The European Proceedings of
Social & Behavioural Sciences
EpSBS

ISSN: 2357-1330

https://doi.org/10.15405/epsbs.2019.05.02.41

AIMC 2018
Asia International Multidisciplinary Conference

WILLINGNESS TO PARTICIPATE AND CURRENT PARTICIPATION LEVEL IN MANGROVE CONSERVATION

Yakin Nur Sunoto (a), Zakiah Ponrahono (b)*
*Corresponding author

(a) Department of Environmental Management, Faculty of Environmental Studies, UPM, yakinsunoto@gmail.com
(b) Department of Environmental Management, Faculty of Environmental Studies, UPM, zakh@upm.edu.my

Abstract

Mangrove forest is one of the essential ecosystems in the coastal region that occupies and provides a broad range of ecological services such as protection from erosion, natural flood mitigation, as well as a mechanism for biodiversity maintenance. However, the urbanization process and environmental issues of land and coastal pollution have currently threatened the mangrove areas worldwide. The pressure on mangrove forests loss becomes a crucial issue in sustaining the natural ecosystem particularly within the tidal areas. Hence, this study highlights the issues of i) decline of mangrove areas ii) zero price value on mangrove areas and iii) lack of understanding in valuing the mangrove areas. This paper reports on a study of perceptions on mangrove forest, willingness to participate in mangrove conservation and satisfaction level in management of mangrove. The Pearson correlation test shows there was a weak correlation between perception and willingness to participate ($r = .464$), significant at $p<.01$ for 219 samples of population interviewed. 59 (26.9%) respondents strongly satisfied with the current mangrove forest conservation practices and 87 (39.7%) respondents were satisfied and the others rate as unsure, not satisfied and strongly not satisfied.

Keywords: Mangrove forest, willingness to participate, satisfaction level, mangrove forest management.

https://doi.org/10.15405/epsbs.2019.05.02.41
Corresponding Author: Zakiah Ponrahono
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

Mangrove is a unique ecosystem that occupies a transition area around the tropical and subtropical beaches. Typical characteristics of mangrove forest ecosystems are always influenced by the tides, tolerant to high salinity, and able to grow on muddy ground conditions with aerobic reaction (Nagelkerken et al., 2010) A mix of land and water ecosystems makes the mangrove ecosystem full of productive resources and biologically complex forest that can support large number of biodiversity as it provides wide range of habitat especially for reptiles, fishes and birds. Thus, mangroves become the sources of income especially for lower and middle class households (Kuenzer & Vo, 2013; Abu Nasar, Garnett, & Myers, 2016; and Dev Roy, 2016).

Mangroves forests mainly serve as habitat for commercially valuable marine species. As stated by Walters et al., 2008), a mix of land and water ecosystems makes the mangrove ecosystem full of productive resources and biologically complex forest that can support a large number of biodiversity as it provides a broad range of habitat, especially for reptiles, fishes and birds. The quarterly report of mangrove action project showed statistically that three-quarters of the tropical world's fisheries depend upon mangrove forest (Ogeh, Jimoh, & Ajewole, 2016).

Moreover, mangroves forest area can be considered as human life-support systems and importance in providing a broad range of ecological services like protection of shorelines and riverbanks from erosion, flood regulation, violent storms and hurricanes, as well as a mechanism for biodiversity maintenance (Mantra, 1986). The dense network of roots bind the soil, trap the sediment, and suspended particulate matter in deltaic settings, support nutrient and organic-matter processing and offer sediment control for other inshore habitats (Mukherjee, Sutherland, Dicks, Huge, Koedam & Dahdouh-Guebas, 2014).

With the potential of natural resources and land owned mangrove forests are used as the area of human development that includes aquaculture, timber resources, as well as tourism destinations. The utilisation is not only in the aspect of the land, but also as a source of pulp raw materials, medicines, and in foodstuffs (Food and Agriculture Organization of the United Nations, 2015). The development concept that integrates ecological, economic and social can refer to as sustainable development. The idea of sustainable development has been implemented in development activities, ranging from planning, implementation and evaluation stages (Ibnu Sina, Maryuni & Harahab, 2017). Mangrove rehabilitation programs had positive effects on people's lives, especially the local communities. Nature and resources in it would provide economic value and high benefits to humans if humans treated it well.

2. Problem Statement

2.1. Mangrove Threats

Many of the ecosystem services serve as 'public goods' such the people whose benefit from it cannot be excluded from receiving the service provided and one level of beneficiary is not reducing the level of service receive by others such as coastal and storm protection (Brander et al., 2012). Mangroves are generally undervalued relating to their use, conservation and restoration needs, both in private and public decision-making process because of the lack of understanding and information regarding the values it possessed (Brander et al., 2012). The main drivers identified that caused threats to mangroves are the

https://doi.org/10.15405/epsbs.2019.05.02.41
Corresponding Author: Zakiah Ponrahono
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

population growth, coastal development and climate change such as deforestation, land use change, and sea-level rise (Brander, et al., 2012).

An example of documented losses of mangrove areas in the Philippines, Thailand, Vietnam, and Malaysia is about 7.4 million hectares (Spalding cited in Lewis III, 2009). About 8,017.3 hectares loss of Matang Reserve Forest in Perak were identified through detection map mainly caused by loss to water body and erosion, transitional forest, oil palm plantation and aquaculture activities within 18 years' time frame (Ibrahim, Mustapha, Lihan, & Mazlan, 2015). Whereas, in Johor, the mangrove forest cover is declining too from 29,797.13 hectare in year 1989 to 25,477.19 hectare in year 2000 and 23,676.43 hectare in year 2009 with total loss 6,120.7 hectare within two decades (Khairul Azwan, Audi Hani, Hamdan, Khali Aziz, & Shamsudin, 2011).

2.2. Mangroves' Ecosystem Services

Mukherjee et al., (2014) emphasise that ecosystem services has three components which are provisioning services, regulation and maintenance services and cultural services –derived from the Common International Classification of Ecosystem Services (CICES) framework. The monetary valuation of ecosystem services is important step in addressing issues related to mangrove ecosystem service degradation. Some common issues in assessing the mangrove ecosystem are difficulties in differentiating the aggregate economic values of mangroves, and overlapping of ecosystem services classification led to double counting issues. Additionally, there is inconsistency in the terminologies and concept used within the existing ecosystem services classification by previous literatures (Liquete et al., 2013).

2.3. Community Based Conservation and Willingness to Participate

A few definition of community based conservation (CBC) were cited in a study by Kamariah, Abdullah & Dasimah (2014): "As conservation strategies that emphasised the role of local communities in decision making and being actively involved as partners in the protected area management", "sustainable management where local communities can manage and extract benefit from natural resources at the local level to improve livelihoods of local communities and to foster pro-conservation attitude", thus concluding that CBC is generally a collaborative management framework that share the power and responsibility to manage natural resources in protected area.

Kamariah et al., (2014) further stated that CBC approach of mangroves that covering the aspect of psychological factors among locals' willingness to participate and attitudes in managing mangrove rehabilitation is still at infancy stage in Malaysia. Their study aims to explore how the psychological factors in community based conservation (CBC) influence willingness to participate (WTP) in mangrove rehabilitation and resulted in majority (76.2%) of respondents willing to participate with a correlation to their socio-demographic attributes such as gender, education, race, benefit and risk perceive but not the residency length.

A study by Dev Roy (2016) found that income, age, gender, and education do influence local people attitude towards conservation where those with low income and less educated commit illegal harvesting and women are being underrated in the management practices. Mohd Basri (2016) discussed, unlike other countries, Malaysia rarely involve the local communities to participate in critical decision-making

https://doi.org/10.15405/epsbs.2019.05.02.41
Corresponding Author: Zakiah Ponrahono
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

regarding the forest utilization and management. Hence, this study is initiate to explore the sustainable forest management concept that address the need of participation of local communities in forest planning, exploitation, and conservation.

3. Research Questions

The research questions in this study are as follows:

- What are the factors that correlate with perception toward mangrove forest and people willingness to participate in mangrove conservation?
- Does local people positively supportive in conserving the mangroves?

3.1. Research Objectives

- To identify what are the factors that contribute to perception toward mangrove forest and willingness to participate in mangrove conservation.
- To evaluate local communities' willingness to participate in mangrove conservation.

4. Purpose of the Study

The study aims to quantify some of the direct value of mangrove forest in Kampung Sungai Melayu and to assess the local community readiness in mangrove conservation. This study will contribute in assisting government agencies, local authority and policy makers in planning the development within mangrove forests area and proximate to it. They could benefit through the result generated by this study to have an overall view about local communities' willingness to contribute in the mangrove conservation.

5. Research Methods

5.1. Study Area

The study area is eco-tourism village of Kampung Sungai Melayu, situated at the outlet of Sungai Melayu, Iskandar Malaysia, Johor Darul Takzim Malaysia (Iskandar Regional Development Authority, 2017). The area of Kampung Sungai Melayu is about 126 acres covering the settlement areas, palm oil plantation, infrastructure and public facilities and the mangroves forest. Kampung Sungai Melayu is selected as the study area because its vicinity to the mangrove forest of Sungai Melayu and has its own local communities who depend on fisheries activities.

5.2. Sampling Technique

The population size of Kampung Sungai Melayu is 813 villagers including 408 male and 405 female. A set of questionnaire is distributed to random villagers using the random sampling technique. Using the Slovin formula for sample size, the minimum sample size required is 269. Additional 27 respondents (10%) is added and used as replacement to avoid errors and unattainable visit during the survey. Both set of survey is conducted through face-to-face approach to ensure the highest response rate.

https://doi.org/10.15405/epsbs.2019.05.02.41
Corresponding Author: Zakiah Ponrahono
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

5.3. Questionnaire as Research Instrument

A set of questionnaire is developed with four (4) sections which are: Section A: Socio-demographic of respondents, Section B: Perception on mangrove forest, Section C: Willingness to participate, and Section D: Management practice. Internal consistency approach is used to test the reliability of items developed in both questionnaires. The value of Cronbach alpha coefficient of the items is between ranges of 0.7 to 1.0, indicates the items are reliable.

6. Findings

6.1. Socio-Demographic Profile of The Respondents

The socio demographic background for this study is presented in Table 01. The total of respondents engaged in the survey was 219 respondents. 56.2% (123) of respondents are male and 43.8% (96) are female. Respondents with the secondary school education level represent almost half from the total respondents (47.9 %), followed by primary school level is 43.3% (95), and others are 3.7% (8) no schooling and 5.0% (11) respondents with higher educational level. 39.7% (87) of respondents are self-employment mostly as a fishermen and 'others' here referring to the housewives and no working persons made up of 32.4% (71) respondents.

Half of respondents 51.5% (115) live in a house that consist household between 4-6 persons per house. Majority of the respondents 79.5% (174) had been living there for more than 20 years. This is similar to the study conducted by Kamariah et al., (2014) where up to 75% of their respondents had lived in the study area for more than 20 years. The household income is considered low as 37.4% of respondents has household income below RM1000 and 37% have household income range RM1001-RM2000. 32.9% (72) of respondents are fishermen and 67.1% (147) are non-fishermen. Only 10% (22) of respondents said that they had side income by doing others job.

Table 01. Socio-demographic of the respondents

Characteristic	Categories	Frequency	Percentage (%)
Gender	Male	123	56.2
	Female	96	43.8
Educational level	No schooling	8	3.7
	Primary school	95	43.4
	Secondary school	105	47.9
	Higher institution	11	5.0
Occupational sector	Government	16	7.3
	Private	45	20.5
	Self-employed	87	39.7
	Others	71	32.4
Age (years old)	18-20	6	2.7
	21-30	26	11.9
	31-40	43	19.6
	41-50	57	26.0
	51-60	47	21.5
	61 and above	40	18.3
Number of household (person)	1-3	43	19.6
	4-6	115	51.5
	7-9	41	18.7
	10-12	15	6.8

https://doi.org/10.15405/epsbs.2019.05.02.41
Corresponding Author: Zakiah Ponrahono
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

	13-15	5	2.3
Length of residency (years)	<5	11	5.0
	5-9	14	6.4
	10-14	7	3.2
	15-20	13	5.9
	>20	174	79.5
Household income	<RM1000	60	27.4
	RM1000-RM1999	71	32.4
	RM2000-RM2999	38	17.4
	RM3000-RM3999	30	13.7
	RM4000-RM4999	8	3.7
	>RM5000	12	5.5
Category of villagers	Fishermen	72	32.9
	Non-fishermen	147	67.1
Having side income	Yes	22	10.0
	No	197	90.0

6.2. Perception Toward The Importance and Functions of Mangrove Forest

Majority respondents of 94.1% (206) agreed that mangrove forest existence is important and the number of respondents that perceived mangrove forest area as a source of income is 53.8% (118). Almost all respondents 93.2% (294) agreed that mangrove forest has its own functional use and benefits. Overall, respondents' perception on mangrove functions and benefits as listed in the questionnaire are skew toward agree side. This indicates that the local community in Kampung Sungai Melayu knows the function of the existing mangrove forest in their area or mangrove forest in general.

More than 95% of respondents agree that mangrove forest should be conserved and many negative impacts will occur if there is no more mangrove forest exist here. This finding is in line with the findings from Kamariah et al., (2014) about importance of mangrove conservation which has additional note that the study conducted by them showed the respondents also agree that mangrove conservation should be managed by using a sustainable approach for the next 30 years to safeguard the future generations' needs. The descriptive analysis of respondents' perceptions toward importance and functions of mangrove forest is presented in Table 02.

Table 02. Respondents' perceptions toward the importance and functions of mangrove forest

No.	Item	Mean	Median	1 Freq (%)	2 Freq (%)	3 Freq (%)	4 Freq (%)	5 Freq (%)
B1	Mangrove forest is important	4.60	5	1 (0.5)	4 (1.8)	8 (3.7)	56 (25.6)	150 (68.5)
B2	Importance of mangrove forest as income	3.44	4	34 (15.5)	42 (18.2)	25 (11.4)	29 (13.2)	89 (40.6)
B3	The mangrove forest has its own functional use	4.47	5	0	1 (0.5)	14 (6.4)	84 (38.4)	120 (54.8)
B4a	As aquatic breeding ground	4.44	5	1 (0.5)	3 (1.4)	11 (5.0)	87 (39.7)	117 (53.4)
B4b	River erosion control	4.42	5	2 (0.9)	2 (0.9)	21 (9.6)	72 (32.9)	122 (55.7)
B4c	River sedimentation control	4.21	4	3 (1.4)	3 (1.4)	33 (15.1)	86 (39.3)	94 (42.9)
B4d	Source of construction woods	3.49	4	25 (11.9)	23 (10.5)	44 (20.1)	70 (32.0)	56 (25.6)
B4e	Source of charcoal	3.48	4	24 (11.0)	26 (11.9)	45 (20.5)	68 (31.1)	56 (25.6)

https://doi.org/10.15405/epsbs.2019.05.02.41
Corresponding Author: Zakiah Ponrahono
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

B4f	Habitat for inland animals	4.03	4	5 (2.3)	5 (2.3)	37 (16.8)	104 (47.5)	68 (31.1)
B4g	Carbon dioxide absorption ability	3.93	4	4 (1.8)	3 (1.4)	66 (30.1)	78 (35.6)	68 (31.1)
B4h	Environmental risk indicator	3.90	4	6 (2.7)	5 (2.3)	60 (27.4)	81 (37.0)	67 (30.6)
B4i	Aesthetical value	4.32	4	0	7 (3.2)	18 (8.2)	91 (41.6)	103 (47.0)
B4j	Eco-tourism recreational area	4.47	5	0	1 (0.5)	18 (8.2)	77 (35.2)	122 (55.7)
B4k	Pollution abatement	4.08	4	5 (2.3)	7 (3.2)	44 (20.1)	73 (33.3)	90 (41.1)
B5	Mangrove forest has its own economic value	4.50	5	0	0	20 (9.1)	70 (32.0)	127 (58.9)
B6	Mangrove forest should be conserved	4.55	5	0	1 (0.5)	7 (3.2)	81 (37.0)	130 (59.4)
B7	Negative impacts will occur when there is no mangrove forest	4.63	5	1 (0.5)	1 (0.5)	7 (3.2)	62 (28.3)	137 (67.1)

Note: 1 (Strongly disagree), 2 (Disagree), 3 (Unsure), 4 (Agree), 5 (Strongly agree)

6.3. Willingness to Participate in Mangrove Conservation

Majority 60% (138) of respondents are willing to participate in mangrove conservation activities and only 8.2% (18) strongly disagree to participate. Similarly, 61.7% (135) of respondents are voluntarily to involve in mangrove conservation activities. In term of the rewards or benefits gain from the activities, 58.9% (129) of respondents do not mind if they were not getting paid for involving and doing the mangrove conservation activities, and 42.5% (93) respondents expressed the need of appropriate payment for doing the mangrove conservation activities.

Almost half of the respondents 43.7% (98) of the respondents agreed to pay for conservation activities while 27.9% (61) disagreed. 59.2% (132) are willing to spend their free time for mangrove conservation activities and willing to involve as part time job 40.7% (89), however, they do not willing to involve as main job 42.9% (94), 37.5% agreed to contribute their working hours for mangrove conservation and 31.9% (70) disagreed.

When respondents were asked about their willingness to learn about mangrove conservation and its management, positive responses was acquired where 61.2% (134) of respondents agreed to learn and 27.9% (61) were unsure. The following question on willingness to share the knowledge with others shows that 60.3% (132) agreed. Promising results obtained from respondents when they were asked on willingness to contribute time (55.3% (121)), money (40.2% (88)) and physical energy (57.1% (125)) in mangrove conservation.

Overall, the willingness to participate among local communities (Table 03) shows a skew to agree (mean value >3.0). It should be noted that, all items received quite high number of respondents that are unsure about the questions asked. This might due to the current management practices of mangrove area in the village and lack of exposure to the mangrove management and conservation activities.

Table 03. Respondents' willingness to participate

No.	Item	Mean	Median	1 Freq. (%)	2 Freq. (%)	3 Freq. (%)	4 Freq. (%)	5 Freq. (%)
C1	Involvement in mangrove conservation activities	3.70	4	18 (8.2)	23 (10.5)	39 (17.8)	66 (30.1)	73 (33.4)

https://doi.org/10.15405/epsbs.2019.05.02.41
Corresponding Author: Zakiah Ponrahono
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

No.	Item	Mean	Median	1 Freq. (%)	2 Freq. (%)	3 Freq. (%)	4 Freq. (%)	5 Freq. (%)
C2	Willingness to participate in mangrove conservation	3.61	4	18 (8.2)	24 (11.0)	39 (17.8)	83 (37.9)	55 (25.1)
C3	Involvement in mangrove trees planting program	3.67	4	20 (9.1)	22 (10.0)	36 (16.4)	74 (33.8)	67 (30.6)
C4	Voluntarily in mangrove conservation	3.67	4	19 (8.7)	18 (8.2)	47 (21.5)	68 (31.1)	67 (30.6)
C5	Not getting paid to involve	3.68	4	12 (5.5)	23 (10.5)	55 (25.1)	63 (28.8)	66 (30.1)
C6	Willingness to pay for conservation activities	3.14	3	33 (15.1)	28 (12.8)	60 (27.4)	71 (32.4)	27 (12.3)
C7	Willingness to spend free time in conservation activities	3.59	4	18 (8,2)	17 (7.8)	52 (23.7)	82 (27.4)	50 (22.8)
C8	Willingness to contribute working hours for mangrove conservation activities	3.11	3	34 (15.5)	36 (16.4)	66 (30.1)	40 (18.3)	43 (19.2)
C9	Mangrove conservation as main job	2.73	3	57 (26.0)	37 (16.9)	64 (29.2)	31 (14.2)	30 (13.7)
C10	Mangrove conservation as part time job	3.06	3	42 (19.2)	31 (14.2)	57 (26.0)	49 (22.4)	40 (18.3)
C11	Appropriate payment for mangrove conservation activities	3.27	3	15 (6.8)	39 (17.8)	72 (32.9)	58 (26.5)	35 (16.0)
C12	Willingness to learn on mangrove management	3.74	4	6 (2.7)	18 (8.2)	61 (27.9)	77 (35.2)	57 (26.0)
C13	Sharing knowledge of mangrove conservation with others	3.70	4	10 (4.6)	15 (6.8)	62 (28.3)	76 (34.7)	56 (25.6)
C14	Willingness to contribute time for mangrove conservation activities in future	3.67	4	8 (3.7)	18 (8.2)	72 (32.9)	61 (27.9)	60 (27.4)
C15	Willingness to contribute money for mangrove conservation activities in future	3.15	3	28 (12.8)	32 (14.6)	71 (32.4)	56 (25.6)	32 (14.6)
C16	Willingness to contribute physical energy for mangrove conservation activities in future	3.58	4	16 (7.3)	17 (7.8)	61 (27.9)	74 (33.8)	51 (23.3)

Note: 1 (Strongly disagree), 2 (Disagree), 3 (Unsure), 4 (Agree), 5 (Strongly agree)

6.4. Community's Participation Level in Mangrove Conservation and Management Activities

From the study, 80.4% (176) of respondents never been involve in mangrove conservation activities in their village. Majority were also never been invited to involve in mangrove conservation activities. Table 04 presents the findings of respondents' participation in mangrove conservation and management activities.

Table 04. Current respondents' participation level

No.	Item	1 Freq. (%)	2 Freq. (%)
D1	Involvement in previous mangrove conservation activities	176 (80.4)	43 (19.6)
D2	Invited to involve in previous mangrove conservation activities by government agencies	195 (89.0)	24 (11.0)
D3	Invited to involve in previous mangrove conservation activities by government agencies by private agencies	200 (91.3)	19 (8.7)
D4	Invited to involve in previous mangrove conservation activities by government agencies by non-government agencies	199 (90.0)	20 (9.1)
D5	Never invited to involve in mangrove management	168 (76.7)	51 (23.2)
D6	Never invited to involve in discussion of mangrove management	167 (76.3)	52 (23.7)

Note: 1 (No), 2 (Yes)

https://doi.org/10.15405/epsbs.2019.05.02.41
Corresponding Author: Zakiah Ponrahono
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

In overall, majority of the community answered 'No' for all of the questions asked in the current participation of local community in any stages of management or activities in mangrove conservation. This exhibit the current participation in mangrove conservation at Kampung Sungai Melayu is still low. However, the reasons behind why or what is the factor that causing this low rate of participation is not included in this study.

Further, the Chi Square test analysis (Table 05) shows significant relationships of demographic characteristic with local community's willingness to participate in mangrove conservation. Therefore, this study concludes that there are three factors in socio-demographic variables have significant relationship with local community's willingness to participate on mangrove forest which are educational level, job sector, and household income.

Table 04. Chi-square tests results between characteristics and willingness to participate

Characteristic	Value	df	CV	Min expected count	Asymp. Sig.
Gender	5.255	3	7.81	6.14	.154
Educational level	22.963	9	16.92	0.51	*.006
Job sector	17.046	9	16.92	1.02	*.048
Category of villagers	7.262	3	7.81	4.60	.064
Age	11.906	12	21.03	0.38	.453
Length of residency	5.963	12	21.03	0.26	.193
Household income	24.261	12	21.03	0.77	*.019
Number household members	13.106	12	21.03	0.32	.361

Note: Categories of villager in this study are fisherman and non-fisherman

Additionally, based on the result obtained from Spearman correlation test in Table 06, result indicates that the relationship between local community's perception toward mangrove forest and their willingness to participate is significant ($r=.472$, $p<.05$). Hence, null hypotheses is rejected. This study accepts that there is a correlation between local community's perception toward mangrove forest and their willingness to participate, however, the strength of correlation is weak between these two variables.

Table 05. Spearman's Rho correlation test between perception and willingness to participate

		Willingness to participate	Perception
Willingness to participate	Correlation coefficient	1.000	.472*
	Sig. (2-tailed)	.	.000
	N	219	219
Perception	Correlation coefficient	.472*	1.000
	Sig. (2-tailed)	.000	.
	N	219	219

7. Conclusion

In conclusion, the result suggested that socio-demographic attributes such as educational level, job sector, category of villagers and household income influence positively in local community's willingness to participate in mangrove management and conservation activities. Local community empowerment in

mangrove management and conservation is necessary through knowledge sharing, workshop, site study and others activities engaging the community in maintaining the mangrove forest. Furthermore, the results also indicate huge community willingness. However, the sustainability of mangrove conversation activities in Malaysia is still at infant rate. Therefore, promotion of local community's' participation in mangrove forest management is needed and requires various efforts from the government, non-governmental organisations, academic institution, and the business sector. Understanding the local community willingness in the mangrove forest conservation activities must be an important step to formulate a sustainable mangrove forest management.

References

Abu Nasar, M. A., N. S., Garnett, S. T., & Myers, B. (2016). Economic dependence on mangrove forest resources for livelihoods in the Sundarbans. Bangladesh. *Forest Policy and Economics*, 64, 15-24.

Brander, L., Wagtendonk, A., Salman, S., McVittie, A., Verburg, P., de Groot, R., … & van der Ploeg, S. (2012). Ecosystem service values for mangroves in Southeast Asia: A meta-analysis and value transfer application. *Ecosystem Services* (1), 62-69.

Dev Roy, A. K. (2016). Local community attitudes towards mangrove forest conservation: Lessons from Bangladesh. *Marine Policy* (74), 186–194.

Food and Agriculture Orgnization of the United Nations. (2015). *Global Forest Resources Assessment*. Rome: Food and Agriculture Organization.

Sina, I., Maryunani, B.J., & Harahab, N. (2017). Analysis of Total Economic Value of Ecosystem Mangrove Forest in the Coastal Zone Pulokerto Village District of Kraton Pasuruan Regency. *International Journal of Ecosystem 7*(1), 1-10.

Ibrahim N. A., Mustapha M. A., Lihan T., & Mazlan A. G. (2015). Mapping mangrove changes in the Matang Mangrove Forest using multi temporal satellite imageries. *Ocean & Coastal Management* 114, 64-76.

Iskandar Regional Development Authority (2017). Changing Lives: Eco-tourism in Iskandar Malaysia. Kampung Sungai Melayu, pp. 4-19. Johor Bahru, Malaysia: Iskandar Regional Development Authority.

Kamariah, A., Abdullah, M., & Dasimah, O. (2014). Community-Based Conservation in Managing Mangrove Rehabilitation in Perak and Selangor. *Procedia - Social and Behavioural Science*, 153, 121-131.

Khairul Azwan, M., Audi Hani, A., Hamdan, O., Khali Aziz H., & Shamsudin, I. (2011). Perubahan Hutan Paya Laut di Negeri Perak, Johor dan Pahang. *FRIM Reports*, 95, 9-10. Selangor, Malaysia.

Kuenzer, C., & Vo Quoc, T. (2013). Assessing the ecosystem services value of Can Gio Mangrove Biosphere Reserve: Combining earth-observation and household-survey-based analyses. *Applied Geography*, 45, 167-184.

Lewis III, R.R. (2009). Methods and criteria for successful mangrove forest restoration. in G.M.E. Perillo, E., Wolanski, D. R., Cahoon, & M. M., Brinson (Eds.). *Coastal Wetlands: An Integrated Ecosystem Approach* (787-800).

Liquete, C., Piroddi, C., Drakou, E. G., Gurney, L., Katsanevakis, S., Charef, A., … & Egoh, B. (2013). Current status and future prospects for the assessment of marine and coastal ecosystem servives: A systematic review. *PLOS ONE, 8*(7), 1-15.

Mantra, I. B. (1986). Socio-economic problems of the Kampong Laut community in Central Java edited workshop paper on the socio-economic situation of human settlements in mangrove forests under the auspices of United Nations University (UNU) and the National Research Council of Thailand. Retrieve from URL: http://www.nzdl.org/gsdlmod?e=d-00000-00---off-0cdl--00-0----0-10-0---0---0direct-10---4-------0-1l--11-en-50---20-about---00-0-1-00-0--4----0-0-11-10-0utfZz-8-00&cl=CL1.219&d=HASH46443c892101dd560745f0.10&gt=2

Mohd Basri, A. (2016). Assessment of Local Community Participation in Peat Swamp Forest Conservation and rehabilitation Program in Selangor, Malaysia. Selangor: Submitted for Master of Science.

Mukherjee, N., Sutherland, W. J., Dicks, L., Huge, J., Koedam, N., & Dahdouh-Guebas, F. (2014). Ecosystem service valuation of mangrove ecosysems to inform decision making and future valuation exercises. *PLOS ONE, 9*(9), 1-8.

Nagelkerken, I., De Schryver, A., Verweij, M., Dahdouh_Guebas, F., van der Velde, G., & Koedam, N. (2010, December 15). Differences in root architecture influence attraction of fishes to mangroves: A field experiment mimicking roots of different length, orientation, and complexity. ScienceDirect: *Journal of Experimental Marine Biology and Ecology*, *396*(1), 27-34. https://doi.org/10.1016/j.jembe.2010.10.002

Ogeh, K. L., Jimoh, S. O., & Ajewole, O. I. (2016). Willingness to Pay For Environmental Service Functions of Mangrove Forest in Uzere, Delta State, Nigeria. *Journal of Resources Development and Management*, 16, 1-7.

Walters, B. B., Ronnback, P., Kovacs, J. M., Crona, B., Hussain, S. A., Badola, R., … & Dahdouh-Guebas, F. (2008, August). Ethnobiology, socio-economics and management of mangrove forest: A review. ScienceDirect: *Aquatic Botany, 89*(2), 220-236. https://doi.org/10.1016/j.aquabot.2008.02.009