

## Contribution of Non-Wood Forest Product to The Local Community Living Near Mangrove Forest in Kudat, Sabah

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### Abstract

This study was conducted to identify the types of non-wood forest products from the mangrove forests that are used by people of the mangrove fringe, reviewing the contribution of non-wood forest product sales of mangrove forest on the edge of the mangrove population income sources and investigate the local use of mangrove's non-wood forest products of socio-economic development of the mangrove fringe population. The method which was used is by distributing the questionnaires and carried out formal interviews with the respondents. The locations which were studied are Kampung Limau Limauan, Kampung Bukit Kelapa, Kampung Longgom Kecil and Kampung Indrasun Laut. The questionnaires comprises of three parts which the first, second and third parts are containing the information regarding on the demographic of the respondent, the inventory of the mangrove's non-wood forest products which sells by the respondent and the contribution of the mangrove's non-wood forest product to the development respondent's socio-economy respectively. The respondents as a whole are more than 53 people and only 13 people only involved in the recruitment of mangroves. Of the total, found only three respondents who actually depend on the mangrove's non-wood forest products, while 10 others were only made to take the job as a sideline of mangrove forests. The types of mangrove's non-wood forest products stated are mangrove crab (*Scylla sarrata*), shell (*Cerithidea obtuse*), cat fish (*Plotosus sp.*), mullet fish (*Valamugil seheli*) and marine shell (*Polymesuda expansa*). However, only four out of six products are marketed which are marine shell, shell, and mangrove crab and cat fish while the other is for domestic purposes. Based on data collected on correlation of the relationship between the average incomes of non-wood forest product sales of mangrove forests with a total average monthly income of respondents, it shows a positive relationship with  $r=0.527$ . The value of contribution of the average income from the selling of mangrove's non-wood forest product over the total average of monthly income is 28.7%. The Local usage value of mangrove's product is calculated based on the formula of Local usage value =  $\sum P_i Q_i - C_i$ . The value of the local use non-wood forest products from the mangrove forests which are marketed by RM 1924.40 per month while the total value of products marketed locally applied to each individual is at RM 148.03 a month. As a conclusion, mangrove forests do contribute to the development of residence's socio-economy although the value is low.

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## 1. Introduction

This study was carried out in several locations Mangrove Forest Reserve Class (V) around the district of Kudat, Sabah. Among the sites involved are Kampung Longgom Kecil, Kampung Limau-Limauan, Kampung Bukit Kelapa, Kampung Indrasun Laut. The total area of mangrove forests in Sabah are 341 000 ha and 93% of the total area was classified as forest reserves under the Forest Enactment (Sabah Forestry Department, 2008). Geographically, Kudat is located in the northern region of Sabah and covered by 19,507 ha of mangrove that was gazetted as Permanent Forest Reserve Class (V) of mangrove.

Mangrove forest product is obtained from the mangrove forests that cover all biological life, including all types of animals or plants found in mangrove areas. According to FAO (1991), non-wood forest products other than wood products, including firewood and charcoal found in forest or land used for the same purpose, which includes products such as soil, sand, rocks, water and ecotourism. Non-timber forest products also includes products from animals and plants such as sericulture, bones, skin, hair and horns of animals (FAO, 1991). According to De Beer (1996), non-wood forest products are defined as all materials or objects derived from forest plants and animals that include other than the timber where the material is often used by people.

Mangrove forests provide many benefits to the surrounding population. Besides of providing protection, mangrove forests also provide a variety of products that can help local people increase their income. The position of the mangrove forests that bit sheltered has made the early human being make settlement around the mangrove forest (Plaziat et Al., 2001). According to Ismail Yaakob (1994), there are a lot of habitat in the mangrove forests like fish, shrimp, crabs and many other species as the mangrove forests provide many sources of food and suitable for species breeding.

This study was conducted to determine the level of contributions of the non-wood forest product sales of mangrove forest on the income of people living nearer mangroves and to find the value of the local use non-wood forest of mangrove forests on the socio-economic development of local people in the Kudat district. Moreover, this study also carried out to identify the types of non-wood forest products from mangrove forests taken by villagers.

**2. Materials and Methods**

The study began with an observation or review of the study area to see the forest and the activities carried out by local residents (Fig, 1). The study continued with the survey in which questionnaires through interviews conducted with local residents. The number of respondents for each village must be at least 10% of families and it is done through random sampling. Hence, a formal interview is conducted with respondents were asked to complete a survey form provided. Questions are divided into three sections: Section one (1) consists of questions related to demographic status, part two (2) is related to questions of non-wood forest inventory of the mangrove forests that are sold by the respondent and the three (3) contains questions related to the contribution non-wood forest products from mangrove forests to the socio-economic respondents. Analysis process is done by finding the correlation using SPSS 17.0 to determine the relationship between sales of non-wood forest of mangroves on the average monthly income of respondents. In addition, data analysis also involved the use of local computation based on the following the study by Ayu Khodillah et al., (2008);

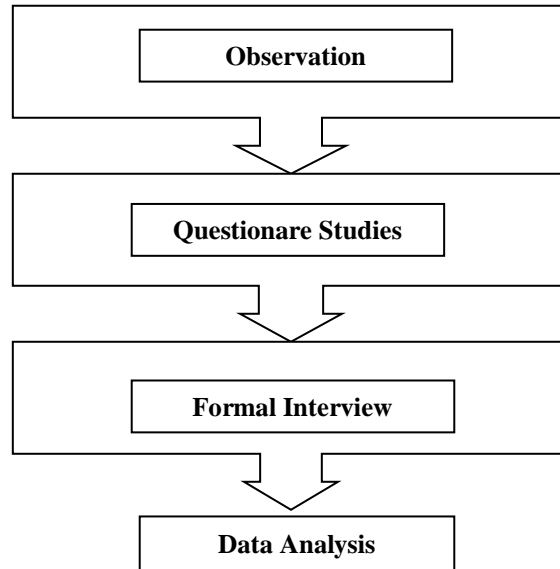
$$\text{Local usage value} = \sum P_i Q_i - C_i$$

Where:

$P_i$  = Product price  $i$

$Q_i$  = Total product taken  $i$  yang dikutip

$C_i$  = Cost involved  $i$



**Figure 1:** Flow chart of methods

**3. Results and Discussion**

**3.1. Types of Non-wood Forest Products From Mangrove Forests**

Non-wood forest products from the mangrove forests that are often taken by the villagers are black crab (*Scylla sarrata*), cat fish (*Plotosus sp*), seashell (*Polymesuda expansa*), snails (*Cerithidea obtuse*), and mullet fish (*Valamugil seheli*). Results are captured for some purpose that is sold or for their own used. Non-wood forest products from the mangrove crabs that are often caught was black crab.

**Table 1:** List of types of non-wood forest products from mangrove forests

No.	Local Name	Scientific Name	Uses
1	Black crab	<i>Scylla sarrata</i>	Sale and Own use
2	Cat fish	<i>Plotosus sp.</i>	Sale and Own use
3	Seashell	<i>Polymesuda expansa</i>	Sale and Own use
4	Snail	<i>Cerithidea obtusa</i>	Sale and Own use
5	Mullet fish	<i>Valamugil seheli</i>	Own uses

Non-wood forest products from mangrove forests taken by residents in the area of mangrove forest fringe Kudat more focused on the marine (Table 1). Among the types of fish caught in the mangrove forest is like cat fish and mullet fish. There is only one type of crab that can be caught in the mangrove forest that is black crabs. While others marine life is like a snail and seashell.

### 3.2. The Level of the Contribution of Non-wood Forest Product from Mangrove Forest Sales on the Monthly Income of Residence Nearer Mangrove Forest

Kampung Limau Limauan had two respondents to take and sell non-timber forest products from mangrove forests with a percentage of average monthly income of 41.7%. For Kampung Bukit Kelapa, the respondents were involved in the sale of non-wood forest of mangroves are a total of five people. Percentage of average monthly income

for the village was of 29.6%. There are a total of six respondents from the Kampung Longgom kecil involved in taking and selling non-timber forest products from mangrove forests with a percentage of average monthly income of 43.3% was recorded. However, none of the respondents are involved in the sale of non-wood forest of mangroves are recorded from Kampung Indrasun Laut. The overall average percentage of monthly income of non-wood forest products from mangrove forests to the average monthly income of respondents was 28.7% (Table 2).

**Table 2:** Percentage of average monthly income of non-wood forest products from the mangrove forest to the average monthly income for each village

Villages	The number of Respondents of the Selling Products (HSB)	Average Monthly Income (RM)	Average Monthly Sales Revenue from non-timber Forest Mangrove Forest (RM)	Percentage of Average Monthly Income Non-Wood Forest Of The Mangrove Forests Against Average Monthly Income (%)
Limau limauan	2	460	192	41.7
Bukit Kelapa	5	485.6	143.6	29.6
Longgom Kecil	6	426.2	184.3	43.3
Indrasun Laut	0	0	0	0
Total	13	1371.8	519.9	114.6
Average	3	343	130	28.7

Correlation between the average total monthly income with an average income of non-wood forest product sales of mangrove forests is positive and significant ( $d = 0.527$ ,  $p = 0.05$ ,  $n = 13$ ). Correlation results are shown in Table 3.

**Table 3:** Correlation data between the average monthly income with an average income of non-wood forest product of mangrove forests sales.

		Average Revenue of Mangrove product	Average Monthly Income
Average Revenue of Mangrove product	Pearson Correlation	1	.527*
	Sig. (1-tailed)		.032
	N	13	13
Average Monthly Income	Pearson Correlation	.527*	1
	Sig. (1-tailed)	.032	
	N	13	13

This shows a positive correlation between these two variables at 0.527. This analysis shows that sales of

non-wood forest of mangroves also contribute to the average monthly income of respondents.

### 3.3. Local usage value of Non-Timber Forest Of The Mangrove Forest

There are four types of products marketed by the people involved in collecting non-timber forest products from the mangrove forest they are black crab, seashell, cat fish and snails. Each result has a different value of the contribution depends on the price, the amount of the harvest and the cost of acquisition. Crabs have the highest local market prices between RM 5 to RM 7 per kilo and it is higher than other product. Other findings seen contribute lower than the crab because the quantity taken is less and the market price is lower than the crab. Local usage value of the overall domestic is RM 1924.40 per month. The total of local usage value of each individual is RM 148.03 per person (Table 4).

**Table 4:** Local usage value of Non-Timber Forest Of The Mangrove Forest

No.	Product	No. of Respondent	Harga /Unit, P (RM)	Kuantiti, Q (KG)	Kos, C (RM)	Nilai Gunaan Tempatan* (RM)/Bulan ( $\sum P_i Q_i - C_i$ )	Local usage value Bagi Setiap Responden/ Bulan (RM)
1.	Mangrove crab ( <i>Scylla sarrata</i> )	10	5.4	216	200	966.4	96.6
2.	Shell ( <i>Cerithidea obtuse</i> )	7	2.3	184	50	373.2	53.3
3.	Cat fish ( <i>Plotosus sp.</i> )	4	5	76	80	300	75
4.	Marine shell ( <i>Polymesuda expansa</i> )	6	2.7	124	50	284.8	47.5
5.	Total	27	15.4	600	380	1924.4	219.1
6.	Local usage value of each individual is RM 148.03 (NGT/ 13)						148.03

\* Local usage value is found from the formula of Ayu Khodillah et al., 2000

#### 4. Conclusion

Non-wood forest product from mangroves forest taken by local people in four locations in the study area Kudat district are black crab, seashell, snail, mullet fish and cat fish. These products are harvested for a particular purpose, namely to the source of income and their own use. The products that are often sold are crabs, seashell, snail and cat fish. The results of the harvest for own consumption as mullet fish and mangrove wood products.

Respondents from four villages had a job that most other time. Taking non-timber forest products from the mangrove forest is the side to increase the monthly income. Based on the data correlation between the average percentage of sales income and the percentage of the mangrove forests of the average total monthly income, it shows a strong positive correlation between the average sales revenue of mangrove forests and monthly income ( $r=0.527$ ,  $p=0.05$ , and  $n=13$ ).

Each non-wood forest products from mangrove forest sold have value in use or contribution to the respondents. Based on calculations made on the local usage value for each of the sale, the overall results of non-wood forest of mangrove forests have value for local use of RM 1924.40 per month is RM 148.03 per month for each individual. In terms of percentage of sales is the average monthly income, non-wood forest products from mangrove

forests to provide a contribution of 28.7% on the average percentage of total monthly income.

Research and information about the contribution of mangrove forest on the socio-economic population of the jungle is still not done. Conduct a more detailed and in-depth needs to be done, particularly in the area where the mangrove forest cover is still extensive. The results of this study can be used to review the role of mangrove forests in the socio-economic development of a mangrove forest area to be protected and conserved for future generations.

#### References

- Ayu Khodillah, K. J., Nik Fuad, N. M., Nur Azura, S., Awang Noor, A.G. 2008. Mengganggu nilai Gunaan Langsung Sumber Hutan Paya Laut di Dataran Tanah Bencah Setiu (Setiu Wetlands) Terengganu. Malaysia
- De Beer, J. H. 1996. The Economic Value of Non-Timber Forest Product In Southeast Asia. Amersterdam. IUCN. Halaman 42-44.
- FAO. 1991. Non-wood Forest Product: Expert Consultation. Forest News V (4): 1-4. In Tiger Paper XVII (4).
- Ismail A & Yaakob M. J., 1994. Tumbuh-Tumbuhan Dan Persekitaran: Satu Perspektif Geografi. Kuala Lumpur: Dewan Bahasa Dan Pustaka.
- Plaziat, J., Cavagnetto, C., Koneniguer, J. and Baltzer, F. 2001. History and Biogeography of the Mangrove Ecosystem, Based On A Critical Reassessment of the Paleontological Record. Wetlands Ecology and Management 9: 161-179. Kluwer Academic Publisher, Netherlands.
- Sabah Forestry Department (ed.). 2008. Annual report 2007, Sabah Forestry Department, Sabah.