

## The Sensitivity of Communities towards the Environmental Changes in Tembeling, Pahang and Muar Rivers

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**Abstract:** Rivers have played a long and significant role in community livelihoods. However, extensive development processes have created formidable challenges that affect the daily activities of those who reside near rivers. The present study attempts to gain a broader understanding of the sensitivity of communities residing near three main rivers in Malaysia in view of the environmental changes that are occurring to the rivers. This is a qualitative study in which a total of three Focus Group Discussions were conducted with the communities that reside near the rivers at Kuala Tembeling, Kuala Pahang and Muar. To achieve the study's objective, data relating to the communities' sensitivity towards the environmental changes, the causes of these changes, their impact on the communities' socio-economic activities and efforts to reduce the impacts were gathered from the respondents. A number of recommendations were made by the respondents and including them in any preservation strategy is crucial to form a holistic approach towards an effective preservation effort.

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### 1. Introduction

Rivers constitute an important element for the survival of man as well as flora and fauna. Water is important for humans in the sense that it is utilized for both industrial and domestic development. In addition, humans and aquatic life (particularly exotic and endangered species) depend hugely on rivers for their survival. Rivers are also used for recreational purposes, as they can be a source of attraction for tourists, both at a national and international level. Nonetheless, all of these benefits can only be seen if the rivers are clean and free of pollutants and, today, a number of main rivers in Malaysia are being challenged by serious environmental problems. The swift development of industry is one of the contributors to the serious environmental problems and it has inevitably increased the demand for rivers to be 'sacrificed'. Commonly, there are three sources of waste water, namely the urban sewage system, industrial activities and agricultural runoff. Under certain regulations, waste water usually gets dumped into one of the environmental components: rivers. To date, there have been detailed and broad state-wide studies with regard to local communities and these environmental changes; nonetheless, they have varied greatly in term of focus as well as analytical methodology. This scenario has increased the need for a qualitative study to be conducted with regard to

the communities and their sensitivity towards the environmental changes occurring in the rivers in Malaysia. Such a qualitative study will provide a broad and in-depth understanding of what is actually occurring to the rivers from the point of view of the communities.

#### 1.1 Tembeling, Pahang and Muar Rivers

The Tembeling River is a main tributary of the Pahang River. It originates in the pristine wilderness of Taman Negara National Park, Kuala Tahan, and Pahang. The Tembeling River offers some of the most scenic views of the world's oldest rainforest along its course. In addition, the Tembeling River is a famous place for eco-tourism activities, which attract tourists from across the globe. The Tembeling River is still used by the community as a source of clean water and food. In addition, places such as Mat Daling village, Pagi village, Bantal village and Kuala Sat village still rely on boats as means of transportation. In addition, a small number of locals are conducting aquaculture activities on the Tembeling River, whereby species such as patin (*Pangasius sutchi*) and tilapia are reared.

The Pahang River is one of the main rivers in Malaysia and the longest in Peninsular Malaysia. It originates in Mount Tahan, Pahang, where it rises in two headstreams, the Jelai and Tembeling, about 10 miles north of Jerantut, and flows south past

Temerloh, in parallel to the main range of Mengkarak. At the break of the slope between the mountains and the plains, it abruptly turns eastwards. The Pahang River flows along 459 km and drains into an area of 25,600 km<sup>2</sup>. A total of 75% of this basin area is located in Pahang and the remaining 25% is located in Negeri Sembilan. The river then completes its course to empty into the South China Sea at Kuala Pahang, Pekan, Pahang. A number of socio-economic activities are still conducted on the Pahang River and among the major ones is the aquaculture industry. This industry has flourished along the Pahang River, and one of the famous species being reared by the local entrepreneurs is patin. Indeed, Pahang is one of the leading states in terms of aquaculture entrepreneurs and productivity in Peninsular Malaysia (Department of Fisheries Malaysia, 2010). In addition, the Pahang River is still used as a source of recreation (fish and shrimp netting) and transportation (particularly for the aborigines and those who have settled in the remote areas).

The Muar River flows through the states of Johor, Negeri Sembilan and Pahang in Malaysia. The upstream of the Muar River is located at Tanjung Ipoh, Kuala Pilah and the downstream of the Muar River is located at Muar, Johor. In the old days, particularly during the 15th and 16th centuries, the Muar River contributed significantly towards local economic development in the sense that it was the main route used by traders to go up to the east coast. At Penarikan, the Pahang River and Muar River are nearly connected at a place called Jempol, in Negeri Sembilan. This was possible due to the Serting River flowing into the Bera River, a tributary of the Pahang River, while the Jempol River flows into the Muar River. Traders from the west coast could continue their journeys to the east coast states such as Pahang, Terengganu and Kelantan. At Penarikan, the locals' assistance was needed to pull the boats onto land. The distance was about 300 meters and, due to the pulling of boats overland, the route was called Penarikan, which is the Malay word for pulling. In modern days, the current activities conducted on the Muar River reflect a different scenario. The Muar River is no longer used as the main route for economic activities due to existence of tar roads. However, according to Abu Samah et al. (2011), the local community still relies on the Muar River, particularly for recreational activities such as fishing and netting. A small portion of the community earns incomes as river fishermen.

### **1.2 Community Sensitivity with regard to the Environmental Changes, and the Importance of Their Views**

The strength of the impact of exposure to any environmental change on a social system will be

impinged in part by its sensitivity. The sensitivity of a community that depends on the environment is significantly influenced by their degree of dependency on certain activities that will be affected by environmental change (International Union for Conservation of Nature and Natural Resources, 2010). Within the scope of the study, the communities depend on the river as a source of food and income (e.g. fishing and netting river fauna such as fish and shrimp), recreational activities (e.g. fishing and eco-tourism activities) and transportation (boats and kayaks).

It is often claimed that rural communities tend to be enthusiastic supporters of environmental causes. Such support emerges as they are important users of local environmental and natural open sources. Abu Samah et al. (2011) concluded that rural communities, particularly those that settle near rivers, still rely on rivers for their income-generating activities and for recreational purposes. According to Abu Samah et al. (2011) a river community will welcome any development as long as it will not create any environmental problems and will not obstruct them from conducting their routine activities at the river. Other local studies by Yassin et al. (2011) and Shaffril et al. (2011) have confirmed that the river communities in Malaysia have a 'close relationship' with and are 'attached' to the rivers, particularly the senior villagers who have stayed near the rivers a long time. It is argued that their length of stay has provided them with a chance to have better 'communication' with the rivers.

Shaffril, Abu Samah, D'Silva and Yassin (2013) demonstrated how experienced people are benefiting from their close relationships with the environment, as they know what the best practices are to preserve it, what to avoid, what to do to face threats to the environment and the best methods to teach the younger generation. As they are close to and have better 'communication' with the environment, it is vital to consider the views of communities, particularly views related to the environmental preservation strategies planned (Wiseman, Williamson and Fritze, 2009). The future preservation strategy must be sensitive to the existing critiques of participatory processes, especially those from the community. Wiseman et al. (2009) confirmed via their study that the inclusion of community views within any development strategy that will engender a democratic, fair, focused, specific, innovative and effective decision-making process is vital. Furthermore, community views are valuable as they will produce a strategy that is fundamental, cost effective and lessens the relevant agencies' time and energy required, as they generate

strategies grounded by the community's interest, ability and affordability.

## 2. Material and Methods

This is a qualitative study whereby Focus Group Discussions (FGD) was employed as the main medium to gain the data. To fulfill the data requirement, a total of three FGDs were conducted: the first FGD was conducted with four villagers from Kundang Hulu village, the second FGD was conducted with three villagers from Kuala Tembeling village and the third FGD was conducted with five villagers from Kuala Tahan village. Employing a phenomenological approach using a qualitative method provided the researchers with the opportunity to identify and record the living experiences of the river communities relevant to the environmental changes in the Tembeling, Pahang and Muar rivers (Marshall and Rossman, 2011). In addition, it offered a rich and thick phenomenological description of the phenomenon being studied in its particular context. The researchers continued to conduct interviews until they believed that the data had reached a point of saturation. Generally, saturation points reflect a full understanding of the experience and this understanding will not be altered through further discussions with participants (Laverly, 2003).

The first FGD was conducted for 50 minutes, the second FGD for an hour and 10 minutes and the third FGD for an hour and 28 minutes. The FGDs started slowly with introductions of the research group and the objectives of the study and then continued with small talk to get to know the backgrounds of the participants. The FGDs later moved into deeper discussions of the issues at hand. All the FGDs were conducted in the respondents' mother tongue, the Malay language. The interview protocol was prepared earlier and was made to keep the FGDs to standard interview procedures and to maintain the flow of conversations. The key questions were initially prepared based on the literature review related to the social sensitivity of the river communities towards the environmental changes in the Tembeling, Pahang and Muar rivers and the questions were developed to uncover information such as: 1) their social sensitivity towards the changes that are occurring in the Tembeling, Pahang and Muar rivers; 2) the causes of the changes; 3) their impact on the communities' environmental and socio-economic activities; 4) potential efforts to reduce the impacts. All of the respondents were identified and selected via the help of the leaders of each village. The main criterion for the selection of respondents was that they must be involved in any river activity that is related to socio-economic activities, preservation or river

development planning. The questions served as a guide allowing the respondents freedom and flexibility in their answers. The data gained were later transcribed verbatim and analyzed using thematic analysis.

## 3. Results

### 3.1 Sensitivity towards Environmental Changes

Questions with regard to the respondents' sensitivity towards the environmental changes were posed to the respondents. Based on the data analyzed, three themes emerged: the unstable climate, the cleanliness of the river and fish extinction.

#### 3.1.1 Unstable Climate

The respondents did admit that the climate nowadays is not similar to the environment of the early days. According to them, it is difficult to predict the climate nowadays as heavy rain and long surface runoff can occur unpredictably. The respondents interviewed expressed their concern regarding the instability of the rain pattern, which brings difficulties for them in conducting their daily routines at the rivers.

*Nowadays, it is not just 1, 2 or 3 months of rain. It is never certain. That is what we cannot really estimate, unlike before. In the '80s, it was possible. In the last five to six years, weather is one of the factors (for the changes) (R1).*

Another respondent, a fisherman, agreed with the uncertainty of the seasons. This therefore may disrupt their activities.

*We never know; for three to four months there is no rain, but when it rains heavily, the water becomes cleaner (which is not suitable for shrimp fishing and netting). (R4).*

It is no surprise that the respondents discussed the role of the instability of the climate in the changes, as a number of local and international studies have proven the instability of the climate in Malaysia, particularly with regard to rain and temperature patterns. Studies completed by Wan Azli (2010) have noted that Malaysia is facing an increasing trend of heavy rain and floods, increasing occurrences of strong winds and increasing trends of heavy storms. In addition to this, Wai, Carmelengo and Ahmad Khairi (2005) detected a temperature increase from 1.75 °C to 2.69 °C within a period of 50 years in selected areas in Malaysia, while Tangang (2007) has detected an increase between 1.75 °C and 2.69 °C in the last 40 years in selected areas in Malaysia.

#### 3.1.2 River Cleanliness

The second theme that emerged from this study was the river cleanliness. As the rapid evolution of development has taken place, it has measurably influenced the water quality's

deterioration. The respondents accentuated that the river cleanliness is not similar to the river cleanliness of their childhood days, when they could directly drink the water from the rivers without boiling it first. A village leader, R1KT, responded:

*...my teacher told us to drink boiled water. "No need," said my grandfather. "Drinking river water is better because the herbs and roots all leach into the river and God has created it as medicine for us," he said (R1KT).*

A fisherman, R4, expressed his agreement with R1KT and reflected on a similar scenario: *"...in the past, as we bathed, as we drank, it was ok. I used to catch shrimp. Before, we could do it at night"*. R3KT, a former village leader, expressed his agreement with R1KT by stating: *"Before the water was unpolluted"*. R1KT then added that it is dangerous nowadays for them to drink the water directly from the river as it can cause stomach ache: *"...it is true, as they say, the water was not polluted like today. Today, if we drink directly [the water from the river] we can get sick; the water is muddy..."*

The current findings are in line with data concluded from previous studies. A study by Rahman et al. (2011) confirmed that in 2008, a total of 17 out of 186 river systems in Malaysia were contaminated as they were toxic and unsafe to be used. Ahmad Faiz, Khairuddin, Jegak, D'Silva and Shaffril (2010) conducted a study in a community that relies on the Pahang Tua River for its aquaculture activities. He recorded the complaints of the respondents regarding the river cleanliness and argued that waste from the factories and highway construction were the major contributors to the problem. Another study by Nather Khan (1991) on the Linggi River concluded that the river had been highly polluted from rubber and palm oil waste discharges. According to Nather Khan (1991), such pollution will cause the death of certain river species.

### 3.1.3 Fish Extinction

Fish extinction is the third theme that emerged. The respondents stated that species such as jelawat (*Leptobarbus hoevenii* or river carp), kelah (*Tor tambroides* or river carp) and temoleh (*P. jullieni* or Malaysian carp) are fast becoming extinct. According to the respondents, there is worse to come as there are no efforts in place to further breed those species. A director of the Community Eco-Tourism Resource Centre remarked: *"...becoming extinct (the fish), and possibly other fish shall disappear. No efforts to breed them. Nowadays, there is no more jelawat"* (R4TH). A resort manager and travel agent had the same view: *"What is clear, jelawat shall become extinct, as well as kelah and temoleh"* (R3TH).

The manager, R3TH, further stated that he

had been in the eco-tourism industry for 30 years. Over this period, he did not find any jelawat fish. He expressed his concern that there is a probability that jelawat and kelah will be extinct in the future:

*That was what I said: we have to think now. It means in the future, jelawat are only a dream. I have been in the industry for 30 years and in these 30 years I have not seen the kelah and jelawat of this river.*

To have such a scenario in Malaysia is not surprising as a number of local and international studies have come to conclusions that are in line with the current findings. A study done by the World Conservation Union Red List (2007) concluded that out of 2,491 freshwater fish species studied in Malaysia, more than two fifths (1,074 species) can be categorized into the "threatened" category (grouped under Critically Endangered, Endangered and Vulnerable). Further analysis by the organization proved that among the major causes for this problem are habitat loss, introduction of alien species, pollution and over-harvesting. Findings from Chew and Zulkafli (2012) are in line with the sensitivity of the local communities; via their study, they managed to prove that there is a higher need for conservation efforts for species such as jelawat, kelah and temoleh, as their numbers are consistently declining due to uncontrolled human activities.

## 3.2 Causes of the Changes

As the respondents discussed the changes that are occurring to the rivers, they were asked about the possible causes for such changes. A total of five themes emerged: logging and mining, deforestation, agricultural activities and other causes.

### 3.2.1 Logging and Mining

Logging and mining, particularly sand mining, were described as one of the causes for the changes. Furthermore, according to the respondents, unsystematic logging activities had caused erosion and brought negative impacts to the rivers. A secretary of VDSC reported: *"Firstly is unsystematic logging. In my opinion and of my friends, unsystematic logging results in erosion. The water gets muddy. As my friend said, in the past the river water quality was good, now it gets muddy."* (R1TH). A former village leader involved in the river development remarked: *"We are at a loss. What is worse is the road along Jelai. Jelai involves mining and logging"* (R3KT).

Respondents, particularly in Kundang Hulu, Muar, raised their concerns regarding sand mining as the major contributor to the river changes. According to them, sand mining activities had caused the river to become muddy and the fish to die. A rubber tapper who fished part time confirmed this by stating: *"those who take the sand are one of the causes; they dig for*

the sand". A local fisherman, R4, expressed his agreement by stating: "*Quite deep, the job done there at Durian Chondong, so the river is polluted and dirty*". He further commented:

*Fish float [died]; it had happened before. In the '70s, a lot of poison was used, that was bad. We avoided the river because of the stench from dead fish. It was in '71 if I am not mistaken. It was really poisonous"* (R4).

The respondents' views are in line with a number of local studies that have confirmed that sand mining activities can cause turbidity to rivers. According to Hitchcock and Drucker (1996), the physical disturbance of sediment during the mining process can affect the suspended solids and increase the turbidity in water. In addition, sand mining activities have also been found to create a formidable challenge for river fauna, particularly fish. The information provided by the respondents on the relationship between sand mining activities and fish death is in line with a number of studies. According to Ambak and Zakaria (2010), sand mining can lead to psychological stress for fish, which in turn leads to infection or death. Furthermore, according to Ambak and Zakaria (2010), sand mining minimizes the success rate of catching prey, which disrupts the diets of fish which can cause local extinction of certain species and can affect the diversity of fish.

### 3.2.2 Deforestation

Malaysia has two thirds of its area forested (20.5 million hectares). Nonetheless, it is a concern that Malaysian forests nowadays are consistently disappearing as a result of the over-usage of natural resources, which creates formidable challenge for biodiversity conservation efforts, clean drinking water supply and climate stability. It was recorded that between 1990 and 2010, Malaysia lost 1.9 million hectares of forest. A similar scenario can be seen within the specific scope of the Tembeling, Pahang and Muar rivers. A former forest ranger offered: "*Difficult for me to say it; this involves the opening of land. The second is mining. These have become major problems*" (R2KT).

According to the respondents, deforestation is among the major contributors to the river changes. The respondents informed us that some of the areas in their vicinities are facing such problems, as observed by a pensioner:

*If we see nowadays, the Tembeling River is not good anymore. If you go to the upper reaches, you shall see how they opened up the forest. Before they guarded the forest; nowadays, up to the border with Terengganu, it is all gone...* (R3KT).

Furthermore, at Kuala Tembeling particularly, a development plan has been strategized with regard to opening new rubber and oil palm

plantations, and unfortunately it involves deforestation. According to Benavides and Veenstra (2005), deforestation can cause water pollution as the lack of trees will not be able to provide a canopy shelter that prevents the rain from falling directly onto the soil and washing pollution into the rivers, as the soil contains chemicals that pollute the water. Scientifically, it has been discovered that deforestation is one of the contributors for river pollution.

### 3.2.3 Agricultural Activities

The relationship between agricultural activities and freshwater systems is often complex and leads to a number of results. One of the recognized results is that agricultural activities conducted near a river can deteriorate the river quality via pollution. Phosphates and nitrates are both used immensely within agricultural activities and can leach into rivers, resulting in excessive algal growth and damaging the environment via the eutrophication process. Similarly, the excessive usage of pesticides in agriculture, which are highly toxic, will cause damage to the river. As a proportion of all pesticides used will inevitably be drained from the land, perhaps by runoff, they can easily be channeled into the rivers and poison fish, shrimp and other fauna. A number of respondents expressed their agreement with these facts and expressed their concern on this. A Village Development and Security member noted: "*To be open, what we fear is that if the plantation is large, it uses a lot of chemicals, so it will damage our rivers*" (R1TH).

A fisherman lamented the irresponsible plantation operators:

*They don't bother because they don't look for it near the river... for example, they open up plantations where they know it is a reserve area by the river but they still just go ahead. So if they don't have a feeling of love, just care for their pocket [income], they don't care for us down here [who depend on the river sources for income]* (R1).

Gyedu-Ababio and van Wyk (2004) demonstrated how agricultural activities can affect rivers by stating that the fertilizers and pesticides used by farmers to increase their productivity actually harm rivers. The chemicals can leach into the soil by rain, ending up in rivers. The situation is worsened as the river algae uses these chemicals to grow and multiply rapidly, which results in the water turning green with such massive growth of algae. This leads to pollution and causes the death of many animals.

### 3.2.4 Other Causes

Aside from logging and mining, deforestation and agricultural activities, the respondents also dwelled on a number of other causes as contributors to the river changes, as discussed

below

#### 3.2.4.1 Garbage

Throwing waste garbage into a river can cause problems for those who rely on it and the respondents interviewed expressed their concerns on this. Waste garbage is not a new environmental problem and it is occurring everywhere across the globe. R5TH claimed that they have faced such problems for years and efforts to solve them seem to face failure:

*The major problem now is waste. There have been attempts to solve it from the past 'til now; still it cannot be solved. Before, we had students who did work with us for a day; we cleaned up the tourist areas.*

#### 3.2.4.2 Sewage from Settlements

A number of studies have claimed that sewage from settlements can create environmental problems for rivers. Within the scope of this study, particularly at Kuala Tahan, the extensive development of the eco-tourism industry in the vicinity has influenced the population density, thus increasing the sewage waste from the settlements. A study by Hartwig (2006) confirmed that sewage from a settlement can pollute a river by reducing the oxygen concentration. This causes eutrophication, which causes oxygen to buffer in a high-loaded river system and minimizes the oxygen control while increasing the sludge quantity. One of the respondents confirmed this by stating:

*...then, of course, is the waste from settlements. As the tourism economy developed, so did the population, and so did the influence from the resorts and settlements... (R4TH).*

Waste from factories will commonly raise concern among those who depend on the local natural resources. Ahmad Faiz et al. (2010) demonstrated that the main concern of the majority of communities regarding factory waste is that such waste can cause death to fish and deteriorate the quality of the water, which in turn affects the communities' social and economic activities.

Within the scope of this study, a similar scenario can be seen as the respondents expressed their concerns about the collected waste water dumped by various factories directly into the main part of the river. Furthermore, the respondents stressed that compared to their early days by the river, they cannot drink the water directly from the river as it has been polluted from the factory waste.

*...the river water, according to people before, could be fetched using our hands to drink it. But nowadays, the water is contaminated and if we drink it, we will be in deep trouble. Waste from the factories should be considered. We see them as how*

*they are: they just want the money. The factories want money (R1).*

A number of international studies have reflected these findings with regard to the negative impacts of eco-tourism on nature (Buckley, 2007; Tran and Quynh Anh, 2011). In a local setting, a similar scenario was raised by the respondents. As the eco-tourism industry in Kuala Tahan and Kuala Tembeling in particular continues to develop, it increases the demand on the boat rental industry. While it does bring more income and job opportunities for the locals, such demand actually needs some 'sacrifices' from nature. One of the respondents highlighted the impact of the boat rental industry on the Pahang River by stating:

*...and the local boats, the oil from the boats, overflows into the river and there are not so many fish here (R1KT).*

The development of industry, in this case eco-tourism and factories, has sacrificed the natural element of the environment. In this study, it can be seen that the development of the eco-tourism industry and the emergence of factories have created formidable challenges for the river, particularly due to the pollution brought about by factory waste, sewage waste and oil residue from the boat rental industry.

### 3.3 Impact on the Environment and Socio-economic Activities

The respondents were then asked about the impact of the changes on their socio-economic activities. With regard to this question, two themes emerged: the impact on the river fauna and the impact on their income.

#### 3.3.1 Impact on the River Fauna

As the water quality has deteriorated, it has resulted in negative impacts for the river fauna. A number of river fauna are unable to cope with such changes, causing their death. Some of the species, such as river shrimp and fish, have decreased significantly in terms of their quantity. Respondent R1, a fisherman, confirmed this by stating: "*...as the water gets polluted, like poison, if the water is like that, the small shrimps will die*". He then compared the previous scenario in the river, particularly in the '80s when there was an abundance of fish and shrimp available in the river:

*... before, when we cast our nets in the '80s, it was just one try and we could keep our catch for a week and it was not finished. Nowadays, if we catch today, tomorrow it is gone (R1).*

R4, also a fisherman, claimed that though some people argue that certain techniques will result in more fish and shrimp being caught, nonetheless, no matter what catching technique they practice nowadays, still fewer fish and shrimp can be caught.

According to this particular fisherman, “*Nowadays, whether using the net or just fishing, the results [the small quantity of fish landed] is still the same*”.

### 3.3.2 Impact on Their Income

Abu Samah, Shaffril, D’Silva and Uli (2012) found that a reduced quantity of fish caused by changes to the environment increases concern among the community due to the fact that fewer fish means less money for them. This study seems to have found similarities with these findings; according to the respondents, the number of fish and shrimp has significantly decreased and this has reduced the respondents’ earnings from the river. Respondent R2KT, a retired forest ranger, indicated that the river may no longer be a relevant source of income as the catches have significantly reduced compared to those of yesteryear. According to R2KT, “... *[working] on a part-time basis means if they just depend on fish, I feel that it is not enough because if we compare the past and now, the number of fish is so much reduced*”.

Nonetheless, respondent R4 (a fisherman) provided a contrasting view by stating that although the quantity of the catch is not the same as in the early days, the current monthly income earned by them is still adequate to survive. This is because the decreased quantities of the catches have increased the prices, as the demand for fish and shrimp is now high. He remarked: “*In the past, there was a lot of catch but the money was small. Now the shrimp are fewer but the price for them is high*”.

### 3.4 Efforts to Reduce the Impacts

A proper understanding of the possible efforts to reduce the impacts of the changes is essential for the preservation efforts. In response to this, the respondents were also asked their opinions with regard to the possible efforts to overcome the impacts brought about by the changes. A total of four themes emerged: conforming to standard operating procedures (SOPs), awareness and education programmes, zoning and the roles of VDSC and extra funding.

#### 3.4.1 Conforming to Standard Operating Procedures (SOPs)

SOPs are seen to be an effective preservation effort. The respondents stressed that they cannot stop any development project by any agency, but they urged the relevant authorities to exercise the necessary powers to enact pertinent SOPs and strictly supervise their implementation, as they will help to preserve the environment and thus maintain the socio-economic activities run by the community. As noted by a resort manager / travel agent:

*It means that anybody that wishes to do that must follow the regulations strictly. To reduce*

*the impact on our river. We just cannot stop the implementation of development. Because at least it helps the people and the villagers around the area... But just reduce it by following SOPs (R3TH) .*

The resort manager added:

*Development cannot be avoided, but the damage or pollution can be minimized with SOPs. Every development must have its own SOPs. Then I feel the river can be at an appropriate water level and we can utilize it fully, whether for the fishermen or those in eco-tourism or for the benefit of the local populace. This is what the government should do; the procedures should be followed (R3TH).*

#### 3.4.2 Awareness and Education Programmes

Another effort that should be emphasized is awareness and education programmes. According to R4TH, a director of the Community Eco-tourism Resource Centre, the programmes must cover all age groups but must target the younger groups in particular. Tapsell (1997) accentuated the need for environmental education for children as they are the largest user group of outdoor spaces. Such information is vital for them as they are the future ‘managers’ of the environment. R4TH stressed the need for such programmes to be conducted among young people in schools:

*Because they are taught how to throw the garbage away at school, right, so the awareness I feel has to be with all students. It starts from young, say from kindergarten. The teachers say: “...don’t simply throw away garbage”. When they get home they can remind us, if they see us littering. So the programme should begin from below; it cannot start from top to bottom. [It should be] from bottom to top. So if there is a programme, the university can do it; they should assist the areas up ‘til the villages upstream at Ulu Tembeling. Because if they throw garbage there (Ulu Tembeling), it will flow down here (R4TH).*

Another view stated by R1TH, a VDSC member, expressed the need to conduct workshops to raise awareness with regard to the importance of the river preservation efforts. Abu Hassan et al. (2009) reflected on the importance of organizing consistent workshops and seminars to increase the interests of the community in certain issues. He and his colleagues furthermore proved that inconsistent organization of workshops or seminars in a community will create a ‘seasonal’ attitude towards certain things and, within the scope of this study, river preservation efforts. The communities near these three rivers should be provided with continuous awareness workshops and campaigns and this responsibility can be borne by the concerned municipalities and VDSCs.

*For those who are more concerned about*

*the environment, we try to conduct workshops for the people in Kuala Tahan village up 'til the foremost upstream village on the importance of eco-tourism so that the villagers are really serious in developing eco-tourism (R1TH).*

### 3.4.3 Development Zoning

Development, according to R2TH (a resort and restaurant manager), should be zoned to avoid any pollution being dumped into the rivers. Any development plan near to the rivers should measure the impact it has upon the society. In certain areas, any form of development should not be allowed, particularly in areas where a lot of socio-economic activities are being conducted. This means that there should be several hundred meters between the river and developments". R2TH then added that any activities, particularly logging, should be zoned far away from the river sources:

*...but like the logging issues that can make our river polluted, perhaps it is where we can get tourists to come. I cannot estimate when, but if there is such a system, I feel that even if we wish to log, we need to make some [development zones] so that the river is not polluted... (R2TH).*

### 3.4.4 Roles of VDSCs, Extra Funds and Involvement from all Groups in the Community

D'Silva et al. (2009) confirmed that to have a successful programme and plan at a territorial level, a VDSC that is proactive and possesses influential and good leadership is needed. A similar criterion of VDSC is needed within these areas as the respondents emphasized the roles of VDSCs in networking with other associations and forming cooperation that could assist in the preservation efforts.

Furthermore, in view of the preservation efforts, R3TH accentuated the roles of extra funds and involvement from the community (particularly boat owners, restaurant owners and guides) in achieving success for the preservation efforts. *"Thank God, that with the Village Development and Security Committee Members (JKKK), we can cooperate with the association, we are heading in that direction..."* remarked the manager and travel agent. He added: *"...with regard to the funding, we don't have it and this problem hampers us"*. The manager finally added: *"... we need to remind the entrepreneurs. We always remind them about this, not only the restaurants owners but also those involved in the tourism industry: the guides and boatmen. We do it continuously."*

## 4. Discussions

This study offers a comprehensive evaluation of community social sensitivity towards the environmental changes that are occurring to the

rivers. Due to a number of causes, the rivers in Malaysia are now susceptible to changes. These changes have been felt and experienced by the river communities around the Tembeling, Pahang and Muar rivers and are cause for concern. The impacts of these changes, particularly on the communities' socio-economic activities, have been disastrous and efforts to preserve the river should be initiated at the earliest stage.

In deciphering the FGD data, several conclusions can be deduced from the study, including the importance of local appreciation, local apathy, community helplessness and dependence on external development forces.

In terms of local appreciation, it was heartening to note that true local community members are quite conscious of the plights of their rivers, which once served as useful and natural sources of livelihoods. They showed their concern for the survival and the sustainability of the rivers, but there is a real lack of concern for the rivers in their midst from the communities as a whole. This reflects the local apathy that was apparent among the communities. To them, many unmonitored activities have occurred and the states of the rivers have been overtaken by the throng of development.

The communities seemed helpless against the onslaught of more land being opened upstream and the destruction of forest and surface cover due to logging, as well as the loss of flora and fauna due to damage and pollution due to sand mining. Another dilemma that they face is the need to have some local development to keep the local economy alive and at the same time balance that with eco-tourism. It is also fascinating that so much was discussed by the FGD respondents as if they were not fully aware of the rich natural treasures of the Tahan Natural Park.

A number of recommendations were made by the respondents. The inclusion of these views in any preservation strategy is crucial to form a holistic approach towards an effective preservation effort. To have the 'community' preservation strategy developed by the authorities is deemed important. Uzzell (1989) emphasizes that the relevant authorities should know what people need and expect from a preservation effort, what types of efforts meet their needs and expectations, and how important these needs and expectations are to them. This study was conducted among villagers living near three main rivers in Malaysia; the results might be enriched if villagers living near other rivers were included as respondents.

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