



INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES



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ISSN: 2222-6990

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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v11-i8/10783>

DOI:10.6007/IJARBSS/v11-i8/10783

Received: 02 June 2021, **Revised:** 04 July 2021, **Accepted:** 24 July 2021

Published Online: 08 August 2021

In-Text Citation: (Rahman, 2021)

To Cite this Article: Rahman, H. A. (2021). Water Issues in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, 11(8), 860-875.

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Vol. 11, No. 8, 2021, Pg. 860 - 875

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ISSN: 2222-6990

Water Issues in Malaysia

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Abstract

Malaysia has one of the highest rates in population access to tap water. Based on 2017 data, Malaysia extracts 18.375 billion liters of raw water per day for treated water supply alone. However, water issues are still a significant problem in Malaysia. The aims of this paper was to highlight the water issues in Malaysia. Secondary data are collected with regard to “water issues” scope matters. River pollution, the safety of drinking water, and water disruption are some of the related water issues in Malaysia. These issues are connected. Polluted rivers caused water disruption and deterioration of drinking water quality. Undoubtedly, the water problem that we face nowadays is because we failed to see water as scarce commodities and partly due to the mismanagement of the finite water resource that we have taken for granted. The problem arising is not an easy one to solve. All these problems caused great inconvenience to the public. In short, many challenges have come up to create better water governance in Malaysia. Water is on people’s life business and responsibility, reaching from the government to water corporations, water companies, water authorities, businesses, consultants, NGOs, industries, and the citizenry. Thus, an integrated approach plan involving all stakeholders, including community participation, to cultivate the sense of ownership should be established and implemented.

Keywords: Water Issues, Malaysia, Unsustainability, Pollution, Integrated Approach

Introduction

According to the Dublin Principles on Water (ICWE 1992), freshwater is a finite and vulnerable resource, essential to sustain life, for development and the environment (Principle 1) Therefore, and this resource should recognised for its social values and economic and social values (Principle 4). Thus, water management and development should based on a participatory approach, involving users, planners, and policy-makers at all levels (Principle 2).

In Malaysia, we were showered with abundant and sufficient water resources. The rivers and streams with and no reservoir reservoirs account for 98 per cent of the total water used in Malaysia; the groundwater provides the rest. An irregular river flows regime and to obtain safe yields from surface water sources and storage facilities have been built. Now, there 63 multi-purpose dams with an entire capacity of 25 billion m³. The leading cause of the deficiency of groundwater use in the country is the availability of simple surface water resources, which have more than 150 river systems in Malaysia (FAO, n.d).

It has been estimated that renewable water consumption per capita is more than 5,000 m³ per person per year. Therefore, water supply has been provided 24 hours a day and given to more than 95% of the population. Although water can rarely be renewed per capita less than 1,000 m³ per year, the amount open to Malaysians is considerable. However, we face water shortages and crises in many places in the country. Shortages and disasters are not due to a lack of water to meet our needs. This problem will lead to the continuous management of water resources, which causes suffering to people and the environment (WWF-Malaysia, n.d).

In Malaysia, 99% of the water supply is for domestic use, where the source was taken from the water surface. In contrast, the other 1% of that amount comes from groundwater (Azrina et al., 2011). Malaysia's total local water resources are estimated at around 580 km³ / year, of which 30% of water production is for public use (FAO, 2010). About 76 per cent of water is used for agriculture, 11 per cent for municipal water supply, and 13 per cent for industry. Thus, only less than 1% of the available water resources were used to supply for drinking (Earthtrends Country Profile, 2003) where water supply is distributed and treated to consumers as tap water. By 2020, the industrial and domestic sectors are projected to be the primary water consumers in the country (FAO, n.d).

Water quality is declining tremendously in most states. The population growth, urbanisation and the expansion of irrigated agriculture are imposing rapidly growing demands on the water resources, besides contributing to the rising water pollution (FAO, n.d). Therefore, water safety and security are a crucial aspect that is required to be looked at as often as possible because water resources are the catalyst for environmental well-being and national development. According to National The Water Resources Policy Statement (2012), the safety and sustainability of water resources should be made a national priority. The priority is to ensure that the water is adequate and safe for all. Through the sustainable use, conservation, and effective management of water resources activated by joint sharing mechanisms involving all stakeholders. Therefore, integrated water resources management (IWRM) should be adopted in managing the water and catchment sectors. IWRM is an approach to effectively integrate and coordinate water-related policies, programs, and practices, which consider a variety of aspects of socio-economic development and environmental conservation. Regarding IWRM, water users should play an active role as "partners" which is allowed by the water authorities. This can be taken through participation in the implementation of privatisation, water tariff setting, water conservation and recycling, water education, and awareness with primary objectives to create a "Water Saving Association" in Malaysia (Chan, 2006). Thus, the objective of this paper is highlight the water issues in Malaysia.

Methods

This study identified and selected literature on water-related issues in Malaysia. The research was identified from various and related documents such as journals, reports, proceedings, and newspapers. Articles with key words in its titles or abstract were selected. This was done for articles published mainly in 2019-2020.

Results and Discussion

The unsustainability of Water Resources in Malaysia

Water in Malaysia is an important national issue. In Malaysia, the average water consumption produces in between 220 and 240 liters of water per day. The UN has recommended that at

least 32 per cent of water consumption above 150 litres. The National Water Services Commission proves in their report data that Malaysia has used 10.786 million litres of water a day in 2017, of which about 60 percent is used in households. Per capita, household consumption in Malaysia was 201 litres in 2017 (New Straits Time, 2019). Hydrologists have warned that Malaysia will face a water crisis by 2025. Therefore, the issue of unsustainable water resources is very critical and must be overcome to ensure the sustainability of our water resources. Among them are (WWF-Malaysia, nd):

Excessive Emphasis on Water Supply Management

The water management system in Malaysia highly relies on water management supply tactics to depend on demand. These tactics will cause problems in the long term as this water demand will eventually exceed the water supply.

Institutional Issues

There is not a single agency in the country that is responsible for the overall responsibility of water planning and management as a whole. Conflicts in water resource management, such as water rights provision, flood management, pollution control, and environmental protection, are resolved through coordination and consultation between agencies (FAO, n.d). Malaysia does not provide central authorities to manage all aspects of water resource management. Too many authorities agency has jurisdiction in different aspects of water management, which leads to sectoral water management and conflicting or competing objectives. These various water laws focus on issues of limited water resources and water supply that are directly related to the responsibilities of the respective government agencies and are therefore difficult to implement effectively (FAO, n.d).

High Water Wastage Rate

Rates of water wastage in industrial, agricultural, and domestic use are very high, and this is unsustainable in the long term. Some Malaysians are even getting free water. When a resource is cheap and readily available, they don't have a sense of responsibility towards conserving water. And, they certainly don't feel the need to use this resource prudently. As Malaysians use about 210 litres of water per person per day, it translates to wastage of about 50 litres of water (per person per day). Just imagine how much water is being wasted.

Changing Weather Patterns

Climate and weather patterns change globally and locally, which can affect water resources in various countries. For example, in 1997/98, a phenomenon called El Nino caused a severe drought, which resulted in a water crisis in many areas in Malaysia. Based on this phenomenon, this shows that water planning in Malaysia is not enough and needs to be upgraded and consider this change in weather patterns. Due to the effects of climate change, water shortages often occur.

High Non-Revenue Water (NRW) Rates

NRW refers to water produced by treatment plants but not channeled to consumer homes due to pipe leaks, inaccuracies of customer meters, and unauthorised use. The NRW rate in Malaysia is too high, with a national average of 35%. This rate is equivalent to losing 35 liters from every 100 liters of treated water (The Star, 2020). That means that almost a third of the water that should be channeled to consumers 'disappears' just like that.

Privatisation of the Water Sector

Water is considered a profitable commodity. Plans have been introduced by the government to privatise water supply in almost every state. However, some water privatisation schemes do not provide the expected results. Water privatisation is still less transparent and responsible. Moreover, private companies tend to prioritise their income generation at the expense of water quality and long-term sustainability.

Destruction and Deterioration of Water Catchments

Many of water catchments in the country have not been protected and gazetted. Without this, maintenance and protection from exploitation for development cannot be guaranteed. As a result, they are exposed to all kinds of event that results in adverse effects on the environment, which ultimately makes water resources unsustainable.

Legislation

Most of the laws related to water are outdated and need to be reviewed in the latest context. Many of the existing laws are not comprehensive enough and are too general; the scope of these laws is limited and cannot directly address current water problems. Therefore, pollution control laws should be tightened to prevent water pollution and prevent frequent water supply disruptions. A fine of ringgit should be made to the perpetrator who emits waste into the river. Besides, the government needs to introduce new policies and regulations to prohibit unavoidable pollution, with pollution permits issued as a precautionary measure.

Water Pollution

Water pollution in Malaysia had a severe problem, which harmed the sustainability of water resources. One of the issues is when the cost of treating polluted water is high and reduces the overall water availability. In the year 2019, toxic chemical pollution in the Kim River in Pasir Gudang (Johor), which disrupts the water supply to around 20,000 households, is an example. Furthermore, there were 160 cases of river pollution reported in which enforcement was taken during the Movement Control Order (MCO) period from March 18 to May 4, 2020 (Malay Mail, 2019).

Low Water Rates

Water rates in Malaysia are among the lowest compared to other countries. Due to the low value of water, the occurrence of wastage of water and excessive consumption due to this standard water rate is too cheap to push them towards water saving. Indirectly this will damage water sustainability. The water tariff in Malaysia costs 52 sen per meter, and this water tariff is among the lowest compared to Thailand, which charges more than RM1 per cubic meter. The Philippines has a tariff rate of RM2 per 1,000 liters of water, and the nearest country in Malaysia, Singapore, has a tariff rate of almost RM4 per liter (New Straits Times, 2018).

Inefficient Agricultural Water use

In agriculture, about 68% of the total water consumption is used in Malaysia. But for irrigation productivity is the best 50% in higher irrigation schemes and less than 40% for lower irrigation schemes. The irrigation water cannot be recycled. All of these factors challenge the sustainability of water resources.

Water Issues in Malaysia

The World Water Vision Report (2000) said that there is a water crisis recently. But this crisis is not about water shortages to meet our needs. The plight of water management gives severely that billions of people and the environment suffer from not being able to access water resources. If they can be appropriately managed, everyone could have sufficient equal share of these water resources. The high rate of population increase is so rapid and high that water resources can be distributed to serve everyone's needs, but not everybody's wants or greed.

Lack of clean water, water pollution, urban flood disasters, and environmental degradation around rivers or catchment areas are some of the problems related to water problems in Malaysia. For example, the rapid development in Malaysia through economic growth and land development in recent decades has had a significant impact on the environment, which contributes to the deterioration of water quality in urban river basins such as in the Klang Valley and Langat Valley. The level of pollution in the river is a significant cause of concern as it is an essential source of water supply for economic development and domestic consumption. Reports show that the downward trend from year to year has caused the problem of water pollution to become increasingly dangerous.

Moreover, the Klang valley and Langat valley had a severe shortage of clean water in early 1998 mainly due to logging and upland indirectly for housing, diesel pollution from quarries near water treatment plants in the upper Langat district, and others -other pollutants from more than 100 factories along the river. The effects exacerbate this issue it also comes from prolonged drought (El Nino phenomenon), increased non-revenue water loss and lack of resource management (Nghah & Othman, 2011).

River Pollution

Pollution control and river water quality need to be addressed immediately. This is because 98 percent of the total water used by the community comes from the river. In Malaysia, river water quality tends to decline in line with the growth of economic activity and urbanisation. The river itself faces some problems, especially during the dry season, when there is not enough water to dilute the materials discharged into the river. Therefore, water pollution problems arise. Rivers become highly polluted and are too expensive to maintain, or technology to do so is not available. In particular, the increase in population density and the expansion of urban areas and the creation of a higher frequency of construction areas are the most critical influences on changes in hydrological processes. The hydrological process, such as increased water resource development and water demand, as well as increased quantities of waterborne pollution. Which, in turn, affect river water quality (Nghah & Othman, 2011).

Malaysia has 189 river basins, of which 89 are in Peninsular Malaysia, 78 in Sabah, and 22 in Sarawak. Pollution is one of the most significant threats to the rivers (WWF, n.d). Damage to river systems, degradation of their quality, and ability to perform essential functions bring about significant consequences that affect people's quality of life as a whole. Undeniably, most threats to rivers are the direct result of our activities. Many rivers are polluted because society is indifferent to attitudes, which leads to the dumping of garbage or a reckless industry without treating garbage disposal.

River pollution in Malaysia is an environmental problem that is becoming more serious from time to time. Until now, there is no longer any practical solution to tackle this problem. The Malaysian Environmental Quality Report 2017 shows that the percentage of clean rivers has decreased since 2015, while the rate of polluted rivers has increased. At the end of

February 2019, the Minister of Science, Climate Change, Energy, Environment, and Technology, Yeo Bee Yin, revealed that there are 25 'dead' rivers in Malaysia. Sixteen rivers were found in Johor, five in Selangor, three in Penang, and one in Melaka. These rivers were categorised under Classes 4 and 5, which are reserved for highly polluted rivers and where aquatic life cannot survive (The Sunday Daily, 2019).

Ammoniacal Nitrogen (NH₃N) is a measure for the amount of ammonia found in waste products and Biochemical Oxygen Demand (BOD) are a demand for water quality determination rates. In terms of biological oxygen demand (BOD), no monitored rivers were categorised as clean rivers in 2017. Sources of organic pollution, including wastewater from industrial, domestic, and commercial activities, resulted in deterioration of river water quality in BOD conditions. In terms of NH₃N, the number of clean rivers has decreased from 115 in 2016 to 87 in 2017 (The Sunday Daily, 2019). This damage is usually associated with the discharge of treated and untreated sewage into the waterways. The high level of NH₃N pollution in the river, which is the source of raw water intake for water treatment plants, is the cause of many water treatment plant closures in Malaysia, causing thousands of households and businesses without water supply.

In general, there are various sources of pollution, for example, in domestic and industrial sewerage, effluent from livestock farms, manufacturing, and agro-based industries, suspended solids from mining, housing and road construction, logging, and clearing of forests, and heavy metals from factories. This is of grave concern since rivers are the primary sources of water supply to the country. For example, Penang faces severe water pollution problems, both on the island and land. The sea in Teluk Bahang is said to be polluted by heavy metals, while in Nibong Tebal, the water at the mouth of the Sungai Tengah river is black. The problems of fishermen they say have plagued them for about ten years (The Star, 2019).

Moreover, in Selangor, the recent pollution of Sungai Semenyih and Sungai Selangor has resulted in supply disruptions to hundreds of thousands of households for several days, which has caused significant difficulties. All types of economic activities are also affected. If this is the first occurrence of river pollution, to a certain extent, that can be forgiven. However, this phenomenon recurs almost every year. Just last year, the same river was polluted, and now, users have to bear the consequences, again. Supply could not tolerate any disruption, especially on a recent scale. Since clean water is a right, which is paid by the people, the authorities should not take an unfair attitude.

According to the DOE, many factories operate illegally along the banks of the Semenyih River. The law must have provisions to deal with the illegal factories involved. If the compound is too light, the punishment imposed must be severe, including compensation to the parties involved. The implication is that making an effort to make operations that cannot bear the actual cost of production is impossible.

It is ironic that although the cause of river pollution has been identified, enforcement is still low and slow, which fails to prevent contamination from occurring (Ngah & Othman, 2011). This is due to the restriction of various types of pollution and the number of agencies responsible for organising potential pollution activities along the river. As a result, gaps or duplication of responsibilities arise and create uncertainty about who is responsible for taking action if the river is polluted (AlAnezi et al., 2013).

In conclusion, drains, rivers, and streams have been considered as easy-to-carry garbage dumps by the general public and businesses. Drivers in Malaysia are overburdened in terms of pollution due to community indifference, limited enforcement, and, in some cases, weak laws and regulations. Several ways must follow to rehabilitate the river, such as better

enforcement and monitoring, awareness programs, and integrated efforts with local authorities.

Therefore, no one should be left behind in the effort to maintain the well-being and safety of our river. Current water quality laws need to be strengthened and implemented. There is a need to pass water laws and river laws to protect water resources precisely (Chan, 2004). Enforcement is another major challenge to ensure that the water environment is protected as it plays an essential role in ensuring that communities and industries comply with laws that protect against excessive use or mismanagement of water resources. Therefore, it is possible to monitor these resources at all times. Besides, the authorities must also constantly monitor factory activities along the river where factory operators must comply with the rules and not think of profit merely by dumping their garbage into the river. Finally, the local community, meanwhile, should be the eyes and ears of local authorities and report any suspicious activity.

How Is Safe Our Drinking Water?

Human life revolves around water. Therefore, adequate clean water is vital for our healthy life and also the health of the environment. Thus, contamination of drinking water with chemicals and heavy metals released from different anthropogenic sources has become a global concern (Rapant & Krcmova, 2007). Since 1990s, pollution of drinking water increases the stress that arises as a result of precedented population growth, urbanisation, and industrialisation (Velea et al., 2009). The contamination of water resources has an essential impact on the environment and human health (Muhammad et al., 2011).

Water quality has become an essential concern in Malaysia. As of 2015, a total of 488 water treatment plants (WTPs) are operating to treat municipal water before the water is supplied to consumers (National Water Service Council, n.d). Treatment plants in Malaysia can produce 15,536 Million Liters per day (MLD) of drinking water to consumers (National Water Service Council, n.d). Most water treatment plants use conventional water treatment systems. There are only a few water treatment plants that use advanced technology such as Actiflo Clarification System, Ultra Membrane Filtration, Dissolved Air Floatation (DAF), and Ozone (Puncak Niaga, 2013).

Water treated in Malaysia is supplied to more than 95% of the population 24 hours a day using a pipeline system, provided by water bodies such as Syarikat Bekalan Air Selangor Sdn. Bhd. (SYABAS) Besides, most drinking water sources come from surface water and groundwater, which are prone to heavy metal pollution due to natural occurrence and anthropogenic activity (Khan, 2012). Thus, problems with coloured water, blooming algae, high iron and manganese, high ammonia, and peat water still occur in some conventional water treatment plants.

Anthropogenic activities such as mining, industrial, and agricultural activities also contribute to the contamination of heavy metals in the body of water due to improper management of wastewater and discharge from fertilisers (Karavoltzos, 2008). However, most heavy metals from surface water and groundwater are usually removing during the water treatment process (Kioko & Obiri, 2012). Furthermore, corrosion of water pipes, faucets, and water fixtures can cause contaminated water supply for daily use. Unclean practices at home, such as improper drinking water storage containers and unclean operators, also contribute to this. This exposes consumers to the dangers of excess copper ions in drinking water, which can lead to acute poisoning and lead to diseases and ailments, such as liver damage, heart and kidney failure, and brain disease. Because of this statement, it is a

good practice to install a personal water filter at home to prevent heavy metal contamination (Aini et al., 2007).

The Malaysian Ministry of Health has listed the substantial metal parameters in the National Drinking Water Quality Standards to be complied with by the water body to ensure that the drinking water supplied is safe for consumers (Malaysian Ministry of Health, 2009). But, nowadays, consumers are paying more attention to water supply and more reliable services. Water quality is also essential, especially in the matter of safe and tasty drinking water. Therefore, Chiron et al. (2003) stated that, the contamination of heavy metals in drinking water is a public health problem due to their absorption and accumulation in humans as well. Thus, studies by (Aini et al., 2001) and (Azrina et al., 2011) show that drinking water quality is unsatisfactory for consumers.

Usually, in Malaysia, tap water processed in water treatment plants can be eaten directly. This is because it meets the set standards. Tap water is generally safe to drink because chlorination will kill the bacteria found in the water. However, when it is channeled through a kilometre-long pipe before reaching the house, we no longer know if it is safe to use (directly). Therefore, tap water must be boiled before it can be drunk because the treated tap water is supplied through pipes, some of which are old and rusty.

This problem is even worse because there are infectious diseases such as typhoid fever and cholera can be infected by drinking contaminated water. The effect of water pollution on health is called microbial water pollution. The human heart and kidneys may be severely affected if they drink contaminated water regularly. Other health problems associated with contaminated water are poor blood circulation, skin lesions, vomiting, and damage to the nervous system. The effects of water pollution are a significant cause of human death worldwide (Ghafoor et al., 1994).

A cross-sectional study was conducted by (Qaiyum et al., 2011) in Mukim Part Lubok (MPL) and Parit Raja (PR), Batu Pahat, Malaysia, to determine the concentration of aluminum in drinking water and to predict health. Respondents came from these two housing areas, where a total of 100 respondents were selected from the study area with inclusive and exclusive criteria. Based on their study, statistical analysis showed that 14 samples of 28 percent water collected from MPL and 35 samples of 70 percent PR concentration were recorded more than the standard limit set by the Ministry of Health guidelines for drinking water (0, 2 mg / L). The mean value of daily chronic aluminum intake (CDI) in PR drinking water (0.00707 mg / kg / day) is much higher than MPL (0.00164 mg / kg / day). The calculation of the risk index (HI) shows that the respondents have less than 1. In conclusion, there is remarkable potential for adverse effects of aluminium intake in drinking water from two areas of study.

In short, overpopulation has led to an increase in freshwater shortages globally (Lambooy, 2011). Drinking water contaminated by humans and animals is the main route of transmission of pathogens to humans. Moreover, intermittent water supply, inadequate chlorination, and sewage flooding appear to be related to self-reported sicknesses (Abu-Amr & Yassin, 2008). In Malaysia, governments consider the provision of safe water supplies as one of their significant responsibilities. Generally, drinking waters in Malaysia are sheltered because when it departs the water treatment plant, it has complied with WHO standards. WHO/UNICEF Joint Monitoring Programme report in 2015 – the first monitoring after the adoption of the Sustainable Development Agenda showed that 92% of the Malaysian population had access to safely managed water services and 82% to carefully managed sanitation services. Malaysia already has Drinking Water Quality Standards since 1985.

However, during the journey of the water, chemicals, and bacteria can enter the system. It is dependent on many other factors, such as if the building has water filters, how often the filters are cleaned or changed. Besides, how often are the considerable water holding tanks often on the roof of a building cleaned, the water tests to be conducted, the pH level, the acceptable bacteria level? This is all factors that need to be considered.

Water Disruptions, More and More!

Being in a region blessed with rain, Malaysia does not face water shortages. However, areas with water pressure in some parts of Malaysia have difficulty getting water for mobile use due to lack of resources and lack of raw water. Sometimes this can lead to a water crisis. In this situation, the availability of potable water in a region is less than the demand of that region, especially during dry times. Selangor recorded the biggest problem of water supply in Malaysia in recent years. According to a report by the Malaysian Water Association, 49.5% of all water supply problems in Malaysia were reported in Selangor. Whereas in 2017, the number increased to 62.4% (Malay Mail, 2019). Nowadays, water shortage is no longer considered a natural disaster that must be borne and accepted but instead is a human-made cause that can be dealt with and solved by humans.

One of the reasons waters continue to occur in Selangor is because the state has very little treated water storage. The water reserve margin in Selangor in 2017 was at zero percent, which was identified as one of the main factors behind the State water problem. If a pipe breaks, a water treatment plant is damaged or a sudden increase in water demand, such as during the festive season, it is very likely that certain areas in Selangor will experience water disruption.

Another reason behind the recurring water problem is the rapid development of Selangor, but the water supply and distribution system has hardly improved for several years now. Broken pipes often occur because the pipes originated when Selangor water demand was not as high as it is now, and they were not designed to deal with the rising pressure. Last year, Selangor used more water (234 litres per capita) than the national average (209 litres per capita, the highest in Southeast Asia). Although the per capita consumption of the State of Selangor is not much different from 1998 (228 litres per capita), the population has increased significantly since then (The Malaysian Times, 2019). There is also a problem with the layout of the pipe itself. The water distribution system in Selangor follows a radial pattern. Although there are advantages to this layout, a broken pipe will at least cut off the water supply for the entire area.

In October 2016, the Langat and Cheras water treatment plants were closed due to odour pollution suspected to originate from Sungai Semantan in Pahang. Some areas in Kuala Lumpur and parts of Petaling, as well as Hulu Langat, also experienced water disturbances. Previously, the Semenyih water treatment plant was closed four times due to pollution in the Semenyih River, which resulted in water disruption in several areas such as Hulu Langat, Kuala Langat, Sepang and Petaling (The Malaysian Times, 2019).

In May 2016, foul-smelling pollution in Sungai Semenyih, a tributary of Sungai Langat, caused the Semenyih water treatment plant to be closed six times, prompting several water disturbances affecting 1.6 million consumers in Selangor and Putrajaya (DW, 2020). Bad smell from ammonium pollution is also due to 90% of the plant being closed in Johor. In contrast, other pollution such as wastewater, detergent, oil spill, mudslide due to flooding, deforestation, and excavation caused the closure of treatment plants. It disrupted water supply in other parts of the country (The Star, 2019).

On October 9, 2018, there was water disruption across four districts of Selangor for a maximum period of 72 hours. The separation was to facilitate equipment replacement works at the Sungai Semenyih Water Treatment Plant (WTP). The districts involved are Petaling (132,000 account holders), Hulu Langat (64,000), Sepang (86,000), and Kuala Langat (58,000), with dry taps affecting 476 areas (EdgeProp, 2018).

In April 2019, more than four million people faced water supply disruption for up to four days from April 24 due to the shutdown of the Selangor River Phase 2 Water Treatment Plant for upgrading works. According to The National Water Services Commission (SPAN) 620,835, account holders or 4.14 million consumers were affected in 577 areas in Klang/Shah Alam, Petaling, Gombak, Kuala Lumpur, Kuala Langat, and Kuala Selangor. It explained in a statement that Pengurusan Air Selangor Sdn Bhd (Air Selangor) was shutting down the plant for an urgent power supply system upgrade to prevent any unexpected water supply disruptions from power failure (Malay Mail, 2019). The plant's shutdown disrupted the water supply for up to 86 hours, depending on the location of the consumer. Besides, on June 26, the Sungai Semenyih water treatment plant (LRA) was temporarily shut down due to contamination in Sungai Semenyih. Thus, 512 areas involving 377,141 registered customers in Petaling, Hulu Langat, Kuala Langat, and Sepang were affected by the disruption of water supply and low pressure in phases (Malay Mail, 2019).

In July 2019, a diesel pollutant detected in Sungai Selangor in the Malaysian State of Selangor forced the shutdown of four water treatment plants. Diesel oil was found at the intake of the Sungai Selangor Water Treatment Plant Phase 1, 2, and 3 (LRA SSP1, LRA SSP2, and LRA SSP3), and the Rantau Panjang LRA from the raw water of Sungai Selangor. Thus, all four major water treatment plants had to stop operation, causing considerable scale water supply disruption to the consumers. The shutdown of the water treatment plants by supply company Syarikat Bekalan Air Selangor Sdn Bhd (SYABAS) is a company involving the states of Selangor, Putrajaya, and Kuala Lumpur. SYABAS came just two days after odour pollution forced more than one million consumers to face sudden water cuts. A total of 1.2 million customer accounts in Kuala Lumpur, Petaling Jaya, Klang, Shah Alam, Kuala Selangor, Hulu Selangor, Gombak, and Kuala Langat found their pipes dry on Friday due to odour pollution detection. The same area was also affected by the water cuts on Sunday. Currently, the water cut last October 2019, for instance, changed 120,000 households in 177 districts in the Klang Valley, lasted 23 hours, throughout 2019, the Klang Valley experienced disruptions in water supply at least nine times (New Straits Times, 2018).

In March 17 2020, Water treatment plants in Sungai Selangor (LRA) Phase 1 (SSP1), Phase 2 (SSP2), Phase 3 (SSP3) and Rantau Panjang were forced to halt operations after odour pollution was detected at the raw water intake source in Sungai Selangor. The water supply was fully restored only the next day (Malay Mail, 2020). Next, in September 3, a total of 1,292 areas in the Klang Valley, Petaling, Klang/Shah Alam, Kuala Selangor, Hulu Selangor, Gombak and Kuala Langat experienced an unscheduled water supply disruption, following the halting of operations the water treatment plants in Sungai Selangor Phases 1, 2, 3 and Rantau Panjang, due to odour pollution that was later identified to have come from a factory in Rawang. This disruption was the longest for Selangor in 2020 yet, with the supply fully restored by 9am six days later (Malay Mail, 2020). Later in October 4, the water treatment plants in Semenyih and Bukit Tampoi ceased operations at 4.30pm, leaving 274 areas in Petaling, Hulu Langat, Kuala Langat and Sepang without water. The cause was attributed to odour pollution said to have originated from the Nilai Industrial Estate in Negri Sembilan, which entered Sungai Semenyih from Sungai Batang Benar. Sungai Semenyih resumed

operations on October 6, followed by Bukit Tampoi the following day, with water supply restored in stages within the next 24 hours (Malay Mail, 2020).

Despite the water crises, the water authorities continue to adopt a single approach to supply management, have neglected demand management and other water management tools. Hence, many states are on the verge of water disruption (Chan, 2004). Although some progress has been made, water crises continue to be highlighted with much to be done.

Undoubtedly, the crisis had affected community work and daily activities. The positive effect of the crisis was the changing attitude of the residents in appreciation of the value of water. However, the proper strategy needs to be put in place to ensure water safety and security with continuous development in the country because more and more of our rivers were polluted. For Selangor, the current water distribution system is almost insufficient to support its population and its ever-increasing development and needs to be improved to a better version to follow. Furthermore, the water tariff in this country should be raised to a realistic level to prevent the community from wasting water, even though Malaysia is among the countries that receive the highest rainfall in the world. The problem is that Malaysians see water as something cheap compared to other necessities because water bills for household's average only 10% of the electricity bill because the tariffs are the lowest in the region. Thus, the current malpractices by individuals and other sectors and the mismanagement by the water authorities must be recognised and addressed so that the water shortage will not re-occur in the future.

Any Solutions?

Water pollution is a serious problem in Malaysia and impacts negatively on the sustainability of water resources. It reduces total water availability considerably as the cost of treating polluted waters is too high. As example, there were 160 cases of river pollution reported in which enforcement was taken during the movement control order period from March 18 to May 4, 2020 (Malay Mail, 2020). Therefore, to minimise the negative impacts on water resources, proactive measures are needed from people, government and industry. Each can play their role to safeguard water resources. For public, increasing the awareness on the importance of freshwater resources and their sustainable management are needed. It is imperative that consumers change their attitude towards water and learn to use water prudently as experts are saying that Malaysians should brace themselves for frequent water shortages and higher tariffs in the near future. Although our water tariffs are among the cheapest globally, public cannot take them for granted and action should be taken to make every drop of water count. Currently, our average water consumption is 210 litres per capita per day. This consumption is 27% higher than the water usage recommended by the WHO, which is 165 litres per capita per day for domestic consumption. We require only 100–120 litres of water per person per day to meet our basic needs (The Star, 2020). To prevent water wastage, the first thing we can do is to be aware of how much we use. This can be done by monitoring our monthly household water bill.

With water demand in the non-domestic sector projected to increase every year, more needs to be done to reduce water consumption in industries, particularly water-intensive industries. Many successful cases were reported overseas of businesses that have implemented water recycling in their operations and have enjoyed significant water and cost savings. The benefit of cost saving is more obvious in industries because their water tariff is significantly higher compared to domestic users. In addition, we should not take the water pollution incidents lightly as they are often caused by man-made activities. Environmental

laws, need to be made tougher, with harsher penalties to serve as a deterrent. There needs to be a concerted effort by enforcement authorities which the authority concerned should not hesitate to take stern action against those found guilty by making jail terms and fines mandatory because they are the culprits causing the dangerous water supply disruptions (The Star, 2020).

Water is the source of all life, the most important liquid in our ecosystem. Human beings, plants, insects and animals cannot survive without it. Hence, there needs to be political will. For the government, reducing the level of non-revenue water (NRW) should be the top priority. Currently, the national average for NRW is 35%. This means that for every one litre of treated water produced, 0.35 litre is lost mainly due to leakage in faulty pipes (The Star, 2020). This is a huge financial loss to the water utilities that treat raw water and pump it to consumers, only to see it leak into the ground. As a comparison, Denmark and Singapore only record around 5% NRW losses (The Star, 2020). For long-term planning, the government should consider diversifying our nation's water supply portfolio by incorporating a secure and rainfall-independent water source. The only methods to expand water supply beyond its hydrological cycle are water reuse and desalination.

Conclusion

The entire water problem cannot be solved as it continues to appear from time to time. Malaysia has water problems; it may not be called the "great crisis"; however, we can get there if we are not careful. Therefore, there are many areas that need improvement to achieve better governance in water management. Ineffective management, leakage, waste, ineffective privatisation, public indifference, and other causes are the main problems of water (Chan, 2004). Therefore, the solution to our country's water problems is not by leveraging groundwater reserves by improving and maintaining existing water supply infrastructure to minimise non-revenue water loss and to promote and uphold more efficient use of water. It is also imperative that water legislation is strengthened because, at present, many of these laws are outdated, redundant, or ambiguous. Enforcement also needs to be stepped up (Chan, 2004) with more allocations provided for more enforcers and training.

Moreover, traditionally, water governance in Malaysia is mostly based on a top-down approach. This approach is found to be desirable because users do not cooperate. Public participation in water resource management should be mandatory for all development projects involving water. While it is recognised that governance and the authorities have a significant responsibility to manage these water resources, all stakeholders, including the consumers, could be roped in to contribute. In doing so, the public could volunteer their services to micromanage the water resources in their local community. They could also be training seminars and workshops where the youth and community could learn together experientially on the ground on understanding these issues and on how to manage them effectively and collectively.

Authorities need to adopt a more "people-friendly" approach by allowing the public, including NGOs, to play a more significant role in water management through consultation and participation in all water-related developments (Sharma et al, 2004). Water is everyone's business, and everyone's responsibilities range from government to water companies, water authorities, water companies, consultants, industries (including hotels, resorts, and theme parks), businesses, NGOs, and citizens (Chan, 2006). All must work together in ensuring that water resources are exploited sustainably in the best possible way economically without

endangering the environment but providing everyone accesses and protects the needs of future generations with adequate and clean water. If these pro-active measures are undertaken and implemented, it will contribute towards the holistic approach of the water management system in the country (Chan, 2009).

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