

## CHAPTER 1

### INTRODUCTION

#### 1.1 Research Background

Islam places a high value on water and is considered a blessing that gives and supports the life of Muslims while also purifying the planet and humanity (Jennifer Dergin, 2020). *Al-mā'* originated from the Arabic word for water and is referenced precisely 63 times throughout the al-Quran and is a recurring topic in many of the *hadith* of the Prophet Muhammad (peace be upon him) (Abdul Baqi', 1987). The importance of water for human life has been mentioned clearly in the al-Quran through the word of Allah SWT, which is:

﴿ أَوْ لَمْ يَرَ الَّذِينَ كَفَرُوا أَنَّ السَّمَوَاتِ وَالْأَرْضَ كَانَتَا رَتْقًا. فَفَتَقْنَاهُمَا وَجَعَلْنَا مِنَ الْمَاءِ كُلَّ شَيْءٍ حَيٍّ أَفَلَا يُؤْمِنُونَ ﴾

Which means, “Do not the Unbelievers see That the heavens and the earth Were joined together (as one Unit of Creation), before We clove them asunder ? We made from water every living thing. Will they Not then believe?”.

(Al-Quran. Al-Anbiya' 21:30)

Al-Quran and the *hadith* teach its followers principles of social justice and equity, which extends into the practice of preserving the earth's natural resources, particularly water

conservation. According to Islam, water is a community resource and blessing for all humankind. Prophet Muhammad SAW highlights this in the following hadith:

المسلمون شركاء في ثلاث: الماء والكأ والنار

Which means, “Muslims have a common share in three things: grass [pasture], water, and fire [fuel].”

(Hadith. Abu Dawud. Kitāb al-Ijārah: Book 23: #3470)

Al-Quran has set down the foundations of water conservation and demand humankind to manage earth’s water resources. This can be seen as follows:

﴿ وَأَنْزَلْنَا مِنَ السَّمَاءِ مَاءً بِقَدَرٍ فَأَسْكَنَتْهُ فِي الْأَرْضِ وَإِنَّا عَلَى ذَهَابٍ بِهِ لَقَادِرُونَ ﴾

Which means, “And We send down water From the sky according to (Due) measure, and We cause it To soak in the soil ; And We certainly are able To drain it off (with ease)”.

(Al-Quran. Al-Mu’minun 23:18)

Furthermore, Allah has instructed humankind not to be wasteful in the following verse:

﴿ يٰٓأَيُّهَا آدَمُ خُذُوا زِينَتَكُمْ عِنْدَ كُلِّ مَسْجِدٍ وَكُلُوا وَاشْرَبُوا وَلَا تُسْرِفُوا إِنَّهُ لَا يُحِبُّ الْمُسْرِفِينَ ﴾

Which means, “O children of Adam! wear your beautiful apparel at every time and place of prayer: eat and drink: but waste not by excess for God loveth not the wasters”.

(Al Quran. Al-A’raf. 7:31)

Prophet Muhammad (peace be upon him) exemplifies the logical approach to sustainable water use through the manner in which he performed the ablution ritual. The principle

of water conservation is illustrated by the rule, which says that while making ablutions (*wuḍū'*), we should be abstemious in water use, even while using water from the river. The Prophet performed ablution with just one *mudd* of water, equivalent to 2/3 of a litre and bathed with one *sa'* of water, equivalent to around 3 litres in modern volume measurements. All the evidence shows the importance of water and the proper ways to use water according to Islam guidelines, as water is an essential element in a Muslim life. There are many others evidence that mentions the water's importance. Discussions about water status can also be found in the first chapters of contemporary *Fiqh* and *turath* (classical) *Fiqh* books.

Meanwhile, in the global world, awareness of the importance of water received the attention of the United Nations in its 47<sup>th</sup> annual conference on 22<sup>nd</sup> December 1992 in Rio de Janeiro, Brazil. They have launched World Water Day, which will be celebrated every March 22 to give awareness regarding the clean water quality of the world.

At the same time, there are also predictions of a worsening food supply which can be seen as relevant to water scarcity and related to each other. Water supply is a severe problem in Asian countries as currently, one in three people in Asian countries do not have enough clean water supply, which also leads to future food production limitations. Accordingly, water is much more valuable than food because, without food, humans can still live, but without the presence of water for only three days, humans will surely die (Murdin, 2000).

This means the water is crucial, but if drinking water is contaminated and poisonous, it will adversely affect life expectancy. Additionally, the UN reported that the potable water in the world could only be filled into a cube-shaped tank measuring 95 square miles only (UNEP, 2012). This shows how much water is readily available on

this earth nowadays. While according to United Nations (2020), 1 in 3 people are living without safe drinking water; by 2050, up to 5.7 billion people could be living in areas where water is scarce for at least one month a year. The effect will be doubled by 2040 as water demand is expected to increase by more than 50%. These are the expected situation by the water experts towards our source of water forwarded.

Alex Kirby (1999) has reported that the earth has no fresh water compared to 2,000 years ago. The evidence is apparent when the countries in the Middle East that rarely receive rain, like Israel, Jordan and Syria, struggle to secure their water supply from the Jordan River Valley and its surrounding areas. Now, as a result of the shortage of water supply, some countries such as Saudi Arabia, Israel, Jordan and North Africa need to import clean water from other countries, especially Egypt. It is estimated that within the next 25 years, 48 countries, especially those in Africa, with more than one-third of the world's population, will suffer from water scarcity.

Zaharuddin (2004), in his article, mentions that Malaysia has a level of system and water management that is considered to be among the best in the region, with the reservoir and water catchment systems and rivers that are still functioning to supply water needs of its inhabitant. The water crisis in 1998, which contaminated and dried the rivers in Malaysia, is threatening the existence of Malaysia's water source. According to Datuk Seri Dr Wan Junaidi Tuanku Jaafar, Minister of Natural Resources & Environment said that there are ten highly polluted and contaminated rivers in Malaysia, namely: a) Air Merah River, Johor; b) Sebulung River, Johor; c) Sengkuang River, Johor; d) Jelutong River, Penang; e) Tukang Batu River, Johor; f) Untut River, Selangor; g) Air Baloi River, Johor; h) Tampoi River, Johor; i) Rembia River, Malacca; and j) Seluang River, Perak. Hence, the Department of Irrigation and Drainage plan to restore and revive these contaminated rivers should be implemented immediately to ensure the

water supply in this country will not be affected soon (National Resources & Environment, 2016). So, water waste should be immediately treated to prevent the worsening of the water crisis so that people would not suffer the prolonged impact of water scarcity. The saying of Bahá's Great Parakrama, Sri Lanka's King of the 12th century:

"Do not allow even a drop of rainwater to flow into the sea without benefitting the people".

Another quote by Audrey Azoulay (2020), the Director General of the United Nations on World Water Day 2020, says that the water crisis is global. Without sustainable access to water, we will be unable to achieve goals such as quality education or developing more prosperous, fairer societies. History has demonstrated this by example in China, and in the Middle East, the major rivers (the Yangtze, Nile and Euphrates) made the first great agrarian and urban civilizations possible. Given the situation's urgency, the coming decade must be one of action.

Consequently, serious action must be taken as the water crisis scenario worsens. Wastewater and sewage water from residential, urban and industrial areas that flows back into the natural environment without being treated or reused must be stopped and improved. In this regard, wastewater treatment methods were introduced to solve the problem.

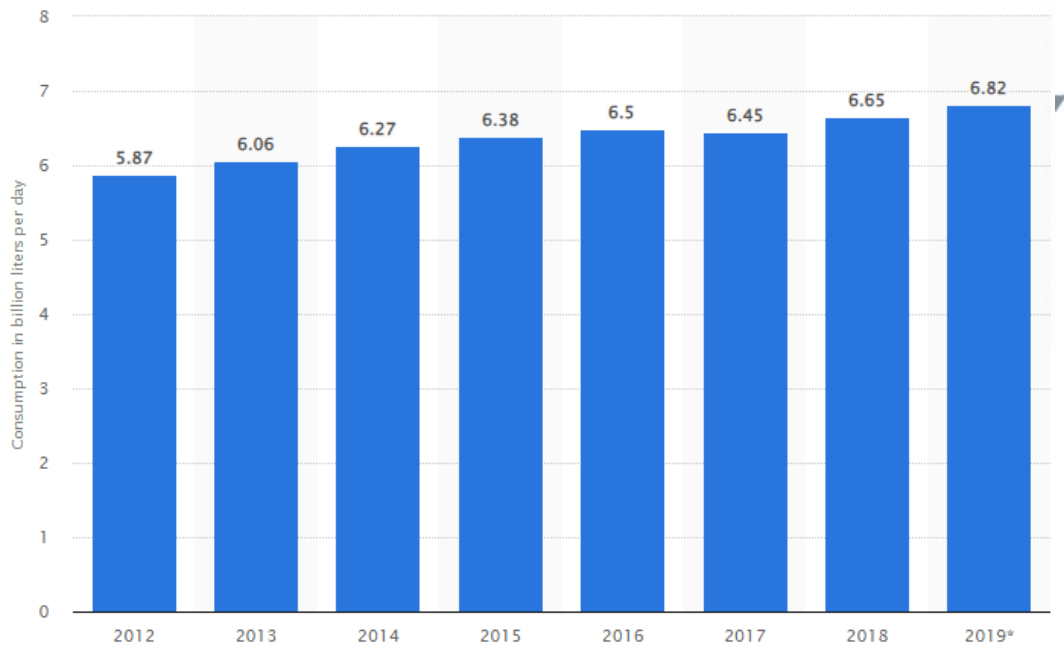
Hence, the method of treatment and purification of water is invented to avoid wasted water and conserve nature. There are many treatment methods used today in households and industries to reuse water, and it is permissible and accepted in science perspective as not harmful to the body's health. But are these methods applied nowadays in line with Islamic guidelines? So, this study is to determine and then suggest the best method of treatment and purification of water in line with *Fiqh's* perspective.

## 1.2 Problem Statement

Water is an essential and primary source to ensure human and other creatures' continuity. There is plenty of water on this planet, but increasingly this water is not where it is needed, or it is of inadequate quality (purity) for human consumption nor for industrial and agricultural usage. Contaminated water supply causes harm to human health and also contributes to the extinction of particular flora and fauna.

Various efforts have been made to provide exposure and awareness to human beings on the importance of effective and best water management, such as the World Water Day celebration held on 22<sup>nd</sup> March every year. A report released by the World Health Organization (WHO) shows that half of the world's population will live in a water crisis by 2025 if water consumption levels remain as they are now and barely any steps are taken to resolve this issue (Jye, 2017). UNESCO also expects the earth to face water scarcity by 2050 due to rising global population, urbanisation, and water demand from agriculture, industry and other sectors (Yusof et al., 2020).

Malaysia is among the highest countries in Southeast Asia in water consumption, with almost 300 litres per capita per day (R Shaheed, WHMW Mohtar, 2017). Every Malaysian household uses almost 211 litres of daily water daily (Sobian, 2018). In contrast, World Health Organization recommended the usage of water of only 165 litres per day only (Jye, 2017). However, the average of water for daily consumption by a Malaysian is currently 300 litres, which is double the benchmark recommended by the United Nations (Bernama, 2016). Malaysians overuse water daily, and the major contributor is domestic water consumption which is categorised into 30% of the water used outside the house, 19% used in the toilet, 12% for bathing, 15% for laundry, 9% for food and beverage, 9% leakage and 4% for other domestic uses such as cleaning services (Raduan, 2018).



Source: Muller (2021)

**Figure 1.1:** Domestic Water Consumption in Malaysia 2012-2019

While in the context of use for worship, almost 80% of the total water consumption in a mosque is for ablution (Misbahul Muneer et al., 2014) and almost 30-47% of water is wasted while performing ablution, with half of the water flows directly into the drain without barely any contamination (Zaied, 2016). It also can be seen in some studies that have been conducted that almost 86,500 litres of water have been used per month for ablution (Suratkon A, Chee MC, 2014). Water is required for an individual to do ablution for one prayer time, and the minimum of water used during ablution is suggested to be less than a litre, between 0.5 to 0.68 litres (Hashim, 2016).

Therefore, Muslims should try to practice what the Prophet Muhammad has done in ablution by only using 1 mudd (2/3 litre) of water (Nasir I. Faruqui et al., 2000). Thus, the reuse of ablution water is seen as the best effort in managing water resources because ablution wastewater or *mustaʿmal* water does not contain harmful chemicals, however

there are high amounts of foodstuff and may contain suspended solids, BOD5, pH turbidity and few contaminants or faecal coliform and little chemical contaminants such as nutrients and sodium result from the use of chemical products such as soap (Misbahul Muneer et al., 2014). Water demand is also expected to continue to increase in line with economic development until 2050, predominantly from the domestic and industrial sectors (Riffat et al., 2017).

Thus, reuse, recycling and diversification of water reuse are present needs (Konda Reddy et al., 2017). Even greywater and blackwater (*mutanajjis* water) can be treated and reused. Jye (2017) added that wastewater reuse would improve water resource availability. This can be seen from the Orange Country Water District (OCWD) in California, USA, which applies this system to 850,000 residents with water production of 70 - 100 million gallons per day. In addition, Abbott Company, a manufacturer of medical and healthcare devices, also uses the method of recycling wastewater produced and can meet more than one-third of the total water needs at its plant in Rio De Janeiro, Brazil (Jye, 2020).

Singapore has also produced NEWater technology which now contributes as much as 30% of water to the country's demand (Riffat et al., 2017). Due to their water shortage, treatment or reclamation water usage has been introduced in that country. Though, the acceptability among the users is an obstacle towards this action due to several factors such as disgust or 'yuck' factor, specific reclaimed water applications like toilet flushing versus bathing, sources of water to be recycled which are from greywater and blackwater and so on (Exall & Vassos, 2012).

In addition, some Muslims have specific objections to using treated water as they believe it is not permissible, especially on religious grounds. These factors come from lacking knowledge. It can be seen from the acceptability of South African users when

The municipal considers introducing the usage of reclamation water as a supplement to existing potable water resources (Ismail Tayob et al., 2015) and also the acceptability of Singapore residents towards NEWater sourced from wastewater to drink which some have irked on it (Exall & Vassos, 2012).

Available technologies for water treatment are reaching their limits in providing sufficient quality to meet human and environmental needs (Qu et al., 2010). Reusing, recycling and repurposing water are the 'needs of the day' (Konda Reddy et al., 2017). Subsequently, there are various methods and ways to treat raw water sources for water to be consumed safely. Advanced technologies for water purification are essential to meeting current and future water needs, and one of the methods to purify the water is by using the membrane treatment process. The membrane process is used in several ways to purify water because of their energy efficiency, which the membranes helped to do. This method will grow in importance compared to other water-purifying technologies (Geise et al., 2010).

Membrane water treatment technology is a new technology in treating and purifying water because it's energy efficient and saves almost 60% of water after treatment. This membrane water treatment method has been widely applied in treating wastewater and sewage, such as in NEWater, which will be for domestic as well as industrial or commercial use. However, this method raises doubts amongst Muslim consumers because the water source came from *musta'mal* or *mutanajjis* waters. In addition, the materials used in the manufacture of membrane water filters also consist of organic materials such as polymers, carbon, etc., as well as inorganic materials such as clay (clay), bone, shells, fibre, kaolin, kenaf and so on.

Reusing this water source raises doubts, especially for worship purposes such as purifying the large and small *hadath* and drinking. Muslim consumers question the status

or *hukm* of the treated water because the source of water before treatment is derived from *musta'mal* water and *mutanajjis* water (Osman et al., 2020)

Although the fatwa has ruled that treated water from wastewater such as NEWater can be used for religious purposes, some Muslims are still hesitant to reuse treated water derived from sewage wastewater due to this confusion. While, based on the 53<sup>rd</sup> Muzakarah Jawatankuasa Fatwa Majlis Kebangsaan Bagi Hal Ehwal Ugama Islam Malaysia, which convened on 27<sup>th</sup> November 2002 stated that the use of NEWater is clean and can be used from the point of Islamic law (JAKIM, 2015). However, some people are also still sceptical regarding the safety level of treated effluent use (Jye, 2020). Nevertheless, it has been proven effective when looking at the implementation and the current use of NEWater in Singapore since 2000.

Even after going through the process of water treatment and purification by membrane water technology to produce clean and pure water from *zahir* sight, the water source used still brings doubts and disgust to consumers because the process of treatment is to reuse *musta'mal* water and *mutanajjis* water. Once processed, the water will turn into clean and pure water on the *zahir* sight, but it will cause doubt among the people since the source and origin of the water is dirty and disgusting wastewater despite the use of a membrane process in treating the wastewater is accepted and in line with *Fiqh* perspective.

In addition, the use of materials for the filter should also be evaluated from the point of view of its *hukm*, whether it's *halal* or not. The material used in the membranes filter also sparked controversy in the water treatment process, where there have been reports that the bones of cows and pigs are widely used in water filter products (Halim et al., 2014). The correlation between the current water treatment process with the *musta'mal* water and the *mutanajjis* water purification method discussed by the *fuqaha*

should be examined to clarify the confusion and doubt arising from Muslims as an effort to enhance and promote the use of treated water for religious purposes. Thus, this study will discuss the treatment of membrane water in the context of *Fiqh* and then evaluate it from a juristic view of the usage of membrane water treatment, especially for religious purposes.

### 1.3 Research Questions

The research questions of this study are as below:

- a) What are the water treatment and purification concepts from *Fiqh* and science perspectives?
- b) What is the status/*hukm* of the membrane water treatment and purification technology?
- c) How is the membrane water treatment from *Fiqh* perspective?

### 1.4 Research Objectives

The objectives of the research as outlined below:

- a) To identify the concept of treatment and purification of water (*taṭhīr al-mā'*) according to *Fiqh* and scientific perspectives
- b) To study the status/*hukm* of the membrane water treatment and purification technology
- c) To evaluate the membrane water treatment from *Fiqh* perspective

## 1.5 Research Significance

This research significance is outlined below:

- a) This study is able to identify water usage in daily human life as the water is recycled and reused by the suggested membrane water treatment technology.
- b) This study is expected to be able to provide a legal solution to the Muslim from the point of view of facilitating their *taharah* matter focusing on the treatment and purification of *musta'mal* and *mutanajjis* water.
- c) This study is expected to provide comprehensive research from the perspectives of *Fiqh* to ensure the water purification methods applied by consumers are accepted and in line with the guidelines outlined by Islamic scholars.
- d) This study is hopeful to be the main point of reference for many parties, especially for the halal industry, water processing industries, researchers, relevant field engineers and others, especially Muslims.

## 1.6 Research Scope

This study on water treatment applications focuses on membrane filter materials that can save water usage, especially for domestic use. The raw water sources before being treated using the membrane filtration process usually come from wastewater or *musta'mal* and *mutanajjis* water, which is also studied in this research to know the water status after treatment. This study focused on *musta'mal* water produced from ablution water usage. This treated water will be used for daily human purposes like bathing (*wajib* and *sunnah*), drinking and taking ablution. Then, the treatment is evaluated from Fiqh perspective.

## 1.7 Operational Definition

The terms used in this study are defined below:

### 1.7.1 Shariah Compliance

Shariah or Islamic Law is derived from these primary sources; the Quran, hadith or *sunnah* (sayings and practices and also traditions of the Prophet Muhammad PBUH) and also the other secondary sources such as *Qiyas* (analogical deductions and reasoning), *Ijma<sup>c</sup>*; (consensus of Islamic scholars) and *Ijtihād* (legal reasoning) (FTSE Shariah Research, 2013). Next, Shariah compliance means adherence and conformity with the Shariah principles (Engku Rabiah Adawiah, 2013). So, in the context of this study, Shariah compliance membrane water treatment can be defined as membrane water treatment that provides process and materials bounds with Shariah principles. Shariah principles also can be described as the principle of *Maqāsid Syarīah* (the ultimate objective of Shariah) in protecting mankind and preventing harm from humans in this world and hereafter (al-Jauziyyah, 1973). The essential objective of Shariah is divided into five fundamental values to be protected (*al-darūriyyah al-khamsah*); religion (*al-dīn*), life (*al-nafs*), dignity and lineage (*al-‘ird*), intellect (*al-‘aql*) and property (*al-māl*).

### 1.7.2 Water Treatment

Water treatment can be defined as any procedure or method used to alter the chemical composition of a water supply, either surface water or remote groundwater. The origin of water (surface or remote) affects the content of its contaminants (Grassman et al., 2002).

### 1.7.3 Water Purification

Water purification removes contaminants from untreated water to produce potable, safe and pure enough water for human consumption (Holed et al., 2014). While according to Britannica Encyclopaedia, water purification is the process by which undesired chemical compounds, organic and inorganic materials, and biological contaminants are removed from the water. Hence, this study defines purification as the method of purifying water from the Islamic perspective (*Fiqh*) or *tathīr al-mā'*.

### 1.7.4 *Fiqh* Perspective

*Fiqh* is the Islamic jurisprudence and the science of Shariah (FTSE Shariah Research, 2013). This study uses *Fiqh* guidelines to evaluate the membrane water treatment model and whether it complies with Islam or vice versa.

### 1.7.5 Halal

Halal originates from the Arabic word *halla*, *yahillu*, *hillan*, *wa halalan* means allowed or permissible by the Shariah law (JAKIM, 2014). Halal means activities, professions, contracts and transactions permissible in Islam (lawful) (FTSE Shariah Research, 2013). According to Trade Descriptions (Definition of Halal) Order 2011 and Trade Descriptions (Definition of Halal) (Amendment) Order 2012 defines halal as follows:

- i. When food or goods are described as halal or are described in any other expression to indicate that the food or goods can be consumed or used by a Muslim, and the key points are:

- a. neither is nor consist of or contains any part or matter of an animal that is prohibited by Shariah law for a Muslim to consume or that has not been slaughtered following Shariah law and Fatwa;
  - b. does not contain anything impure/ *najāsah* according to Shariah law and Fatwa;
  - c. does not intoxicate according to Shariah law and Fatwa;
  - d. does not contain any part of a human being or its yield, which are not allowed by Shariah law and Fatwa;
  - e. is not poisonous or hazardous to health;
  - f. has not been prepared, processed or manufactured using any instrument that is contaminated with najs according to Shariah Law and Fatwa; and
  - g. has not in the course of preparing, processing or storage been in contact with, mixed, or in proximity to any food that fails to satisfy paragraphs (a) and (b).
- ii. When services related to the food or goods are described in any other expression to indicate that a Muslim can use the services, such expression means that the services concerning the food or goods are carried out per Shariah law.

Specification of halal also will be described in the model of membrane water treatment in this study.

### **1.8 Research Structure**

The structure for this research is arranged and written for seven chapters. These chapters are distributed according to the three objectives of this research. The first chapter discusses the introduction and first picture of this research, the problem statement, and the research question, which are answered by research objectives, significance, scope and conclusion for the first chapter.

Next, the second chapter is about a literature review discussing research topics and recent research from other researchers to review the issues and the gap related to the topic discussed. The third chapter discusses the methodology used for this research and also explains the flow and operational framework of the research.

The fourth chapter is about the water treatment and purification method from Fiqh and scientific perspective, including the *tahārah* and *najāsah* chapter as the introduction. Next, the fifth chapter discusses the concept and application of membrane water treatment from a scientific perspective. The next chapter is portrayed the data analysis and also the finding from the research, especially from the interview method. Lastly, chapter seven is about discussion, conclusion, and suggestions for the following related research. This research evaluates the membrane water treatment in Fiqh view that Muslims can use for all purposes. The summary of this research structure is as follows:

- Chapter 1: Introduction
- Chapter 2: Literature Review
- Chapter 3: Research Methodology
- Chapter 4: Water Treatment and Purification in *Fiqh* and Scientific Perspectives
- Chapter 5: Membrane Water Treatment Technology
- Chapter 6: Data Analysis and Findings
- Chapter 7: Discussion & Conclusion