THE ASSESSMENT OF PUBLIC PERCEPTIONS AND ATTITUDES TOWARDS WATER QUALITY IN SUNGAI KEDONDONG, BATANG KALI, SELANGOR

by

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DECLARATION

I declare that this thesis entitled **"The Assessment of Public Perceptions and Attitudes towards Water Quality in Sungai Kedondong, Batang Kali, Selangor"** is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature: …………………………

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DATE:

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The Assessment of Public Perceptions and Attitudes towards Water Quality in Sungai Kedondong, Batang Kali, Selangor

ABSTRACT

Water is essential to life. It needs to be treated properly. Yet water pollution is one of the most serious ecological threats on Earth that cannot be taken lightly. When the water ecosystem are polluted, it will not affect human health only but animals and plants also will be affected. The aim of this study is to assess the public awareness and perception towards water quality in Sungai Kedondong, Batang Kali, Selangor. The study involves perception, awareness, knowledge and attitude of public especially visitors towards water quality. 322 respondents involved in a survey to assess their opinion on water quality, however only 313 respondents completed the questionnaire form properly. The result showed that the respondents are aware that the river quality not in a good condition and is polluted with waste residue from the visitors' activities at Sungai Kedondong recreation area.

Kajian Persepsi dan Sikap Awam terhadap Kualiti Air di Sungai Kedondong, Batang Kali, Selangor

ABSTRAK

Air adalah penting untuk setiap kehidupan. Ia perlu dijaga dengan baik. Namun, pencemaran air adalah merupakan salah satu ancaman ekologi yang paling serius di Bumi yang tidak boleh dipandang remeh. Apabila ekosistem air tercemar, ia bukan sahaja menjejaskan kesihatan manusia tetapi haiwan dan tumbuhan juga akan terjejas. Tujuan kajian ini dijalankan adalah untuk menilai kesedaran dan persepsi masyarakat terhadap kualiti air di Sungai Kedondong, Batang Kali, Selangor. Kajian ini melibatkan persepsi, kesedaran, pengetahuan dan sikap orang ramai terutamanya pelawat terhadap kualiti air. 322 responden terlibat dalam tinjauan untuk menilai pendapat mereka mengenai kualiti air, namun hanya 313 responden menyiapkan borang soal selidik dengan betul. Hasil kajian menunjukkan bahawa responden sedar bahawa kualiti sungai tidak dalam keadaan yang baik dan tercemar dengan sisa sisa dari aktiviti pelawat di kawasan rekreasi Sungai Kedondong.

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LIST OF ABBREVIATIONS

H_2O	Water
DOE	Department of Environment
WQI	Water Quality Index
RWI	Recreational Water Illness
CO_2	Carbon Dioxide
SPSS	Statistical Package for Social Science
ANOVA	Analysis of Variance
PTWQ	Perception Toward Water Quality

LIST OF SYMBOLS

α	Alpha
β	Beta
ε	Eplison
>	Greater than
<	Less than
%	Percentage

CHAPTER 1

INTRODUCTION

1.1   Background of study

Water is a chemical compound that consists of two hydrogen atoms and one oxygen atom(H_2O). All living things need water as human use water to dissolve nutrients in the body, while plant requires water for transpiration process and animal also needs water to stay hydrated. Water is the essential element to sustain daily life, specifically for human use. To keep the body hydrated, human should drink at least eight glasses of water every day. Other than that, water is use for keep the body clean by bathing. Agriculture is one of the main human activities. It also needs right amounts of water for the crops to grow well (Thairu, 2017).

As water is essential to all living things, it needs to be conserved properly. Water resources such as rivers, lakes and groundwater have to be clean and are not pollute from any contaminant. Contaminant is any substance that can harm the environment and will result in water pollution. Water pollution can be divided into two categories which are pollution from point sources and pollution from non-point sources. Point sources of water pollution are those which the sources can be detected and identified. For example, chemicals effluents from factories such as cyanide, zinc, lead, copper, cadmium and mercury. These kinds of contaminants are usually poisonous and can cause organic

pollution as the effluent wastes are rich in decomposable organic matter (Kanu, 2011). Organic pollution is a condition when the excessive amount of organic matter like sewage or manure flows into the water body.

Non-point source pollution is the pollution that the sources cannot be identified. For example, from agriculture activity. Excessive usage of fertilizer and pesticides can flow into the river and cause river pollution. Nitrate and sulphate are the example of pollutants from fertilizers. Their molecules will flow into the river and will enhance the blooming of algae and will deplete the oxygen and as the result, aquatic animals will be lack of oxygen and cannot survive (Biello, 2008).

Polluted river water can affect the public health as it might cause recreational water illness (RWIs) such as diarrhea that caused by parasite found in the water. Water borne disease such as Cholera and Hepatitis B also can happen if people drink contaminated water. To prevent those diseases, it is important for the public to have the awareness to keep the river water clean and safe.

Public perception is a social phenomenon to assess the differences between the truth based on facts or research and the virtual truth from public opinion, media coverage and reputation. Public perception can be either positive or negative based on individual background, education, lifestyle and their personal point of view. This public perception might be found on a completely exact appraisal of the concern, or it might be founded on one-sided media reports and flawed scientific studies. Bad public perception will make it more difficult to make a significant difference for the particular concern.(Chillieh, 2012)

Survey in public perception is a method that focus on hearing people voices and evaluating their opinion and perception on a particular issue. Generally, there are two types of public perception survey which are questionnaires and interviews. Questionnaire survey is good for asking closed-ended questions and but it needs budget in order to provide the questionnaire papers. Interview survey is a type of survey where the interviewer will be asking the questions directly face-to-face with the respondents and they will jot down the respondent's answers by their own self. The advantage of this type of survey is it can provide better understanding of the respondent's answers as follow-up questions can be asked. However, interview will take time and it will be difficult to get many surveys in a short period (Sincero, 2018).

1.2   Problem Statement

All living things rely on water and it is important to ensure that the water supply is always available and not polluted with any contaminants. In Malaysia, the government take many initiatives to make sure the water sources such as rivers, oceans, lakes and underground water are always in good quality. As for the public, they need to be concern on the cleanliness of the water resources. Awareness on the water quality aspect need to be nurtured in every citizen.

Human are the main contributor to water pollution as they tend to throw sewage, household and industrial waste to the river (Tomlin, 2014). The interaction between human and water involves the perceptions and trust that individuals have towards water, also the particular action and how they utilize it (Hendri Coetzee, 2016).

Sungai Kedondong is one of the rivers that flows from Sungai Batang Kali. To measure the water quality level, Water Quality Index (WQI) is used. The WQI has a scale from 0 to 100 to indicate the water quality level, and the higher the score, the poor the water quality level. Based on the Department of Environment official portal, in 2015 and 2016 status of clean rivers, the river is classed under Class II which means that the water quality is in a good condition and can be used for recreational activities. However, as more visitors come to the river for recreational activity, they tend to throw rubbish in the water and at the surrounding. This attitude is very bad as it might affect the water quality and will give bad effect to the environment and human health as well.

The main issue for this study is that the WQI in Sungai Kedondong is low because of low awareness from the public or visitors regarding the water quality issues. Thus, the aim for this study is to survey whether the locals at Sungai Kedondong know their sources of water and know how they protect the river from any pollution. As Sungai Kedondong is also recreational river, many visitors go there to enjoy themselves. The attitude of visitors towards the river water cleanliness will also be assessed. Other than that, the purpose of this study is to identify the possible pollutants that might contaminate the river.

1.3   Objectives

   i.   To assess the visitor's perception related to water quality at Sungai Kedondong, Batang Kali, Selangor.

   ii. To identify the relationship between perception, knowledge and awareness of river water quality towards the attitude of public.

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1.4   Scope of Study

This study is conducted to assess the public perception towards water quality issues. It is to know whether they are concern on the water quality and what are their efforts in order to protect the water resource. Therefore, the purpose of this study is to approach the visitors at Sungai Kedondong and asking them a few questions regarding river water quality. A survey was carried out which include a set of questionnaires for the public to assess their perception and awareness on river water cleanliness and ask their opinion on the water quality aspects.

1.5   Significance of Study

This study is important as water quality is one of the largest issues in the world. All kind of creatures rely on water resource to sustain their life. Provision and utilization of good quality water on a sustainable level is not just important to prevent disease, but also to ensure social stability. To address this issue, it is first necessary to gain a greater understanding of the perceptions, sources and uses of water that are currently threaten with anthropogenic activities that give bad impact to the water quality (Hendri, 2016). When the public know how to keep the river water clean, it can give good impact to their health as well as to the environment generally.

CHAPTER 2

LITERATURE REVIEW

2.1 Importance of Water

Water is a substance made of hydrogen and oxygen (H_2O). It exists in three states of matter which are solid, liquid and gas. The common properties of water in room temperature are odourless and tasteless liquid. However, water also can be seen as intrinsic blue colour due to slight absorption of light at red wavelength. All living things rely on water as the water is said to be a universal solvent which mean that it has the ability to dissolve many types of substance. Based on Figure 2.1, the structure of water molecule is illustrated in simple form.
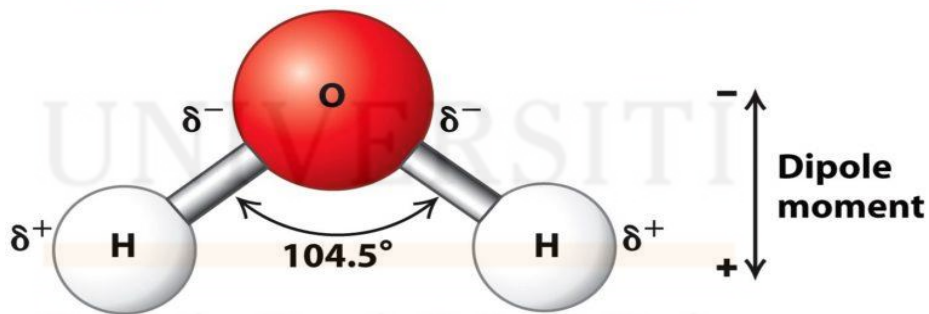
(Source: A- Level Biology)

Figure 2.1: structure of water molecule.

Despite the structure of water molecules are straightforward and simple (H_2O), the chemical and physical characteristics are quite complicated as they are not the same as other typical substances existed on the Earth. For example, it is seen as normal when ice cube is floating in a glass of ice water, but this condition is actually unusual

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for other chemical substances because normally solid state will be at the bottom of the glass since solid is denser than liquid. This condition is essential to the natural world because in cold areas of the world such as the lakes and ponds, the ice that forms on top of it can protect the aquatic life below the see as it can act as an insulating barrier. If the ice is denser than water, it cannot float on the water surface and will eventually sink into the pond. As a result, the water can be exposed to cold temperature and the pound could freeze entirely, killing all the aquatic creatures below it (Steven, 2019).

Under normal condition, water exists as a liquid form on the Earth's surface which can make it useful for transportation, recreational activity and as a habitat for various types of flora and fauna. One of the characteristics of water is its state of matter can easily change to other state of matter. For example, in the ocean, the water is in liquid form, but it can be transported into the land through the atmosphere by changing it state to gaseous form in the atmosphere and then changed its property back to liquid in the form of rain and nourish the plants and animals' life (Steven, 2019). Based on Figure 2.2, it shows the hydrological cycle where the water is transferred between the ocean surface, the land and the atmosphere.
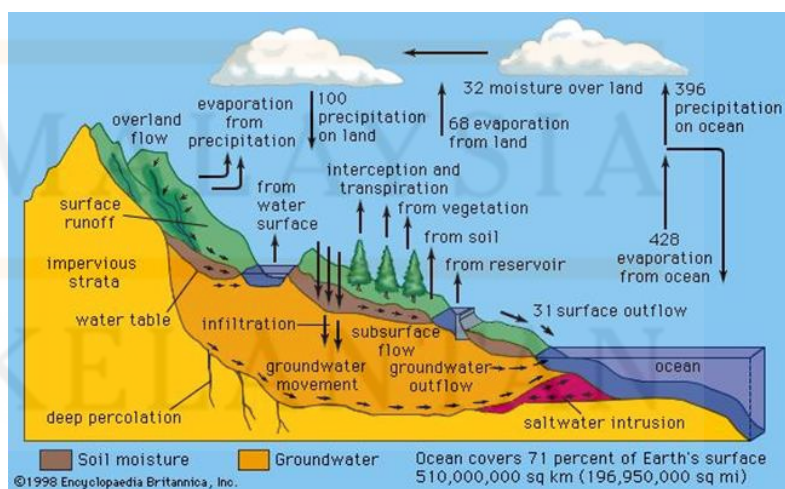
Figure 2.2 Hydrological cycle where the water is transferred between the ocean surface, the land and the atmosphere.

All living organisms need water as it is crucial for them to carry out their functions. For human, the body uses water in all its cells, tissues and organs in regulating its temperature and maintaining the other body functions. As the body keep losing the water through sweating, breathing and digestion, it is essential for the human to rehydrate their body back by drinking and eating foods that contain water (Laskey, 2015). Other than drinking and washing, human also rely on water for household use, agricultural, industrial and recreational. The average use of water for recreational use and environmental use are 1% (Steven, 2019).
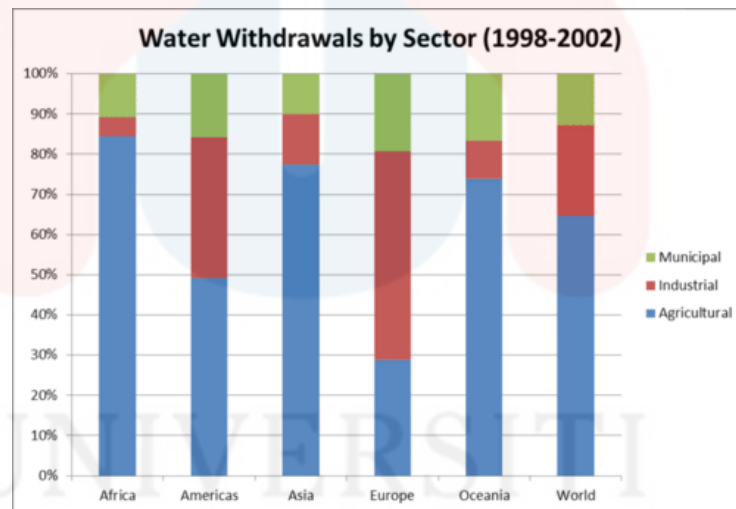
(Source: Food and Agriculture Organization, 2017)

Figure 2.3: the water used for household, industrial and agricultural activities in different regions. More than two-thirds of water is use for agriculture, globally.

Water use can be divided into two groups which are consumptive and non-consumptive. The types of water use can be classified according on how they lost to the ecosystem. For consumptive water use, it means that the water will be taken out of the ecosystem. Meanwhile for non-consumptive water use, it means that the water would be recycled and reused. For example, the water that flows down the drainage

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and go into the sewage system is cleaned and purified and then will be redistributed for reuse. The whole water consumption can be optimized and decrease by this recycling water method.

Next, water also used for agricultural activity. In some regions, farmers are doing agriculture by planting crops that is suitable with the amount of rain falls in their area. It means that they only rely on the rain falls to water their crops without a proper irrigation method. However, as some years are wet and the other time will be dry, the farmers need to find new initiative to water their crops. Irrigation is the best method for agriculture as they can produce more variation of foods not only rely on the years or weather. Some of the most efficient irrigation methods are overhead sprinklers, trench irrigation and flood irrigation. For the trench irrigation, the water will be carried by the canals from a water source to the field and for the flood irrigation, it means that the field will be flooded with water.

Other than that, human also use water for recreational purpose. Examples of recreational purpose that use water are swimming, boating, fishing, and many more interesting activities. Even though the water value for recreational is worth, but the amount of water that most recreational activities use is low and only less than 1% of the water that the human use. Generally, the recreational water uses such as fishing, swimming and boating are non-consumptive. As golf courses require huge amounts of water for irrigation, golf course is said to be the highest recreational water consumer.

2.2 Environmental Degradation Issues

Environmental degradation is a phenomenon where the natural environment is pressured in some way, decreasing the biological variety and the environmental health. Environmental degradation can be originally caused by natural factor or can also is caused due to anthropogenic or man-made activities. Environmental degradation is a famous debate topic among the international organizations as it is said to be the biggest challenge or threat that the Earth faced. It is a serious concern as environmental degradation can give bad impacts to all living on the Earth (Essay. UK., 2018).

Environmental degradation is resulted from human activities and also from the natural phenomenon. The natural resources on the Earth is at a serious threat to become vulnerable and can be depleted. This is due to the resources exploitation from human and can cause them to be exhaustion. One of the best examples of this condition is the exploitation of fossil fuel. A big scale of fossil fuel exploitation can make the amount of the fossil fuel reserves across the globe to be decreased, and will leave us with no other choices rather than to find an alternative source of energy. Environmental degradation also is contributed from other human activities such as overpopulation, pollution, deforestation, hunting, urbanization, etc.

Ecological change might be caused by numerous components such as growth of financial, growth of population, urbanization, increase of farming activity and also the increase of vitality use and transportation.

Water logging and soil salinity can be a factor that can cause environmental degradation. Water logging in the soil happens when there is no proper water drainage for

irrigation. The salt then will be deposited on the Earth's surface as a thin crust or it can also become accumulated at the roots of the plants. The amount of salt content in the soil can affect the growth of crops and can damage the whole agricultural activity.

Other type of environmental degradation is climate change. The global surface temperature of the Earth has increased annually since 1900. The rise of the Earth's temperature is caused by the significant atmospheric concentration expansion of the greenhouse gases such as carbon dioxide (CO_2) (Scafetta N., 2010). The climate change is a serious concern as it can affect the Earth in so many ways. For environmental effect, climate change can make the sea level increase and also the melting of polar caps. For human life impact, climate change can cause the spread of diseases such as Vector-borne and Rodent-borne disease. Food security will also be affected as the agricultural activity cannot be run as usual (Adedeji O., et al, 2014).

2.3 Public Awareness on Water Quality Issues

Water quality issue has been a huge debate topic in public. People need to realise that if the surface water especially river and lake are polluted, it will give adverse impact not only to human but all creatures such as animals and plants. Water quality is also related to environmental degradation issues. Rapid growth and urbanization, the excessive quantity of chemicals used in agricultural activity will lead to a decline in the water quality level. The sources of water pollution could be higher in the river system as the ground-based operation triggered the revolutionary change. Management of water resources can be more complicated due to the government's industrial and growth policies. Generally, the government policy will be focused on the economic growth, like the change from conventional agricultural activity to heavy industrial activity. To change to the heavy industry, the land use also will be affected. They need to do land clearing and deforestation before achieving the government policy. Land clearing and deforestation can threat the quality of river water in many river systems. Water pollution can arise from this issues and human can be affected if the water quality is low. Figure 2.4 shows the map of polluted river basins in Malaysia and their level of pollution.
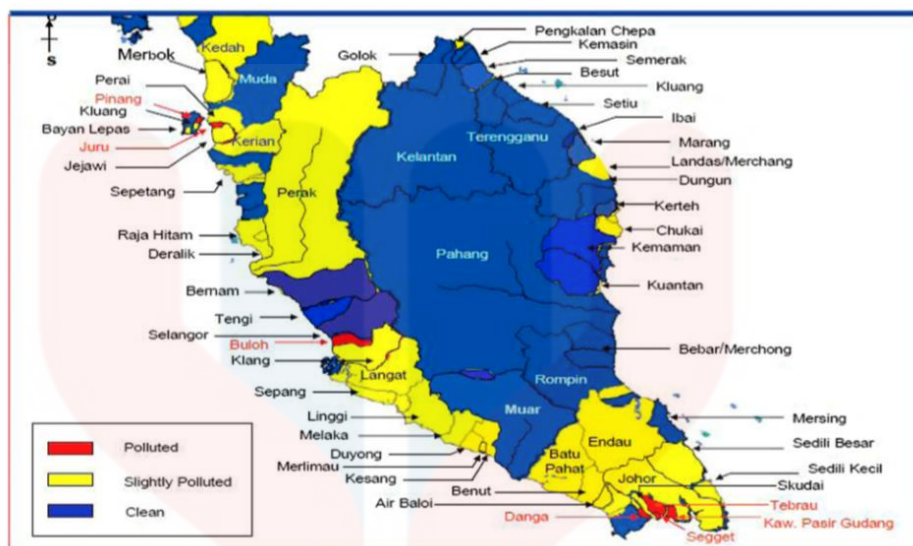
(Source: Akhtar, R., 2014)

Figure 2.4: Map of polluted river basin in Malaysia

In order to achieve the sustainable lifestyle, people must treat their water resources preciously as staying healthy is important for the economic growth and sustainable lifestyle. It is generally known that human health can be affected badly by the water pollution. Industrial waste, household waste, sewage and rainwater are widely known as the common sources of water pollution. Then, the polluted water will be used in the agriculture activity. Thus, it can be said that the polluted water can be both used positively or negatively. Some of the effect can be seen faster but other effect can only be seen after a long-term period.

The bad water quality can affect the human health. Polluted water sometimes will be the source for animal farming activity. The animals will drink the water that is already contaminated with toxins. It is not only giving bad impact to the animal's health but also to the human health as human will consume the flesh of the animals. Diseases such as cholera and typhoid can spread and they can harm the human body. If the human consumes

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the polluted water continuously, it can also damage the organs such as the heart and kidney.

Thus, to ensure that all living things on the Earth can live harmonically and give advantage to each other, the human needs to ensure that the water resources will always be clean and not contaminated with any bad pollutant. As the pollutants sources are not only the natural sources, human needs to ensure that no man-made or anthropogenic activity can resulted in low water quality.

CHAPTER 3

METHODOLOGY

3.1   Study Area

The selected research area for this study is in Sungai Kedondong, Batang Kali, Selangor. Batang Kali is a town located in Hulu Selangor district, Selangor state. Based on a statistic from Hulu Selangor District Council, the population in Batang Kali are 32783 people, with 20684 of it are Malay, 344 other Bumiputra, 5235 India, 181 others and 1060 non-citizen. With different background, races and religions, the locals can live harmonically in a multiracial community.

Batang Kali is a transit point to Genting Highland, as Genting Highland is located at the peak of Mount Ulu Kali at 1800 meters high, people who want to get there need to use Batang Kali road. To get to Genting Highland, there are many rivers and waterfalls alongside the road. Those rivers and waterfalls are among the unique attractions of Batang Kali. The trail to this particular waterfall started somewhere near the Hulu Tamu Hot Springs (Traveller, 2018).

One of the infamous Batang Kali river is Sungai Kedondong. Located alongside the road from Batang Kali to Gohtong Jaya in the Genting Highland, this river is suitable for recreational activity and family picnics. There are many basic facilities provided at the river's recreational area such as parking area, public toilet, restaurants, stalls and shops

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that sell souvenirs and other stuffs. There are also camping area for visitors who want to spend their night there.

As a famous recreational area, the authority has provided enough trash can. However, some poor mentality of the visitors that they don't utilize the provided trash can and just littering around the river area. Trash like plastics and bottles are thrown into the river and slightly effect the river's cleanliness. If all visitors have that kind of mentality and keep littering, Sungai Kedondong can be severely polluted and might not be suitable for recreational activities anymore.

Other than known as a recreational area, Sungai Kedondong is also the main water resources for a local indigenous people who live near the river. The local rely mostly on the river water to do their daily life activities such as cooking, bathing and agriculture. If the river water become polluted by human activities, it can affect the local's life (Hussin, 2017).
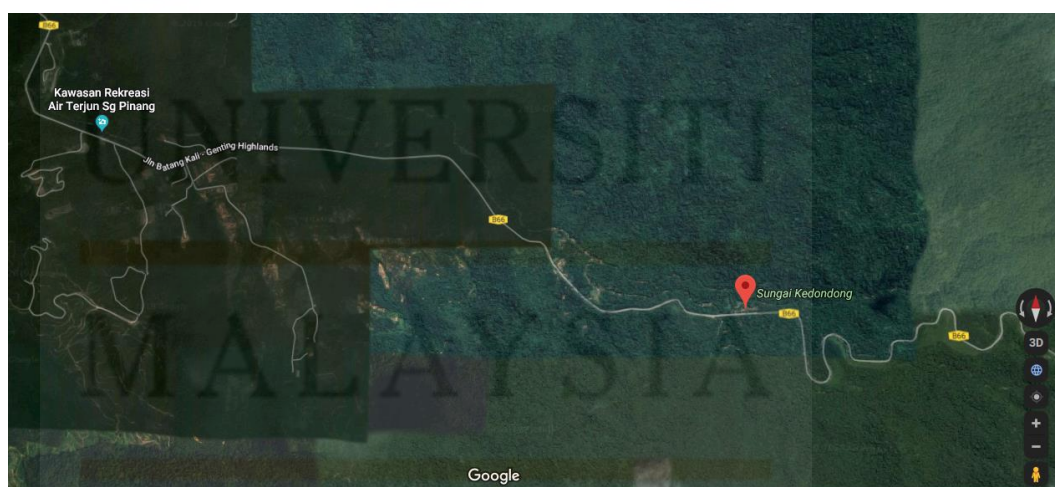
(Source: Google Map)

Figure 3.2 Map of sampling area (Sungai Kedondong, Batang Kali).

3.1.1 Sample Size

According to the information from the management of Sungai Kedondong recreation area, the estimated numbers of visitors come to Sungai Kedondong every months are around 2000 people. The sample size was calculated using Krejcie and Morgan sampling method (1970). From the table below, the most suitable sample size for this survey is 322 respondents. However, due to some limitation in conducting the survey, only 313 set of questionnaires can be accepted. Nine of the questionnaires set are not answered properly by the respondents.

Table 3.4: Krejcie and Morgan table (1970)

Table 3.1

Table for Determining Sample Size of a Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size   Source: Krejcie & Morgan, 1970

(Source: Krejcie and Morgan 1970)

3.2 Data Collection

3.2.1 Questionnaire Design

This project was conducted during semester break 2019. The survey that was conducted in Sungai Kedondong are focused on the locals and the visitors at the river as its respondents. The questionnaire sets that consists of twenty questions were distributed to the respondents for data collection. In developing the questionnaire set, the main issues that related to water pollution problem will be asked in the questions. The questionnaire set consist of three section with the first section will be on the respondent's demographic information such as their gender, age, race, education background, occupation and monthly income. Second section will be on the water quality and health issues related questions. For the last section, the questions that will be asked is intended to measure the respondent's awareness, perception, knowledge, behavior and attitudes towards the water pollution and the impacts to the human health. To answer the third section questions, the respondent needs to give their response based on a 5-point Likert scale. The scale of "1—strongly disagrees" to "5—strongly agree" will be used to ensure that the respondent will be flexible and can answer the given questions easily. As the majority of respondents will be Malay, the questionnaire set will be written in Malay language to make it accessible and convenient to all the respondents.

3.3   Data Analysis

3.3.1 Pilot Test

Pilot test was conducted before the main survey as an improvement of the scale, to identify the barrier in completion of the project, to calculate the estimation time to complete the questionnaire and to determine whether the respondents can understand the questions asked in the questionnaire. Pilot test is important as it will give an opportunity to gauge the target population's reaction to the survey. It also can help to measure the success of the questionnaire method.

3.3.2 Correlation Coefficient

The relationship between the relative movements of two variables can be calculated using a statistical measure called correlation coefficient. Correlation coefficient value range from -1.0 and 1.0 if the number is more than 1.0 or less than -1.0, it means that there was an error in the correlation coefficient.

There are several types of correlation coefficient that can be used to measure the variable such as Spearman and Pearson correlation. For this study, Spearman correlation was chosen to show the relationship of the variables (Ganti A., 2019).

CHAPTER 4

RESULT AND DISCUSSION

4.1 Respondent's Socio-Economic Profile

In the questionnaire set, there are 4 section to be filled. For section A, the respondents were asked on their demographic information such as their gender, age, religion, marital status and education level. Demographic profile gives information on the respondent's background and is important in determining whether the respondents are fit to be the representative of the survey. The objective is to see the connection between the socio-economic profile and the awareness or behavioral toward river water quality. The calculated respondent's socio-economic profile by using SPSS is shown in Table 4.1 and Table 4.2.

Table 4.1: Descriptive statistics of demographic

Elements	Population	Minimum	Maximum	Mean	Std. Deviation
Gender	313	1	2	1.38	0.485
Age	313	1	5	2.27	1.191
Race	313	1	4	1.64	0.988
Status	313	1	2	1.35	0.478
Income	313	1	5	2.66	0.768
Occupation	313	1	7	3.87	1.373
Education	313	1	5	3.28	0.886

Table 4.1: Socio-Economic Profile of Respondents

Variable	Frequency	Percentage (%)
Gender		
Male	195	62.3
Female	118	37.7
Age		
< 20	85	27.2
21-29	135	43.1
30-39	42	13.4
40-49	24	7.7
> 50	27	8.6
Race		
Malay	211	67.4
Chinese	24	7.7
Indian	59	18.8
Others	19	6.1
Religion		
Muslim	211	67.4
Buddha	21	6.7
Hindu	41	13.1
Other	40	12.8
Marital Status		
Single	203	64.9
Married	110	35.1
Education Level		
Never been to school	2	0.6
Primary school	51	16.3
Secondary school	152	48.6
College	74	23.6
University	34	10.9
Occupation		
Government	10	3.2
Private employee	53	16.9
Self-employee	80	25.6
Pensioner	12	3.8
Student	145	46.3
Unemployed	10	3.2
Others	3	1.0
Monthly Gross Household Income Level		
< RM 999	15	4.8
RM 1000 – RM 2000	118	37.7
RM 2001 – RM 3500	138	44.1
RM 3501 – RM 6500	42	13.4
> RM 6501	0	0

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Nationality		
Domestic	309	98.7
International	4	1.3
Distance from Destination (km)		
< 50 km	232	74.1
50 km – 100 km	77	24.6
100 km – 150 km	4	1.3
> 150 km	0	0
Environmental Group or Non-Government Organization (NGO)		
Yes	21	6.7
No	292	93.3

4.1.1 Age and Gender

Based on Table 4.1, the result shows that the respondents are consist of male with 62.3 % while female are only 37.7 %. The highest age group is from 21 to 29 years old with 43.1% and the lowest age group that complete the survey is between 40 to 49 years old with 7.7 %.
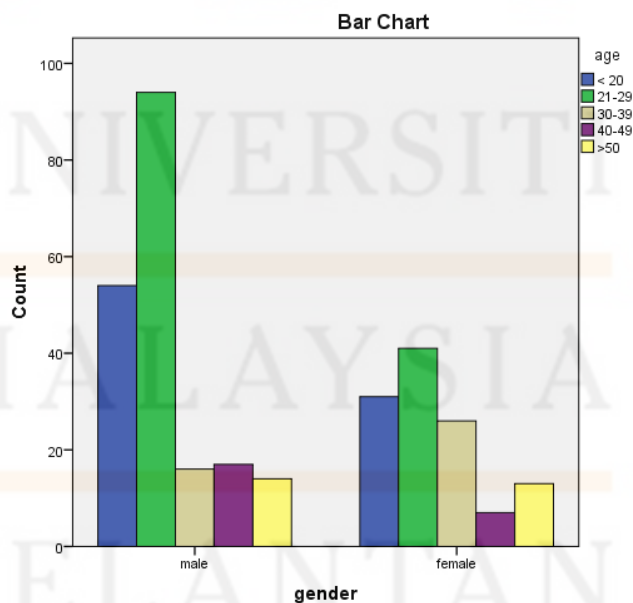

Figure 4.1 The Age and Gender of Visitors

4.1.2 Race

Based on the survey conducted, most of the visitors at Sungai Kedondong are Malay with 67.41 % and the lowest are other races with 6.07 % and most of them are indigenous people as there is an indigenous people village located nearby the river.

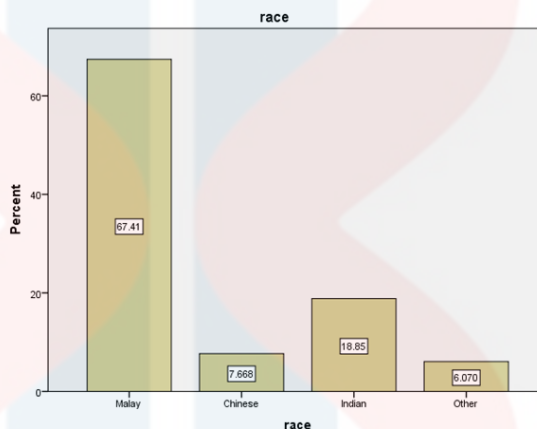
Figure 4.2 The races of visitors

4.1.3 Marital Status

From the total of 313 respondents that answered the survey form, 203 people or 64.9% of them are married and the rest are single.
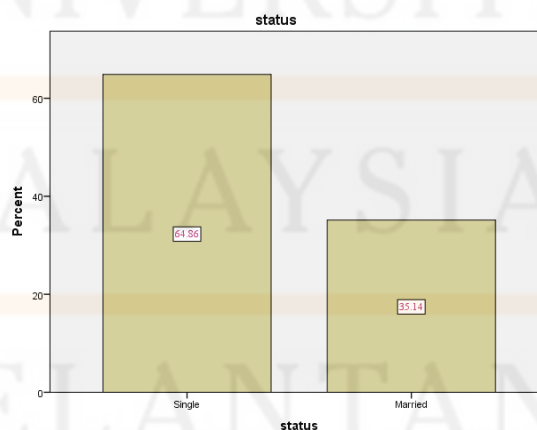

Figure 4.4 The marital status of visitors

23

4.1.4 Education Level

Education level is one of the most important aspect in demographic information as it Based on Figure 4.5, 152 respondent's education level are secondary school which also the highest percentage of the education level with 48.6%. Meanwhile, the lowest percentage of education level is never been to school with only 2 persons.

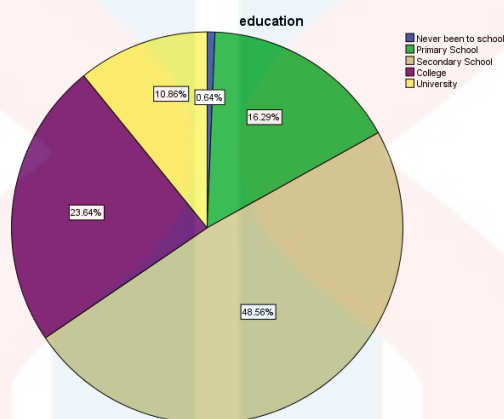**Figure 4.5** The education level of visitors

4.1.5 Occupation

For the occupation information, the occupations stated are government, private sector, self-employee, pensioner, student, unemployed and others. The occupation that get the highest percentage is student with 46.3% or 145 respondents in total. Most of the students are from secondary school. The least occupation is "Others" with only 3 respondents.
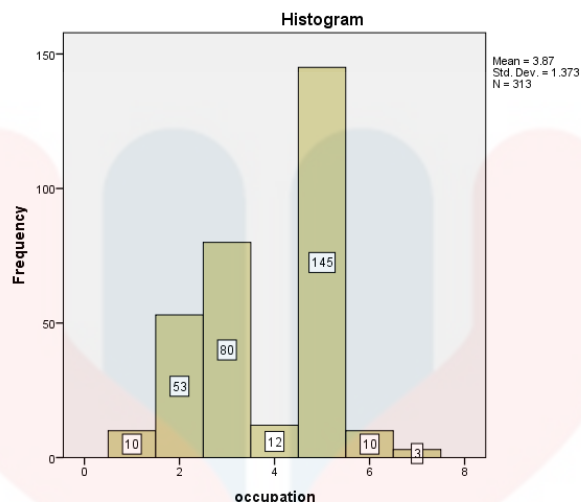
Figure 4.6 The occupation of visitors

4.1.6 Household Income

Household income can be defined as the total amount of net monthly income of all household members that are 15 years old and older. Total household income need to be assessed in the demographic information section as it can be a good indicator to see their daily lifestyle activities. Based on the survey conducted, most of the respondents have a household monthly income in range of RM 2001 to RM 3500 with a total of 138 respondents or 37.7 % from the total respondents. There are no respondents that have household income exceed than RM 6501
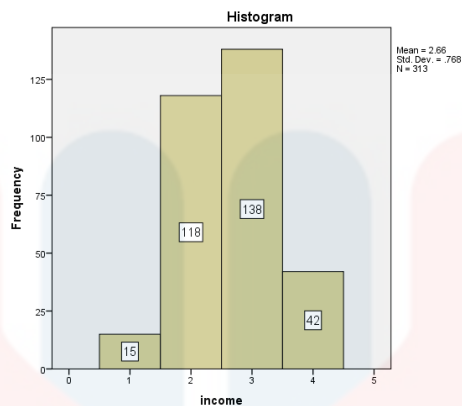
Figure 4.7 The household income of visitors

4.1.7 Visitor's Nationality

As an infamous recreation area, Sungai Kedondong not only visited by local tourist but also from foreigners. During the survey section, a few westerners can be seen at the area. They are probably hiking or jungle trekking at the area. However, they refused to cooperate to fill the questionnaire survey form. This might be due to the communication boundary between them and the survey conductor. So based on the data that we got from the questionnaire form, 309 of the respondents or 98.7% are domestic visitors while, the left 4 respondents are foreigner from Indonesia.
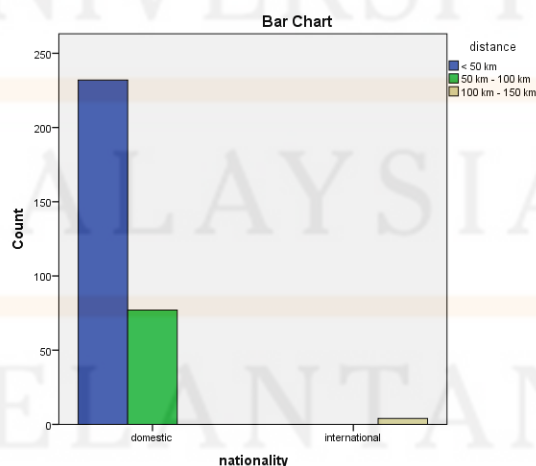
Figure 4.8: The nationality of the visitors

4.2 Respondent's Characteristics of Visit

The respondents approached in this survey session are mostly domestic and live not more than 50 km away from Sungai Kedondong. Respondents that visit Sungai Kedondong more than 10 times a year are 13 people, while 5 to 15 times a year was 60 people. The highest number of visiting frequency was 240 respondents or 76.7% in total.

Table 4.2: Respondent's Characteristics of Visit

Element	Frequency	Percentage (%)
Frequency of visiting		
1 to 5 times a year	240	76.7
5 to 10 times a year	60	19.2
More than 10 times a year	13	4.2
Reasons for visiting Sungai Kedondong		
Recreation (picnic)	291	93.0
Carry out scientific research	6	1.9
Jungle trekking	16	5.1
Others	0	0

4.3 Visitors' Knowledge on Water quality

Table 4.3

Characteristics	Rank (mean)	1 N (%)	2 N (%)	3 N (%)	4 N (%)	5 N (%)
I care about the river cleanliness and water quality.	3.62	6 (1.9)	34 (34)	101 (101)	104 (104)	68 (68)
Domestic wastes such as food waste and plastics need to be dispose in a right place so it won't pollute the river.	3.59	6 (1.9)	31 (9.9)	106 (33.9)	112 (35.8)	58 (18.5)
Disposal of waste into rivers can cause river water quality to be adversely affected.	3.74	2 (0.6)	27 (8.6)	97 (31.0)	111 (35.5)	76 (24.3)
I am aware of the effects of dumping waste into the river.	3.70	2 (24)	24 (108)	108 (34.5)	112 (35.8)	67 (21.4)
Visitor's awareness on river cleanliness is low.	3.57	1 (0.3)	46 (14.7)	102 (32.6)	103 (32.9)	61 (19.5)
There are a lot of trash I found in Sungai Kedondong area.	3.70	3 (1.0)	36 (11.5)	99 (31.6)	89 (28.4)	86 (27.5)
Visitor's action of dumping waste into the river is the factor why the river is dirty.	3.70	10 (3.2)	36 (11.5)	72 (23.0)	114 (36.4)	81 (25.9)
Trans cans are not enough provided in Sungai Kedondong recreation area	3.74	6 (1.9)	29 (9.3)	83 (26.5)	117 (37.4)	78 (24.9)

Characteristics	Rank (mean)	1 N (%)	2 N (%)	3 N (%)	4 N (%)	5 N (%)
Trash cans are provided but are not used properly by visitors.	3.55	6 (1.9)	41 (13.1)	98 (31.3)	110 (35.1)	58 (18.5)

Note: N = population

4.4 Visitor's Opinion and Perception

Table 4.4 The importance of maintaining the cleanliness and quality of the river water.

Characteristics	Rank (mean)	1 N (%)	2 N (%)	3 N (%)	4 N (%)	5 N (%)
River water is important for villager's domestic use.	3.60	6 (1.9)	41 (13.1)	87 (27.8)	118 (37.7)	61 (19.5)
Visitors can enjoy recreational activities such as picnic and swimming.	3.64	6 (1.9)	34 (10.9)	99 (31.6)	101 (32.3)	73 (23.3)
The river is used for water activities such as kayaking and kayaking	3.60	5 (1.6)	40 (12.8)	90 (28.8)	117 (37.4)	61 (19.5)
The river as an aquatic life habitat.	3.56	5 (1.6)	40 (12.8)	109 (34.8)	94 (30.0)	65 (20.8)
River water is important for irrigation.	3.64	2 (0.6)	40 (12.8)	94 (30.0)	110 (35.1)	67 (21.4)
Ensure that the ecosystem is functioning normally	3.62	2 (0 .6)	38 (12.1)	97 (31.0)	117 (37.4)	59 (18.8)

Characteristics		1	2	3	4	5
Maintains the natural food chain between plants and animals.	3.63	3 (1.0)	39 (12.5)	108 (34.5)	84 (26.8)	79 (25.2)
Provides human sources of protein such as fish and shrimp.	3.62	6 (1.9)	45 (14.4)	84 (26.8)	104 (33.2)	74 (23.6)
River water can be used as an alternative source of energy (hydroelectric power).	3.66	3 (1.0)	26 (8.3)	105 (33.5)	120 (38.3)	59 18.8)

Note: N = population

Table 4.4 Cause of pollution in Sungai Kedondong.

Characteristics	Rank (mean)	1 N (%)	2 N (%)	3 N (%)	4 N (%)	5 N (%)
The attitude of visitors who throw garbage into the river.	3.73	4 (1.3)	25 (8.0)	94 (30.0)	118 (37.7)	72 (23.0)
The daily activities of the villagers include cooking and bathing.	3.61	7 (2.2)	34 (10.9)	99 (31.6)	108 (34.5)	65 (20.8)
Disposal of chemical waste from fertilizers and poisons from agriculture by villagers.	3.71	7 (2.2)	25 (8.0)	93 (29.7)	114 (36.4)	74 (23.6)
The turbidity of rivers is due to the removal of materials such as white clay.	3.67	7 (2.2)	28 (8.9)	99 (31.6)	105 (33.5)	74 (23.6)

Lack of strict enforcement by the Hulu Selangor District Council.	3.66	6 (1.9)	34 (10.9)	97 (31.0)	99 (31.6)	77 (24.6)
Rivers are polluted due to heavy rainfall or landslides due to deforestation.	3.65	3 (1.0)	29 (9.3)	114 (36.4)	97 (31.0)	70 (22.4)

Note: N = population

Table 4.5 Effect and consequences if Sungai Kedondong water is polluted

Characteristics	Rank (mean)	1 N (%)	2 N (%)	3 N (%)	4 N (%)	5 N (%)
Increase in bacteria in water.	3.62	7 (2.2)	33 (10.5)	104 (33.2)	95 (30.4)	73 (23.3)
Humans will get sick if they drink polluted river water.	3.60	7 (2.2)	32 (10.2)	107 (34.2)	100 (31.9)	67 (21.4)
The dissolved oxygen content decreases and can cause endangered aquatic life.	3.77	2 (0.6)	29 (96)	96 (30.7)	97 (31.0)	89 (28.4)
The groundwater system is also contaminated.	3.60	6 (1.9)	30 (9.6)	110 (35.1)	104 (33.2)	63 (20.1)
Destruction of aquatic life such as fish and shrimp.	3.66	2 (0.6)	33 (10.5)	105 (33.5)	103 (32.9)	70 (22.4)
The waste in the river causes the flooding of the water to cause flooding.	3.75	7 (2.2)	28 (8.9)	82 (26.2)	116 (37.1)	80 (25.6)
Affect the beauty of the environment.	3.66	8 (2.6)	31 (9.9)	97 (31.0)	100 (31.9)	77 (24.6)

This makes visitors less interested in water activities.	3.58	4 (1.3)	36 (11.5)	114 (36.4)	93 (29.7)	66 (21.1)
The number of visitors on the Kedondong River will decrease.	3.62	5 (1.6)	33 (10.5)	100 (31.9)	113 (36.1)	62 (19.8)

Note: N = population

4.5 T-Test Analysis

		Levene's Test for Equality of Variances	
		F	Sig.
Q4a	Equal variances assumed	.417	.523
	Equal variances not assumed		

t-test for Equality of Means					95% Confidence Interval of the Difference	
t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
-2.633	29	.013	-1.828	.694	-3.247	-.408
-1.801	1.060	.312	-1.828	1.015	-13.111	9.456

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CHAPTER 5

CONCLUSION AND RECOMMENDATION

Surface water such as river and lake is very important for human and all living things. Its quality needs to be regularly monitored as it can give adverse impacts to all creatures that rely on it. We human are responsible to take care of the river water

Based on the conducted survey, it shows that most of the people are concern of the emerging issues on water quality. They know that they need to take care of the environment by not polluting it. The actual knowledge and perception of public regarding water quality issue can be seen through the survey session. Most of the respondents give positive respond and it is a good sign as it can be a benchmark to show that our society have high level of awareness and they know their responsibility toward the environment especially to the water resource.

All people need to work together in order to sustain a good water quality level. Not only the visitors, the government, non-government organization, local authority and local community themselves also need to give their full support and hard work in maintaining the river water cleanliness.

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