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An Indication of Policy Study towards Water Resource in Malacca State: A Case Study of Malacca River, Malaysia

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Abstract

Freshwater is needed by all living creatures. Freshwater is used for various activities such as drinking, bathing, washing, and so on, while providing various benefits to living beings for activities and benefits such as habitats, shelter, breeding, and so on. However, rapid development has caused contamination towards water resource in the river, which could bring various problems to affect and harm the quality of living species. Hence, a new approach is required to stop the pollution. This research study has been carried out to indicate the effectiveness of application of policy study regarding water resources in the Malacca River, which is concentrated on quantitative method through questionnaire. The questionnaire has been divided into two parts. Part A includes a demographic profile, and part B includes a policy study of water resources in the Malacca River. Meanwhile, 400 respondents are targeted randomly for sample size and only focused to Malacca citizen who live near the Malacca River. Correlation analysis showed that the majority of respondents strongly agreed with the policy study (Green Technology Program Malaysia Malacca; No Plastic Bag Program, No Plastic Product Program, and Recycle Program; Cleaning Our River Program and Love Our River Program; Save Water Program, Rainwater Collection Program and Recycle Water Program) to apply in daily life to protect the water resource in Malacca River. Respondents also believed that people should feel responsibility to preserve and conserve the environment before it is destroyed and disappears forever.

Keywords: Freshwater, rapid development, pollution, policy study, preserve, conserve.

Introduction

Freshwater is among the natural resources including sunlight, air, earth (minerals), plants, and so on that are very important to society. Water can exist in three main forms, which is solid, liquid, and gas (moisture). Due to the natural forms, people only have the ability to grab liquid water for drinking, bathing, washing, etc. Basically, freshwater can only be up taken from a lake, in the ground, the swamps, and the rivers[1]. Water in Crisis: A Guide to the World's Fresh Water Resources, has shown that ice caps, glaciers and permanent snow have the highest percentage of freshwater with 68.7%, and followed by ground freshwater with 30.1%, lake freshwater with 0.26%, swamp freshwater with 0.03%, and river freshwater at 0.006%[2]. The statistics show that freshwater is still in a sufficient state to support life on Earth. However, changing towards modernization and development has led to various problems that affect the quality of life, such as through pollution[3-5]. When development is viewed from the river perspective, this situation will certainly affect the water quality in the river. At the same time, the percentages of freshwater contained on the Earth's surface are very low, especially the riverine supply, demonstrating that water pollution in rivers can affect not only to human life, but also affect the ecosystem and the environment. Therefore, a suitable approach should be established so that water quality can be maintained, and in the same time allow a sustainable quality and quantity of freshwater.

According to National Geographic's Environmental Department, in developing countries, a majority at 70 percent of industrial wastes are dumped with untreated into the water, polluting the usable water supply[6]. As general information, 99 million pounds (about 45 million kilograms) of fertilizers and chemicals are used each year, and about 2 million tons (average of 1.8 billion kilograms) of human waste are disposed of in waterways around the world every day[6]. Examples include the world's most polluted rivers Ganges River (India), Jian River (China), the Jakarta River in Jakarta (Indonesia), Pasig River (Philippines), Tiete River (Brazil), and Yamuna River (India)[7]. Major pollution has occurred as a result of industrial chemical waste dumping, rubbish dumping, and failure in sewage treatment. The main factors that led to the occurrence of this situation are because of an excessive number of population and rapid development. Yet, this pollution activity still continues until this day due to the increasing demand for development and facilities for everyday life. This development is no exception for a country like Malaysia; to develop as a developing country, is also involved in the contamination of river water. According to the report from Department of Environment in 2012[8], 41 % or 195 rivers out of 278 are considered as polluted. One of the examples is from Malacca River in Malacca state. Well-known as a tourist centers and recognized by UNESCO in July 2008 as a historical and heritage site[9], Malacca state once again has been surprised by the river water pollution occurring in Malacca River, where the pollution has led to a variety of aquatic life

dying as a result of the water toxicity[10]. Therefore, this research study has been conducted to evaluate and determine the effectiveness of the application of policy that formulated by the state government to help in reducing water pollution in the Malacca River.

Methodology

This research study is concentrated on quantitative methods, which is involved with the questionnaire. Since this research study has been conducted at Malacca state, the respondents chosen to answer the questionnaire include only the local residents, especially to the people who are staying nearer to the Malacca River. In the process of obtaining information from the respondents, a set of questionnaire has been designed and formulated according to the determination on policy that formulated by the state government on water resources in Malacca River. The questionnaire is divided into two main parts, part A and part B. Part A is involved with the questions regarding social and demographic profile of respondents like gender, age, number of years lived in Malacca, education level, and occupation. Meanwhile, part B concentrates on policy of water resources in Malacca River. This part is designed using the Likert scale, which consists of five (5) points (1-Very Disagree, 2-Disagree, 3-Normal, 4-Agree, 5-Very Agree).

Sampling Method: Malacca state can be divided into three districts, namely Alor Gajah, Jasin and Central Malacca. Central Malacca is the main city for Malacca state. According to the physical characteristic of Malacca state, the Malacca River flows from Alor Gajah (which is the upstream) across Central Malacca (which is the downstream) before the water flows into the Malacca Straits. Due to the result, the questionnaire will only distributed to Alor Gajah and Central Malacca with the total number of respondents reaching 360 local residents[11]. Referring to the calculation in the sample size for research activities, it is appropriate to have information from 360 respondents (with the total of population for Alor Gajah and Central Malacca in 2012 is 561 667 out of 842 500 local residents). However, if the number of respondents can be increased, the information produced through analysis will be more accurate.

Results and Discussion

The analysis showed that a total of 400 respondents successfully provided information for the success of this research study, and most of the respondents were equal for men and women respectively reaching 200 people. Majority involved in providing the information is comprised of adults with an expected age of 31 to 40 (45.75%) and 41 to 50 (32.5%), where their education level is up to secondary (166 respondents) and pre-university or college (108 respondents). However, respondents that involve in answering the questionnaire are self-employed (32.75%) with running a business like hotel services, food vendors, selling handicrafts and antiques, selling groceries, etc.; meanwhile there is also respondent that working in private sectors with 21.5% such as factory worker. Employment information is as important as the duration of staying in Malacca because when respondents have regular jobs, then the probability of settled at Malacca is very high percentage. For example, respondents who lived between 21 years to 30 years is ranked first with total of 130 people or 32.5%, followed by 31 years to 40 years with 119 people or 29.75%. This is because the longer the respondents residing at Malacca, the information provided will be more accurate and precise.

Information provided in the analysis of application of policy towards water resources can be divided into two, which is table-2 involved with the perception of Malacca citizen towards the water resources in Malacca River, and table 3 involved with the application of policy towards water resources in Malacca River, which is formulated by the State Government. According to the analysis of table- 2 shows majority respondents are agreed with their views and opinions that Malacca River is polluted due to some factors and reasons. For example, industrial waste and excretion waste will cause water in the river to become black color, smelly and contaminated (45.75%). In other words, there are various industries built near to the Malacca River, for example in figure-1. Therefore, if there are chemical residues and waste material from industries that does not undergo the decomposition process before being discharged into the river, then this situation will cause the original water resources in the river to changes, such as in figure-1. This situation not only causes physical changes that occur in the river, but it also brings death to aquatic fishes (due to the poisoning and bacteria spreading) and become habitat to the dirty animals (46.5%). As general information, waste chemical liquid form from industrials that does not undergo treatment and is discharged directly into rivers will cause a reaction with the water to produce bacteria that can poisoning and lead aquatic animals to death.

Thus, 171 respondents were agreed when the contaminated water can cause aquatic species to become extinct. Hence, water pollution in Malacca River is happening widely, and can affect the aquatic animal quantity to decrease because of poisoning death and also harm human quality of life through problems with vision, breathing, and exposure to infectious diseases. Some respondents are also agreed with the statement that water pollution can cause the loss of soil nutrients and will affect the plants species (41%).

Water pollution in the Malacca River is widespread and continuous, causing the Malacca State Government to decide to apply the water resource policy which they believe can save the water quality of Malacca River from further contamination. Among the policies is Green Technology Program Malaysia (Malacca), No Plastic Bag Program, No Plastic Product Program, and Recycle Program, Cleaning Our River Program and Love Our River Program, and Save Water Program, Rainwater Collection Program and Recycle Water Program. A

policy of Green Technology Program Malaysia (Malacca) can reduce the negative impact of human activity and preserve the environment has a strong positive significant correlation with the variables A(r = 0.24), B(r = 0.21), C(r = 0.38) and D(r = 0.28) at 0.05 level (2-tailed) test. In other words, policy of Green Technology Program Malaysia (Malacca) shows the program have probability to impact all variable in saving the water resources in Malacca River. Green Technology Program is a program that is based on environmental friendly approaches in all products or services, where the basic concept of green technology is designed to reduce the consumption of natural resources as a whole to maintain economic growth, reduce energy consumption, and improve the country, especially protection of the environment. Green Technology Program refers to products, equipment, or systems produced and used have met the criteria as to minimize degradation of the quality of the environment, the release of Green House Gas (GHG) are zero, safe to use, and provide a healthy environment for all living things, save energy and natural resources, and promote resource-renewable resources. Practicing this program in everyday life is very important, because a majority of respondents are believed that it can overcome the problems of environmental degradation and natural resources, improve their health and life, preserve ecosystems, and reduce management costs in order to reduce the negative effects of development, and serve as alternative to improve economy without compromising the natural surroundings.

Table-1
The analysis of social and demographic profile of respondents

	Category	**Frequency**	**Percentage (%)**	**Total**
Gender	Man	200	50	400 (100%)
	Women	200	50	
Age				400 (100%)
	<20	1	0.25	
	21-30	78	19.5	
	31-40	183	45.75	
	41-50	130	32.5	
	51>	8	2	
Education Level	Primary School	52	13	400 (100%)
	Secondary School	166	41.5	
	College	108	27	
	University	74	18.5	
Occupation	Government	30	7.5	400 (100%)
	Private	86	21.5	
	Self-Employment	131	32.75	
	Retirees	78	19.5	
	Student	75	18.75	
Number of Years Live in Malacca (years)	1-10	40	10	400 (100%)
	11-20	70	17.5	
	21-30	130	32.5	
	31-40	119	29.75	
	41-50	40	10	
	>51	1	0.25	

Table-2
The analysis perceptions of Malacca citizen towards water resources condition in Malacca River

Category	Frequency					Total
	Strongly Disagree	Disagree	Normal	Agree	Strongly Agree	
Industrial waste and excretion waste will cause water in river to become black color, smelly and contaminated.	-	7 (1.75%)	54 (13.5%)	156 (39%)	183 (45.75%)	400 (100%)
Polluted water in river can cause disease, cause aquatic animals to death and become habitat to dirty animals.	-	1 (0.25%)	51 (12.75%)	162 (40.5%)	186 (46.5%)	400 (100%)
Contaminated water can cause aquatic species to become extinct.	-	3 (0.75%)	66 (16.5%)	171 (42.75%)	160 (40%)	400 (100%)
Water pollution can cause the loss of soil nutrients and will affect the plants species.	-	32 (8%)	139 (34.75%)	164 (41%)	65 (16.25%)	400 (100%)

Table-3
Correlation analysis between policies with the water resources condition in Malacca River

Water Resources Policy	Variable A	Variable B	Variable C	Variable D
Green Technology Program Malaysia Malacca can reduce the negative impact of human activity and preserve the environment.	r = 0.244 P < 0.05 N = 400 Significant	r = 0.212 P < 0.05 N = 400 Significant	r = 0.375 P < 0.05 N = 400 Significant	r = 0.279 P < 0.05 N = 400 Significant
No Plastic Bag Program, No Plastic Product Program, and Recycle Program can reduce the garbage wastes and the production of toxic waste.	r = 0.172 P < 0.05 N = 400 Significant	r = 0.295 P < 0.05 N = 400 Significant	r = 0.397 P < 0.05 N = 400 Significant	r = 0.320 P < 0.05 N = 400 Significant
Cleaning Our River Program and Love Our River Program can save the river from becoming a garbage dump.	r = 0.185 P < 0.05 N = 400 Significant	r = 0.261 P < 0.05 N = 400 Significant	r = 0.319 P < 0.05 N = 400 Significant	r = 0.283 P < 0.05 N = 400 Significant
Save Water Program, Rainwater Collection Program and Recycle Water Program can avoid wastages of clean water and increase the water resources quantity.	r = 0.121 P < 0.05 N = 400 Significant	r = 0.103 P < 0.05 N = 400 Significant	r = 0.279 P < 0.05 N = 400 Significant	r = 0.262 P < 0.05 N = 400 Significant

Variable A = Industrial waste and excretion waste will cause water in river to become black color, smelly and contaminated
Variable B = Polluted water in river can cause disease, cause aquatic animals to death and become habitat to dirty animals
Variable C = Contaminated water can cause aquatic species to become extinct
Variable D = Water pollution can cause the loss of soil nutrients and will affect the plants species

Figure-1
Various industries build near to the Malacca River and dumping the waste material into the drain and let it flow into Malacca River, causing the water to become black and smelly. Photo taken in 21 May 2014 at middle stream of Malacca River

Secondly, the policy of No Plastic Bag Program, No Plastic Product Program, and Recycle Program can reduce the garbage wastes and the production of toxic waste also has a strong positive significant correlation with variable A (r = 0.17), B (r = 0.3), C (r = 0.4), and D (r = 0.32) at 0.05 level (2-tailed) test. According to the statistic Department of Environment Malaysia in 2013, Malacca citizen had produced about 900 tons of solid waste per day, of which 24% is made up of plastic waste[12]. Therefore, policy of No Plastic Bag Program is conducted every Friday, Saturday, and Sunday as every hypermarket is recommended and required not to supply plastic bags to consumers for every purchase until December 2015. However, if there is a demand from consumers, the hypermarket will only be allowed to supply paper bags or biodegradable bags to replace plastic bags. The program for No Plastic Bag Day and No Plastic Product Program will be forwarded to each day starting on January 2016 so that the policy will successfully implemented and create awareness to consumers that the dangers of the use of plastic bags on the environment and preserve the planet from destruction. So, this analysis from the respondent perceptions has proved that the policy of No Plastic Bag Program, No Plastic Product Program, and Recycle Program can stop river water pollution through reducing the use of plastic, which will cause the industrial areas to produce less wastes to dump into the river and harm aquatic animals and soil nutrients.

Next, the policy of Cleaning Our River Program and Love Our River Program can save the river from becoming a garbage dump has a strong positive significant correlation with variable A (r = 0.19), B (r = 0.26), C (r = 0.32), and D (r = 0.28) at 0.05 level (2-tailed) test. Result from analysis of the policy have indicated that the program of rehabilitation and beautification of Malacca River successfully implemented through activities such as collecting garbage and food scraps that are on the edge of the river, increasing the quantity of dustbins, and awakening the local people about the importance of maintaining Malacca River cleanliness through brochures. The methods used to clean Malacca River are effective in reducing water pollution and this can be proved by winning the Green Apple Awards on June 24, 2013 and get recognition of Green Ambassador Awards on November 11, 2013 in London[13]. Therefore, Malacca citizens are strongly agreed that the disclosure and application of Cleaning Our River Program and Love Our River Program policy shall be practiced every day not only towards the Malacca state, but also the country requires this policy so that every existing river in all state can be maintained in clean condition and that the river water quality will not contaminated by human activity.

Lastly, policy of Save Water Program, Rainwater Collection Program and Recycled Water Program can avoid wastages of clean water and increase the water resources quantity shows a partially-positive significant correlation with variable A (r = 0.12), continue by C (r = 2.8), D (r = 0.26), and weak-positive significant with variable B (r = 0.10), at 0.05 level (2-tailed). The result indicate that this policy will not have strong impact to stop the pollution, but have minor effect in saving the Malacca River through an increase the quantity of fresh water (example tap water) and reducing the percentage of water pollution through recycling the water. For example, rainwater collection can be used for washing activities (cars or clothes), and the washing water can be recycled for watering the trees. Although this policy are not well accepted, but most of the respondents

still believes that the saving and recycling water program can help in reducing river pollution and sustain the quality of water resources in Malacca River. So, a majority of respondents agreed that the policy should be implemented and applied in everyday life.

Conclusion

This research study showed the water resources policy formulated by the state government toward Malacca River has received positive reaction from Malacca citizen. Most of the respondents are strongly agreed with all policies (Green Technology Program Malaysia Malacca; No Plastic Bag Program, No Plastic Product Program, and Recycle Program; Cleaning Our River Program and Love Our River Program; and Save Water Program, Rainwater Collection Program and Recycle Water Program) can curb, prevent, and stop the activities like factories, agriculture, and farming from continuing to pollute the Malacca River. Respondents who are stay longer and near to the river, suggest that the rapid development is the main factor to cause water pollution to occur and contribute negative impacts to human and ecosystems. Therefore, this matter should be taken seriously. So, most of the respondents have strongly agreed with the water resources policy is applied in everyday life so that the people are aware of their responsibility towards the environment.

References

1. USGS Water Science School Official Portal. *The World's Water*. Retrieved from http://water.usgs.gov/edu/vearthwherewater.html **(2011)**

2. Gleick P.H., *Water in Crisis: A Guide to the World's Fresh Water Resources*. New York: Oxford University Press **(1993)**

3. Bobak M., Richard M. and Wadsworth M., Air Pollution and Birth Weight in Britain in 1946, *Epidemiology*, **12**, 358-359 **(2001)**

4. Ajao E.A. and Anurigwo S., L and-Based Sources of Pollution in the Niger Delta, Nigeria, *Ambio,* **31**, 442-445 **(2002)**

5. Paavola J., Interstate Water Pollution Problems and Elusive Federal Water Pollution Policy in the United States, 1900-1948, *Environment and History,* **12**, 435-465 **(2006)**

6. National Geographic Official Portal, *Water Pollution*, Retrieved from http://environment.nationalgeographic, com/environment/freshwater/pollution/ **(2015)**

7. Bittner M. The World's Most Polluted River, EHS Journal. Retrieved from http://ehsjournal.org/http:/ ehsjournal.org/michael-bittner/the-worlds-most-polluted-rivers/2013/ **(2013)**

8. Department of Environment, *Malaysia Environmental Quality Report 2012* **(2012)**

9. Department of Town and Country Planning, *World Heritage City*, Retrieved from http://www.jpbdmelaka.gov.my/bandarwarisan.html **(2015)**

10. Nasbah, N.N. Sungai Melaka Tercemar. *Utusan Online*. Retrieved from http://ww1.utusan.com.my/utusan/info.asp?y=2010&dt=0123&sec=Selatan&pg=ws_01.htm **(2010)**

11. Krejcie R.V. and Morgan D.W., Determining sample size for research activities, *Educational and Psychological Measurement,* **30**, 607-610 **(1970)**

12. Melaka Green Technology Corporation Official Portal. *Day without Plastic Bags,* Retrieved from http://www.melakagreentech.gov.my/index.php/go-green/peta-lokasi/2014-09-12-03-40-52/hari-tanpa-beg-plastik **(2015)**

13. Melaka Green Technology Corporation Official Portal. *Melaka River Conservation Project,* Retrieved from http://www.melakagreentech.gov.my/index.php/go-green/peta-lokasi/2014-09-12-03-41-25/projek-pemuliharaan-sungai-melaka **(2015)**