

## **MANGROVES FOREST PRODUCE (MFP): IMPORTANCE AND CONTRIBUTION TO THE LOCAL COMMUNITIES AT BANGGI ISLAND MALAYSIA USING FREE LISTING TECHNIQUE**

Andy Russel Mojiol  
Forestry Complex  
Faculty of Science and Natural Resources, Universiti Malaysia Sabah  
Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia  
andy@ums.edu.my

Walter Lintangah  
International Tropical Forestry  
Faculty of Science and Natural Resources, Universiti Malaysia Sabah  
Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia  
walterjl@ms.edu.my

Musri Ismenyah  
International Tropical Forestry  
Faculty of Science and Natural Resources, Universiti Malaysia Sabah  
Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia  
walterjl@ms.edu.my

Roziela H. Alamjuri  
Wood Science and Technology  
Faculty of Science and Natural Resources, Universiti Malaysia Sabah  
Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia  
walterjl@ms.edu.my

Che Siti Zubaidah Jaafar  
Forestry Complex  
Faculty of Science and Natural Resources, Universiti Malaysia Sabah  
Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia  
zubaidahcs@gmail.com

---

### **ABSTRACT**

*Mangrove is an important source of many goods and services to humankind. The direct and indirect benefits contributed are also identified as ecosystem services of the mangrove forest. The aims of this study are to document the Mangrove Forest Produce (MFP) that used by the communities in Banggi Island, Malaysia. A total of hundred (100) respondents from 4 villages namely Kg. Perpaduan, Kg. Singgahmata, Kg. Sabur and Kg. Batu Putih was selected. Household convenience sampling method with semi-structured questionnaire by using free listing technique was employed in this survey. The main ethnic groups involved in the study are identified as Bajau's, Dusun and Ubian. Their average income is RM500 per month, which is under the poverty line of the state of Sabah. Based on the acquired data from free listing technique, the utilization of MFP can be divided into eight categories and ranked at highly important to the less important based on the communities' knowledge of judgment. The most important categories confined to fuelwood and marine products, followed by construction materials, medicinal and domestic uses, and fishing equipment. The less substantial fall under the categories of food or drinks, decoration, and handicraft. Out of the total respondents, 51% of them enter the mangrove forest when they need the products. The level of communities' dependency on MFPs at Banggi Island was fair with the frequency of 54 percent are low dependent, while the others were moderate to highly reliant on the MFP. Most of the respondents agree that mangrove forest is highly appreciated for its ecological function of ecosystem services, and therefore should be protected.*

Keywords: Mangrove forest produces (MFP), local community, free listing technique, Banggi Island Malaysia

---

### **Introduction**

Mangroves ecosystem provides many direct and indirect benefits to the humankind as well as ecological services to the environment (MEA 2005). Mojiol et al., (2016) elaborated that mangroves serve as an important breeding ground for fish and other marine life, and they also provide livelihood to coastal communities. Where mangroves are intact, they also serve as natural offshore barrier, dispersing the energy of waves, mitigating property damage and perhaps saving lives. Calls for mangrove conservation gained a significant hearing following the Indian Ocean tsunami of December 2004 that took over 200,000 lives (EJF, 2006).

Mangrove vegetation in Malaysia covers an area of 577,500 ha, with the state of Sabah accounting for 59% or 341,000 ha of the total area. While Sarawak has 132,000 ha (23%) and Peninsular Malaysia with 104,200 ha (18%). Sabah's mangrove forests occur largely along the north to the east coast, facing the Sulu and Sulawesi Sea's. According to Ong and Petol (2007), while many countries in the South East Asia continent have had lost as much of their mangrove forests but the Malaysian mangroves forest are still generally intact.

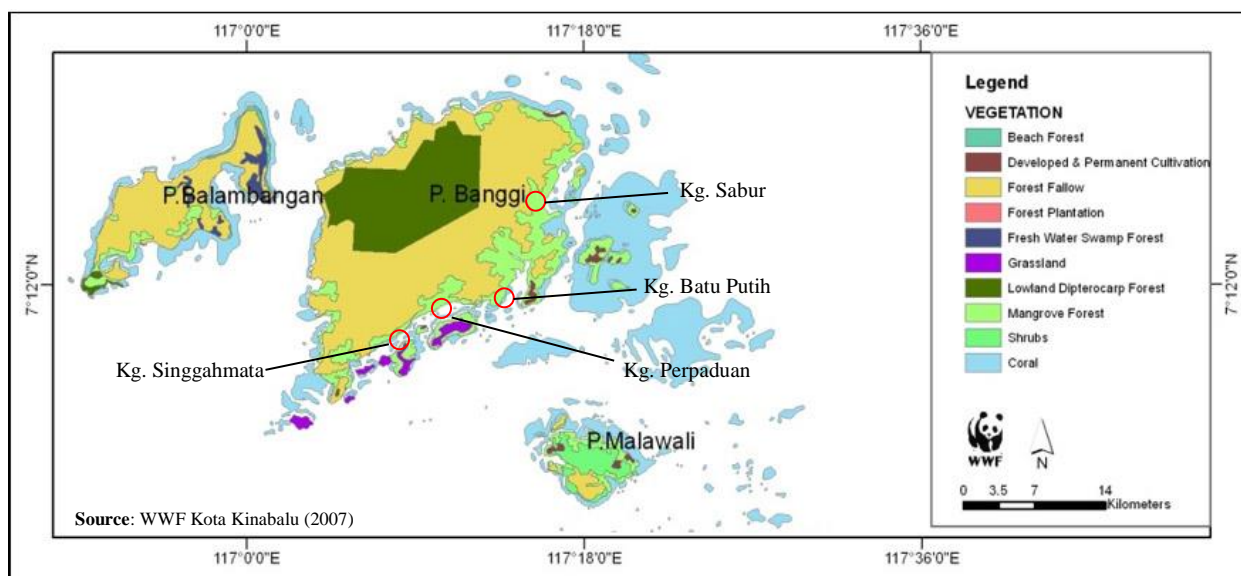
According to FAO (1994), there are many benefits obtainable from mangrove forest ranges from wood products such as timber and charcoal. Others non-wood products include wildlife, fish, honey, fodder, thatch and medicine (Mahmoud, 2014). Other importance resources are as amenities provided from within and beyond its boundaries (Sabah Forestry Department, 2014). In Sabah, the most common uses of mangrove wood are as a source of energy, either charcoal or firewood and as the primary material for the construction of boats, houses, furniture and others Lo *et al.*, (2011). The local communities highly appreciate most of the uses of mangrove products, but it has not yet documented comprehensively. The aim of this study, therefore, is to document the Mangrove Forest Produce (MFP) utilized by the communities in Banggi Island, of Sabah Malaysia.

## Methodology

### Study Area

Banggi Island is situated at the Northern tip of Sabah, East Malaysia with a coordinate of 7.26° North, 117.15° East and it is surrounded by the South China Sea on the West and the Sulu Sea to the East. Banggi is the largest island in Malaysia, covering a total area of 700 km<sup>2</sup>, with a coastline of 420 km long (Anon, 2003). The nearest mainland town is Kudat, which is about 26 km away and across the Banggi channel. Kudat town is about 190 kilometers from to the north of Kota Kinabalu state capital (Teh *et al.*, 2005). Banggi Island consisted of the large island of Banggi and fifty other smaller islands surrounding such as Pulau Patanunan, Pulau Malawali, Pulau Balambangan and Pulau Mandidarah (Fisher, 2000). The Banggi island is a sub-district of the Kudat administrative district, with its headquarters is in Karakit. The current population of Banggi approximately 20,000 (Che Siti Zubaidah, 2008; IPMB, 2003). The study area covered four local villages of the island namely Kg. Perpaduan, Kg. Singgahmata and Kg. Batu Putih and of Kg. Sabur.

Figure 1: Map of Banggi Island with the location of four villages as study sites



### Sampling Design and Analysis

The data collection were done using household convenience sampling with the aid of semi-structural questionnaire's that was divided into two main sections. The questionnaire consisted of demographic backgrounds such as age, gender, ethnic group, origin, income, forest dependency and the important of mangrove forest produce (MFP) to the community. The importance was based on categories of products and its uses. The sampling approach is by interviewing the head of the family, Head of the village and representative for Village Development Committee (JKKK). The study was conducted in Bahasa Malaysia with the assistance of a translator if the respondents using their local languages. The data's were analyzed using Microsoft Office Excel and SPSS program. The free listing technique by the respondents was used to determine which mangrove forest products are important and were ranked based on the level of importance accordingly.

### Observation

The other method used was observation. The DSLR-digital camera was used to record the communities daily activities and their usage of mangrove products. The importance of mangrove products utilized by the communities was ranked and documented according to their level of usage.

**Results and Discussions**

*Demographic*

The majority of the respondents from the four villages of Kg. Perpaduan, Kg. Singgahmata, Kg. Sabur and Kg. Batu Putih, are belong to the Bajau, Dusun, and Ubian ethnic group, and all of them are Muslim (Table 1). Most of the respondents are locals and raised in the same place where they are now living. The percentage of the number of respondents is shown in Table 2.

Table 1: Total Number of Respondent and Main Ethnic Group

Villages	No. of Respondents	Main Ethnic Group
Perpaduan	25	Bajau
Singgahmata	25	Ubian
Sabur	25	Dusun-Bonggi
Batu Putih	25	Ubian
<b>Total</b>	<b>100</b>	

In term of land ownership, most of the respondents houses are built on state land, since most of them are also fishermen who depend on the sea for their food and livelihood. Because the island is surrounded by mangrove forests that fall under mangrove forest reserve, the dwellers cannot privately claim the ownership of the land in the villages.

Most of the respondents are male, and many women were unwilling to be interviewed. The main age group is between 31 to 50 years old, and most of them are married (Figure 2). The majority of them belong to a family with 4 - 6 members. The education level of the respondents are mostly without any formal education and thus influenced their employment. The educational facilities in the villages are limited to primary schools with only one secondary school available in Banggi island. As a whole, 67 percent of the respondents earn less than RM500 per month (Figure 3) of which is falls below the poverty line for the households in the state of Sabah, (RM600 per month) as indicated by the Wetlands International-Asia Pacific in 1999.

Figure 2: Respondents' Age and Marital Status

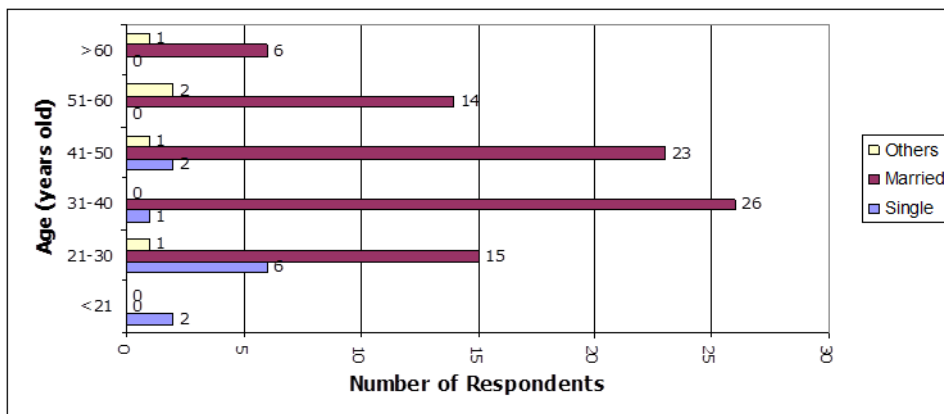
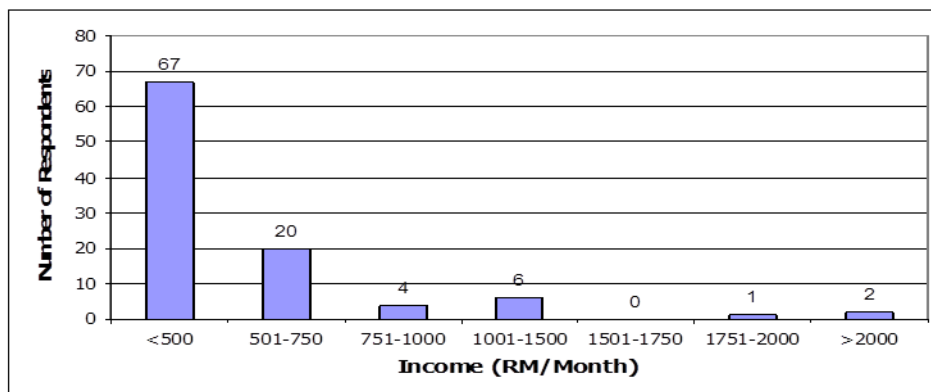


Figure 3: Distribution of Monthly Income of the respondents



Although many of the respondents earn less than RM500 per month, most of them have reported not do any others job which could bring additional income to their household. The respondents with aged above 60 years old obtained their income contributed by their son or daughter. A total of 34 respondents claimed of having a second job to filling up their leisure time.

*Communities Dependency on mangrove forest*

Many of the respondents indicated that they do not depend on resources derived from the mangrove forest (Table 2). It was found that the respondents are more dependent on fishing from the sea, which serves as their main livelihood. Direct dependence on the MFPs is confined to some communities in Kg. Sabur, who utilized the MFPs for their own consumption. According to Fisher (2000), about 75 to 85 percent of the Karakit villagers are "involved in fishing", which supported that the fishery is a very crucial and has been by traditional, practiced by the communities.

Table 2: Dependency on MFPs

Dependency	SND	ND	MD	D	SD
Dependency on MFPs	34(34%)	17(17%)	38(38%)	3(3%)	8(8%)
Dependency on Wood Products	33(33%)	21(21%)	30(30%)	3(3%)	13(13%)
Dependency on Non-wood Products	34(34%)	22(22%)	28(28%)	2(2%)	14(14%)
<b>Total</b>	<b>101(101%)</b>	<b>60(60%)</b>	<b>96(96%)</b>	<b>8(8%)</b>	<b>35(35%)</b>

1= Strongly Not Depend (SND), 2= Not Depend (ND),  
3= Medium Depend (MD), 4= Depend (D), 5= Strongly Depend (SD)

The level of respondents' dependency on MFPs is very low with 54 percent of the them indicated do not depend directly on MFPs (Table 3). This was supported by the high value of Cronbach Alpha value on the reliability test. Most the communities in Banggi Island using MFPs indirectly as a source of foods (fish, crab, bivalve and others), and wood products (firewood, charcoal, and timber). Some of the communities also generate income from MFPs, which indicate the necessity to manage the mangrove forest to maintain the livelihoods of those who rely on the mangrove forest. The uses of MFPs in a sustainable way is crucial to preserve the mangrove forests and its surrounding ecosystems.

Table 3: Level of Dependency on MFPs

Level	Frequency	Percentage (%)
Low	54	54.0
Medium	33	33.0
High	13	13.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

*Mangrove Forest Produce (MFP)*

The MFPs categories under the fuel wood and marine products are more important to the respondents as compared to categories under food, drink, and others (handicraft and decoration) (Table 4). The MFPs under construction materials, fishing equipment, medicinal values and domestic uses are moderately important to the respondents. Many indicated the lack of knowledge about the uses of MFPs especially related to food or drink, medicinal values, domestic uses, and for making handicraft and decoration. The (MFPs) are not considered as a main source of income, but rather for their personal consumption. Marine products or aquatic organisms like mollusks, crustaceans and fish also provide immediate cash, as well as food, for the communities.

Under favorable conditions, mangrove trees can grow to large sizes and be useful in construction. Mangrove trees always used as timber piling, flooring, thatch, fence posts, poles, bridge, stairs, and cottage. Poles extracted are used as agricultural stakes and fencing material. The extraction of mangrove trees for medicine, domestic purposes, and food or drink are not well recognized by the younger generation, which may be prone to the loss of the traditional knowledge of the MFPs uses. The uses of MFPs for cosmetic making, handicraft and decoration can be potentially commercialized to benefit the local communities by bringing in additional income. However, the implementation can be only possible with the assistance of the Government or Non-Government Organizations (NGOs).

**Conclusion**

This study showed that the communities at Banggi Island are not directly dependent on MFPs. The level of dependency on MFPs is low as indicated by 54 percent of the total respondent, followed by moderate (33 percent) and those who indicated at the high dependency on the MFPs is only 13 percent. The extraction of wood and non-wood of MFPs is only carried out during their free time. The Mangrove Forest Products (MFPs) which used by the local communities at Banggi Island were documented and listed out under eight categories namely; marine products or mangrove animals, construction materials, fuelwood, medicinal values, for domestic uses, fishing equipment, food or drink and others that are included decoration and handicraft. The main categories that

consumed by communities are fuelwood, construction materials, and the marine products. The marine products confine to be the highest category of MFPs used by the communities, while the lowest category is under fishing equipment.

Table 4: List of Mangrove Forest Produce's by their importances

Categories	Parts	Products/Uses	Local Name	Scientific Name	Important
<b>Mangrove Wood Products</b>					
Fuel Wood	Wood, Branches	Charcoal Firewood	Tengar Bakau	<i>Ceriops tagal</i> <i>Rhizophora</i> spp.	5
Construction Materials	Wood	Timber Piling Flooring Thatch Fence Fence Posts Poles, Bridge Stairs, Cottage Cage	Tengar, Bakau, Santing Tengar, Bakau, Bakau, Bakau, Bakau, Bakau,	<i>Ceriops tagal</i> <i>Rhizophora</i> spp. <i>Lumnitzera littorea</i> <i>Ceriops tagal</i> <i>Rhizophora</i> spp. <i>Rhizophora</i> spp. <i>Rhizophora</i> spp. <i>Rhizophora</i> spp. <i>Rhizophora</i> spp.	4
Fishing Equipments	Small Wood, Branches	Fish Traps Fishing Rod Fishing Poles Crab Traps	Perangkap Ikan Pancing Pancing Perangkap Ketam	<i>Rhizophora</i> spp. <i>Rhizophora</i> spp. <i>Rhizophora</i> spp. <i>Rhizophora</i> spp.	2
<b>Mangrove Non-Wood Products</b>					
Marine Products		Fish Crab Bivalve etc.	Ikan Ketam Bakau Lokan	Various kind of species <i>Scylla serrata</i> <i>Polymesoda expansa</i>	5
Medicinal Values	Fruits, Barks, Seeds, Shoots	Constipation Bleeding Sore Throat Dysentery Stingray Stings Smell Breath Catarrh, Swollen Fever, Diarrhea	Bakau Santing Tengar Terbigit Api Api Bakau Santing Perepat	<i>Rhizophora</i> spp. <i>Lumnitzera littorea</i> <i>Ceriops tagal</i> <i>Xylocarpus granatum</i> <i>Avicennia marina</i> <i>Rhizophora</i> spp. <i>Lumnitzera littorea</i> <i>Sonneratia alba</i>	3
Domestic Uses	Shoots, Barks, Fruits, Seeds Barks Barks	Cosmetic Powder Tannin Dyes	Perepat Terbigit Tengar Tengar	<i>Sonneratia alba</i> <i>Xylocarpus granatum</i> <i>Ceriops tagal</i> <i>Ceriops tagal</i>	3
Food/Drink	Barks Fruits, Barks Fruits, Shoots	Fermented Drinks Seasoning Vegetables	Tengar Perepat Tumu Api Api	<i>Ceriops tagal</i> <i>Sonneratia alba</i> <i>Bruguiera</i> spp. <i>Avicennia marina</i>	1
Others: Decoration Handicraft	Dead Wood Fruits Wood, Roots	<i>Bonsai</i> Oil Lamp Short Machete Head	Api Api Terbigit Terbigit	<i>Avicennia marina</i> <i>Xylocarpus granatum</i> <i>Xylocarpus granatum</i>	1

Note: 1= Strongly Not Important, 2= Not Important, 3= Medium Important, 4= Important, 5= Strongly Important

### Acknowledgment

The authors would like to express their deepest appreciation and sincere gratitude to the Sabah Forestry Department Kudat, Head of Villages, JKK Kampong and all of respondents' who had involved in this project for their invaluable contribution assistance and contribution in which made this study possible.

## References

- Anonymous. (2003). *District profile of Banggi Island in 2003*. Kudat District Office.
- Che Siti Zubaidah Binti Jaafar, (2008). *Communities' Dependency on Mangrove Forest Product at Banggi Island, Kudat*. Sekolah Perhutanan Tropika Antarabangsa: Universiti Malaysia Sabah. Unpublished.
- EJF., (2006). *Mangroves: Nature's defence against Tsunamis - A report on the impact of mangrove loss and shrimp farm development on coastal defences*. Environmental Justice Foundation, London, UK.
- FAO., (1994). *Mangrove Forest Management Guidelines*. FAO Forestry Paper No. 117. Rome.
- Fisher, H., (2000). *A Socio-Economic Assessment of Coastal Communities of Pulau Banggi Sabah, East Malaysia*. Master of Science Thesis, University of Minneapolis.
- Institut Penyelidikan Marin Borneo (IPMB). (2003). *Laporan Kajian Mengenai Pengetahuan dan Pandangan Masyarakat Pulau Banggi Terhadap Penubuhan Taman Tun Mustapha*. IPMB, Kota Kinabalu (2003) p. 36. Unpublished.
- Lo, M. W., Mojiol, A. R., & Saleh, E. (2011). Diversity of mangroves ecosystem in Semporna mangrove forest. *Borneo Science*, 28(8), 17.
- Mahmoud Sarhan. (2014). *The Economic Valuation of Mangrove Forest Ecosystem Services: A Review*. Environment Department, Environmental Valuation. University of York. May, 2014
- MEA., (2005). *Ecosystems and human well-being*. Vol. 5. Washington, DC: Island press, 2005.
- Mojiol, A.R., Guntabid, J., Lintangan, W., Ismenyah, M., Kodoh, J., Liew, K.C & Sompud, J., (2016). Contribution of Mangrove Forest and Socio-Economic Development of Local Communities In Kudat District, Sabah Malaysia. *International Journal of Agriculture, Forestry and Plantation*, Vol. 2 (February.)
- Ong, R. C. and Petol, G. H., (2007). *Sabah's Mangrove Forests: Towards Conservation and Sustainable Use*. Sandakan: Sabah Forestry Department.
- Sabah Forestry Department. (2014). *Annual Reports 2014*. Sandakan Sabah
- Teh, L., Cabandan, A. S. and Sumaila, U. R., (2005). The reef fisheries of Pulau Banggi, Sabah: A preliminary profile and assessment of ecological and socio-economic sustainability. *Fisheries Research*. 76: 359-357.
- Wetlands International-Asia Pasific., (1999). *Conservation and Sustainable Use of Tropical Peat Swamp Forests and Associated Wetland Ecosystems in Malaysia*. UNDP/GEF Project Document MAL/99/G31.
- WWF. (2007). *Peta Profil Daerah Kecil Kudat & Banggi Tahun 2003*. Kota Kinabalu.