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## **RIVER AND AQUATIC INSECT: AWARENESS LEVEL OF VISITORS AT RECREATIONAL RIVERS IN NORTHERN REGION OF PENINSULAR MALAYSIA**

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### **ABSTRACT**

*Our government especially the Ministry of Natural Resources and Environment and other Non-Government Organizations (NGOs) started to feel the pressure bear by the environment, especially the freshwater ecosystem. Thus, several programs such as “Love Our River” and “One State, One River” have been conducted. This study was carried out to determine the level of river awareness and aquatic insect knowledge among the visitors at recreational rivers, to find out either they are willing to participate in awareness programs or not, and to educate visitors on the importance of aquatic insects. Overall, 136 of respondents were able to complete the face-to-face survey. Despite all activities carried out by the government, the awareness levels among visitors at recreational rivers are considered moderate. Aquatic insects are used as bio-monitoring tools to indicate the health of rivers and balancing the river ecosystem. Respondents with higher education levels were expected to be more concerned about the existence of aquatic insects and their importance. Contrary to this study, few of them knew about it. Less than half of respondents were aware of the existence of aquatic insects and only one-third of them have knowledge of aquatic insects. Only 63.2% of respondents were willing to take part in the awareness program.*

**Keywords:** *aquatic insects, biomonitoring, ecosystem services, public awareness.*

## INTRODUCTION

Freshwater, including rivers, lakes, and ponds is vital to human life and social well-being such as agricultural, industrial activities and recreational purposes. Rivers have an important relationship with humanity as a recreational resource with many type of recreational activities, from public bathing to kayaking (Ahmad Ainuddin & Ali Muhammad, 2014). May (2006) stated that rivers and its surrounding provide several valuable natural and aesthetic sites for cultural, historical and as well as physical attributes for the purposes of recreational users. Thus its utilization has long taken precedence over the commodities and services provided by freshwater ecosystems but, this has resulting in overlooked its value in supporting the balance ecosystem.

Due to human alteration of their habitat and over exploitation of freshwater rivers has received multiple and ongoing stresses. Aquatic insects such as order Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisfly) and others, also part of living organism that plays a vital role in Malaysian freshwater ecosystem (Yule & Yong, 2004). Aquatic insects can be used as bio-monitoring tools to measure the health of freshwater ecosystems. Thus, their relative abundance has been used to make inferences about pollution status of the freshwater as they are classified into very sensitive, sensitive, tolerant and very tolerant groups (Cummins *et al.*, 2008; McGeoch, 1998).

Basically, the management of rivers is solely under the government or public agencies responsibility (Chun *et al.*, 2012). However, due to an unexpected increase in complexity of water related problems, the government has taken several actions in controlling the problems as well as promoting awareness among the public regarding rivers. “Love Our Rivers” and “River Adoption” program was launched by the Department of Irrigation and Drainage (DID), Malaysia in 1993, followed by “River Expedition”, “River Beautification” and “River Watch” (Love Our River Campaign, 2013). Recently, “One State, One River” known as “Satu Negeri, Satu Sungai” (1N1S) was launched in 2005 by the Ministry of Natural Resources and Environment under the system of Integrated River Basin Management (IRBM) which currently managed by DID, Malaysia (Hasil Inisiatif, 2013)

Despite all programs regarding rivers being conducted by the Malaysian government as well as several other non-governmental organizations (NGOs), are Malaysians really aware of government efforts in promoting river awareness? Are Malaysians aware of the existence of aquatic insects? Are they willing to contribute in order to increase level of river awareness and cultivate awareness on aquatic insects among them? Therefore, this study aims to determine the level of

river awareness as well as aquatic insect awareness among visitors in recreational rivers, to find out how far are they willing to participate in awareness program and indirectly to educate visitors on the importance of aquatic insects as part of freshwater ecosystem since not much of them aware on the existence of aquatic insects.

## **METHODOLOGY**

### **Study Site**

Study was conducted at six recreational rivers in the northern region of Peninsular Malaysia (Table 1). In this study, visitors of recreational rivers were targeted respondents. Generally, all of the selected rivers were used as recreation. There were differences in recreational activities done by visitors at selected recreational rivers. Recreational activities such as public bathing, picnic, and camping were observed in all rivers except Bukit Mertajam River (BMJ). Based on observation, most of the visitors went to the BMJ River to hike, jog, cycle and get some refreshment from the hectic city. In Sedim River (SDM), water sport activities such as water rafting was conducted here as SDM River was famous for its extreme cascade.

### **Data Collection**

This survey was carried out among the visitors who visit and have activities along selected recreational rivers. Altogether, one hundred and thirty-six respondents were able to complete the interview. The respondents consisted of Malays, Chinese, Indian and respondents from other races which represent the ratio of races visiting selected recreational rivers. This survey was done with a face-to face method by Gorard (2003). This method allowed researchers to reduce the number of damaged surveys and researchers able to know whether respondents were confused and can explain them about the question. This survey was conducted in three languages which were Bahasa Malaysia, English and Mandarin (Chinese). The first construct of the questionnaire concerns the respondent's background. Four close-ended questions were asked with multiple choice categorical answers. The second construct of this questionnaire consists of the questions regarding respondents' knowledge on the existence of aquatic insects. This section also consisted of four items with multiple choice and open ended questions. In this part, respondents were asked whether they knew the existence of aquatic insects or not. If respondents answered "yes" to this question, respondents were required to give examples of aquatic insects and proceed with questions on knowledge and importance of aquatic insects. Respondents were given score = 1 for each item if they were able to give an

example, knowledge, and importance of aquatic insects and zero score for any “do not know” answer. If respondents answered “no” for the first question of this part, respondents were asked with the next section of questionnaire.

Third construct of questionnaire composed of seven items about respondents’ awareness on river and aquatic insects. This part related to respondents’ awareness on river and aquatic insects campaigns and how did they knew about it. Respondents were also asked on what kind of medium they preferred to be able to receive any information regarding river and aquatic insects. Respondents were required to give their opinion on how to promote awareness on river and aquatic insects to the public in this part. The last item in this part deals with respondents’ willingness to take part in any river and aquatic insect awareness program.

### **Statistical Analysis**

All completed survey data were recorded and analysed in Statistical Package for Social Sciences (SPSS) version 22. The tests by SPSS included frequencies and crosstab between the variables.

## **RESULTS**

### **Respondents’ Background**

There were 136 respondents completed the interview consisting of 85 males and 51 females from various races. The respondents’ background in this study consisted of 125 Malays, seven Chinese, one Indian and three respondents from other races which represent the ratio of visitors at recreational rivers. Figure 1 shows the distribution of respondents based on gender and races.

Distribution of age of the respondents are shown in Figure 2, where the most respondents are the youth-aged group between 18 to 25 years old, with 63 respondents. Followed by respondents 26 to 35 years old with 33 respondents and 26 respondents aged above 45 years old. There are three respondents younger than 18 years old and 11 respondents from groups 36 to 45 years old.

Education level of respondents is also part of the questionnaire requirement. Education level of respondents were divided into four categories as follows: 1= did not complete high school; 2=completed high school but no further schooling; 3=with certificate (Sijil Tinggi Pendidikan Malaysia (STPM), Sijil Tinggi Agama Malaysia (STAM), Matriculation certificate, A-Level, skills certificate fall into this category); and 4=Universities graduate (Bachelor Degree, Master Degree and

Philosophy Doctorate were categorised under this class). Overall, 24 respondents from category 1 of educational level, 57 respondents were in category 2, category 3 and 4 comprising 43 and 12 respondents respectively (Figure 3).

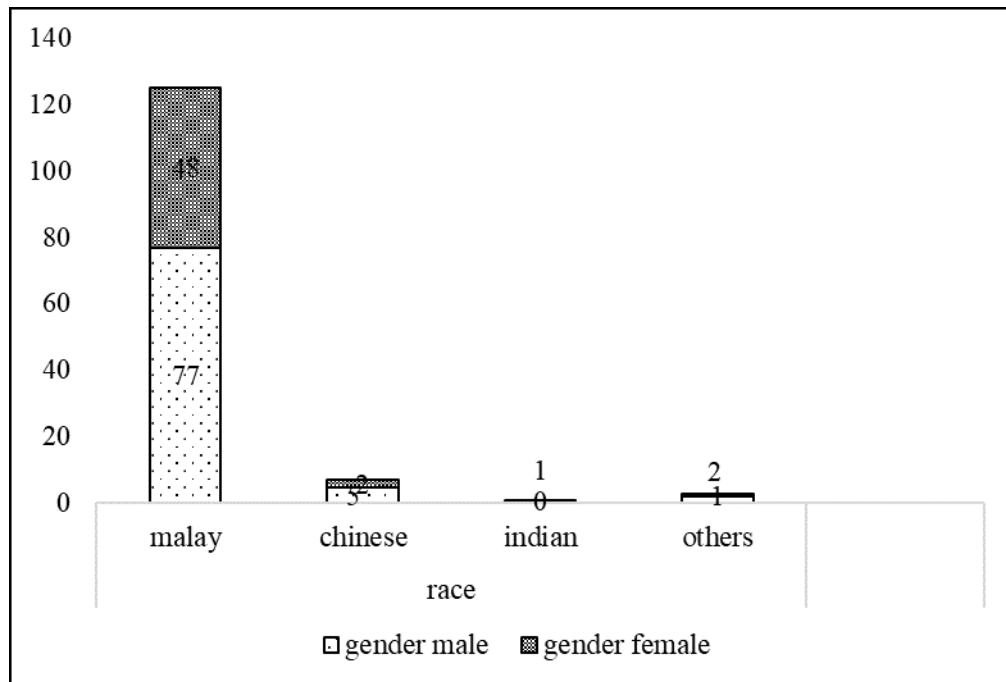


Fig. 1. The distribution of respondents based on gender according to races.

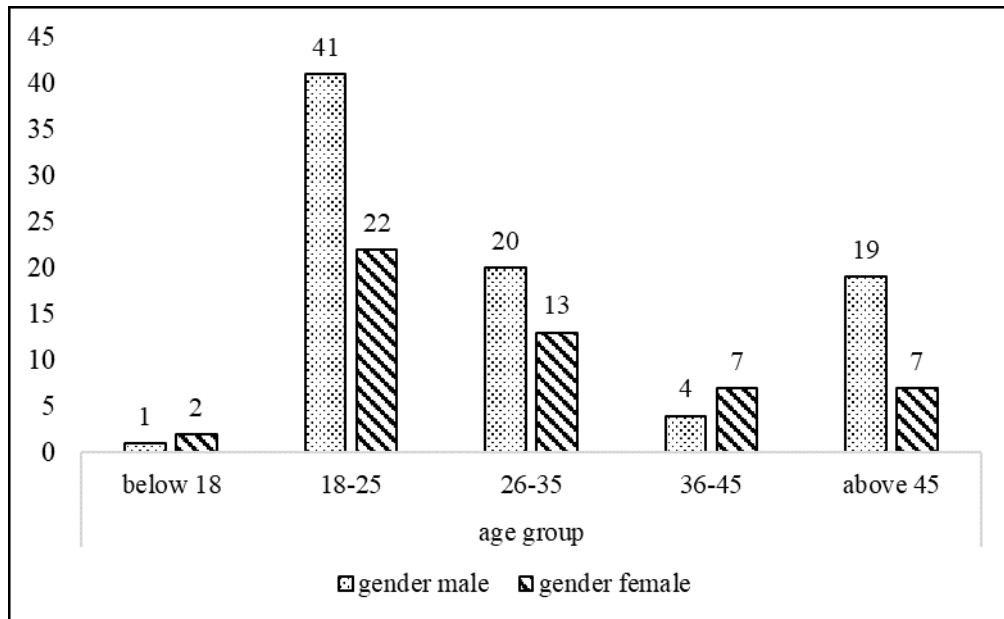


Fig. 2. The distribution of respondents' age based on gender.

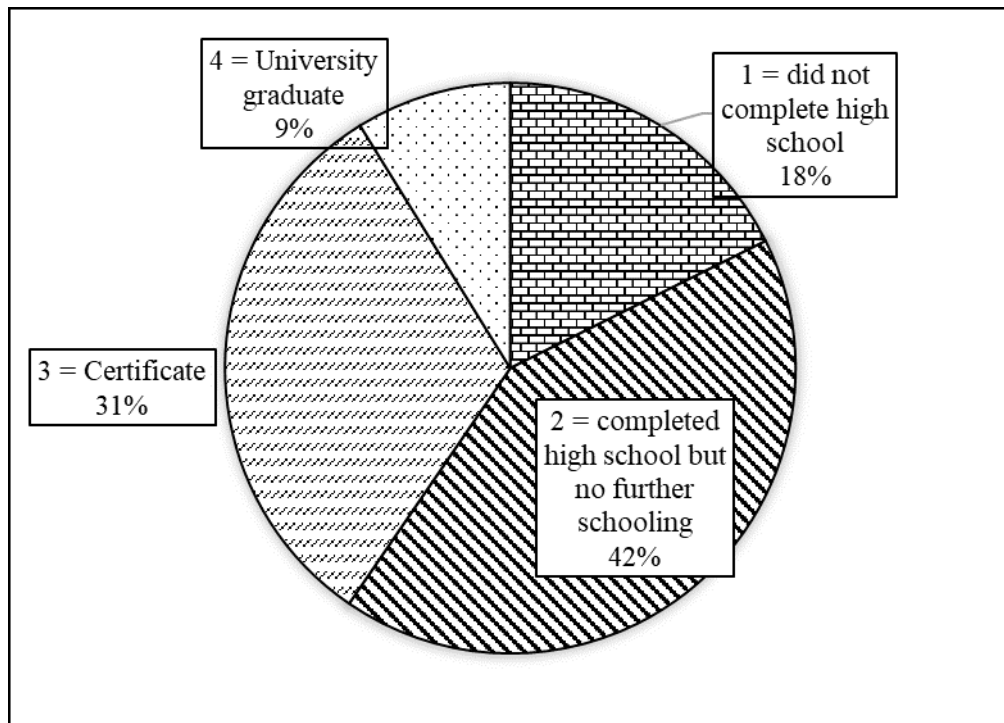


Fig. 3. The distribution of respondents' educational level.

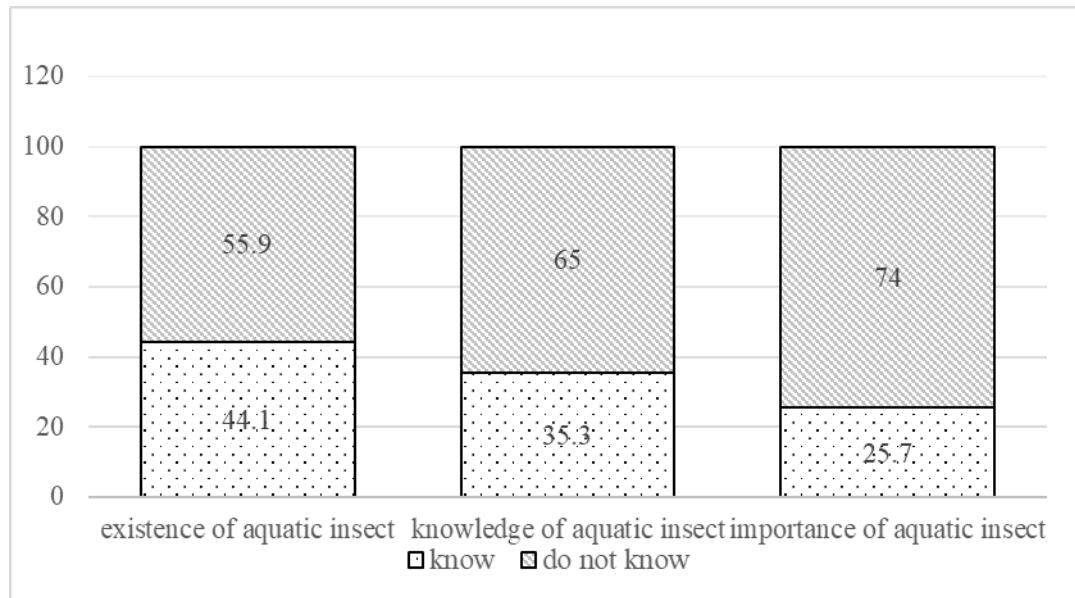


Fig. 4. The summary of respondents' knowledge on aquatic insects.

### **Respondents' Knowledge on Aquatic Insects**

Respondents with higher educational levels were expected to have a higher percentage of knowledge on aquatic insects. However, contrary to the statement, Table 2 showed that no matter which education level the respondents are, the percentage of respondents not aware of aquatic insects was high. Overall, only 44.1% of respondents knew the existence of aquatic insects, while another 55.9% respondents do not know what aquatic insects are (Item 1).

All (60 respondents) of respondents who knew the existence of aquatic insects were able to give examples of aquatic insects they knew (Item 2). Water striders and water bugs were the most common answers given by the respondents. Respondents were able to describe water striders and water bugs as they live at the surface of water and it can be seen clearly compared to other aquatic insects which live in the water such as Ephemeroptera, Trichoptera, and Plecoptera.

Although 44.1% of respondents were aware of the existence of aquatic insects, not all of them know much of it. Only 35.3% respondents were able to explain more on aquatic insects (Item 3). Another 8.8% of them happened to know about aquatic insects because they see it only at the surface of water. Only 25.7% of respondents knew the importance of aquatic insects as bio-monitoring tools and



balancing river ecosystems from reading materials and television programs such as Discovery Channel. While the rest, did not know the importance of aquatic insects (Item 4). Figure 4 shows the summary of respondents who have knowledge on aquatic insects.

### **Respondents' Awareness Regarding River and Aquatic Insects**

Despite several programs related to the river being conducted by government and water related agencies, only 70.6% of respondents have been exposed to river campaign while almost one-third (29.4%) of respondents have never been exposed to river campaign (Item 1). Based on interviews conducted, respondents were exposed to river campaigns mostly by electronic mass media and advertisements in newspapers (Item 2). From this survey, 99.3% respondents have never been exposed to aquatic insect awareness, hence not many of them realized the existence of aquatic insects (Item 3). Only one respondent has been exposed to aquatic insect awareness from reading the scientific magazine (Item 4).

Respondents were asked on which medium they preferred to receive any information regarding river and aquatic insects in item 5. Most of the respondents agreed that the electronic mass media such as advertorial video on television is one of the most important mediums in promoting river and aquatic insect awareness. Second highest preferred medium chosen by respondents was pamphlet or brochure with information regarding river and aquatic insects which can be distributed to public at recreational rivers.

In item 6, respondents were also asked for their opinion on how to create awareness on river and aquatic insects among Malaysians since the public still lacks awareness on it. An interesting river and aquatic insect awareness event with the public at recreational rivers with mass media coverage was the most suggested by respondents followed by campaigns in public areas. River and aquatic insect awareness in school and distribution of pamphlets also have been suggested by respondents.

Respondents were also asked on their willingness to participate in river and aquatic insect awareness programs (Item 7). With 63.2%, more than half of respondents are willing to participate in an awareness program. Meanwhile, 28.7% of respondents were not willing to participate and another 8.1% respondents were unsure whether to take part or not (Figure 5).

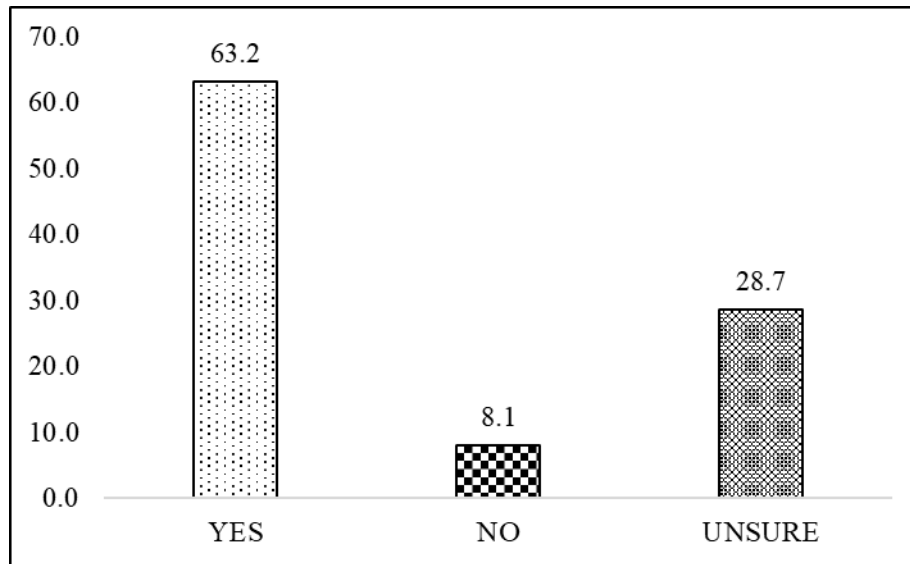


Fig. 5. Level of visitors' willingness to participate in awareness program.

## DISCUSSION

As a developing country, Malaysia follows the examples of successful programs related to river management from developed countries. Water related agencies try to adopt a similar approach of involving the public to participate in rivers management (Rasagam and Chan 2002). The “Love Our Rivers” campaign was launched in 1993 until 2006 by the Department of Irrigation and Drainage (DID), Malaysia throughout the country, considered a failure (Report: Malaysia's, 2007) due to increasing number of polluted river from time to time.

Besides that, in 2005, “One State, One River” (1N1S) program was launched and government allocated about RM 5 million under this program to achieve the aim of the program and that is to make sure the river water quality will achieve a minimum of second class in water quality index by 2015, and rivers become recreational areas are free from flood and rubbish (Hasil Inisiatif, 2013). Despite all of the effort taken by the government, especially the Ministry of Natural Resources and Environment (NRE) and DID, the success of such programs especially 1N1S has yet to be seen (Chun *et al.* 2012).

Respondents with higher education were expected to be more concerned about river awareness programs conducted previously. Unfortunately, from this study, no matter which level of education, not many respondents were aware of the

government effort on cultivating awareness among Malaysians. With more than half of respondents aware of the river campaign, respondents' awareness level can be interpreted as "moderate".

According to Rezaei et al (2021), knowledge is one of the factors affecting a person's behaviour and it is closely related to people's intention. In contrast to the statement, respondents seem to be lacking knowledge regarding aquatic insects. Some respondents with higher educational levels did not even know the existence of aquatic insects. This might be due to lack of information on aquatic insects. Therefore, several actions must be taken in order to promote aquatic insects as well as their importance as freshwater bio-indicators to Malaysians.

From census statistics on household characteristics by the Department of Statistics Malaysia (2010), with 86.5%, the percentage of television ownership was the highest compared to other households. Therefore, electronic mass media such as television can be a successful medium in promoting awareness related to rivers as well as other awareness programs. Newspaper is the most preferred reading material of Malaysians thus information regarding rivers in newspapers also plays an important role to cultivate public awareness on rivers as well as aquatic insects. Besides, mass media must actively participate in awareness programs to ensure the public are able to receive information regarding awareness programs continuously. Hence, both electronic and printed mass media plays a vital role in promoting river awareness among the public.

## CONCLUSION

Nowadays, the government and other water related agencies feel the pressure of the freshwater environment and have started to implement IRBM to overcome the problem and conducted a 1N1S program to create awareness among the public. Many developed countries adopted the concept of sharing the responsibility of river management. However, the river awareness level of Malaysians is comparatively considered as moderate. Lack of enforcement, lack of proper management of recreational rivers, and non-continuous promoting awareness were the opinions pointed out by respondents. Besides, environmental education from primary school must be employed to cultivate the responsibility towards the environment in children from the beginning. Respondents lacked knowledge on aquatic insects as they were not able to receive any information regarding aquatic insects through formal study. Some of them knew about it from observation, reading and television programs. Thus, respondents suggested that information regarding aquatic insects should be included in school syllabus so that students

will be more aware of their existence and importance as biological indicators as well as in balancing the freshwater ecosystem services.

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