



Research Framework in Local Communities Participation of Deltaic Mangrove Forest Resources Conservation in Kuching, Sarawak: A Review

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Abstract Mangrove is important as habitat, provide food source, maintain ecological quality, and contribute economic value to human perspective. Nevertheless, mangrove forest resources are threatened, destroyed and exploited due to lacking of conservation awareness and concern, which the area are develop as industrial, housing and agricultural activities. This research study through research framework are carry out in investigate, defined and determine the attitude of local communities in conservation towards mangrove forest. This research is concentrate at Sarawak area, which involve with quantitative approach through questionnaire methods in collecting data. The contribution through research results, findings, and discussion will become initiative in conserve the mangrove forest resources. Conclusion will be react as summary towards all findings and conclude the achievement of objective in the research study.

Keywords mangrove, awareness, conservation, attitude, achievement

Introduction

The participation of local communities in the conservation of mangrove forests is vital to sustain a good livelihood for future generations. This is because local communities, as one of the stakeholders in mangrove forests, play an important role in contributing to the conservation efforts. Mangrove forests have been one of the important sources of income for local residents as they depend on mangrove forest resources and the value of these resources have bolstered their income through various activities such as fishing, farming, logging, ecotourism, charcoal production, agriculture and aquaculture activities. These activities would have a negative impact on the forest's natural resources as well as local communities if there were no action taken on awareness or conservation programs taken by the responsible authorities. This study will focus on the local community's participation and their willingness to pay (WTP) for the conservation of deltaic mangrove forests in the district of Kuching in Sarawak.

Background of the Study

Mangroves are trees and shrubs that grow in mangrove habitats and live between the sea and land in the tropical and subtropical coastal areas [1-2]. It is referred to as 'mangroves' due to its mangrove habitat or ecosystem that includes all its physical, chemical and biological components [3]. Hence, mangrove forests are quite unique compared to other types of forests due to its water salinity and its habitat consisting of fishes, shrimps, birds, crabs, cockles, reptiles and mammals.

These mangrove forests mostly exist in the tropical and subtropical areas, which covers Australasia, South Asia and South East Asia [4]. According to the United Nations Food and Agriculture Organization (FAO), Indonesia, Australia, Brazil and Nigeria accommodate roughly 43% of the world's mangrove forests, which comprises a total area of approximately 160,000 km² [4]. Unfortunately, countries like Vietnam and Ecuador have already lost their mangrove forest, which is close to 50% of all mangroves worldwide, while Indonesia and Thailand have lost even more due to human activities and global climate change [5].



While in Malaysia, the mangroves presently cover 637,164 hectares representing 2.5% of the global mangrove resources [6]. One of the famous mangroves in Malaysia is the Matang Mangrove Forest Reserve in Sarawak and it has been nominated as the best-managed mangrove in the world because of its high productive ecosystem that provides numerous benefits to the local residents in that area [7].

In Sarawak, the mangrove forests cover about 93,000 hectares (9,300 km sq) of the total state land [8]. The mangrove forests are largely found at the river mouths of the Sarawak, Rajang and Trusan-Lawas Rivers (Figure 1.1) [3]. The most common species recorded in Sarawak are *Rhizophora*, *Avicennia* and *Sonneratia* [9]. The mangrove forests in Sarawak are managed by the State Forest Department i.e. through the Sarawak Forestry Department (SFD) and Sarawak Forestry Corporation (SFC). About 15,983 hectares of Sarawak mangrove areas are gazetted as Totally Protected Areas (TPA) and 28,000 hectares remain as Forest Reserves and Protected Forests [10]. Even though some states in Malaysia have substantially increased their mangrove forest reserves recently, the substantial losses of Malaysia's mangrove forests have increased to 119,820 hectares or 17% from 1973 to 2003 [11].

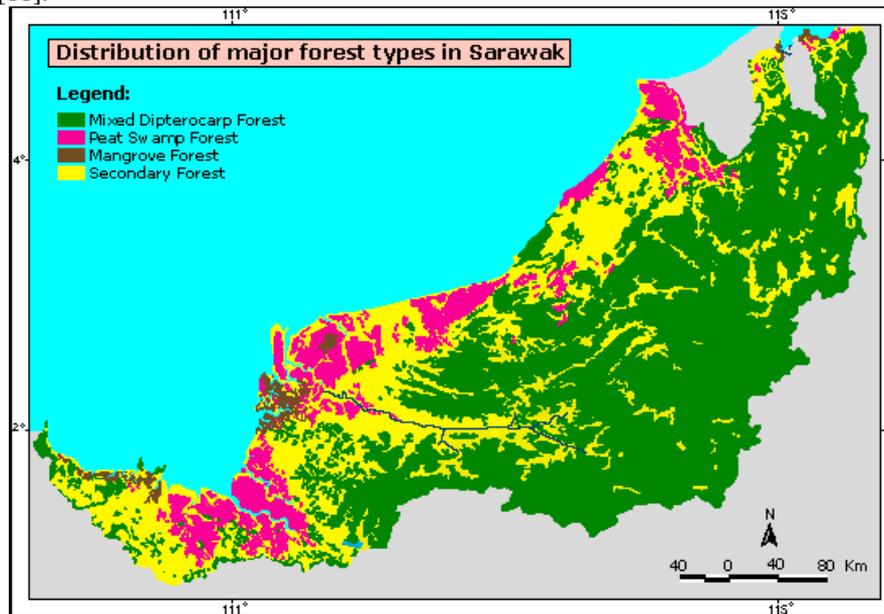


Figure 1.1: The map shows the distribution of major forest types in Sarawak as most of the mangrove forest are concentrated in the Sarawak River Delta, Rajang Delta and Trusan-Lawas Delta (Source: Chong, 2006 and Fah, 2007).

There have been changes in deforestation from year to year that affects the mangrove forests. There has been a 30% decline in mangrove forests in Malaysia over the past five decades from 800,000 ha in the 1950s to 575,000 hectares in 2005 and Sarawak has seen one of the highest mangrove losses besides Perlis, Selangor, Johor, Negeri Sembilan and Penang [11]. In Sarawak, mangrove forests have provided benefits through its diversity of resources especially to socio-economic livelihood such as logging, ecotourism and fisheries activities. These logging activities generate income to Sarawak, especially contributing to Sarawak's timber industry [12].

Mangrove forests play a crucial role in maintaining a good ecological system for the biodiversity of the tropical forest. Amri [13] suggests there are tangible and intangible benefits to the local people provided by these mangrove forest resources. Apart from that, the mangroves' ecosystem also provides various benefits to the coastal communities ranging from timber, fuel, food and medical herbs and other forest products as well as becoming the feeding and nursery grounds for many aquatic and terrestrial organisms. The existence of mangroves gives a positive impact to environmental protection, especially the rising of the sea level and the salinity of water as well as preventing the coastline from effects of tsunamis and land-erosion.

Furthermore, it plays a significant role in economic and ecological fields due to the diversity of its habitat for organisms ranging from bacteria and fungi to fish, shrimps, birds, reptiles and mammals [14]. The species of fauna such as reptiles, birds and mammals are habitats that use these breeding grounds and nurseries for offshore fisheries and for protecting the coastline from erosion [15]. Other identified habitats in the mangrove forest areas include saltwater crocodiles, proboscis monkeys, silver leaf-monkeys, long-tailed macaques, flying foxes, otters, bees, crabs, mudskippers, bearded pigs, bats, snakes, monitor lizards, fishes, shrimps and cockles [7].



Mangroves also provide food for migrating birds such as kingfishers, eagles, storks, bar-tailed godwits and grey plovers that travel from Australia and the Pacific Islands to China and Siberia. They migrate from the southern hemisphere to a warmer climate during certain months (July to April) and they use the mudflats and mangrove forest as their transit area during their journey. Besides that, mangrove forests also provide a valuable source of recreational activities for local communities to participate in such as fish, prawn and crab catching, bird watching and wildlife observation (Ibid).

Malaysia is one of the develop country that have multi ethnics and rich of its flora and fauna. It has attracts tourist arrivals every year due to its culture and nature diversity. One of its total revenue Gross Domestic Product (GDP) is coming from tourism sector. In 2014, Malaysia has attracted 27,437,315 tourists arrivals, a growth of 6.7% compared to 2013 [16]. It is expected by 2025, Malaysia total GDP will be 5.8% or RM95.96 billion through its direct contribution in tourism [17]. Meanwhile, Sarawak is known as “Land of Hornbill” represents its tourism receipts in 2014 at RM10.7 billion compared to RM9.6 billion in 2013 [18]. Sarawak is also one of the states that offered more on nature tourism. The diversity of flora and fauna in Sarawak has giving good potential to attract more tourists from outside especially those who loved nature and adventure activities such as bird watching, jungle trekking, river cruising, fishing and wildlife watching.

In 2012, almost 2 million arrivals of international tourists were recorded for Sarawak. More than 40,000 of these tourists were from European countries such as France, Germany, Sweden, Denmark and Norway and mostly interested in Sarawak’s natural beauty. The increasing of tourists coming to Sarawak has shown that it become one of the desirable destinations in Malaysia. Furthermore, tourism also provides a significant contribution to the local community’s economic growth through the utilization of mangrove forests. The direct benefit from ecotourism has generated additional income for them and increased their standard of living.

Sathirathai and Barbier [15] and Ronnback [19] both agree that the role of mangroves is very important both economically and ecologically as a natural resource and as a breeding ground for a limited number of plants and species as well as protecting the environment, which offers valuable benefits to the local community. However, both these aspects cannot be separated without causing damage to the area. Therefore, the participation of local communities in utilization, conservation, preservation and management of mangroves should be taken into consideration since it will prepare them on how they should react towards the threat and destruction of mangrove forest resources.

Social Exchange Theory

Social Exchange Theory (SET) has different perspectives in defining this theory. However, this study tries to explain the model participation of local communities in conservation activities in mangrove forest resources in Sarawak. It is a theory that concerned with the understanding the interaction of resources exchange between individual and groups [20]. It is also explains the understanding the social behaviour of the people in undertakings the economic costs and benefits. For example, the local communities are expect to contribute i.e. participate in conservation activities to preserve the natural resources of the mangrove forests in their area; they have to consider the costs and benefits they get from the resources. This theory has provided a conceptual base co-operation among members-owners as it is one of the factor that initiated cooperation among others stakeholders. This situation will give a significant influence on their attitude towards the development of their participation in conservation.

Problem Statement

Mangrove forest resources are threatened, destroyed and exploited because there is a lack of conservation awareness and concern among the local communities in the deltaic area of Kuching district. For instance, the mangrove forest areas have been cleared for industrial, housing and agricultural development. Although the government is responsible for protecting and preserving mangrove resources, they cannot do it alone, as the local population must help to conserve the mangrove forests.

As Chong [3] indicated, it is the local population that has caused damage to the mangrove forests, thus it is responsible, as a public agency, to protect the forests. Furthermore, factors such as the exploitation for aquaculture projects, pollution, cultivation and quarrying activities have led to the destruction of vast areas of mangrove forests.

Isager *et. al.* [21] stated that the conservation program would fail without the participation of the local population. According to Walters [22] and Zareet. *al.* [23], the participation of the local population would enhance the success of reforestation by involving them in conservation programs such as planting new trees.

In Sarawak, the mangrove forest areas have decreased as much as 25% of the total area from 175,000 ha in 1973 to 130,000 ha in 2005 [11]. Local communities living near the mangrove forest areas depend directly or indirectly on the existence of the mangrove resources. Some depend for their livelihood on mangrove resources,



others depend indirectly on the existence of the forest in terms of its protective capabilities, such as against flooding, storms etc.

It is important that local communities participate in conservation programs so that they can support the actions taken by the government to protect mangrove forests. In order for the government to ensure the success of conservation programs, it is necessary to know the local community's level of participation in programs and their willingness to be involved in conservation programs. Although there have been some efforts in conservation programs but the level of participation is still low. According to the Sarawak Forestry Department [24-25], each year there are awareness programs and conservation activities initiated by the department, but due to limited allocations, the involvement of the local community has been limited. Table 1.0 shows that budget allocations provided by the government from 2006 to 2009 were increased due to the tsunami disaster that hit the South East Asian region in December 2004. Numerous precautions and awareness programs were implemented by the government such as mangrove tree planting, which could reduce the effects of tsunamis. However, in 2010 and 2011, there was a slight decrease in government budget allocations due to the decreasing involvement of the local community.

Table 1.1 Budget Allocations for Mangrove and other Tree Planting Species in Coastal Areas of Sarawak

Year	Total Budget Allocation (RM)
2006	150,000
2007	500,000
2008	1,000,000
2009	1,500,000
2010	1,000,000
2011	15,000

Source: Sarawak Forestry Department (2011)

Table 1.1 shows the number of participants in various conservation activities such as seminars, mutual aid programs, study and field trips in Sarawak. It had increased from 2007 to 2009, which relates to the increasing budget allocation and spending from the government. In 2010, the number of participants decreased to 842, due to decreased allocation of government budget spending.

Table 1.2 Numbers of Participants in Conservation Activities in Sarawak

Year	Participants
2007	150
2008	675
2009	1,080
2010	842

Source: Sarawak Forestry Department (2011)

It is crucial to encourage the community to participate in resource management programmes such as trees planting, seedling, and site visits', study trips organized by schools or institutions of higher learning or government agencies. One of the protection and conservation programs carried out successfully in Kampung Trusan Jaya, Sematan since 2003 was funded by grants provided by the Global Environment Facility-Small Grants Programme (GEF-SGP) under the United Nations Development Program (UNDP). Under this project, forest logging activities were reduced and conservation programs had increased the local community's income through alternative income sources such as mud crab farming, homestay programs, and production of traditional food cottage as well as downstream fishery products [5].

As of July 2009, Sarawak had planted over 380,500 mangrove trees and other coastal tree species covering over 40km in various areas along the coastal areas in Sarawak [12]. Unfortunately, according to the Sarawak Forestry Department [25], some of the trees had died due to the high tide ocean waves and monsoons as well as the sensitivity of the younger trees. Therefore, a proper intensive planting protection plan should be initiated to save these young trees.

Specifically, this study could increase the awareness and willingness of local communities to participate and support the actions taken by the government or other bodies to protect the biodiversity of mangrove forest ecology. For instance, the effective strategies of the government or other bodies through the improvement of awareness programs and educational activities on conservation helps the local communities to be more alert towards the destruction of mangrove forest resources [26]. However, a lack of involvement and understanding by government agencies and local communities could result if there is a lack of institutional support and the project's efforts are poorly sustained [20, 27-28].

The study equipped the government or policy makers with more knowledge regarding the awareness programs and activities as well as the proper utilization of mangrove forests for future generations. Based on a given statement, more systematic and effective enforcement of the existing legislations should be taken into



consideration to protect the mangroves because the illegal collection of mangrove forest has been ignored by some local communities even though they know legal action could be taken by the local authorities against them.

Research Objectives

General Objectives

The main purpose of this study is to analyse the local community's participation and their awareness in conservation programs of the deltaic mangrove forest in the district of Kuching, Sarawak.

Specific Objectives

- (i) To determine individual characteristic participate in deltaic area.
- (ii) To clarify local community participate in mangrove activities.

Significance of the study

This study will benefit the local communities by enabling and encouraging them to be involved in more conservation activities. Furthermore, the level of awareness and participation in conservation will increase in their area. In fact, their participation will give them an opportunity and provide better exposure for younger generations to learn about the importance of mangroves to our ecology. Younger generations, especially youths, could play an active role in protecting and improving the mangrove forests, which could change the attitudes of local communities towards future activities or programmes.

Besides that, the study will be useful to the government as an authoritative body and other policy makers' based on their understanding of the critical factors that influence the participation of local communities in conservation efforts through their active co-operation in the future. This will help them make improvements accordingly for the benefit of these communities.

In addition, the involvement of government bodies such as Sarawak Forestry Department (SFD) and Sarawak Forestry Corporation (SFC) as policy makers will provide better exposure in managing and preserving the mangrove ecosystem as well as greater participation, which could lead to a better sustenance of their livelihood. The realization of the importance of community participation towards the conservation programs would equip the relevant authorities to be more efficient in providing better training in educating the different levels of the community.

Furthermore, this study could provide additional knowledge to the existing corpus of literature especially information on mangroves in the Kuching area. This is due to limited studies and research on community participation in mangrove forest conservation in Malaysia, especially in Kuching. It would also benefit others who show interest in mangrove studies through the involvement of Universiti Malaysia Sarawak (UNIMAS), as one of the institutions of higher learning in Malaysia involved in this field of study. This research could also present information and statistical analysis of mangrove conservation for other researchers to expand their understanding on mangroves in Sarawak, especially pertaining to the participation and awareness of the local communities. Besides, it is a good opportunity for researchersto better understand the livelihood of these local communities that depend mostly on mangrove resources for their everyday activities.

Scope of the Study

This study focuses on identifying local community participation in conservation, which will be conducted in the deltaic mangrove forest in Kuching, Sarawak. The participation of these local communities will be analysed based on the variation of their participation and conservation activities involving them that could lead to a better sustainable development of the community in that area.

Conclusion

In conclusion, this chapter's purpose was to develop the research problem, which focuses on local community participation in conservation programs in the deltaic mangrove forest in the district of Kuching in Sarawak. This chapter contains a brief description of mangrove forests and explains its uniqueness and benefits to nature and local communities. Furthermore, this chapter also discussed the deterioration of mangrove forests that occur each year that has significantly affected various habitats in this area.

One of the problems is the lack of local community participation in conservation, as many stakeholders, such as local authorities i.e. SFD and SFC, should play an important and creative role in increasing local community participation, especially those who depend directly on its resources. The statement of the problem that is presented in this chapter provides the foundation for formulating the aims and objectives of the study, i.e. to analyze the participation of local communities in conservation programs and the willingness to pay for conservation by local communities who are living in the periphery of the deltaic mangrove forest in Kuching, Sarawak. Therefore, the information that will be derived from this study will suggest to relevant authorities (SFD and SFC) the need for sustaining the mangrove forests in the delta area of Kuching district.



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