DEFORESTATION AWARENESS AMONG THE COMMUNITY LIVING NEAR MANGROVES IN MUKIM TANJUNG KUPANG, JOHOR, MALAYSIA

N. S. Sarmin[1,*], I. Mohd Hasmadi[1,*], H. Z. Pakhriazad[1], W. A. Khairil[2], M. K. Mohamad Roslan[1]

[1]Faculty of Forestry, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

[2]Faculty of Economics and Management, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

[*]For correspondence; E-mail: noorshaila01@gmail.com

[*]For correspondence; Tel. + (60) 389467220, E-mail: mhasmadi@upm.edu.my

ABSTRACT: *A study was carried out on the deforestation awareness among the community living nearest to Sungai Pulai mangrove forest under mukim (sub-district) Tanjung Kupang in Johor Bahru, Peninsular Malaysia. A Structured questionnaire was used to collect data on respondents' socioeconomic condition, their familiarity to mangroves and awareness from six villages which have been selected randomly. Majority of the respondents were male, Malay, Muslim and from middle aged group. About 82% respondents had some level of education. Average household size was 5.5. About 71% respondents' livelihoods were dependent on mangrove ecosystem of which 65% were fishermen, 5% aquaculture and 1% tourism. Mean monthly income of respondents was quite lower than national average income. Moreover, monthly average income of mangrove dependent group was lower than the non mangrove dependent group. About 93% of the respondents were somehow familiar to mangroves. Respondents mean awareness score of 3.78 indicates respondents were aware about the mangroves. It was also found that male had significantly higher awareness than female for two out of ten awareness components. Likewise, mangrove dependent group had significantly higher awareness than the non-mangrove dependent group for six out of ten awareness components.*

Keywords: Awareness, Community, Deforestation, Mangroves, Peninsular Malaysia

1. INTRODUCTION

Deforestation can be defined as the reduction of forested area or canopy coverage below than 10% [1]. Coastal mangrove forests are more vulnerable to the deforestation due to diversified anthropogenic threats from different sources. Globally during the last two decades, since 1990 to 2010 about 500,000 ha of mangrove area was decreased with an annual decreasing rate is 25,000 ha/yr [1]. Malaysia follows the same trend with global deforestation. State of Johor in Peninsular Malaysia has reported as one of the most mangrove declining areas. During the aforementioned period, Johor has lost about 6120.70 ha (20.54%) of mangroves with annual loss rate of 1%, which is almost same with the global deforestation rate [2]. In Johor, the deforestation mainly concentrated to the southwestern part due to both small scale and large scale development projects in agriculture, aquaculture, infrastructure, industries or urban development [3].

The Sungai Pulai (SP) mangrove forest is the second largest mangrove area in Peninsular Malaysia which supports a diversified ecosystem and source of livelihoods to the local communities as well as provides protection against floods, coastal erosions or other coastal disorders. Due to land use pressures at the SP mangrove periphery for various development activities the SP mangrove coverage are reducing [4].

Deforestation and local socioeconomics are strongly related to each other. Several reports indicate that deforestation phenomena are strongly related to population growth, human demands and socioeconomic changes [5-16]. The study of population demography and socioeconomics is very important as it reflects the quality of living standard [17]. Socioeconomic factors are reported as one of the main underlying causes of deforestation or biodiversity loss and the pace of deforestation depends on the socioeconomic condition of the community [1, 18-20]. On the other hand, mangrove deforestation enhances the loss of ecosystem service which results the loss of income to the locals from the mangrove ecosystem. Household survey data can provide (are the source of) important information of population status or socioeconomic monitoring [21]. Respondents' demographic information such as gender, age, education level and household income are reported as important socioeconomic drivers of mangrove deforestation [14-16, 22-25]. Assessment of respondents' knowledge and awareness about the status and importance of mangroves can guide to understand the level of the awareness of the community. It may provide baseline information on current socioeconomic conditions and awareness that will make information available to the managers or policy makers to monitor, evaluate, or manage a certain condition properly. Hence, this study was planned to analyze respondents' present socioeconomic conditions, their knowledge and awareness level about mangrove deforestation. Awareness differences among gender groups (male and female) and among major two occupation groups (mangrove dependent and non dependent) were also studied.

2. MATERIALS AND METHODS

A field survey was conducted among the local communities living nearest to Sungai Pulai mangrove forests in mukim (sub-district) Tanjung Kupang in Johor Bahru, Peninsular Malaysia to study their awareness about mangrove status and deforestation.

Mukim Tanjung Kupang is located at the southwest of Johor under district Johor Bahru and nearest to Sungai Pulai Mangrove Forest Reserve (SPMFR). Most of the villages under this mukim have mangroves within 0 to 5 kilometers. This mukim is going through a rapid development and land use is converting from mangroves or other land uses to build up. As example, the Port of Tanjung Pelepas (PTP) and two connecting ways between Peninsular Malaysia and Singapore, located in this mukim. This mukim is also under

some ongoing projects with huge budgets like Iskandar Malaysia (IM) and Forest City projects.

Six villages were chosen from this mukim, located within two kilometers periphery of the SP mangroves. Hundred respondents from these six villages were interviewed. Most of the villages nearest to mangroves were fishermen villages. The location of study area is shown in Figure (1).

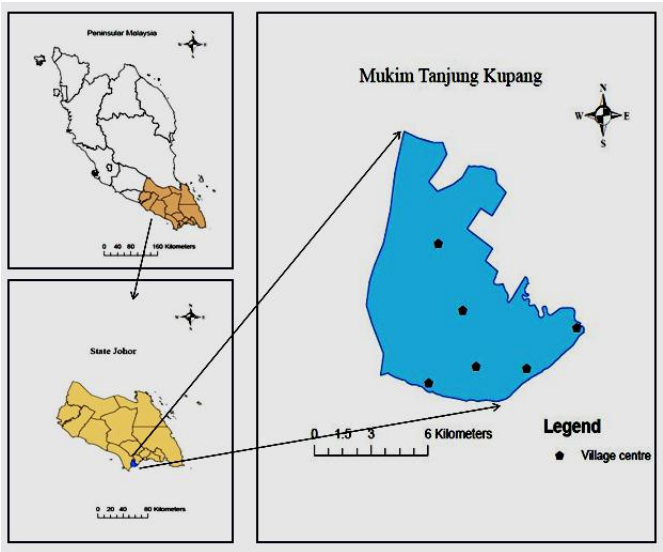

Fig (1) Location of study area

Data were collected using structured questionnaires, focus group discussions and observations. Local administrative officers, mukim heads, village heads and tfishermen community chairman were interviewed with a checklist of questions to avail information about village infrastructural conditions and local facilities to the villagers, problems, opportunities and management plans. It also intended to obtain information on mangrove conditions and their dependence.

The questionnaire was addressed to extract information on the respondents' socioeconomic conditions (age, education level, income, and family size etc.), their familiarity to mangroves and awareness to mangrove deforestation.

Data were analyzed using SPSS software. Descriptive analysis was conducted to describe the socioeconomic characteristics and mean awareness score of local community. Mann-Whitney test conducted to study awareness differences among genders and major two occupation groups as the data were not normally distributed.

3. RESULTS AND DISCUSSION

Respondents' socioeconomic condition

Respondents' socioeconomic condition includes their socio-demographic and economic status. Socio-demographic profile includes gender, marital status, age, race, religion, education level and family size. Economic status includes their occupational background and income level. Table 1, 2 and 3 represent respondents' socio-demographic profile, occupational background and mean monthly income, respectively.

Among the surveyed respondents, 82% were male, while rest 18% was female, which indicate usually men are the head of households in the studied area. Majority of the respondents (86%) were married while 11% single, 2% divorced and 1% widowed.

Table 1. Socio-demographic condition of the local community in mukim Tanjung Kupang

Variable		Percent (%)	Mean & SD
Gender	Male	82	
	Female	18	
Marital status	Single	11	
	Married	86	
	Widow	1	
	Divorced	2	
Age	18-30 yrs	15	45.11 yrs SD 13.40
	31-40 yrs	18	
	41-50 yrs	38	
	51-60 yrs	20	
	>60 yrs	9	
Race	Malay	75	
	Chinese	4	
	Orang asli	21	
Religion	Islam	93	
	Christian	2	
	Buddha	5	
Education level	No formal education	18	
	Primary school	33	
	Secondary school	42	
	Colllege/University	7	
Number of family members	1-3	15	5.5 SD 2.32
	4-6	61	
	>7	24	

Age is considered as an important demographic indicator. There are differences between different age groups in terms of their experience and activities which affect their social and economic status. Age distribution showed that majority of the respondents was middle aged. The oldest was 78 years old and the youngest was 18 years old. Mean age was 45.11 years with standard deviation (SD) 13.40. The highest proportion (38%) of respondents was found in 41-50 years group. More than three-fourth (76%) of the respondents were between 31 to 60 years. Only 15% respondents were below 30 years, and 9% respondents were above 60 years old.

The young generations of the study area mostly working in the city because there are more job opportunities in the city compared to the suburban area. Majority (75%) of the respondents was Malay and 21% Orang Asli and only 4% were Chinese. There were no Indian respondents in the study area. About 93% respondents were Muslim followed by 5% Buddhist and 2% Christian.

Education enables individuals to gain knowledge, expand the power of understanding and outlook [26]. Majority of the respondents (82%) had some level of education, while (18%) had no formal education at all. Among the literate group, majority of the respondents' educational level was secondary school followed by primary level and tertiary level. Only 7% respondents had te college or university level degree. One of the main reasons for not continuing their education to higher level might be the financial problem. Their family couldn't afford to pay tuition fees for college or university level. Another reason might be the respondents were more

interested to involve in business or other works rather to continue higher studies.

Average family size of the respondents was 5.5 persons and ranged from 1 to 14 with a standard deviation of 2.32 (Table 1). Majority (61%) of the respondents' household size was 4-6 i.e. husband, wife and two to four children or sometimes husband, wife, parents and children. The average household size by the Department of Statistics Malaysia (DoSM) is 4.2 (Malaysia) and 4.1 (Johor) which was within the range of the study area family size. The findings indicated that the average family size in the study area was a bit larger (1.3 person/family) than the national average family size.

Respondents' economic status

There was a lot of occupational diversity in the study area, although majority of them were fishermen (nelayan). Table 2 depicts about 65% respondents were fishermen followed by 9% agriculture, 7% business, 5% aquaculture, 5% service 1% tourism and rest 8% others. Respondents in 'others' groups were mainly students and housewives. Among the different occupational groups' fishermen, aquaculture and tourism activities were mainly based on the mangrove ecosystem. So, these three groups together may assume as mangrove dependent group consisting of 71% of the respondents and the rest 29% fall under the mangrove non-dependent group. Although, the 'others' group may fall in either dependent or non dependent category. This finding informs that almost three-fourth of the respondents in the study area were depended on mangroves for their livelihood.

Table 2. Main occupation of the community in mukim Tanjung Kupang

Occupation	Percent (%)	Dependency on Mangrove	Percent (%)
Fishermen	65	Dependent	71
Aquaculture	5		
Tourism	1		
Agriculture	9	Non dependent	29
Business	7		
Service	5		
Others	8		
Total	100		100

Table 3: Mean monthly income

Income (RM)	Percent (%)			Mean income (RM)
	Mangrove dependent	Non-mangrove dependent	Total	
No income	0	4	4	1705.00 (SD 1498.73)
≤1000	23	4	27	
1001-3000	47	17	64	
3001-6000	1	3	4	
>6000	0	1	1	
Total	71	29	100	

In the study area, respondent's average monthly income was RM1,705.00 with standard deviation 1498.73 (Table 3) which indicates a huge variation of the monthly income among the respondents. More than half (64%) of the respondents' income was between income category RM1,001.00 to RM3,000.00 followed by 27% ≤ RM1,000.00, 4% RM3,001.00-RM,6000.00 and only 1% respondents having monthly income above RM6,000.00. Majority of the respondents' income below RM3,000.00 were from the mangrove dependent group and incomes above RM3,000.00 were from non-mangrove dependent group. Mangrove coverage in the study area is reducing [4] which might caused the reduction of production from mangroves and consequently the income of the mangrove dependent groups. According to DoSM, in 2014 average monthly income in Malaysia was RM6,141.00 and in Johor was RM6,207.00. This finding shows that respondents mean monthly income quite lower than te national average or state average income. According to the respondents' opinions, their income has reduced than before due to the reduced production from the mangrove wetlands. Several studies also reported that mangrove coverage of the study area was reducg due to land use changes and erosion [4, 27, 28]. As mangrove wetlands serve as nursery and home to many important economic species, the reduction of mangroves has an impact on the production and ultimately the income from this ecosystem.

Respondents' familiarity to the mangroves

Majority of the respondents were familiar to the mangroves and its importance. However, only 7% respondents were completely unfamiliar. About 50% respondents were slightly familiar followed by 28% respondents moderately familiar and 15% respondents completely familiar with mangroves (Figure 2). The demographic information shows that majority of the respondents' livelihood activities based on the mangrove ecosystem so the result is very relevant that about 93% respondents were more or less familiar with the mangroves status and importance.

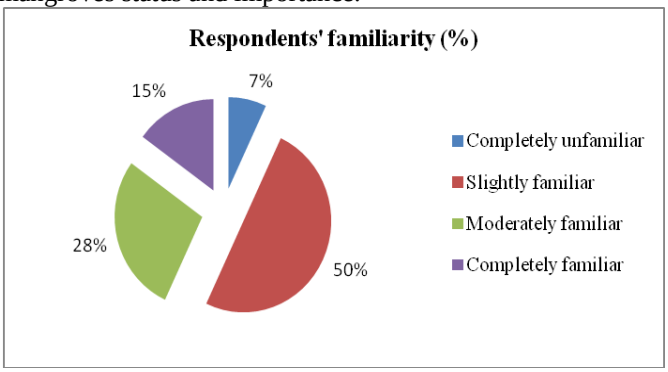

Fig (2) Respondents familiarity to mangroves

Mean awareness scores about mangroves deforestation

Mean score of awareness level among the local communities in mukim Tanjung Kupang was 3.78 and almost all the items mean were above average, which indicates respondents were more or less aware about the mangroves, its importance and deforestation. Among the ten awareness statements, A1 (mangroves are an important source of livelihood) had higher mean score (4.27) and A8 (all mangrove change effects are negative) had a lower mean score (3.10) (Table 4).

In the study area, majority (71%) of the respondents' occupation based on mangroves and associated wetlands and most of the respondents (65%) were fishermen. Hence mangrove ecosystem plays an important role to their livelihood. They were concerned about the mangroves and its

importance. This is the reason why the mean awareness score and mean score of the statement A1 was higher.

Table 4: Mean scores of respondents' awareness about mangroves and deforestation

Item of awareness		Mean
A1	Mangroves are important source of livelihood	4.27
A2	Mangroves protect occurrence of natural disasters	3.97
A3	Mangrove deforestation will hinder the sustainability of fishery activities	4.01
A4	Mangrove deforestation will make tourism to be less attractive	3.42
A5	Mangrove deforestation will hinder the sustainability of charcoal production	3.64
A6	Mangrove coverage of the Sungai Pulai area is reducing	3.94
A7	Human activities are a major cause of mangrove deforestation	3.65
A8	All mangrove change effects are negative	3.10
A9	Deforestation may increase the risk of natural disasters occurrence	3.78
A10	Deforestation may lead to the extinction of some aquatic creatures	4.06
	Mean awareness	3.78

Relationships of awareness with gender and broad two occupational groups

Mann-Whitney test was conducted separately to compare differences of means of gender and occupational groups in terms of awareness. Based on Table 5, for gender groups, only A1 and A3 'Mangrove deforestation will hinder the sustainability of fishery activities' were found significant. For A1 the mean value for male was 4.34 and for female were 3.94. Though both the values were close to 4 but the Mann-Whitney test indicates that there was a significant difference between the awareness A1 among the two gender groups. For A3 the mean value for male was 4.20 and for female were 3.17. The p value (0.000) for Mann-Whitney test indicates a significant difference of awareness A3 among male and female.

Table 5: Relationship of gender with awareness

Items of awareness	Mean value		Mann-Whitney U	P value
	Male	Female		
A1	4.34	3.94	537.50	.044
A2	3.98	3.94	709.50	.775
A3	4.20	3.17	335.50	.000
A4	3.48	3.17	642.00	.358
A5	3.71	3.33	607.00	.184
A6	4.00	3.67	553.00	.059
A7	3.71	3.39	575.00	.114
A8	3.12	3.00	693.00	.672
A9	3.78	3.78	728.50	.924
A10	4.10	3.89	588.50	.123

For occupational groups, almost in all the cases mangrove dependent group had higher mean value than the non-mangrove dependent group and p values for the awareness component A1, A3, A6, A7, A8 and A10 were found significant (Table 6). This finding shows that male had significantly higher awareness than female for awareness items of A1 and A3. Similarly, the mangrove dependent group had significantly higher awareness than the non-mangrove dependent group for awareness items of A1, A3, A6, A7, A8 and A10.

Table 6: Relationship of major occupational groups with awareness

Items of awareness	Mean value		Mann-Whitney U	P value
	Mangrove dependent	Non-mangrove dependent		
A1	4.48	3.76	473.50	.000
A2	4.03	3.83	852.00	.131
A3	4.24	3.45	500.00	.000
A4	3.48	3.28	908.00	.325
A5	3.63	3.66	991.00	.741
A6	4.04	3.69	714.00	.006
A7	3.79	3.31	711.00	.009
A8	3.23	2.79	778.00	.045
A9	3.82	3.69	909.50	.305
A10	4.20	3.72	603.00	.000

4. CONCLUSION

In conclusion majority of the respondents' livelihood were dependent on the mangrove ecosystem and about 65% of them were fishermen. Larger family size and lower mean monthly household income comparing to the national average indicates a lower socioeconomic condition of the community. The poor percentage (7%) of respondents with tertiary level education in the study area also indicates their financial inability to pay higher tuition fees to continue college/university level studies. Reduction of mangrove coverage might affect their mean income from the ecosystem. Therefore, the incomes among the mangrove dependent groups were lower than the non dependent groups. Higher mean awareness score indicates respondents' positive awareness to mangrove deforestation as majority respondents' livelihoods were dependent on the mangrove ecosystem. Government has initiated some incentives to the fishermen through some organizations like the "Persatuan Nelayan" for fuels or other fishing necessities but still not sufficient. Government has also launched coastal plantation program with suitable species to recover the eroded and denuded areas. Other sectors or agencies should support and work together to increase the deforestation awareness, and then implement those government's programs smoothly. Land use managers, policy makers or planners would also be taken consideration about the deforestation effect to the local community's livelihood. The findings of this study will be helpful to the researchers, social scientists, environmentalists, ecologists, economists and decision makers for a better management of the mangrove ecosystem of the study area.

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*For correspondence; Tel. + (60) 389467220, E-mail: mhasmadi@upm.edu.my, *For correspondence; E-mail: noorshaila01@gmail.com