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ECONOMIC VALUES OF PEATFOREST TO LOCAL COMMUNITIES IN MUKAH, SARAWAK

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SUMMARY

Peat soil forest (as used in this study are the natural forest (peat swamp forest)) serves important ecological and environmental functions and provides perpetual benefits, if properly conserved. The peat swamp forest in the Mukah district represents the most significant protected peat soil area in the state. Communities living in the proximity of this forest are dependent directly or indirectly on it for their livelihood. The main objective of the study was to determine the economic value of the peat swamp forest to the local communities in Mukah. A sample survey of the villagers living along the fringes of the forest was undertaken to determine the types of benefits accrued to the local communities. The results of the study are significant at both the local and state level. At the local level, the peat swamp forest plays an important role because it contributes to the communities' income through the production of fish, wildlife products and wild sago as well as being a source of domestic water. At the international level, an important benefit derived from the peat swamp forest which accrues to the global community is carbon sequestration. Conservation of the peat swamp forest will, in the long run, safeguard the sustainability of the resources to support the livelihood and welfare of the local communities in Mukah.

Keywords: *natural resources, local communities, non-forest products, income, sustainability, Mukah*

INTRODUCTION

In the coastal areas of many Southeast Asian countries peat soil areas cover approximately 12% of the land area, equalling more than 27 million hectares (MHA). The swampy peat land areas are not suitable for agricultural use and difficult to access and thus have low population densities. Peatlands are still important to millions of people for the production of crops such as sago (*Metroxylon sago*), rattan, and for fisheries, hunting and forestry.

Very few relatively intact peat swamp forests remain: less than 10% of the original areas of such forests. But even these remnants, including the less than 5% of the South East Asian peat swamp forest that are officially protected, are affected by illegal logging and encroachment. Close to 45% of the remaining peat swamp forests have been severely affected by large-scale development, drainage, deforestation and (often illegal) logging. Another 45% have been destroyed by selective logging and drainage. Many millions of hectares have been consumed by fires (Wetland Organization 2005). –The consequence of millions of hectares of peatlands becoming unproductive will likely increase fire risks in these areas during dry periods for many decades to come. By then it will be too late to restore them” (Silvius, 2015).

The peat swamp forests in Mukah District, Sarawak, are being converted to other uses such as industrial, agricultural and housing, to cater for the needs of the district's increasing population. However, some members of the population depend on the peat swamp forest resources for their livelihood; they will be affected if the forests are not protected. The swampy peat land areas under natural conditions are not suitable for most agricultural uses and are often referred to as marginal lands suitable for marginal crops like sago. In Mukah peat lands are still important to the local communities for the production of sago and rattan crops as well as for fisheries, hunting of wild game and as a source of domestic water. Other important functions include providing flood control, acting as natural water filters, recreation etc.

The purpose of this study was to determine the communities' willingness to pay for peat swamp forest resources as an indicator of the values to them of the peat swamp forests. The value to non-timber forest products collected from peat swamp forests was determined using the market price.

METHODS

The Mukah-Socioculturally-Appropriate Multi-Facet Inventory (MSAMFI) is an instrument that is part of a trial web-based application system developed purposely based on a model partially adapted from the Malaysian Career Facet Inventory (as initially proposed via the Development of the Career Factor Inventory CFI: Chartrand, Robbins, Morrill and Boggs 1990). It was designed to assist Universiti Putra Malaysia's eco-tourism and socio-economics researchers to gather local economic credentials and imperative community development information parameters for Mukah, Sarawak. The instrument aims to gauge and identify pertinent informed economic choices and feasible sago-plantation based factors for economic enhancement opportunities, which will be scrutinized under the lenses of Item Response Theory Model and Knowledge, Attitude and Practice Rating Scale (Ahmad Hariza *et al.*, 2008).

Two categories of entries were constructed within the system: Mukah's socio-economic background and its vital demographic pertinent parameters, which were gathered via multi-tiered platforms of a single-online network, performed with an adaptable infrastructure (hardware) of a customizable-computerized algorithm (software programs). An initial closed-ended and partially open-ended questionnaire was integrated within the systems to be fully constructed as the test-bed for the Mukah-Socioculturally-Appropriate Multi-Facet Inventory (MSAMFI). The current study proposes to replicate Choi *et al.*'s (2010) analyses of a new stopping rule that attempts to address the efficiency and measurement precision problems associated with commonly used stopping rules. Precision measurements of MSAMFI's items were tested as per the aspirations for the instrument's development. According to Choi *et al.*'s (2010) study, the predicted standard error reduction (PSER) stopping rule seeks to balance the dual concerns of measurement precision and testing efficiency by considering the predicted change in measurement precision that would result from the administration of additional items in test system delivery and the complexities of the psychometrics involved in developing the initial version of the Mukah-Socioculturally-Appropriate Multi-Facet Inventory (MSAMFI). Data were extracted and imported to a .csv format to be synchronized with the application of a series of statistical data analytical tools.

RESULTS

Types and values of fish caught

The highly acidic and low oxygen conditions of the peat swamp forest water do not support many fish species. The river water is brown indicating a high tannin levels. Most of the fish are air-breathers such as snakeheads and catfish.

The common species of fresh water fish recorded in the survey are keli (*Clarias batrachus*), seluang (*Puntius* sp.), baung (*Mystus baramensis*), puyu (*Anabas testudinesis*) and sepat (*Trichogaster pectoralis*) (Table 1). The main commercial fish species are the catfish, gobies and snakeheads. During the data collection period of about 12 weeks, about 126kg of fish were caught by one selected respondent who used the "bubu", a traditional apparatus, to catch the fish.

The rivers are used for the transportation of sago logs and this sometimes affected the villagers' normal fishing activities.

Table 1: Types and prices of fish recorded

Type of fish	Price range (RM kg ⁻¹)
Keli	10 –18
Toman	18
Baung	10 -12
Lajong	10
Tapah	15 –20
Udang	10 –30
Bawang	15
Bureh	18
Haruan	20 –30
Puyu	7 –10
Sepatsiam	10
Ma'en	15
Padek	25
Dak	18

Wildlife conservation benefits

The peat swamp forest has been an important habitat for several game and endangered species. The mammalian population at the study site comprises mainly small mammals such as treeshrews, squirrels, rats, bats, otters and pangolins. The survey indicated that larger animals such as wild boar, deer, mousedeer and barking deer were still occasionally hunted for their meat. The encroachment of human beings into the forests for hunting and logging had caused the larger animals to become scarce. Under these circumstances, hunting of larger animals was no longer a significant activity of the local natives. Table 2 shows the price of game per kg.

Table 2: Types and prices of wild game

Types of game	Price range (RM kg⁻¹ or per animal)
Tenggiling	12
Wild boar	15 –30
Deer	18 –25
Mousedeer	25 / animal

Carbon stocks of sago forests

Peatlands store approximately 550 Gigatonnes of carbon worldwide, twice the amount stored in the world's forests. Peatlands also absorb atmospheric carbon in their soil and thus help to reduce greenhouse gas emissions which contribute to global climate change (Joosten, 2010).

Willingness to pay for conservation

Given that almost all (98.7%) the respondents either live close to the area and / or own land plots in Mukah peat swamp forest, and 90.6% benefit from the collection of peat swamp products, it could be concluded that the majority of them have made direct use of, and are aware of Mukah peat swamp forest. This indicates that the respondents are the users and receive benefits from the peatland. Therefore it could be expected that they possess sufficient knowledge from the use and benefits received to form a value for the Mukah peat swamp forest. The results from the perception questions (Table 3) demonstrate that the respondents agree on the importance of conserving the Mukah peat swamp forest.

Table 3: Perceptions on importance of Peat land forest

Statement on Importance of Peat swamp forest (PSF)	Mean score
a. PSF helps maintain health of Mukah town	4.75
b. Peat swamp forest provides opportunities for recreational fishing, bird watching, hunting and pleasant scenery	4.73
c. Peat swamp forest helps to clean the water and trap sediments and so improve water	4.73
d. Preserving Peat swamp forests will allow future generations of people to also enjoy them	4.74
e. It is important that the Peat swamp forest has continuously growing stands of Peat palm	4.75
f. It is important that owners of Peat swamp forest have the possibility of earning an income from the Peat swamp forest	4.74
Mean for perception on Importance of PSF	4.74

Scale: 1 Strongly disagree; 2 Disagree; 3 Neutral; 4 Agree; 5 Strongly agree

On a different note, most respondents chose as top priorities for conserving peat swamp forest matters that concerned their immediate livelihood. The results (Table 4) show that the communities have higher preferences for healthy living and better education over the conservation of the peat swamp forests. This is also consistent with their preference for protecting the rivers from pollution since they are dependent on the river systems.

Table 4: Priorities of conserving PSF as a national asset

Statement on priorities for conservation of PSF	Mean score
a. Replanting sago palms that have been cut down	3.15
b. Restoring sago forest on land previously drained	3.28
c. Conserving areas of wildlife	3.19
d. Protecting rivers and streams from pollution	3.85
e. Health services and facilities	3.82
f. Peat forest conservation	3.27
g. Education	3.39
h. Tourism	2.59

Priority Rank: 1 least; 2 low; 3 high; 4 highest

Willingness-to-pay for all cases

The communities' recognition of the significance of the peat swamp forest to their livelihood is reflected in the positive willingness-to-pay bids whereby more than 60% of the respondents are WTP. The changes in the district's environment as economic development takes place have enhanced the communities' awareness of the importance of the peat land forest to sustain their livelihoods. Consistently, the communities place protection of water quality above other values (Table 5).

Table 5: Willingness to pay (WTP) for conservation of PLF per person once in a life time

Items	Conservation of PLF	Wildlife	Water quality	Fish
Percent WTP above RM10	61.8	58.2	62.9	81.5
Percent unWTP above RM10	30.2	41.8	37.1	18.5
Percent WTP below RM10	10.9	11.4	8.1	15.1
Percent unWTP below RM10	89.1	88.6	91.9	85.0
Percent WTP	65.9	63.0	65.9	84.3
Percent unWTP	34.1	37.0	34.1	15.7
Mean WTP above RM10	RM14.43	RM13.72	RM14.74	RM10.91
Mean WTP below RM10	RM2.77	RM2.21	RM1.93	RM2.43
Mean Total WTP	RM13.69	RM12.85	RM14.16	RM10.63

Mean WTPs for conservation of wildlife were RM1.88, for water quality RM3.51 and for fish stocks RM1.84 (Sulaiman, 2005)

CONCLUSION

Conservation of peat swamp forest is an important task since the peat swamp forest has many functions. The secondary benefits derived from conserving the forest must be taken into account and cannot be ignored when deciding on alternative uses for this forest. Serious consideration should be given to the roles the secondary products play in the livelihood of communities living at the periphery of such forests. The social benefits from the peat swamp forest include availability of domestic water, fish and wildlife. The private benefits which belong directly to the land owner (established sago forest) contributing to his income may be derived solely from sago cultivation. The local population not involved directly in sago cultivation benefits from the conservation of the peat swamp forest as it forms a 'green lung' for Mukah new township and acts a buffer between the town and oil palm plantations.

The global benefits derived from peat swamp forest which accrue to the world community include maintenance of or additions to the carbon stock: degradation of peatlands on a global scale leads to an increase in CO₂ emissions, which causes global climate change.

Peat swamp forest should be viewed as wetland in terms of its economic value. This would enhance its use values and result in it being better understood. If peat swamp forest is regarded as marginal land then it loses its value, being considered of lesser value than mineral land. Discussions of peat swamp forest must be in the context of environment and the total benefits. Society's perceptions have to change in order to make the peat swamp forest a heritage.

The Mukah peat swamp forest will undoubtedly continue to mature and evolve, continuing to be a haven for flora and fauna. And with so much of the state's natural peat swamp forest having been lost to development, it comes as a relief that this peat swamp forest, a living, breathing ecosystem, is able to demonstrate its capacity to buffer the effects of environmental degradation following the developments facing Mukah town and the surrounding areas.

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