

CONTRIBUTION OF MANGROVE FOREST TO THE LIVELIHOOD OF LOCAL COMMUNITIES IN SUNGAI KUANTAN, PAHANG

Mukrimah Abdullah
Forest Research Institute Malaysia
52100 Kepong, Selangor, Malaysia
Email: mukrimah@frim.gov.my

Mohd Parid Mamat
Forest Research Institute Malaysia
52100 Kepong, Selangor, Malaysia
Email: paridms@frim.gov.my

Faten Naseha Tuan Hussain
Forest Research Institute Malaysia
52100 Kepong, Selangor, Malaysia
Email: fatemaseha@frim.gov.my

Nurfazliza Kamarulbahrin
Pahang State Forestry Department
25990 Kuantan, Pahang, Malaysia
Email: nurfazliza@forestry.gov.my

Norliyana Adnan
Forest Research Institute Malaysia
52100 Kepong, Selangor, Malaysia
Email: norliyana@frim.gov.my

ABSTRACT

The conservation of mangrove forests does also means to sustain livelihood of coastal communities that for generations have received direct and indirect benefits from these natural mangroves' ecosystem. Ecosystem services provided by the mangrove habitats on human society come in many forms, especially as a source of food and raw materials used in daily life. Determining how mangroves contribute to human society are now more crucial than ever, since this ecosystem often to be traded-off and converted into other types of land uses such as development projects and industrial purposes. Besides, mangrove forests also provide amenity services such as ecotourism and recreational fishing. Hence, local community are able to generate income from these amenity services served by the mangrove. A case study was conducted in 2020 to analyse the contribution of mangrove forest towards local community, in Sungai Kuantan, Pahang. A total of 384 sampled households involving nine villages were interviewed. The study employed household's socioeconomic survey on locals live near Sungai Kuantan mangrove forest, Pahang. The result of the study found that 70% of the coastal communities had visited and knew about the existence of mangrove forest near their villages. The study also found that 36% of them use the mangrove forest area in Sungai Kuantan either for the purpose of income generation, recreation or as part of their daily food source. On average, the monthly household income for the community live near the Sungai Kuantan mangrove forest is RM2,882 per month. Of that amount, 31.9% was contributed from Sungai Kuantan mangrove forest and the coastal areas nearby. The results of this study act as evidence that Sungai Kuantan mangrove forest is able to generate income, hence, contribute to the livelihood of local community especially at Sungai Kuantan, Pahang.

Keywords: Mangrove forest, socio-economics study and coastal communities.

INTRODUCTION

Mangrove forests are among the most important types of forest in Malaysia, where, Malaysia contributes 3.7% of world mangrove forest coverage (Wan Juliana WA *et.al*, 2018). Meanwhile, Abdul Shukor AH (2004) stated Malaysia's coastline is estimated to be 4,810 km distributed along the Peninsular Malaysia (west and east coast), Sabah and Sarawak. There are various types of ecosystems in Malaysia coastline; one of the ecosystems is mangrove forest. Mangrove forests act as frontiers that protect the country's coastline against strong waves especially during monsoon seasons. Other than that, mangroves also provide habitat for various marine life forms, function as natural filter that improves the quality of water and also play important roles as significant carbon sink in coastal environment (Hamdan O & Muhammad Affizul M, 2020). Most importantly, mangrove ecosystem also a spawning and nursery ground for many marine shrimps and fishes. This made mangrove forests among naturally fertile and productive area as it serves as nesting and feeding ground for biodiversity of life (Kamarulzaman Y *et. al.*, 2011).

Not only have extensive values, mangrove resources also serve great importance to the socio-economy of the country, especially to local community living bordering the ecosystem. The importance of these resources is derived from the direct goods harvested from the mangrove forests as well as from the amenities provided by the resource itself. The fisheries goods that are harvested from the mangrove ecosystem include mud crab, variety of shrimp species, gastropods and also cockles. Together, they provide

an important food source as well as able to generate income for nearby community. Therefore, maintaining and conserving this mangrove ecosystem is very crucial not only for the environmental stability and safety, but also for the well-being and livelihood of local community.

Thus, a 2020 study aimed to analyse the contribution of mangrove forests toward the livelihood of local community specifically at Sungai Kuantan mangrove reserved, Pahang. The objectives of this study were (i) to identify the uses of mangrove forest by local community, (ii) to determine mangrove resources harvested and consumed by local community and lastly (iii) to estimate in monetary value on how much mangrove forests contribute to the household's income.

METHODOLOGY

Study area

Generally, there is estimated about 1.55 million hectares of forest reserved at Pahang, of which 2,416 hectares were mangroves. Out of that, 339-hectare mangrove forest coverage is at Kuantan, Pahang. This green little pocket located at the centre of Kuantan, provides variety of goods and services which contribute to the well-being and livelihood of local community but also serves as ecotourism spot especially for domestic visitors to enjoy and experience its uniqueness that is still preserved. Boat cruising along Sungai Kuantan by local operator, recreational fishing (where visitors can hire boatman or rent local's boat), firefly watching at night, visit to fisherman villages and also there is a boardwalk with lookout tower in the mangrove area are some of the main attractions and activities that can be done in Sungai Kuantan.

However, the sustainability of these mangrove forests is in vulnerable state and also experiencing the pressure due to the rapid development around this area. The change of land use from forested land to development or agricultural land can also occur due to its strategic location. Therefore, it is high time that studies needed to be carried out to act as supporting policy documents that serve as an evidence that this area should be protected and preserved so that mangrove forests sustainability can be maintained and the dependency of local community on the goods and services of this mangrove forest continues to be guaranteed especially for future generation. A total of nine (9) villages were selected to be sampled in this study, namely Kampung Anak Air, Kampung Belukar, Kampung Kempadang, Kampung Peramu, Kampung Permatang Badak, Kampung Sungai Isap, Kampung Tanah Putih, Kampung Tanjung Api dan Kampung Tanjung Lumpur. These villages were sampled together with the Kuantan Land District Office.

Research approach

There are two main research approaches applied in this study which were Rapid Rural Appraisal (RRA) and household's survey. RRA techniques were widely used globally, research by Ganesh C. (2010), Jarrett, CW & Lucas DM (2003), Alayne M. (1997), Wenresti G. (1995), Melville B. (1993) also applied this approach in their study. RRA technique is a tool that enables a quick assessment of the existing environment and the possible impacts of the resource utilization and the other environmental services to the local socio-economics livelihood (Liswanti *et.al*, 2012). The techniques applied in RRA include group interview; methods of cross-checking information from different sources; direct observation at study site level and use of secondary data (Crawford, 1997). This technique provides useful information to be implied in questionnaire design. In this study RRA applied on the preliminary stage of the study to gather baseline information and understanding the roles of mangroves and its contribution towards local community that lives nearby the study area.

The household's survey included a face-to-face formal interview, guided by structured questionnaires. The questionnaire was constructed into few sections covering, household's income sources, locals' perception toward mangroves forest and lastly their demographic characteristic of the households. The household survey was conducted by well-trained enumerators. During the household survey, the respondents were briefed on the objectives and purpose of the survey. Time taken for each interview was about 30 minutes per interview.

Sampling

The estimation of sample size was based on the number of households living at the selected study site, in which the households' data was provided by Kuantan Land District Council Office. This study adopted the simplified sampling formula from Yamane (1985) and taken 5% as level of precision. A total of 384 households were successfully interviewed during the survey (Table 1).

Table 1: Percentage of sampled households

Villages	Households	Sampled Households	Percentage (%)
Kampung Anak Air	150	21	5.5
Kampung Belukar	400	70	18.2
Kampung Kempadang	150	44	11.5
Kampung Peramu	900	80	20.8
Kampung Permatang Badak	60	20	5.2
Kampung Sungai Isap	120	43	11.2
Kampung Tanah Putih	150	41	10.7

Kampung Tanjung Api	180	35	9.1
Kampung Tanjung Lumpur	80	30	7.8

RESULTS AND DISCUSSIONS

Mangrove forest uses

Mangrove forests provide various functions and uses that not only for sustaining ecosystem but also benefited local community. Mangrove forests serve as a breeding habitat for various types of marine life which become local's daily food source and also income for local fishermen. Meanwhile, amenity services by mangroves also created job opportunity and income for local boatmen, tour guides and small-scale ecotourism operators. The results of the study found that 36% of the respondents use the mangroves area in Sungai Kuantan for various purposes. The purpose of the respondents use of mangroves area can be categorized into three, either for own use and consumption, to generate income for fishermen and local fish mongers, or just fishing in the mangroves as a hobby during leisure time.

Table 2 below illustrates the uses of mangrove forest by local community. The results show that the highest percentage is the use of mangroves as a recreational fishing spot during leisure and free time, followed by personal use and consumption and lastly for income generation. Where, 25% of respondents used mangrove forest for recreational fishing especially during their leisure time. There were also 13% of the respondents who used mangrove forest to harvest goods such as mudcrab, fish and seashell for their daily food consumption. Lastly, there were 10% of the respondents depend directly on mangrove forest goods and services for their monthly income generation. Most of these respondents work either as fisherman or fish monger. The study found out that mangroves provide a significant contribution to the surrounding community. This proved that mangroves at Sungai Kuantan not only provide goods (in term of fisheries) but also provides amenities and services that give great values towards local community. This finding also serves as a proof that it is important to conserve and maintain the mangroves at Sungai Kuantan as the area provide a very significant benefit to people either to community living nearby or to Kuantan's residents as a whole.

Table 2: The uses of mangrove forest by local community

Uses	N	Number of households	Percentage of households
For own use/consumption	384	51	13%
For income generation	384	38	10%
Recreational fishing	384	94	25%

Mangrove forest resources

One of the direct benefits of mangrove forests is its function as a source of food. To further support this function, a tagline "No Mangrove, No Seafood" was established to help protect mangroves ecosystem as breeding ground and habitat for many marine lives. The goods from the Sungai Kuantan mangrove forest that are often harvested by the villagers are *Macrobrachium rosenbergii* (Udang Galah), *Scylla serrata* (mud crab or locally known as ketam nipah), *Polymesoda expansa* (lokan), *Cerithidea obtusa* (siput sedut/Belitung), variety of fishes such as grouper (kerapu), sea bass (siakap), croaker (gelama) and many more. Table 3 shows the mangroves resources that are often harvested by locals. Among the catch in the Kuantan River is Udang galah, where its price ranges from RM40-RM90 per kilogram. It was estimated that the total catch per trip is 4kg during the season prior to this study. In addition, various types of fishes are caught in this area such as grouper, sea bass and thorn fish. Most of these catches will be sold to the fish monger or in the market. However, most of the respondents did not sell seashell like lokan and siput belitung. Usually, locals just harvest them to cater their subsistence need or give it away for free. Looking at this result, it is apparent that mangrove resources have provided the local community subsistently while simultaneously generate income for them.

Table 3: Mangroves resources

Mangrove resources	N	Households harvest	Uses
Udang Galah	384	41%	Sales and own use
Mud crab / ketam nipah	384	36%	Sales and own use
Fishes	384	11%	Sales and own use
Molusca /seashell	384	8%	Own use
Others	384	3%	Sales and own use

Contribution of mangrove towards household's income

Result found that the average monthly household income was RM 2,882 per month (Table 4). There are two types of income which are either in form of cash and in-kind income. Cash income refers to income gain from wages, salaries or business. Meanwhile, in-kind income can come in the form of provisions, such as free meals i.e. mangroves resources consumed for daily food sources by households or it can come in the form of property, or an exchange of services. For this study, 92% of this community household's incomes were cash income and only 8% from in-kind income, in which equivalent to RM2,653/month and RM230/month respectively.

Table 4: Households' monthly income

Types of income	RM/ month	Percentage (%)
Cash income	2,652	92
In-kind income	230	8
Average households' monthly income	2,882	100

Estimation of mangrove forests contribution to the household's income can be calculated based on types of income earned by sampled households. The ability of Sungai Kuantan mangroves to generate income for locals can be measured from the sources of households' income, that is to observe whether mangrove is one of the income sources and how much does it contribute to the monthly income. The contribution can be from both cash and in-kind income. For example, the sales or business related to mangrove goods and products either direct produce such as fresh fishes, crabs and other seafoods or indirect produce- processed foods such as fish ball, dried fish (*ikan kering*), fish crackers (*keropok ikan*) and shrimp paste (*belacan*). The result figuratively shows that 31% of households' income generated from the mangroves and its related sources which amounted to RM862/month averagely. This finding is a proof that mangroves contribute to the livelihood of these nearby communities.

Table 5: Income generated from mangroves

Average income generated from mangroves and its related sources	
Average monthly income generated	RM 862
Percentage income generated	31%

CONCLUSION AND POLICY IMPLICATION

In conclusion, mangrove forests at Sungai Kuantan, Pahang do not only provide goods but also amenities and services that give great values. Where, 36% of nearby community used and visited Sungai Kuantan mangroves for various purposes. Some of these communities also depend directly to the mangrove resources in order to sustain their livelihood. Therefore, it is crucial to conserve and maintain the mangroves at Sungai Kuantan as the area provide a very significant benefit to people. The results of this study act as evidence that Sungai Kuantan mangrove forest contribute to the livelihood of the local communities either directly or indirectly.

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