IMPACT OF INDUSTRIAL EFFLUENTS ON WATER QUALITY AT THE TIRAM RIVER, KUANTAN MALAYSIA

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ABSTRACT

Indera Mahkota 3 (IM3) is one of the industrial area at Kuantan, Pahang, Malaysia. The Tiram River is located near IM3 and being affected by the industrial activities. This study was carried out to identify the water quality of The Tiram River and to classify the river based on Water Quality Index (WQI) and National Water Quality Standards (NWQS), Malaysia. Water sample was collected from three different sampling locations from February to March. Eleven parameters were experimented such as pH, temperature, dissolved oxygen (DO), electrical conductivity (EC), turbidity, biological oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), ammoniacal nitrogen (AN), sulphate and phosphate. Based on the result, some parameters that received high impacts from industrial activities were DO, BOD, COD, AN and phosphate. Based on WQI, all sampling stations were classified as Class III. The lowest WQI value was 57.11 and the highest value was 62.91. Based on WQI and NWQS, the study river was slightly polluted and urgent treatment is required to control water pollution.

ABSTRAK

Indera Mahkota 3 (IM3) merupakan salah satu kawasan perindustrian Kuantan, Pahang, Malaysia. Sungai Tiram terletak berhampiran IM3 dan sedang dicemari oleh aktiviti perindustrian. Kajian ini dijalankan untuk mengenal pasti kualiti air Sungai Tiram dan untuk mengelaskan sungai berdasarkan Indeks Kualiti Air (WQI) dan Piawaian Kualiti Air Kebangsaan (NWQS). Sampel air yang dikumpul daripada tiga lokasi persampelan yang berbeza dari Februari hingga Mac. 11 parameter telah diuji seperti pH, suhu, oksigen terlarut, konduktiviti elektrik, kekeruhan, permintaan oksigen biologi (BOD), permintaan oksigen kimia (COD), jumlah pepejal terampai (TSS), nitrogen ammoniacal (AN), sulfat dan fosfat. Berdasarkan keputusan yang direkodkan, beberapa parameter yang menerima kesan yang tinggi daripada aktiviti perindustrian adalah DO, BOD, COD, AN dan fosfat. Dari pengiraan WQI, semua stesen pensampelan dikelaskan pada Kelas III. Nilai WQI terendah adalah 43.15 dan nilai yang paling tinggi adalah 65.61. Oleh itu, Sungai Tiram dapat disimpulkan sebagai sungai yang tercemar dan rawatan segera diperlukan untuk mengawal pencemaran air.

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LIST OF ABBREVIATIONS

AN	Ammoniacal Nitrogen
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
DOE	Department of Environment
EC	Electrical Conductivity
IM3	Indera Mahkota 3
IMIP	Indera Mahkota Industrial Park
NWQS	National Water Quality Standards
RMK3	Third Malaysia Plan
TSS	Total Suspended Solids
WTP	Water Treatment Plant
WQI	Water Quality Index

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND INFORMATION

Water is approximately three-fourths covering surface of the earth. In spite of plentiful of water, several factor comes to limit the amount of clean water available for human use. Water plays an important role in developing countries as the main sources of industrial plant, agricultural, transportation, marketing and other human activities. Water is essential to any life creatures which is 50-97% of the weight of animals and plants while 70% of human body is consist of water (Cheng. L et. al, 2003).

The availability of quality water has become critical day by day. Recently, a number of activities affecting the quality of water is increasing. Apparently, agricultural and industrial activities effluent are considered as one of the worst effluent to the water (Elhassadi. A, 2008). Water pollution is primarily coming from industrial and domestic waste. Industrial waste contain high hazardous and toxic chemical which will highly effect human health. These also include heavy metal such as copper, zinc, iron, cadmium and manganese. In Japan, there was a case of the "Minamata disease" around 1950. It caused by mercury that being used to produce plastic had been released to Minamata bay, Japan (Olayini et. al, 2012).

Indera Mahkota Industrial Park is one of the areas for industrial development around Kuantan, Pahang. In the Third Malaysia Plan (RMK3) around 1976-1980, Indera Mahkota being one of the targeted industrial area with 52 hectare area (Mohamed. R, 1996). The industrial activities around this area are food processing, chemical industries and metal industries. Surface water in Indera Mahkota Industrial Park (IMIP) industrial

area that received high contaminations of effluent from industries will be affected from this industrial activities. Proper waste water management need to be carried in order for the surface water not to be polluted.

A river that struggles with the industrial effluent pollution discharge from IMIP is The Tiram River. The Tiram River is starts from Kuala Pahang and flows around Kampung Sungai Tiram and IMIP. As The Tiram River also flows to Sungai Kuantan, there is some possibilities it will carry along the toxic effluent to the main river in Kuantan. Most of industries there are small and moderate sector. Most of them do not have legitimate waste water treatment plant and released industrial effluent to the nearby river.

1.2 PROBLEM STATEMENTS

The The Tiram River feeds into Kuantan River which is main outlet of the city of Kuantan. The The Tiram River receiving the industrial effluent without proper treatment which cause the level of toxic compound is high. As the number of population grow wider at Indera Mahkota and Kuantan area, IMIP expanding the development of industrial factories for offering job to the community, caused widespread of polluted water.

The amount of pollutant discharged to the water can no longer be accommodate by the water ecosystem (Yunan.H and Cheng. H, 2013). The effluent from industries is highly load with bad contaminant which cause bad odor at certain time. Musty or earth smell usually originating from dissolved solid in the water. Chemical smell can be due to chemical toxic seeping to the river. Besides, the apparent color of the river is chalky and milky. It is happened from the existence of suspended matter. The way of human sight, the aesthetic value of The Tiram River is bad.

All factories are built along the stream which originates the industrial waste water. The chemical toxic from the effluent effect the aquatic life and vegetation. It leads to the death of corps at some part of The Tiram River. It may be effect of low dissolved oxygen in the river. The result of biological activity is depend on dissolved

oxygen. The river is highly turbid and colored. The light is not penetrating through the water. Highly turbid water will affect the photosynthetic process and respiration for the aquatic life.

Discharge of industrial effluent with bad contaminate are problem all over the world (Yasmin et. al, 2012). Under certain water pollution condition, polluted water may give high impact towards man health. There is several cases of Malaria disease around house area near The Tiram River. Malaria is dangerous diseases that can cause high fever and without proper treatment and medical advices will lead to dead. The problem of waste water released to stream is mosquito can easily breed on it.

1.3 SIGNIFICANCE OF STUDY

Clean water is one of the most necessary resources to any living thing. The importance of clean river for all living thing cannot be denied. Rivers provide wide habitat to animal and plant. Clean and healthy streams are also important for humans for daily activities such as drinking water, food and agricultural activities.

Access to safe and clean drinking water will initiate to healthy and productive lifestyle. Clean drinking water and clean river is linked because limited access to clean river will affect safe drinking water as The Tiram River also sources of drinking water. Our body part are functioning well with water. For example, digestion and cooling. Therefore, clean drinking water is very important to human body. High contaminated water will bring many serious disease to human. In Nigeria, many families lost their member due to diarrhea diseases. More than 2 million children dying from diarrhea diseases due to lack of access to clean water (Yang H. J et. al, 2007).

Water is adversely affect if the large amount of toxic material discharge on it. If the water is incapable for its original purposes, it is polluted water. Polluted water is bad for aquatic life. The ecosystem of the aquatic life will be affect if high contaminant of water is their habitat. Clean river is important for aquatic life. In Oka River, Siberia an analysis prove that there is irregularity metal allocate in the fish organ. The metals goes into aquatic life body via their food. From this study, the pollution level, chemical and

biological status of the The Tiram River will be determined and the proper treatment of effluent will be suggested to the government in order to minimize the risk.

1.4 OBJECTIVES OF STUDY

There are two objective of this study:

1.4.1 To identify the status of water quality at the The Tiram River

1.4.2 To classify the river by assessing the Department of Environmental Water Quality Index and National Water Quality Standards

1.5 SCOPE OF STUDY

The Tiram River is a river located at Indera Mahkota 3, Kuantan Pahang and is tributary to Kuantan River. The length of river is 4.8 km and 40.0 m width. The scope of this study is to determine the water quality of The Tiram River and the impact of industrial effluent from IMIP towards the receiving river. It is important to classify the level of pollution of The Tiram River as it is receiving bad contaminant from industrial activities.

The surface water will be collected at 3 stations with 2 replication of each station. The sample will be taken 2 times during February 2015-May 2015. The water sample will be focusing on the part of river which area of industrial activities may be the source of the pollution. The water quality study will be based on several parameters which is turbidity, pH, electrical conductivity, temperature, Biological Oxygen Demand, Chemical Oxygen Demand, dissolved oxygen, total suspended solid, ammoniacal nitrogen, phosphate and sulphate. In this experiment, the data will be classified based on WQI and NWQS.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Water plays a major basic needs in human life. A plentiful of water is one of the important factors in the development of urban societies. Nowadays, the quantity of water is more needed than the quality of water. The availability of water can improve human life. Water is used for domestic, industrial, commercial, agricultural activities and public used. In general, the amount of water supplied to residence is 150-480 L/capita/day.

Surface waters include rivers, lake, oceans and ice or snow. According to Department of Irrigation and Drainage, the number river in Malaysia is around 1800 rivers with a total length of 38,000km. River quality characteristics change from time to time. Rivers is one of the major sources for generating electrical conductivity, transportation and habitat for aquatic life. Rivers also used as a basic need for human being for drinking, agricultural, household activities (cooking and bath) and habitat for aquatic life.

High contaminant in water caused by many sources such as direct storm run-off and effluent released before being treated. The concentrations of toxicity in rivers is increasing because most of the waste water from residential and industrial area are disposed to the river. Aquatic life needs to be preserved from todays because it will generate nation income through tourism and natural sight-seeing for next generation.

2.2 CONCEPT DEFINITION

2.2.1 Industrial effluents

Industrial effluents is one of the major source of water pollution in Malaysia. Industrial activities is important for developing countries. In Malaysia, local product is manufacture every day to fulfill customers' desire. Thus, high number of product produced everyday also cause high volume of raw water being used and wastewater being discharged. According to Department of Environmental (DOE)'s Environmental Quality Report 2013, 42% of rivers in Malaysia are classified as polluted river with manufacturing industries gives high value of sources in river pollution at Malaysia are shown in table 2.1

Table 2.1: Composition of Water Pollution Sources by Sector at 2013

Type of sources	Number of sources
Manufacturing Industries	4,595
Agro-based Industries	
Rubber Mills	72
Palm Oil Mills	436
Animal farms (Pig farming)	602
Sewage treatment plant	
Public	5,995
Private	4,341
Individual septic tank	1,262,185
Communal septic tank	3,629
Food Services Establishments	192,710
Wet Markets	879
Total	**1,475,444**

Source: DOE (2013)

Wastewater from industries is the mixing of solid substances, oil and chemical reagent. Basically, industrial effluents can be classified into inorganic industrial effluents and organic industrial effluents. Inorganic effluents is released from steel and metal industries. Metal industries produce cyanide and acid waste before being treated.

It contains huge amount of suspended solids but it can be destroyed by sedimentation and flocculation process. Inorganic effluents also includes dissolved and undissolved minerals from the blast furnace and aluminums production. Besides that, cooling blast furnace insist on water to absorb iron and ore which not easily to be settle down in water.

Organic effluents is discharged from chemical industries such as pharmaceutical, detergents, textile and cosmetic factories. Chemical industries needs chemical reagent and chemical solvent for chemical reaction in producing products. Organic effluents requires high specification and several process in treatment followed by biological process. Wastewater coming from pharmaceutical industries contains waste from poisonous substances and nutrient. Such wastewater is low concentration of BOD_5 and too low/high pH. Even though many treatment can be used in order to reduce the level of contaminant, but most of industries are fail to applied proper treatment plant in their industrial area.

2.2.2 Water pollution due to industrial activities

Water is one of basic need for industrial survival. Water is used for heating, cooling, manufacturing product and solvent. Industrial effluents that being released to water bodies is a world major problem in developing countries. Industrial waste contain toxic and poisonous substances that can effect human health. The presence of unwanted substances in water can low the quality of water. Water pollution can affect the usefulness of the water. Water pollution is a dangerous threat to all life being.

In Malaysia, industrialization is developing rapidly in Gebeng in Kuantan District. Most of the active industries there is chemicals, palm oil mills and polymers. Wastewater from the industries is being released to stream nearby. Tunggak River and Balok River are the river that suffering in receiving high contaminant waste from industrial estate. A study carried out by Sobahan, Sujaul Islam, Ideris and Hossain (2013) shows the heavy metal content at the river is high while several parameters of COD, BOD, AN, phosphate and nitrate also being affected.

There are many type of contaminant in industrial effluents. For example, nitrogen like carbon and phosphorus. High total nitrogen waste water found to be discharged to the stream in China. Most of the stream around China are high polluted with class V. Higher amount of nutrient contains in effluents will lead to alga bloom. It will also lead to groundwater pollution. Water pollution in China also coming from rural industries. Most of 'made-in-China' products are being produced by rural industries. High volume of water is used for rural industries such as cements and bricks. Around 127.6 million of cement being produced also bring out high volume of effluents being released to streams (Olayini et al., 2012)

Industrial effluents contain heavy metal such as copper, lead, magnesium, cadmium, mercury and organic substances such as hydrocarbons and formaldehyde. High level of iron and cadmium in water usually due to dumped metal debris at the industrial area and vegetable oil industry. The effluents should be treated and the concentration of heavy metal need to be lowered before effluents are release to water body (Olayini et. al, 2012). Most of this substances is dissolved in water and cannot be filter with common water treatment.

2.3 CAUSES OF RIVER POLLUTION

River pollution comes from many sources. It may come from natural resources or human activities. Inorganic matter naturally exist in water due to weathering of mineral and soil. pH value will affect the solubility of minerals in water. For example, aluminium hydroxide will increase together with pH. Organic material react with other chemical pollutant from industrial effluents will cause water more polluted.

Domestic waste released by human can contribute to river pollution. Human basic activities likes washing laundries, kitchen, and water used for bath and human waste that discharge to stream can cause pollution. The level of pollution depends on the volume of waste water released per day. Sometimes, domestic waste can root more water pollution than industrial waste. 10 percent of the polluted stream in India is caused by the industrial waste while 90 percent is coming from domestic waste (M.A. Hossain et. Al, 2013).

Source of water pollution can be divided into two, namely by point source pollution and non-point source pollution. Examples of point sources pollution is domestic waste water and industrial waste water while examples non-point source pollution is runoff from agricultural areas and runoff from urban areas.

2.3.1 Point sources

Water pollution that caused by point source is coming from municipal water treatment, domestic waste water and effluents from industrial activities. It may come from any specific pipe, drainage, tunnel or channel from where it's being discharged. High demand of product by customer grow industrial activities day by day. Waste water treatment plant for industrial effluents is quite expensive to be installed near the industrial park. Due to that circumstances, some of factories released their effluents directly to water bodies without any proper treatment.

Effluents from sewage treatment plant can be a point source pollution. During excessive rain, surface runoff will cross this treatment plant and carry along the chemical substances and run directly to stream. Besides, high volume of sewer plant is possible to be handle properly will caused mixing of sewer and runoff. This combination will overflow to nearest stream.

2.3.2 Non-point sources

Runoff is a complex process including the removal and transport of soil practical and chemicals. The rain water carries soil particles together causing muddy creeks, streams and rivers causing a blockage caused by sediment. The quantity of pollutants carried from the ground into water stream affected by the slope and slope length. Runoff from agricultural and urban areas are classified as non-point sources pollution. This type of contamination usually occurs through the process of diffusion through the underground of agricultural areas, construction areas, septic tanks, acid deposition, farming areas, deforestation area and many others. In addition, the use of fertilizers, pesticides and other contaminants is the cause of river water pollution which difficult to identify and controlled.

Non-point sources of pollution control is very complicated and requires a high cost to conduct the investigation and research to identify and control the sources of pollutants from non-colon. Agricultural activities can cause pollution to the river water. The use of chemicals to kill or control the creatures and plants of agricultural pests such as weeds, diseases and insects as well as fertilizer will cause groundwater contamination and surface drainage through the rain and surface water flow. Running water underground and surface drainage containing these chemicals will flow into the river and will contribute to increased nutrients will also affect aquatic life.

2.4 WATER QUALITY PARAMETER

Water quality can determine biological, physical and chemical characteristics of the water. The common physical characteristic of water are temperature, turbidity, electrical conductivity and total suspended solids while chemical parameter of water are Biochemical Oxygen Demand, Chemical Oxygen Demand, dissolved oxygen, ammoniacal nitrogen, phosphate, sulphate and pH.

2.4.1 Temperature

Temperature is the amount of average kinetic energy in the system. Water temperature can affect other parameter of water quality. High temperature will promote the growth of organism. High metabolic rate of organism will low the dissolved oxygen. Rate of respiration of aquatic life depend on temperature because the amount of dissolved oxygen is influenced by temperature. Most of organism have their range of temperature in order of reproduction and respiration. For example, if the temperature is high. The growth rate of algae will increase.

2.4.2 Turbidity

The first thing that can be seen about water is its cloudiness. Turbidity is the clarity of water. The clear waters allow people to see clearly the image of aquatic life in the water. Suspended particle (Example: clay, organic matter, human waste and microorganism) mixed with water will caused turbidity. The higher amount of

suspended matter, the higher the measure of turbidity. The size of suspended particle, the characteristics of suspended particle and the content of suspended particle will affect the turbidity of the water.

Turbidity can be determined by measuring the transmission of light that pass through the water. The units of turbidity is nephelometric turbidity unit (NTU) or Formazin turbidity unit (FTU) based on method or equipment used. High turbidity can decreased the amount of sunlight availability in the water which can decreased the growth of algae and increase the bacteria growth. High turbidity can affect human health. Not only in aesthetic aspect, high turbidity contain bad contaminant and toxic adsorbed onto them.

2.4.3 pH

pH value is an alkaline and acidic index that is very important in determining the qualities of water. The content of hydrogen ions (H+) in water are the factors that determine the pH reading. The scale used is from 1 indicating the most acidic and ended up with 14 that is, the most alkaline. Neutral value measured at 7. Appropriate pH range will allow the decomposition of organic matter by both types of anaerobic and aerobic bacteria occur at optimum. The optimum pH range is between 6 and 8.5. pH readings were less than that will cause the bacteria to die.

Sudden large pH value changes will cause aquatic life die due to adjustment cannot be done perfectly. As the pH value low, metals will become more soluble in waste water or water. Higher dissolve metals in water will affect the health of aquatic life. Alkaline waste water generate from textile effluents also can cause level of pH. Any changes of pH level will also affect alkaline value in the water (Yang. H. J et. al, 2012)

2.4.4 Electrical conductivity

Electrical conductivity is the capability of water to convey electric current. EC is also the value of total dissolved solids in water. EC is caused by the dissolved salts

(such as chloride and sodium) presence in water. High value of EC show high ion content in water. EC will not disturb human and aquatic life literally but it is one of the fast way to find out any changes of water quality. Rivers contain dissolved solid which coming from soil and rock weathering process. The unit use for EC is Siemen per meter (S/m). EC can be effect by the temperature. Higher temperature will produce high EC in water.

2.4.5 Dissolved oxygen

Dissolved oxygen is the quantity of oxygen dissipated in water. Oxygen dissolved in the water via diffusion, aeration and photosynthesis process. Low DO will threat aquatic life such as fish. As temperature rise, DO level will be declined. DO is the result of photosynthesis process in water. A simple photosynthesis chemical reaction is shown below:

Carbon dioxide + water (in the presence of light and chlorophyll) → Oxygen + rich foods

High DO in daylight coming from photosynthesis process while low DO in a night time. Microorganism feed on oxygen for their activities. High contaminant water will boost up microorganism activities. Contaminant will break down by microorganism and initiate water to be anaerobic.

2.4.6 Total Suspended Solids

The solids that cannot pass through a filtration process is known as total suspended solids. Suspended solids is measured by evaporating and weighing the solids from filter paper. The unit use for suspended solids is milligram per litre (mg/L). Excess TSS can low aesthetic value of the water by unpleasant scenery. The presence of TSS will degrade the growth of aquatic life because it prevent the light to penetrate through the bottom of the water. Some biological matter can survive in TSS will spread dangerous diseases to the human health.

2.4.7 Biochemical oxygen demand

Biochemical Oxygen demand is the amount of oxygen spent by the bacteria to oxidize organic matter. Oxygen is used by the bacteria to decompose organic waste in water supply. The availability of dissolved oxygen in water will decreased. Excess organic waste in the water will increase bacteria growth and BOD level increased too.

Nitrogen and phosphorus can increase BOD level. Nitrogen and phosphorus will speed up the growth of algae and plant life. High BOD will be placed for organism that can survive in low DO to perform. BOD can be measured by testing the water or waste water sample on 5 days experiment. The DO of sample will be compared with the DO value of water sample that had been experience 5 days in the dark incubator.

2.4.8 Chemical oxygen demand

Chemical Oxygen Demand is to determine reducing chemical in water by oxidation. COD is very useful to be an indicator of organic content in surface water. If high COD are found in the water, the dissolved oxygen will be low. Lack of oxygen in the water will threaten the aquatic life. The proportion of COD increase in the level of contamination in water (Hossain. M. A. Et. Al, 2013).

The value of BOD alone cannot be used to estimate the level of organic matter. BOD value can be effect by the amount of toxic in the water. Hence, COD value is always higher than BOD value because COD contains biodegradable and non-biodegradable matter while BOD only have biodegradable.

2.4.9 Ammoniacal nitrogen

Ammoniacal nitrogen is made from nitric acid and ammonia. It being used widely in fertilizer due to low price. The nitrogen contain on AN is high and can provide rapid growth of plant and fruit. AN is very soluble in water. Farmers releasing waste water with high AN from agricultural activities without proper treatment can cause polluted water. Active farm area and oyster pool around Huangpu River, China

cause high AN to the river (Yang. H. et. Al, 2007). AN can come from breakdown of nitrogenous organic and inorganic matter in soil and gas exchange in atmosphere. The amount of ammonia in unpolluted water is usually less than 0.1 mg/l. Ammonia concentration in surface water are usually less than 0.2 mg/l but may reach 2-3 mg/l.

2.4.10 Phosphate

The orthoposphoric acid that ionized in water is called phosphate. Generally, phosphate is an important nutrient for plants and animals. In natural way, phosphate is coming from weathering of minerals and rock. Domestic effluent, industrial discharge and run-off of agricultural is another human source of phosphate in water. High level of phosphate in water can lead to eutrophication. Phosphate can accelerate growth of algae. High level activities of algae will destruct other aquatic life. The DO level of the water will depleted and the turbidities is increasing. This situations will kill or threat aquatic organism.

2.4.11 Sulphate

Sulphate is the product of sulphur and oxygen reaction. Sulphate is coming from leach from the soil. Other sources of sulphate is decay process of animal and plants and fertilizer used in agricultural activities. However, sulphate is classified as non-toxic substances in a normal concentration. The presence of high sulphate in drinking water can cause diarrhea and dehydration to human. Generally, sulphur may occure in the form of hydrogen sulphide. Hydrogen sulphide produce rotten-egg odour and danger to human and aquatic life.

2.5 WATER QUALITY INDEX AND NATIONAL WATER QUALITY STANDARDS

Department of Environment acquired Water Quality Index to determine the water quality of Malaysian’s river. There are six parameters determined in water quality which are dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, suspended solids, ammoniacal nitrogen and pH. Based on the WQI and National Water

Quality Standard for Malaysia, water quality data can classify river in Class I, II, III, IV and V. Table 2.2, Table 2.3, Table 2.4, Table 2.5 and Table 2.6 shows water quality based on WQI.

(Refer Appendix A)

2.6 EFFECT OF WATER POLLUTION

Wastewater from industrial plant that does not go through proper treatment process can contaminate streams with the presence of impurities in suspension. It can lead to major problems such as turbidity, reduction on light penetration into the stream and bring a threat to aquatic animals. When the wastewater discharged into the water body through a pipes or sewers, organic matter will mix with the clean water at stream. Organic materials then broken down by bacteria to get food so as to reproduction. Organic matter will decompose in the presence of oxygen. Thus, the dissolved oxygen in the water will degraded. This will increase the BOD in the river.

Oxygen depletion will result in death of aquatic creatures such as fish and the growth of bacteria like bacteria and protozoa will occurred. This situation will destroyed the original ecosystem. Water polluted by domestic waste and industrial waste have pathogens. Bad diseases such as diarrhoea and malaria can spread and killed man generally. The disease can pass through water through human drinking water or bathe.

In the aspect of economy, water pollution can also affect the nation economy. River is a natural resources that rich with many usefulness. Therefore, any source of disturbance and pollution in ecosystem of the river will create bad influence on the country's economic system. Polluted river cannot generate economic income countries because there was no source of aquatic animals and aesthetic value. Polluted stream is prohibited to be a water supply for human consumption and agricultural activities. In addition, the cost of treating polluted water is very high and uneconomical. Polluted rivers cannot function as a place of recreation and tourism industry as well as reducing national income. In addition, the government should bear the costs of treating polluted river which is higher than maintaining a clean river.