that are currently rampant in the area. Oyster pearl farming is also possible, as it had been done throughout other marine areas in Sabah.

Tourism can provide the necessary economic benefit to this region if management of the resources and activities are conducted responsibly. The challenge is the organisation that
is responsible in managing the park and the activities that are suitable for the park be it marine farming or tourism activity.

Making decisions with multiple possible options can be decided using some form of weight by identifying criteria with indicators. Recently there have been attempts to identify criteria for management of tourism destinations as whole without specifying the type of destinations. The (Council 2009) have identified for main criteria for management of tourism destinations:

1. Demonstrate sustainable tourism management
2. Maximize social and economic activity to the host community and minimize negative impacts.
3. Maximize benefits to communities, visitors, and cultural heritage and minimise negative impacts.
4. Maximize benefits to the environment and minimize negative impact.

The criteria were developed as a benchmark for businesses and destinations to achieve social, environmental, cultural and economic sustainability. The criteria were designed to adapt to the dynamics of the destination in term of culture and local activity. The development of these criteria shows the urgency in management of tourism destinations. TSMP being vulnerable to human activity and exposure in the name of tourism urgently needs a sustainable management model in relation to tourism activity and parks management. If handled properly, tourism can bring significant economic reward for the community and destination.
Conclusion

This study is still at its initial stage of information collection about the challenges in decision making in relation to the management of Tun Sakaran Marine Protected Area. The classification of Marine Protected Area is also a social construct (Heck, Dearden et al. 2011) involving multiple government agencies, stakeholders and other interested parties. The identification of criteria and their respective indicators is mandatory to the management TSMP. Besides the criteria identified by the various agencies, expert opinions will be consulted to further verify the applicability of the selected criterion. Successively, the decision-making in managing the park with the input of multiple stakeholders will be explored further in this study.

References


