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IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT TOWARDS ENVIRONMENTAL ECOSYSTEM IN MELAKA RIVER BASIN

Ang Kean Hua (a)*, Paran Gani (b), Junaidah Yusof (c), Noor Hafizah Abdul Halim (d),
Sayzwani binti Yahya (e)
*Corresponding author

(a) School of Biological Sciences, Faculty of Science and Technology, Quest International University Perak
(QIUP), Ipoh, Perak, Malaysia, keanhua.ang@qiup.edu.my
(b) School of Biological Sciences, Faculty of Science and Technology, Quest International University Perak (QIUP),
Ipoh, Perak, Malaysia, paran.gani@qiup.edu.my
(c) School of Psychology, General and Foundation Studies, Faculty of Social Sciences, Quest International
University Perak (QIUP), Ipoh, Perak, Malaysia, junaidah.yusof@qiup.edu.my
(d) Foundation in Science, Faculty of Science and Technology, Quest International University Perak (QIUP), Ipoh,
Perak, Malaysia, noorhafizah.abdulhalim@qiup.edu.my
(e) School of Computing, Faculty of Science and Technology, Quest International University Perak (QIUP), Ipoh,
Perak, Malaysia, syazwani.yahya@qiup.edu.my

Abstract

Different form of development planning and management approaches have been applied and implemented by many countries in river basins for the past decades. Nevertheless, the outcomes are disappointing. This study aims to explore the local people awareness towards environmental ecosystem by adopting sustainable development. A quantitative method through the questionnaire was reported in two parts. Part A was the environmental ecosystem study while Part B was the sustainable development study. Random sampling technique with 100 respondents was targeted within Melaka River basin. Descriptive analysis showed majority of the respondents were positively agreed that industrial, residential, commercial and agricultural activities would contribute water contamination to the Melaka River basin. Meanwhile, sustainable development of law and regulation, policy, environmental ethics, as well as environmentally friendly were likely to have skewed graph shift towards right hand side, whereby respondents believed that these sustainable development had a possibility to control and manage the river pollution in Melaka River basin. Correlation analysis showed sustainable development positively impacts on the environmental ecosystem in Melaka River basin. In conclusion, implementing and adapting the sustainable development approach would indirectly preserve and conserve the environmental ecosystem before anthropogenic activities take place to destruct the water quality in Melaka River basin.

1. Introduction

According to Environmental Department of National Geographic, most of the developing countries dumped untreated industry waste into the river up to 70% without any preliminary treatment which contaminates the water resources of residents (National Geographic Official Portal, 2019). Approximately 45 million kilograms of fertiliser (or 99 million pounds) as well as the chemicals are used in every year for agriculture activities. About 1.8 billion kilograms of human waste (or 2 million tons) are dumped into surface water daily. The most contaminated rivers in the world are Ganges River and Yamuna River from India, Jian River from China, Jakarta River from Indonesia, Pasig River from the Philippines, as well as Tiete River from Brazil (Bittner, 2013). The contamination occurred due to the chemical waste dumping from industrial, rubbish and failure function of the sewage treatment system. In Malaysia, about 46% of rivers were found to be clean while 43% are slightly to be polluted and 11% of rivers are in polluted condition (Department of Environment Malaysia, 2017). Compared to the previous statistic in 2012, 59% of rivers are considered clean, 34% are moderately (or slightly) polluted and 7% are polluted rivers. Thus, most of the rivers are shifted from the clean condition into slightly polluted and polluted condition due to industrial activities along the river. These rivers were including Sungai Rajang, Sungai Selangor, Sungai Sarawak and Sungai Melaka (DOE, 2017). Since Melaka had been recognised as a historical tourism destination by UNESCO on July 07, 2008 (UNESCO Official Portal, 2015), it indirectly has attracted the increasing of the population by migrating from another state of Malaysia to Melaka. Drastic increased of people especially in the Melaka Central is due to employability opportunities and bring various benefits to the local citizen.

2. Problem Statement

Several researchers had reported that river water quality was polluted because of the degradable organics and nutrients released from domestic effluents, and agricultural wastes. Also, surface and subsurface water runoff in urban activities, industrial activities, as well as farming field activities contribute the most to the water river quality (Hua, 2017a; Hua et al., 2016; Mishra et al., 2016; Rezaei & Sayadi, 2015). Similarly, inadvertent development along Melaka River has caused serious environmental issues and problems due to contamination of water resources (Nasbah, 2010). Other than that, anthropogenic activities such as bathing, washing and others also contribute a lot to the pollution in Melaka River (Hua, 2019; 2017b; Nasbah, 2010). According to Hua (2019), there were various human activities were carried out along Melaka river from the upstream which was identified significantly correlated with agricultural and livestock activities (Hua, 2017a; 2017b). Meanwhile, the middle stream of the river was influenced by the factories and settlement activities, and downstream river because of the commercial activities (Hua, 2017a, 2017b; Hua et al, 2016; Daneshmand et al., 2011).

3. Research Questions

This study attempted to explore the local people awareness towards environmental ecosystem by adopting sustainable development in Melaka River basin. Therefore, the basic research questions were as follows;

1. What is the extent of river pollution occurrence in the Melaka River?
2. Do local people aware the circumstances of river water quality level in Melaka River basin?
3. Do the local people adapt sustainable development approach in Melaka River basin?

4. Purpose of the Study

Sustainable development had been introduced, designed and implemented by Malaysia government into the daily life of the citizen. Due to continuous depletion of water quality in Melaka River basin, therefore, it is essential to protect the water resources by determine the possibility for implementation of sustainable development in the environment. Hence, this research study aims to explore the local people awareness towards environmental ecosystem by adopting sustainable development in Melaka River basin.

5. Research Methods

The questionnaires were set and designed into two parts, namely part A is the environmental ecosystem study, and part B is the sustainable development study. Both parts of questionnaire used Likert Scale method, which consists of five (5) points; strongly disagree, disagree, normal, agree, and strongly agree. This research study targeted 100 respondents. The selection of respondents was based on random sampling method, whereby majority selected local people are located (or residents) adjacent to the Melaka River. The survey collected one-by-one after respondents are completely answered the questionnaire. The researchers would ensure the questionnaire is fully filled-up by respondents without missing out any important information, which indirectly to avoid bias during analytical processes. Since Melaka is divided into three districts (which is Alor Gajah, Jasin and Melaka Tengah), therefore, the process of collecting information were focus at Melaka Tengah. The main reason to concentrate at Melaka Tengah is because the majority populations are highly located at city center due to job opportunities, education and hospitality. Hence, the population is centralised at Melaka Tengah, which located near to the Melaka River in which is expected to provide more information regarding the river water pollution as well as impact to the environment surrounding. This research used the descriptive and correlation technique in the analysis.

6. Findings

The descriptive analysis with a total of 100 respondents indicates majority are strongly agreed and agreed that the river water quality in Melaka River is contaminated due to the activities of industrial, residential, commercial, agricultural, and natural consequences (Table 01 and Figure 01). In strongly agree, the highest peak expressed from respondents are natural, continued by industrial, agricultural, residential and commercial activities. Compare to agreed statement, the maximum preferred which selected by respondents are commercial, continue by residential, agricultural, industrial and natural consequences. Hence, in overall, residential, industrial, and agricultural activities are expected to play a vital role in the determination of the sustainable river water quality in Melaka River.

Table 01. Local perspective in Melaka River basin

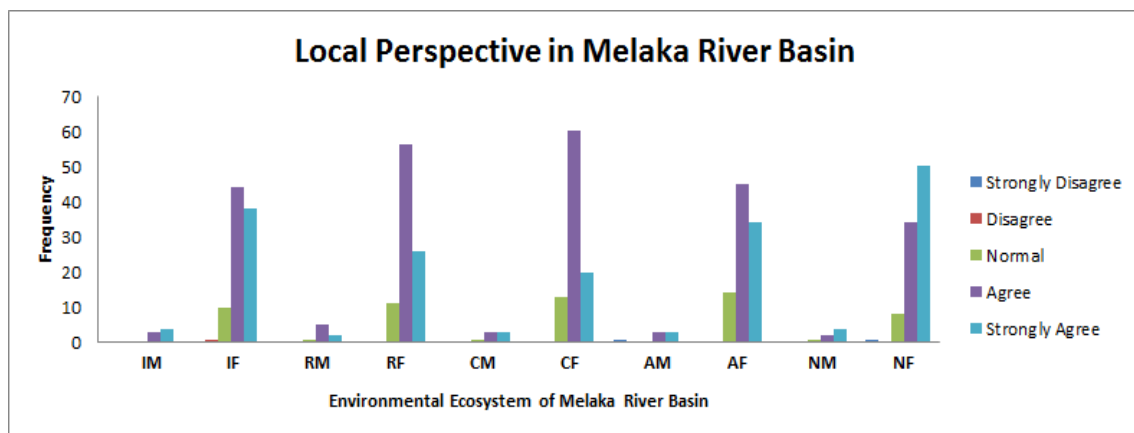| Category		SD	D	N	A	SA
Industrial	Male	0	0	0	3	4
	Female	0	1	10	44	38
Residential	Male	0	0	0	5	2
	Female	0	0	11	56	26
Commercial	Male	0	0	1	3	3
	Female	0	0	13	60	20
Agricultural	Male	1	0	0	3	3
	Female	0	0	14	45	34
Natural	Male	0	0	1	2	4
	Female	1	0	8	34	50

Figure 01. The local perspective in Melaka River basin

Meanwhile, local perspective towards the sustainable development program includes law and regulation, policy, environmental ethics, and environmentally friendly are determined to have skewed graph shift towards right-hand side (Table 02 and Figure 02). In other words, majority respondents were strongly agreed that environmental friendly become a major factor in sustaining the river water quality, continue by policy, environmental ethics, and law and regulation. Meanwhile, local perspective on agreed statement indicates law and regulation have the highest rank for sustainable development; continue by environmental ethics and environmentally friendly, as well as policy. In overall, respondents believed that these sustainable developments have the possibility to control and manage the river pollution in Melaka River basin.

Table 02. Local perspective in Sustainable Development

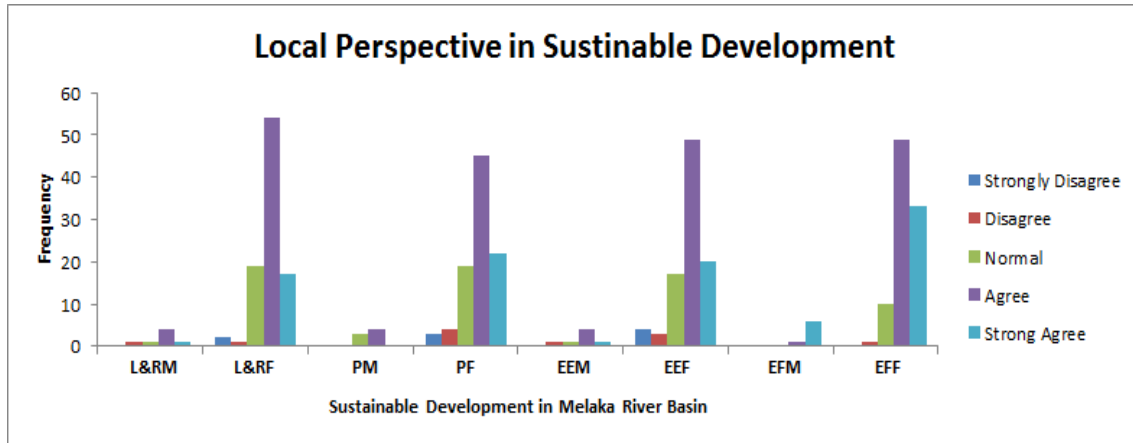| Category		SD	D	N	A	SA
Law and Regulation	Male	0	1	1	4	1
	Female	2	1	19	54	17
Policy	Male	0	0	3	4	0
	Female	3	4	19	45	22
Environmental Ethics	Male	0	1	1	4	1
	Female	4	3	17	49	20
Environmental Friendly	Male	0	0	0	1	6
	Female	0	1	10	49	33

Figure 02. Local perspective in sustainable development

Next, the correlation analysis in Table 03 and Figure 03 of between sustainable development with environmental ecosystem in Melaka River basin indicate that natural consequences, followed by commercial, industrial, agricultural, and residential activities, can be controlled by law and regulation, policy, environmental ethics, and environmental friendly in the particular study area. Subsequently, sustainable development is expected to cope with the environmental ecosystem based on the activities of residential, agricultural, industrial, commercial, and natural consequences. Nevertheless, majority respondents are opinion that neither positive nor negative on the environmental ecosystem where industrial > commercial > residential > agricultural > natural are subjected to the sustainable development of law and regulation, policy, environmental ethics, and environmental friendly. In summarization, majority of the respondents assumed that environmental ethics plus environmental friendly would beneficial in protecting the environment from the activities of industrial, agricultural and residential. Additional, law and regulation which acts on short term as well as policy that acts on long term would advantageous and positively enhance the environmental nature by conservation and preservation program from the industrial, residential, commercial, and agricultural activities.

Table 03. Sustainable development of Environmental Ecosystem in Melaka River Basin.

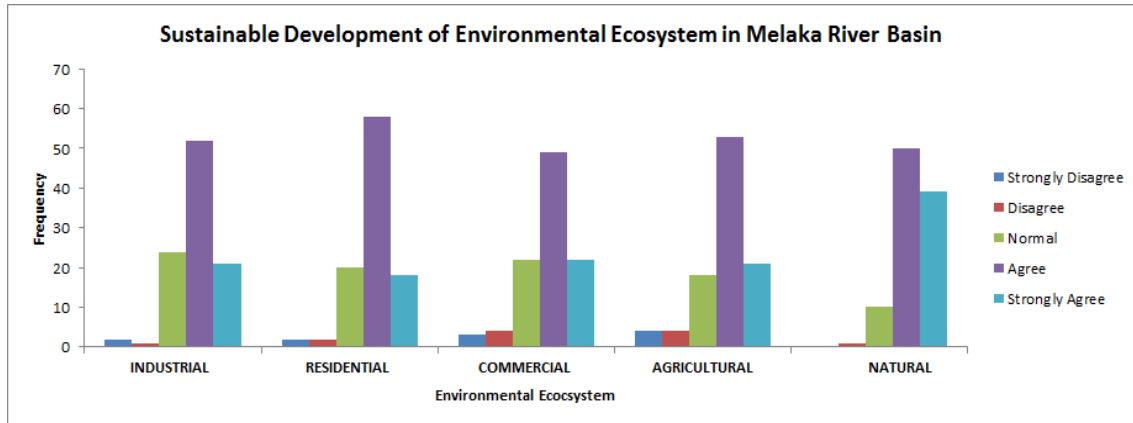| Category	Law and Regulation; Policy; Environmental Ethics; Environmental Friendly				
	SD	D	N	A	SA
Industrial	2	1	24	52	21
Residential	2	2	20	58	18
Commercial	3	4	22	49	22
Agricultural	4	4	18	53	21
Natural	0	1	10	50	39

Figure 03. Sustainable development of Environmental Ecosystem in Melaka River Basin

7.   Conclusion

In summary, local residents are positively agreed that residential, industrial and agricultural activities play an important role in anthropogenic activities to affect the river water quality, while significantly highlight that law and regulation, environmental ethics, environmentally friendly, as well as policy, are considered the most significant sustainable development program in protecting the water in Melaka River. Moreover, significant relation between environmental ecosystems into sustainable development is expected to protect, conserve and preserve the environmental nature through short-and-long term planning from being continuously destructed by the anthropogenic activities. Thus, this study indicates limited number of man power in receiving questionnaire survey would be the main challenges in determination for sustainable development of environmental ecosystem in Melaka River Basin.

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