

**YANGON UNIVERSITY OF ECONOMICS  
DEPARTMENT OF APPLIED ECONOMICS  
MASTER OF PUBLIC ADMINISTRATION PROGRAMME**

**A STUDY ON THE EFFECT OF WATER POLLUTION ON  
ONSHORE COMMUNITIES ALONG THE YANGON RIVER**

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MPA – 26 (22<sup>nd</sup> BATCH)**

**JUNE, 2025**

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**A STUDY ON THE EFFECT OF WATER POLLUTION ON  
ONSHORE COMMUNITIES ALONG THE YANGON RIVER**

A thesis submitted as a partial fulfillment towards the requirement of the Degree of  
Mater of Public Administration (MPA)

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This is to certify that this thesis entitled “**A STUDY ON THE EFFECT OF WATER POLLUTION ON ONSHORE COMMUNITIES ALONG THE YANGON RIVER**” submitted as a partial fulfillment towards the requirement for the degree of Master of Public Administration has been accepted by the Board of Examiners.

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## **ABSTRACT**

The purpose of this study is to examine the effect of water pollution on onshore communities in Myanmar. This study mainly used descriptive method by using primary and secondary data. Primary data were collected from 150 respondents who are living onshore of Yangon riverbank by using simple random sampling method. The findings indicate that water pollution negatively affect socioeconomics conditions, and health conditions of the respondents. The findings also emphasize that water pollution not only undermines environmental sustainability but also leads to economic burdens, livelihood insecurity, and serious health challenges for local communities. The findings also highlight that poor water quality contributes to increased medical expenditures and negative affects household income by reducing productivity. Therefore, this study suggests that it is important to conduct the environmental laws and regulations, improvement of water infrastructure, health education programs, and collaborative efforts among all stakeholders.

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# CHAPTER I

## INTRODUCTION

### 1.1 Rationale of the Study

Water is one of Earth's most plentiful resources and essential to life. UNESCO's 2021 World Water Development Report states that freshwater use has increased by 1% annually since the 1980s and sixfold in the previous century (Lin, Yang & Xu, 2022). Water is one of our most precious resources since it covers about 70% of the planet (Murmu, 2020). Rising water demand is degrading water quality (Lin, Yang & Xu, 2022). According to the WHO, polluted water is unsafe for human consumption. It's poisoned water that kills over 500,000 people a year from cholera, dysentery, poliomyelitis, typhoid, and diarrhea. Human activity and its impacts are the main cause of low-quality water owing to a lack of knowledge, rules, and resources (Iberdrola, 2025).

All living things depend on water (water use and the environment). According to Water utilize and the Environment, humans consume water and utilize it for industry, agriculture, and enjoyment. Humans and aquatic life are equally impacted by water pollution. The majority of water supplies near cities and metropolitan centers are contaminated by trash and chemical dumping, whether done officially or illegally. Water pollution occurs when pollutants are released into subterranean groundwater or lakes, streams, rivers, and seas that interfere with water usage or ecosystems (Nathanson, 2024). Due to garbage, including floating plastic bags and chemicals, our waterways are poisonous (Murmu, 2020).

Water pollution is mostly caused by industry, agriculture, natural causes, and sewage treatment plants. Industrial wastewater has increased as urbanization has advanced. Lin, Yang, and Xu (2022) cite Wu et al. In conclusion, urbanization, population growth, industrial production, climate change, and other human activities will affect water quality (Dwivedi et al., 2018 as mentioned in Lin, Yang & Xu, 2022). Improper gravel, sand, and solid waste disposal also degrades water quality (Ustaogglua et al., 2020 as stated in Lin, Yang & Xu, 2022). Although severity

varies by location, age, gender, and other factors, water pollution harms human health. The most common sickness caused by water pollution is diarrhea, which is spread by enteroviruses in aquatic habitats, according to Lin, Yang, and Xu (2022).

Due to rising domestic and foreign investments in the industrial, urban, and rural development sectors, Myanmar has been confronted with significant environmental management issues (Win, 2021). In terms of poorly managed plastic, Myanmar ranks 17th out of 20 nations, with marine plastic trash reaching 0.07 to 0.18 million metric tons annually in 2010 (Jambeck et al., 2015). Many plastics that are not recycled and are instead dumped in landfills or open dumps wind up in rivers before being carried to the oceans (Lebreton et al., 2017 as referenced in Han, 2022). Growing populations and industries in water management will be the main cause of pollution and health issues due to a lack of technology and inadequate facilities. When creating policies and procedures for preventing and controlling water pollution, Myanmar must use global best practices and experiences. Thus, one of the primary challenges for growth is the prevention and management of water contamination (Win, 2021).

To improve water quality and reduce the health risks of water pollution, governments should deploy intervention measures and strengthen water intervention management. Environmental pollution and deterioration from urbanization, agriculture, and industry harms water sources that are vital to life, human health, and sustainable social development (Lin, Yang & Xu, 2022). 90% or more of the pollutants in sewage may be eliminated by well-designed and run systems. Some plants do, however, have extra mechanisms to eliminate contaminants and nutrients, although these more sophisticated treatment procedures become increasingly costly (Murmu, 2020).

This study investigates the impact of water pollution on livelihoods of onshore communities who are residing on the Yangon riverbank in Myanmar. It helps to deep understanding about the critical environmental issues affecting not only the health and ecosystems but also the livelihoods of onshore communities along the Yangon Riverbank. However, despite efforts to mitigate its effects, many onshore communities continue to face challenges due to polluted water sources. In this area, water pollution has increasingly become and related to be harmful for socioeconomics of the residents. Water supplies for the entire area must be provided by the government. Thus, residents must utilize impure water, creating harmful living

circumstances. Thus, inhabitants of onshore Yangon riverbank regions have contracted infectious ailments, resulting in income loss and expensive health costs. Water contamination harms human health, thus policymakers must be aware of its relevance. This research offers insights and recommendations regarding Yangon River water quality.

## **1.2 Objectives of the Study**

The objectives of the study are as follows:

1. To determine the major sources of water pollution on onshore communities Yangon River in Yangon,
2. To investigate the effect of water pollution on livelihood status of onshore communities of Yangon River in Yangon.

## **1.3 Method of Study**

The study is mainly based on the descriptive research method. Both primary data and secondary data are utilized in this study. The primary data is collected from 150 selected households who are individuals living along onshore of Yangon River by using structured questionnaires. The data were collected through in person survey at the study area. Simple random sampling method is applied in this study. The collected primary data is summarized by using quantitative methods and analyzed by using descriptive approach. Residents' demographics and views on water pollution's effects on socioeconomics and health are included in the surveys. Secondary data comes from research papers, journals, publications, and websites.

## **1.4 Scope and Limitations of the Study**

The study focuses on the impact of water pollution on the livelihoods of onshore communities of Yangon Riverbank in Myanmar. Specifically, socioeconomic impact of water pollution, awareness and knowledge, and water quality are included in the scope of this study, excluding others factors. The study was conducted upon onshore communities along Yangon River in Yangon region excluding others. Data collection and analysis specifically target this demographic to ensure relevance and accuracy in addressing the research objectives. Moreover, the findings of this study are limited to the population living along the riverbanks due to the time constraints.

As such, the results may not be generalizable to individuals living in other areas and cities. The survey period is on May, 2025 to June 2025.

### **1.5 Organization of the Study**

Five chapters make up this study. The first chapter covers the study's premise, objectives, methodology, scope, limits, and organization. The second part reviews scholarly research, while the third chapter discusses Myanmar's pollution and water pollution. The fourth chapter covers survey profile, design, and analysis. Chapter five contains case study findings and suggestions.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Pollution**

Pollution is the release of solid, liquid, or gas into the environment that harms wildlife, humans, and the environment. Environment affects water, air, and land pollution (Ariho, Aja et al., 2025). Pollution is also the contamination of bodies, generally by humans, that damages their regular usage. Pollution is the mixture of environmental contaminants that harms the ecosystem. Pollution may result from chemicals or energy misuse like noise, heat, and light. The components that pollute are termed pollutants (Singh & Gupta, 2016). Today, many contaminants threaten our environment and health. Printing, dyeing, and finishing pollutants are a major issue.

Praveen et al. (2016) defined pollution as environmental changes that harm humans, animals, and plants. This arises when people prioritize short-term financial rewards over global ecological benefits. Human action has altered the environment more than natural events. Pollutants, usually garbage, are the principal causes of pollution. Pollution disrupts our ecosystem and environmental balance, and as our globe modernizes and develops, pollution has peaked, causing global warming and human sickness (Meenakshi and Premlata, 2022). Environmental contamination disrupts our lifestyles by polluting the environment. Air, heat, noise, and water pollution are kinds of environmental pollution.

#### **2.2 Types of Pollution**

Each sort of pollution affects the environment and human health differently. Air pollution, which includes particulate matter, carbon monoxide, and nitrogen oxides, is caused by vehicle emissions, industrial operations, and fossil fuel combustion (National Geographic Society, 2023). These airborne contaminants cause climate change and other cardiovascular and respiratory diseases. Soil, noise, and heat pollution are also significant. Industrial waste, heavy metals, and dangerous chemicals pollute soil due to inadequate agricultural and waste management (Taylor

et al., 2008). The food chain, agricultural output, and soil fertility can be affected by this pollution. Noise pollution comes from transportation, construction, and industry. It can induce stress, sleep disruptions, hearing loss, and animal behavior problems (WHO, 2018).

Thermal pollution—heat pollution—occurs when power stations or factories leak hot water into natural waterways. Like this, untreated sewage, agricultural runoff with fertilizers and pesticides, and industrial discharge pollute lakes, rivers, seas, and groundwater (United States Environmental Protection Agency, 2023). Human health is dangerous due to ecological disturbance, aquatic life damage, and contaminated drinking water.

### **2.3 Overview of Water Pollution**

Water, a renewable resource, supports life, food production, economic progress, and well-being. It is a unique gift from nature to humans and cannot be replicated for most uses. Transportation is expensive and cleanup is tough. Water is one of the most controlled natural resources since it can be diverted, transported, stored, and recycled. Many individuals utilize water because of these properties (Singh & Gupta, 2016). Surface water is in lakes, marshes, rivers, streams, and reservoirs. Groundwater flows into rock and soil pores and fills them (CJ APPU, 2020). The nation's surface and groundwater resources affect agriculture, hydropower, livestock, industry, forestry, fisheries, navigation, and recreational activities (Singh Gupta, 2016). Any change to water's physical, biological, or chemical properties that harms living beings or makes it unsuitable for use (CJ APPU, 2020).

Groundwater and externally polluted water (lakes, streams, estuaries, and marine pollution) are two types of water pollution. Water pollution comes from point and non-point sources (STEFANIE, 2022). We often take water's cleanliness for granted, but we must check it. Human activity is the main cause of groundwater and surface water pollution. Point sources are obvious pollution sources. Examples include industrial and municipal discharge pipes that pollute water. Acid rain, stormwater drainage from streets, parking lots, and lawns, agricultural runoff from farms, animals, and croplands, and others are non-point sources of pollution (CJ APPU, 2020).

More than 80% of wastewater worldwide is thrown into waterways without treatment (UN study, 2020) (Asian Development Bank, 2023). Only one-third of

Asian wastewater is treated before release. Many African nations have dirty water and inadequate sanitation, affecting 319 million people globally. L. Victoria algal blooms and eutrophication are important environmental and public health threats in East Africa. Studies show that only 30% of Ugandans have better sanitation, and urban water sources are often contaminated with plastic and feces. Growing urbanization, industry, and agriculture are the primary sources of water pollution, according to Sahoo and Goswami (2024) and Taylor et al. (2008). This reduces the most common problem of eutrophication, which occurs when fertilizer runoff and sewage and effluent discharge pollute inland lakes and rivers with nitrogen and phosphorus (Ariho, Aja, Muhammad & Mohammad, 2025).

Over the past few decades, population growth and rapid industrialization have increased freshwater demand (Ramakrishnaiah et al., 2009). Most agricultural development activities harm human health, notably through excessive fertilizer usage and unsanitary conditions (Okeke and Igboanua, 2003). Human activities including urbanization, agriculture, industry, and population increase have degraded water quality in many parts of the world. Water shortages have made water quality improvement and pollution management harder (Bu et al., 2010). River water quality must be safeguarded due to severe water pollution and global water resource deficit (Singh & Gupta, 2016).

#### **2.4 Causes and Main Sources of Water Pollution**

Maintaining life requires clean, drinkable water. In addition to being a vital natural necessity for all living things, water is also crucial for the socioeconomic development of the human race (Praveen et al. 2016). Both the amount and quality of water are impacted by human activity. The current water resources are being contaminated by man-made or anthropogenic water pollutants, such as agricultural and domestic wastewater, animal waste, different pesticides, agricultural fertilizers, radioactive wastes, and erosion of nearby water bodies. According to Coyte et al. (2019), as stated in Kumar & Mishra (2024), all of these contaminants are detrimental to aquatic life as well as human health.

Furthermore, one of the most crucial natural resources in every economic system is water. For any community, it is the source of growth and the means of subsistence. Without water, life on Earth's surface would not be conceivable. However, fish, one of the most significant food sources in the planet, can only be

found in water resources. Additionally, a variety of marine transportation methods use water to connect different regions of the world. Additionally, there are other types of pollutants that affect water supplies. Water will soon run out of resources if pollution levels keep rising. The world's population, the variety of their activities, and the quantity of fresh water used for diverse reasons have all gradually grown. The detrimental alteration that takes place to one of the elements of the ecosystem is called pollution. Through food, air, water, and other agricultural products, these changes may have a direct or indirect impact on the ecological equilibrium (Al-Taai, 2021).

Sixty percent of all the contaminants found in lakes, rivers, and oceans come from industrial sources, such as industry wastewater. The majority of contaminants that come from oil pollution are exported by manufacturers. The majority of industries in both developed and developing nations disregard industrial drainage rules and dump their waste into the water. Pesticides, inorganic contaminants, and industrial pollutants are not removed by conventional water treatment techniques. Furthermore, one type of industrial pollution is the use of lake and river water for cooling by power plants and companies (Al-Taai, 2021).

The interaction of sulfur and nitrogen oxides in raindrops, as well as the production of sulfur and nitric acids, results in acid rain. However, human activity is the primary cause of them, as evidenced by the different fuel combustion processes that release massive volumes of carbon and sulfur oxides. The ecology is impacted by acid rain because it erodes different structures and makes soil and water bodies more acidic. Toxic chemicals are created when human waste, rubbish, dead animals, and leftovers like sewage and untreated industry waste are dumped into rivers. Furthermore, the disposal of ship wreckage contributed to the spread of chemical and petroleum seepage into the seas and oceans (Al-Taai, 2021).

Sanitation sources are used to satisfy people's everyday needs, including hospital liquid medical waste and home, agricultural, industrial, and commercial uses. A significant number of contaminants, plankton, and organic and inorganic impurities are also washed away by rainfall. Since most third-world nations lack an integrated sanitation system, sewage water is one of the most significant public health issues in these nations. The largest issue is the untreated influence that coastal communities receive from the ocean, which poses a major health risk. Furthermore, using home pesticides has a negative impact on people's health (Al-Taai, 2021).

Industrialization, agriculture, natural catastrophes, and inadequate water supply and sewage treatment systems are the main sources of water pollution. First, industry—tannery, distillery, food, textile, iron and steel, nuclear, and pulp and paper—pollutes water the most. Industrial manufacturing can release toxic chemicals, organic and inorganic materials, solvents, and volatile organic compounds. Industrial wastewater has increased as urbanization has intensified (Wu et al., 2020). Foreign direct investment also affects industrialization-related water pollution. FDI and industrial water pollution are positively correlated in developing nations (Jorgenson, 2009, cited in Lin, Yang & Xu, 2022).

Second, agriculture and water pollution are linked. Most water pollution comes from organic agriculture waste, nitrogen fertilizers, and pesticides (RCEP, 1979). Agricultural operations pollute water with nitrates, phosphate, pesticides, soil sediments, salts, and pathogens (Parris, 2011). Agriculture has also damaged all pure freshwater systems (Moss, 2008). Untreated or partially treated wastewater is often used for irrigation in water-scarce developing nations, although pollutants pose health and environmental risks (Lin, Yang & Xu, 2022).

When residential water is purified from 100% to 90%, health benefits are reduced by 96%. The decrease is greater when pretreatment water quality is at risk (Brown and Clasen, 2012). Water pollution is caused by natural and human factors. Population growth, urbanization, industry, climate change, and religious activities will all affect water quality (Halder and Islam, 2015). Therefore, improper disposal of solid trash, sand, and gravel contributes to diminishing water quality (Ustaoğlu et al., 2020 as quoted in Lin, Yang & Xu, 2022).

## **2.5 Impacts of Water Pollution on Communities**

Global water pollution requires ongoing examination and adjustment of water resource regulations at all levels. Over 14,000 people die daily from water poisoning, the leading cause of sickness and death worldwide. Water contamination spreads cholera, typhoid fever, gastroenteritis, diarrhea, vomiting, skin, and renal ailments. Pollution of lakes, rivers, streams, oceans, aquifers, and groundwater is called water pollution. It occurs when toxins are dumped into waterways without proper treatment (Ladu et al., 2018).

### **2.5.1 Health Impacts**

Clean water is vital to human health worldwide. As a universal solvent, water causes many ailments. According to WHO, 80% of illnesses are water-borne. Many countries' drinking water doesn't meet WHO standards. Poor water causes 3.1% of deaths. Due to poor surface water quality protection and sanitation, river pollution has become a major concern (Ladu et al., 2018).

Lagoons, rivers, and streams absorb waste. Most garbage is thrown into waterways without considering its ability to absorb it. Raw sewage, debris, and oil spills endanger lagoons and rivers' diluting ability. Water pollution threatens food production, health, and the environment. Pollution in these water sources harms city inhabitants and destroys aquatic life. The water quality of these rivers and streams is deteriorating daily. Polluted rivers stink and have fewer vegetation and animals. 80% of the globe worries about water security (Ladu et al., 2018).

Unsafe water harms health. The UNESCO 2021 World Water Development Report predicts that diarrhea caused by polluted drinking water, inadequate sanitation, and poor hand hygiene kills 829,000 people yearly, including 300,000 children under five, 5.3% of all fatalities in this age group. Lack of water and sanitation increases the prevalence of cholera, trachoma, schistosomiasis, and helminthiasis. According to research in developing nations, cholera and dirty water are linked. Treatment and storage of household water can prevent cholera (Gundry et al., 2004). Apart from illness, polluted water and unhygienic conditions can induce gastrointestinal diseases that impair nutritional absorption and promote malnutrition (Lin, Yang & Xu, 2022).

### **2.5.2 Economic Impacts**

Water degradation and economic prosperity are inextricably intertwined. Pollution is a byproduct of almost every production method. Since life, health, and economic productivity depend on water, downstream consumers may be impacted by the contaminants produced by upstream pollutants. Regulators and policymakers must decide on the proper degree of water pollution while keeping in mind that completely removing all forms of pollution is too expensive and impractical. Economically speaking, this means balancing the costs of pollution against the advantages of the polluting activity (Desbureaux et al., 2019).

Today, 40% of the world's food is farmed under irrigation, many urban and rural areas have acute water shortages, and many industrial operations require water. Surface and groundwater quality affects progress, economic growth, and the environment. Population growth, urbanization, industry, and climate change degrade water quality. Water pollution endangers the earth and its inhabitants (Ladu, Athiba, Lako & Alfred, 2018).

Recent economic downturns have presented a significant chance to highlight the importance of water in human existence. There is an urgent need to address the steadily declining water supply (Moss, 2017). Although there are many predictions of future water shortage, it is challenging to quantify human water use and forecast future water availability. Therefore, it is very difficult to accurately assess issues like how water use affects a nation's economic growth (Katz, 2010 as referenced in Anantadjaya et al., 2019).

Many politicians don't appear to think that controlling water contamination is a serious issue. In the end, this lowers any investment for new capital and/or upkeep for treatment facilities because of the perceived dangers of funding any water-related initiatives. As a result, individuals lack access to clean water and basic sanitation, which is particularly problematic in less developed nations. Furthermore, shortages will affect industry, and people's quality of life will unavoidably suffer as a result (Moss, 2017). The financial circumstances of residents in the affected regions may be impacted by the development and installation of water treatment facilities. The outcome would be a considerable decline in the value of nearby properties in addition to a rise in tax rates (Concerned Erin Citizens, 2014 as referenced in Anantadjaya et al., 2019).

Due to a shortage of water, which would lower production, agriculture will be the industry most affected. This will unavoidably impact food supply and demand, which will impact international trade. Because of the rising cost of water and its finite supply, the industrial sector in many nations will be extremely vulnerable, particularly for water-dependent inputs. As a result, companies are attempting to use water more efficiently. In exchange, the interested parties ought to consistently urge their state and local legislators to enact laws acknowledging and encouraging water conservation (Moss, 2017 as cited in Anantadjaya et al., 2019).

## **2.6 Livelihood Opportunities of Onshore Communities**

In developing nations, the population is still growing, especially in coastal towns where resource depletion and pollution lead to more disputes between the different stakeholders. For policymakers that want to offer sensible development policies for sustainable resource management, these problems present a number of immediate obstacles. Conflicts have arisen between local residents and migrants as a result of large-scale migrations from impoverished rural regions to metropolitan coastal areas where there are more opportunities for employment. The harm brought on by rising pollution levels as a result of growing urbanization (Tran, Euan & Isla, 2002).

Furthermore, having access to a sufficient amount of food may be seen as both a result of people's livelihoods and one of their "livelihood assets," which is likely to have a significant influence on people's decisions about how to make a living. Having access to enough food is essential for maintaining many people's fundamental human resources, such as their health and capacity to work. In order to sustain this food supply, coastal residents can employ a variety of strategies and directly utilize the natural resources that allow them to produce food (Townesley, 2004).

It is crucial to understand that direct use of coastal and marine resources, especially fisheries, is typically market oriented, even if there are undoubtedly "subsistence" users of coastal and marine ecosystems in some parts of the region who consume what they generate. The majority of fishermen fish primarily to make money that can be used to buy the other kinds of food they need; they consume a comparatively small percentage of the catches they make. Thus, access to marine and coastal resources is undoubtedly linked to food security in coastal and marine livelihoods, but so is access to markets that will pay for those resources, enabling direct users to provide for their families and themselves (Townesley, 2004).

The majority of resource users who exploit marine and coastal resources in ways that are not sustainable are well aware that their activities are destroying the same environment on which they rely. However, if there are no other options, short-term survival requirements must take precedence over long-term concerns about resource sustainability. In reality, fishermen and fishing communities are typically seen to be more impoverished than many other rural populations in many regions of the region. Ironically, this poverty frequently shows up in different ways rather than

as "income" poor. Because the item they deal with, fish, is often in demand and easily converted into cash, fishermen frequently command higher quantities of cash income than those employed in agriculture (Townsend, 2004).

Therefore, in order to tackle environmental and development problems and achieve sustainable development, public engagement is necessary. Determining people's attitudes about development concerns, especially coastal marine pollution, is essential to ensuring the active engagement of local residents in the implementation of a good development policy for their community and its surrounding areas. Therefore, a thorough grasp of people's attitudes is crucial to obtaining effective public engagement in resolving such environmental and developmental concerns (Tran, Euan & Isla, 2002).

## **2.7 Review on Previous Studies**

Ariho et al. (2025) studied Meizimera-Kihihi River water pollution sources, impacts, and solutions in Kanugu District, Uganda. This study affects future research, governance, policy, health, the environment, communities, and society. This study investigated the causes, impacts, and continuing solutions to water contamination along the Meizimera-kihihi River in Kanugu, Uganda. Promoting sustainable industrial, waste management, and agricultural practices might minimize pollution.

A assessment of the causes and effects of water pollution on several water bodies in the Indian state of Rajasthan was conducted by Kumar and Mishra in 2024. Water supplies and quality have an impact on society's social, economic, and political development, according to this study. Water contamination has reached an unrecoverable level due to the fast expansion of urbanization and industry brought on by social and economic demands. In the state's dry and semi-arid regions, the level of surface water contamination is concerning. We are aware that water is essential to all living things. Every living thing gets its water from a variety of sources, either directly or indirectly. It would be detrimental to them to consume contaminated water. The issue is made worse by the movement of bioaccumulative contaminants into the food chain. Examining the extent and variety of water contamination in water bodies is therefore essential, particularly in states like Rajasthan.

Lin, Yang, and Xu reviewed water pollution's effects on health and disease heterogeneity in 2022. Over 80% of human-produced sewage is discharged untreated

into rivers and seas, creating pollution and over 50 diseases. Poor water quality causes 50% of child deaths and 80% of diseases worldwide. Even with regional, age, gender, and other differences, water poisoning harms human health. Water pollution causes diarrhea most often, which is propagated by enteroviruses in aquatic habitats. Governments should improve water intervention management and water quality to reduce water pollution's health risks. Mahato (2019) reviewed water pollution. Water was shown to be vital. No explanation is needed for its relevance. Conversely, water contamination is a major environmental issue. Toxic compounds enter lakes, rivers, and seas and dissolve, float, or settle, causing water contamination. This degrades water quality. Industrial and municipal sewage discharges are the worst water contaminants. Indirect water contamination comes from rain, groundwater, and soil. Human farming and unlawful industrial waste pollute soil and groundwater. Radioactive, inorganic, and organic pollutants exist.

In Juba County, Republic of South Sudan, Ladu et al. (2018) investigated the effects of water contamination on human health. According to this report, one of the main issues impacting people in Juba County is water contamination. The issue of water contamination has gotten worse recently due to internal conflict-induced rural-urban migration and Juba's small-scale industry. The purpose of this study was to look at how water pollution affected people's health in Juba County. To gather the required data, the study used qualitative, quantitative, and participative methods. For this investigation, a sample size of fifty respondents was selected. The findings showed that, according to 57.5% of respondents, water tanks are the primary source of drinking water in Juba County. According to almost 42% of the respondents, water pollution destroys ecosystems, kills aquatic life, and causes illnesses that affect both human health and the environment. Approximately 55% of the respondents stated that they believed that raising community knowledge of the negative impacts of water contamination was the best approach to stop it.

The evaluation of the health effects of water contamination in the Hlaing Tharyar Industrial Zone was conducted by Lae Mon Thein et al. (2016). The aim of the study is to investigate the effects on community health in the Hlaing Thar Yar Industrial Zone of the discharge of wastewater and impure water from industrial enterprises. The inhabitants of Yay Oakkan and Thaug Gyi villages, which are close to the industrial area, make up the whole population. The results showed that 22 ailments were caused by contaminated water, which had a detrimental effect on the

health of the inhabitants. Additionally, it is discovered that the tube well water mostly contains detrimental problems including turbidity, ammonia-nitrogen (NH<sub>3</sub>N), cyanide, alkalinity, iron, and chloride. Dizziness, headaches, fever, diarrhea, skin issues, asthma, nausea, cholera, typhoid, and cramps were among the illnesses that the inhabitants experienced. Thus, the findings showed that the health of the people living in the Hlaing Tharyar Industrial Zone was negatively impacted by water pollution.

Hao and Jun (2007) investigated the effects of water scarcity and pollution on the Haihe River basin's economic growth. One of the seven major river basins that are extremely important to China's ecology is the Haihe River basin. The economy of the Haihe River basin is growing quickly, but at the same time, the ecological situation in this area is getting worse and the ecosystem is growing more delicate, which is incompatible with the region's fast economic growth. According to the study, reducing water pollution initially results in a decline in conventional GDP while increasing green GDP. Second, the problem of water contamination is more pressing than the scarcity of water. Water scarcity is lessened by the water diversion project from southern to northern China and the enhancement of method indexes, but more work is required to address water pollution.

## **CHAPTER III**

### **WATER POLLUTION IN MYANMAR**

#### **3.1 Overview of Industrial Water Pollution in Myanmar**

Water resources are abundant in Myanmar; however they are not uniformly distributed in terms of time and space. Inland surface waterbodies are essential for industrial production, agricultural irrigation, and household consumption. Although they differ from river to river, the water environment conditions in the Bago, Shwegyin, and Sittaung rivers are typically favorable, according to data from water quality monitoring. Similar to this, Myanmar is home to several natural lakes, such as Indawgyi Lake, Inle Lake, Inya Lake, and Sunye Lake, which provide water for a variety of uses and are well-liked by tourists due to their biodiversity and visual beauty. Degraded lake habitats, including rising water pollution, deforestation, and unlawful waste dumping, have been a problem for these lakes in recent years (Myint, 2025).

Life on our planet depends on water. As a need of sustainable development, it is essential to guarantee clean streams, rivers, and lakes. One of the issues for both environmental conservation and management and development is water pollution. Numerous harmful substances found in industrial waste harm aquatic creatures' health as well as that of people who consume them. According to Myint (2017), microbial contaminants from sewage frequently cause infectious illnesses that spread through drinking water to both aquatic and terrestrial life.

Water is without a doubt the most important material on the planet. No organism can exist without water, and drinking clean water is essential for human health. Thus, humans require access to clean water as well as water itself. Water pollution is a serious challenge to the world's countries today, particularly emerging ones, as it has an adverse effect on human health, the environment, and a nation's social and economic development. The World Health Organization (WHO) estimates that tainted drinking water is used by at least 2 billion people worldwide. Developing nations lack the infrastructure necessary to manage wastewater and reduce water

contamination due to budgetary limitations. Common water contaminants include suspended particles, organic matter and nutrients, microbiological pollutants from sewage, heavy metals from industrial processes, and industrial waste. Water contamination is a problem in Myanmar, as it is in many other developing countries (Swe, 2019).

Eighty percent of fresh water flowing on the surface of Myanmar is polluted due to a lack of water treatment. The most significant but least obvious water source is groundwater. In Myanmar, it is essential for domestic water and cattle, and its usage for irrigation is growing. Hand-dug wells are used for intensive irrigation of high-value crops, such as vegetables and rice. However, when pollutants are discharged into the ground and travel to the water table, Myanmar's groundwater is getting more and more polluted. In an unconfined aquifer, contaminants can enter the groundwater directly from the surface; in a confined aquifer, they can infiltrate from another area of the aquifer. Once within, they follow the flow of groundwater through aquifers due to pressure and gravity (The Open University, 2024).

In addition to being unhealthy for drinking, Myanmar's lakes and rivers are occasionally unsuitable for swimming and fishing due to pollution. The primary cause of contamination in these freshwater sources is nutrient pollution, which includes nitrates and phosphates, and is brought on by fertilizer runoff, agricultural waste, and discharges of household and industrial waste (NRDC, 2018). Even though Myanmar began working to offer clean drinking water and sanitary facilities in 1952, most people still only have access to the country's cities. City development committees (CDC), particularly YCDC in Yangon, MCDC in Mandalay, and NCDC in Nay Pyi Taw, are responsible for implementing urban water supply, especially for industrial usage. Toxins in surface water are increasingly coming from industrial and municipal waste discharges (The Open University, 2024).

With a 6.8% growth rate in 2017, Myanmar is a rapidly expanding nation (ADB, 2018). By welcoming both domestic and foreign investors, Myanmar is promoting investments in the industrial sector and other areas. Rapid economic expansion, however, runs the danger of harming the ecology of the nation. The ecosystem is already facing many difficulties, and Myanmar's water pollution is mostly caused by a few key factors. Numerous industrial activities release metals including lead, nickel, cadmium, zinc, copper, and mercury into freshwater habitats. Other contaminants include gases like ammonia and chlorine, as well as anions like

fluorides and cyanides. In Myanmar, the combined amount of water used for home and industrial purposes is around 10%. However, industry continues to be a significant source of pollution. For instance, industrial effluent from Yangon's factories is dumped into the Hlaing River and collects in the river basin's creeks (The Open University, 2024).

Ninety percent of all water usage is for the agriculture sector. The primary cause of contamination in rivers and streams, the second greatest source in wetlands, and the third largest source in lakes is agricultural pollution. It also has a significant role in contaminating groundwater and estuaries. Nutrients from farms and livestock enterprises, such as cow slurry or discharges from pig or poultry farms, fertilizers, insecticides, and other materials wash into rivers every time it rains (The Open University, 2024).

Low-lying coastal areas, such as large flood plains and river deltas, may flood due to rising sea levels, altering the salinity of surface and ground water. For instance, the bulk of the population receives their water from the Ayeyarwady River, which serves as both the primary supply of agricultural water and the main river transit route across the nation. However, due to siltation from mining activities, deforestation, and overexploitation of the land, its water quality has been declining for a long time. Nowadays, it is uncommon to see the Ayeyarwady River dolphin in the lower reaches of the river, which is seen to be a sign of the river's health (Bowles, 2013 as referenced in The Open University, 2024). Therefore, limiting the use of some hazardous pesticides and promoting the use of traditional bio-fertilizers as an alternative to chemical fertilizers will help minimize pollution (Myint, 2017).

### **3.2 Water Pollution Condition in Yangon**

One of the earliest Asian cities to install a tap water supply was Yangon. Only recently, in the brief time of democratic governance, were disinfection facilities added to the tap water system and the Myanmar National Drinking Water Quality Standard (MNDWQS) passed. City dwellers are still unsure about whether the tap water is safe to drink since there is a dearth of trustworthy public information (Ko & Sakai, 2021). Access to clean water is one of the most important ways to accomplish community development and improve health and poverty in underdeveloped nations. For the first time since 1987, Myanmar met the requirements to be considered for graduation from the least developed country (LDC) category in 2018, and the committee will take this

into consideration at the next triennial review in 2021 (UNESCO, 2018). According to the 2014 census, Yangon, Myanmar's largest city, is home to 5.21 million people, or almost 10% of the country's total population (DOP 2015 as stated in Ko & Sakai, 2021).

The effects of water contamination are numerous. Because contaminated water may harm aquatic plants that would otherwise assist lower CO<sub>2</sub> levels in the atmosphere, it can, for example, indirectly affect the climate. When people use tainted water, water pollution also poses a harm to their health. The effects on human health will be felt first, followed by those on the economy and environment. Human health depends on drinking clean water. Drinking contaminated water can lead to cholera and other diarrheal diseases, as well as more dangerous ailments including typhoid and dysentery. Contaminated water can transmit water-borne illnesses. More people in developing nations suffer from health issues brought on by tainted water than people in developed nations. Because they have less access to clean water, residents of rural areas are more negatively impacted by water pollution than those in metropolitan areas (Swe, 2019).

Additionally, because bacteria are conveyed in urine and feces, poorly located wells and inadequate sanitation practices can contaminate drinking water. Wastewater treatment investments in Myanmar are unable to keep up with the country's expanding population and resource needs. In the nation, just a small portion of the population has access to clean drinking water and sanitary amenities. People who live in places without a sewage infrastructure dump their waste on the ground or into rivers. Human health is especially at risk from these unhygienic discharges (The Open University, 2024).

There are two main negative impacts of water contamination. It destroys both living things and the ecosystem or environment that all living things rely on. Pollution has a wide range of affects on aquatic communities and people. However, depending on the type of chemicals, the quantities of the pollutants, and the location of the pollution, they might be disastrous. Certain elements found in rivers and lakes, such iron, phosphorus, and nitrogen, are essential for the survival of living things, while other elements, like arsenic and mercury, are harmful and can lead to health issues (The Open University, 2024).

Animals and humans can get diseases and germs from contaminated water through touch and ingestion. Among the leading causes of illness and mortality

worldwide are waterborne infections. Due to their prevalence and diversity, waterborne parasites in particular pose a major global threat. Among other illnesses, they cause cholera, hepatitis, and typhoid. Because ecosystems are so dynamic and react to even slight changes in their surroundings, harming them damages or alters the habitats of living things. If unregulated, water contamination can lead to the collapse of a whole ecosystem (The Open University, 2024).

The release or introduction of chemicals, including pesticides, herbicides, and other naturally occurring compounds, like fluorine, into water bodies that have a negative impact on the environment and human health is known as chemical water pollution. Human immune suppression, infertility, and acute poisoning are mostly caused by toxins found in industrial waste. Along the food chain, the concentration of insecticides like DDT is rising (The Open University, 2020). There are several places in the global water cycle where contamination can happen. Contaminants are most commonly discharged into rivers or the ocean, but soil contamination can also leak contaminants into groundwater. Acid rain is one of the contaminants that enters the water cycle from the atmosphere. However, a number of chronic illnesses, including as cancer, heart disease, and neurological issues, have been connected to arsenic and other naturally occurring inorganic hazardous compounds found in Myanmar's groundwater (Bacquart, 2015 as referenced in The Open University, 2024).

Thus, the Yangon City Development Committee (YCDC) is the government body in charge of Yangon City's water infrastructure, which includes the design, administration, and operation of the city's water supply. Public perception of water quality and home water management practices should be researched in order to properly meet the needs of the water system, as a thorough understanding of these is necessary to increase customer happiness and confidence (Ko & Sakai, 2021).

### **3.3 Community Engagement and Awareness of Water Pollution in Myanmar**

In terms of poorly managed plastic, Myanmar ranks 17th out of 20 nations, with marine plastic trash reaching 0.07 to 0.18 million metric tons annually in 2010 (Jambeck et al., 2015). According to Lebreton et al. (2017), a large number of plastics that have not been recycled and are instead dumped in open landfills or dumps wind up in rivers before being carried to the ocean. Yangon, the capital of Myanmar, adds 29 tons of plastic pollution every day, while the upper and lower Ayeyarwady areas contribute 90 tons. 95 percent of the marine ecosystems examined

by the Myanmar Ocean Project survey are polluted by lost, discarded, or abandoned fishing gear (ALDFG). About 90% of all garbage leaks are caused by plastics. More than 30% of plastic pollution comes from plastic bags alone (Han, 2022).

A natural resource, water is essential to human dignity, cultural values, food security, livelihood, and sustainable development. With 12 percent of Asia's total freshwater resources and 16 percent of the ten ASEAN countries, Myanmar is a country rich in water resources. However, in the Dry Zone in central Myanmar, water shortage is determined by a wide variety of geographical and temporal variations in rainfall. Frequent droughts and floods are another problem in many regions of the nation. In the future, the availability of usable water will be further strained by factors like population growth, the growing demands of economic activity to feed the country, and the indications of the impact of climate change. There is also a chance that water conflicts among various user groups will intensify (Myanmar National Water Policy, 2015).

The essential need for clear communication and legal tools for equitable and peaceful water sharing between state and regional administrations with the Union Government's permission is further highlighted by recent political and economic developments. Lack of awareness of water's scarcity, life-sustaining qualities, and economic worth leads to waste, wasteful usage, contamination, and a fall in flows below ecologically necessary levels. Furthermore, there are disparities in the allocation of water resources and a lack of a common viewpoint in their planning, management, and usage; that is, there is little to no understanding of Integrated Water Resources Management (IWRM) outside of the water industry. The participative method and IWRM concepts must be understood across the nation. The National Water Policy's goals are to acknowledge the current state of affairs, offer a framework for the establishment of a legal and institutional framework, and develop a multifaceted national strategy that includes the Myanmar National Water Framework Directive (Myanmar National Water Policy, 2015). The general public's inadequate comprehension of the detrimental effects of water contamination is one of the primary causes of water pollution in Myanmar. Thus, it would be possible to raise public awareness across the country regarding water contamination and its effects. The contamination of water bodies by hazardous and poisonous substances, materials, pollutants, and compounds is known as water pollution, and it has grown to be a worldwide problem. The primary causes include mining, agriculture, urbanization,

industrialization, and inappropriate waste disposal. Widespread water pollution has a number of negative effects, including major health issues, damage to ecosystems and the environment, and economic losses for a nation (The Open University, 2024).

Although Myanmar's economy has historically been centered on agriculture, its industrial sector is presently expanding. Myanmar also possesses a wealth of natural mineral resources. It should come as no surprise that the primary causes of water contamination are industry, agriculture, and mining. To guarantee that these economically significant industries reduce their influence on Myanmar's clean water, more restrictions and the use of best practices are required. Since many individuals are not aware of the laws, rules, and regulations pertaining to pollution, there is also a problem with water contamination at the home level. This indicates that they violate the rules and regulations, whether on purpose or accidentally. Thus, expanding the number of public awareness-raising initiatives conducted by the government or in collaboration with private organizations may be a long-term answer. These advertisements could be connected to ongoing educational initiatives. In the meanwhile, pollution might be avoided by effectively enforcing current rules and regulations through fines. (2019, The Open University)

### **3.4 Environmental and Industrial Regulations in Myanmar**

For a growing nation like Myanmar, sustainable development in relation to water resources is very important. Although the nation is blessed with an abundance of rain and river water, it faces a serious shortage of clean, enough water for drinking, domestic usage, farming, and fishing. One of the primary causes of river pollution is the degradation of water quality brought on by unsustainable management, but there are several other contributing factors as well. An efficient regulatory framework that helps to enhance water management and water quality in order to optimize social, economic, and environmental advantages is required to overcome the issue. Discharging various types of trash into the rivers is almost a habit in Myanmar. In addition, the river system is gradually being contaminated by the slow expansion of industry, the rising use of pesticides and fertilizers, urbanization, and the release of municipal trash (Maung, 2019).

Myanmar passed the National Water Policy in August 2015. Its goals are to assess the situation, create a legislative and institutional framework, and create a national plan of action, including the Myanmar National Water Framework Directive

(Win, 2021). The national integrated water resources management policy aims to develop, share, and manage Myanmar's water resources in an integrated, holistic, and socially inclusive manner to reduce poverty and promote green growth and sustainable development by providing access to water of equitable quantity and safe quality for all social, environmental, and economic needs of present and future generations. There are two main categories covered by the policy:

- (i) The management framework for water resources includes policy objectives, principles, and techniques for resource monitoring, assessment, allocation, and preservation; and
- (ii) Water resources use: covers the policy goals, guiding principles, and tactics for the development and use of water for people (drinking and domestic water supply, water for cultural and religious purposes, water for industry, and other water uses like hydropower, recreation, non-revenue water (trucks and fire hydrants), water for industry, and water for food security (agriculture). It also covers the maintenance of productive ecosystems. Every municipality should have water reservoirs for additional uses. The water policy will be a flexible tool. To make sure it is successfully adapting to new experiences and altered conditions, it will be periodically reevaluated (Myanmar National Water Policy, 2015).

Myanmar will become water-efficient by 2040 with well-developed and sustainable water resources and a fully operating integrated water resources management system. Water efficiency, equitable, transparent, and inclusive distribution to competing functions like agriculture, forestry, mining, manufacturing, power generation, recreation, and tourism, and the preservation of water resources like groundwater recharge and river flow will benefit the entire population by increasing income, quality of life, greenery, peace, and (Myanmar National Water Policy, 2015).

Additionally, the State and Region Environmental Conservation Departments' monthly reports served as the basis for the development of the Plastic Waste Management Action Plan. To address the issue of plastic pollution, a Plastic Policy Options and Roadmap has been created using the information from a survey conducted by the World Bank in collaboration with the Thant Myanmar Team and the Environmental Conservation Department personnel. With the cooperation of the stakeholders and technical support from the Japan-ASEAN Integration Fund (JAIF), a

National Plastic Action Plan will be created based on the roadmap to minimize marine plastic trash using the Integrated Land-to-Sea method. Myanmar only permits the importation of plastic scrap under these conditions; it does not permit the importation of plastic garbage:

- (i) Imported plastic scrap needs to be uniform, clean, and prepared for usage as raw materials.
- (ii) Recycling facilities must possess an Environmental Management Plan, Initial Environmental Examination, or Environmental Impact Assessment Approval Letter or Environmental Compliance Certificate issued by the Ministry of Natural Resources and Environmental Conservation (Han, 2022).

As a result, growing populations and industries in water management will be the main cause of pollution and health issues due to a lack of technology and inadequate facilities. When creating policies and procedures for the prevention and control of water pollution, Myanmar must use global best practices and experiences (Win, 2021).

## **CHAPTER IV**

### **SURVEY ANALYSIS**

This chapter presents an analysis of the collected data to evaluate the impact of water pollution on onshore communities along the Yangon River. It summarizes the responses from participants to understand the sources of water pollution, the level of awareness among local residents, and the extent to which pollution affects their health, livelihoods, and socioeconomic conditions. Water pollution is not merely an environmental issue; it poses a serious threat to public health, food security, and income, especially in developing countries like Myanmar.

The analysis is organized into several sections: demographic profiles, awareness and knowledge of water pollution, socioeconomic impacts, health-related issues, and community perceptions of government actions. The findings are discussed in relation to the research objectives, and tables and graphs are used for clear and comprehensive presentation.

#### **4.1 Survey Profile**

The Pegu and Myitmaka Rivers in Myanmar create the Yangon River, commonly known as the Rangoon River or Hlaing River. As an exit of the Irrawaddy (Ayeyarwady) River into the delta, it runs from southern Myanmar for 40 kilometers (25 miles). Both the Yangon and Patheingyi Rivers reach the Ayeyarwady near the delta, draining the Pegu Mountains (Khaing & Lwin, 2012).

The river connects to the Irrawaddy River via the Twante Canal, which was first dug in 1883. It serves as the main access channel to Yangon and can accommodate oceangoing vessels, playing a critical role in Myanmar's economy. Additionally, the Yangon River is a branch of the Ayeyarwady River, which is the ninth largest river in the world in terms of sediment discharge, depositing over 330 million tons of sediment annually. Yangon Port, located along the Yangon River, is the largest port in Myanmar and handles approximately 85% of the country's exports and imports (Chang & Htet, 2019).

The study focuses on residents currently living along the Yangon riverbank, specifically Kamar Kasit ward (Dala Township), Botetanyint ward (named Aye village) (Kyimyindaing Township), and No (4) Ward (Kamaryut Township). A total of 150 household members were surveyed, with occupations including garment factory workers, school teachers, fishermen, company staff, street vendors, motorcycle delivery riders, sanitation workers, waiters, pottery workers, municipal employees, chefs, engineers, and others. This diversity of occupations reflects the various employment sectors and highlights the economic activities that sustain their livelihoods.

The primary aim of this study is to explore the impact of water pollution on onshore communities, particularly in relation to health, livelihoods, and levels of awareness about water pollution and how to face specific challenges in accessing clean and safe water.

## **4.2 Survey Design**

This chapter presents the analysis of water pollution in Myanmar, specifically focusing on a case study of the Yangon River. The analysis was conducted using a simple random sampling method to cover the entire study area. The sample respondents of 150 households from Kamar Kasit ward (Dala Township), Botetanyint ward (named Aye village) (Kyimyindaing Township), and No (4) Ward (Kamaryut Township) respectively.

To initiate the data collection process, the researcher first approached the respondents to gather necessary information. Following this initial contact, the researcher established a connection with the respondents and proceeded with data collection. The selected participants were residents living along the riverbanks. Additionally, the researcher designed a consent form to inform respondents about the details of the questions being asked. The personal interviews for this study were conducted between April and May 2025.

The study encompassed respondents with varying levels of income, expenditure, occupation, and education. Both primary and secondary data collection methods were employed. Quantitative data collection methods were utilized for the primary data, with structured questionnaires used for the survey. Secondary data were gathered from various sources, including journal articles, books, and working papers from different organizations.

### 4.3 Survey Results

Understanding the demographic profile of the respondents helps to contextualize the responses and recommendations of the study. The main criteria are gender, age, marital status, and education. Table 4.1 shows respondent demographics.

**Table (4.1) Demographic Characteristics of Respondents**

<b>Descriptions</b>	<b>Characteristics</b>	<b>Frequency</b>	<b>Percentage</b>
Gender	Male	107	71.33
	Female	43	28.67
	<b>Total</b>	<b>150</b>	<b>100</b>
	19 - 36 years	86	57.33
	37 – 54 years	62	41.33
	> 55 years	2	1.33
	<b>Total</b>	<b>150</b>	<b>100</b>
Marital Status	Single	30	20
	Married	114	76
	Divorced	3	2
	Separated	3	2
	<b>Total</b>	<b>150</b>	<b>100</b>
Respondents	Head of households	71	47.33
	Wife	36	24
	Others	43	28.67
	<b>Total</b>	<b>150</b>	<b>100</b>
Educational Level	No Formal	2	1.33
	Primary	22	14.67
	Secondary	93	62
	University	33	22
	<b>Total</b>	<b>150</b>	<b>100</b>
Income Level (Kyat)	Under 100,000	1	0.67
	100,001 - 300,000	116	77.33
	300,001 - 500,000	24	16
	Above 500,000	9	6
	<b>Total</b>	<b>150</b>	<b>100</b>

Sources: Survey Data, 2025

Table 4.1 shows that 71.33% of the respondents were male, while 28.67% were female. This indicates a higher participation rate among males in the study,

which may reflect traditional gender roles related to water management decisions within households.

The majority of respondents were in the 19-36 age group, representing 57.33%, followed by the 37-54 age group at 41.33%. Only a small percentage, 1.33%, were over the age of 55. This suggests that the study primarily captures the perspectives of younger and middle-aged individuals who are likely to be economically active.

Among the respondents, married individuals made up the largest group at 76%, while single respondents accounted for 20%. Divorced and separated respondents each represented 2%. Nearly half of the participants, 47.33%, identified as heads of household, whereas wives and other family members, such as children or extended family, represented 24% and 28.67%, respectively.

In terms of educational background, the respondents had varying levels of education, with 62% having completed secondary education, 22% holding university degrees, 14.67% having primary education, and only 1.33% lacking formal education. These findings indicate that most participants possess at least a basic level of formal education, which may enhance their awareness of health issues and their understanding of water pollution problems.

According to the survey data, the majority of respondents (77.33%) reported a monthly income between 100,001 and 300,000 MMK. Additionally, 16% earned between 300,001 and 500,000 MMK, while only 6% earned more than 500,000 MMK. A small fraction, 0.67%, had a monthly income below 100,000 MMK. This data suggests that most respondents fall into the lower-middle-income category, which may face additional financial burdens stemming from water-related issues.

#### **4.3.1 The Impact of Water Pollution on Onshore Communities**

The following table outlines key findings regarding the socioeconomic impacts of water pollution on communities. It includes data on household income levels, additional expenditures due to water-related issues, increased costs for accessing clean water, illnesses associated with unsafe water, and the effects on local businesses. These findings indicate that water pollution not only harms individual health but also creates economic burdens for families and negatively affects economic activities in the community.

**Table (4.2) Impact of Water Pollution on Onshore Communities**

<b>Additional household expenses on buying clean water, medical costs</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	86	57.33
No	51	34
Not sure	13	8.67
<b>Total</b>	<b>150</b>	<b>100</b>
<b>Increased costs for accessing clean water</b>	<b>Frequency</b>	<b>Percentage</b>
Health/medical expenses	34	22.67
Cost of buying bottled/clean water	13	8.67
Cost for water filtration systems	2	1.33
Reduced income due to illness	101	67.33
<b>Total</b>	<b>150</b>	<b>100</b>
<b>Local businesses affected by poor water quality (e.g., restaurants, food processing, factories)</b>	<b>Frequency</b>	<b>Percentage</b>
Severely affected	78	52
Slightly affected	60	40
Not affected	7	4.67
Not sure	5	3.33
<b>Total</b>	<b>150</b>	<b>100</b>

Sources: Survey Data, 2025

According to Table 4.2, more than half of the respondents (57.33%) incurred extra expenses due to the need to purchase clean water and seek medical treatment. In contrast, 34% did not face any additional costs, and 8.67% were uncertain. These findings indicate that a significant portion of households is financially strained by water pollution, leading to increased household expenditures.

Among the 86 respondents, a substantial 67.33% reported that escalating household costs were primarily due to illness, highlighting how poor water quality adversely affects individual health and diminishes productivity. Additionally, 22.67% of respondents incurred medical expenses, 8.67% spent money on bottled or clean water, and 1.33% invested in water filtration systems. These results emphasize that water pollution creates a multifaceted financial burden for households.

Finally, water pollution has also impacted the local economy. Over half of the respondents (52%) indicated that local businesses, including restaurants, food processors, and factories, were severely affected. Meanwhile, 40% reported a slight impact, and a small portion of 4.67% noted no impact. Only 3.33% were unsure. These results illustrate that poor water quality not only burdens household livelihoods but also disrupts business operations.

#### 4.3.2 Respondents’ Awareness and Knowledge for Reducing Water Pollution

The awareness and knowledge of local communities are crucial in addressing environmental degradation, especially concerning water quality. Understanding how residents perceive the causes of water pollution, their observations of environmental issues, and their expectations regarding responsibility for mitigation efforts provides essential insights for developing effective policy responses. This study examines the level of public awareness about water pollution in the Yangon River, focusing on water usage practices, sources of pollution, its environmental impacts, and identifying the stakeholders that respondents believe should be responsible for pollution control.

**Table (4.3) Usage for Local Water Sources**

Main Usage for Local Water Sources	Frequency	Percentage
Cooking	121	80.67
Drinking	19	12.67
Washing clothes or dishes	5	3.33
Bathing	5	3.33
<b>Total</b>	<b>150</b>	<b>150</b>

Sources: Survey Data, 2025

According to Table 4.3, the findings on the use of local water sources indicates that a significant majority of respondents (80.67%) reported using them for cooking, while 12.67% indicated they used local water for drinking. Other uses, such as washing clothes or dishes (3.33%), and bathing (3.33%), accounted for only a small portion of responses. Notably, no respondents reported using local water sources for agricultural purposes, such as irrigation or livestock. These results highlight the considerable reliance of households on local water sources for essential daily activities, particularly domestic consumption.

**Table (4.4) Respondents' Opinions for Reducing Water Pollution in the Yangon River**

<b>Main sources of water pollution in Myanmar</b>	<b>Frequency</b>	<b>Percentage</b>
Industrial waste	39	26
Sewage/Microbial pollutants	12	8
Agricultural runoff	3	2
Deforestation	3	2
Illegal dumping	93	62
<b>Total</b>	<b>150</b>	<b>150</b>
<b>Environmental problems have noticed in rivers nearby</b>	<b>Frequency</b>	<b>Percentage</b>
Dead fish or aquatic animals	10	6.67
Murky or colored water	19	9.33
Bad smell	6	4
Algae blooms	5	3.33
Illegal dumping	93	62
Do not know	2	1.33
<b>Total</b>	<b>150</b>	<b>100</b>
<b>Most responsible for reducing water pollution at the Yangon River</b>	<b>Frequency</b>	<b>Percentage</b>
Central government	34	22.67
Provincial government	22	14.67
Local government	14	9.33
Industries	2	1.33
Agriculture department	1	0.67
All above	77	51.33
<b>Total</b>	<b>150</b>	<b>100</b>

Sources: Survey Data, 2025

When asked about the main sources of water pollution in Myanmar, the majority of respondents (62%) identified illegal dumping as the primary cause. Industrial waste was cited by 26%, while sewage or microbial pollutants accounted for 8%. Both agricultural runoff and deforestation were mentioned by 2% of respondents each. This study indicates a public perception that improper waste

disposal practices significantly contribute to the degradation of water quality in their communities.

Regarding environmental problems in the Yangon River, an overwhelming 78.67% of respondents pointed to illegal dumping of waste as a major issue. Other concerns included murky or discolored water (9.33%), unpleasant odors (4%), dead fish or aquatic animals (3.33%), and algae blooms (3.33%). Only 1.33% of respondents noted no noticeable problems. These findings underscore the urgent need for effective waste management policies and community awareness programs.

When identifying who should be responsible for addressing water pollution in the Yangon River, the majority of respondents (51.33%) believed that all stakeholders—including the central government, provincial government, local authorities, industries, and the agriculture department—should share responsibility. Others pointed to the central government (22.67%), provincial government (14.67%), and local government (9.33%) as individually accountable. Only 1.33% assigned responsibility to industries, and 0.67% to the agriculture department. These results suggest that most respondents expect a comprehensive, collaborative approach to tackle the issue of water pollution.

The impact of water pollution is closely linked to environmental degradation, significantly affecting the livelihoods, health, and economic well-being of people living along the Yangon River. This study presents the experiences of respondents regarding the causes of water pollution, the environmental changes they have observed, and how pollution has affected their daily lives and economic activities. Additionally, it explores their willingness to contribute financially to improved water services and their perceptions of responsibility in addressing pollution. These results highlight the connection between environmental conditions and the socio-economic challenges faced by communities along the riverbank.

**Table (4.5) Cause of Water Pollution**

<b>Cause of Water Pollution</b>	<b>Frequency</b>	<b>Percentage</b>
Industrial waste	128	85.33
Household waste	15	10
Others	7	4.67
<b>Total</b>	<b>150</b>	<b>150</b>

Sources: Survey Data, 2025

The respondents' perceptions regarding the causes of water pollution, its environmental and economic impacts, and their attitudes towards potential solutions reveal significant insights. According to Table 4.2, a considerable majority of respondents (85.33%) agreed that industrial waste is a major contributor to the pollution of the Yangon River, while household waste with 10% of respondents and others with 4.67% respectively. This indicates that residents are highly aware of the role of industrial activities in contaminating local water sources.

**Table (4.6) Respondents Perceptions on Water Pollution in Yangon River**

<b>Smelled pollution near the riverbank</b>	<b>Frequency</b>	<b>Percentage</b>
Frequently	39	26
Sometimes	76	50.67
Rarely	27	18
Never	8	5.33
<b>Total</b>	<b>150</b>	<b>100</b>
<b>Safe using water from the Yangon River</b>	<b>Frequency</b>	<b>Percentage</b>
Washing clothes	28	18.67
Fishing	48	32
Bathing	32	21.33
None of the above	42	28
<b>Total</b>	<b>150</b>	<b>100</b>
<b>Economic losses due to water-related issues</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	52	34.67
No	98	65.33
Other: _____	0	0
<b>Total</b>	<b>150</b>	<b>100</b>

<b>Willing to pay a small monthly fee for a clean and safe water supply</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	20	13.33
No	110	73.33
May be	20	13.33
<b>Total</b>	<b>150</b>	<b>100</b>
<b>Most of the polluted water in your area comes from</b>	<b>Frequency</b>	<b>Percentage</b>
Nearby factories or industries	58	38.67
Drains and canals from households	32	21.33
Farms and plantations	2	1.33
Urban waste from nearby towns	54	36
Don't know	4	2.67
<b>Total</b>	<b>150</b>	<b>100</b>

Sources: Survey Data, 2025

Furthermore, over half of the respondents (50.67%) occasionally detected pollution odors near the riverbank, while 26% frequently encountered such smells, highlighting ongoing pollution issues in the area. The primary uses of the Yangon River water included fishing (32%), bathing (21.33%), and washing clothes (18.67%); however, 28% of respondents stated that they do not use the river water for any of these activities, likely due to concerns about contamination.

In terms of economic impact, 34.67% of respondents reported experiencing financial losses related to water issues, while 65.33% indicated no financial impact. Despite acknowledging the pollution problem, a significant majority (73.33%) were unwilling to pay a small monthly fee for clean and safe water, possibly due to economic constraints or a lack of trust in the effectiveness of such initiatives.

Lastly, respondents identified nearby factories and industries (38.67%) and household drains and canals (21.33%) as the primary sources of pollution, followed by urban waste from neighboring towns (36%). This highlights the complex nature of water pollution sources and the shared responsibility required among industries, households, and municipal systems to address the issue effectively.

These findings emphasize that while local communities are aware of the causes and consequences of water pollution, financial limitations and barriers to

institutional trust may hinder their participation in proposed solutions. This underscores the need for comprehensive and transparent water management policies.

### 4.3.3 Impacts of Water Pollution on Socioeconomics and Health Conditions

Understanding the relationship between pollution and household livelihoods, health conditions, and financial burdens is crucial for evaluating the true cost of environmental degradation. This study presents the perceptions and experiences of respondents regarding how water pollution in the Yangon River has impacted their daily lives, income-generating activities, and overall well-being. It also outlines the direct and indirect consequences on household expenditure, particularly concerning health care and the need for clean water.

**Table (4.7) Impacts of Water Pollution on Socioeconomic and Health Conditions**

<b>Water pollution affected your livelihood or income</b>	<b>Frequency</b>	<b>Percentage</b>
No effect	26	17.33
Slight impact	49	32.67
Moderate impact	66	44.00
Severe impact	1	0.67
Not sure	8	5.33
<b>Total</b>	<b>150</b>	<b>100</b>
<b>If affected, in what way has your livelihood been impacted?</b>	<b>Frequency</b>	<b>Percentage</b>
Reduced fish catch or quality	34	22.67
Crop loss or poor yield from polluted irrigation	20	13.33
Higher cost of water or water treatment	47	31.33
Loss of work related to tourism/recreation	49	32.67
<b>Total</b>	<b>150</b>	<b>100</b>
<b>Spending more money on health or clean water due to pollution</b>	<b>Frequency</b>	<b>Percentage</b>
Yes – a lot more	17	11.33
Yes – a little more	72	48
No change	40	26.67
Not sure	21	14
<b>Total</b>	<b>150</b>	<b>100</b>

<b>Households suffer from waterborne diseases (e.g., diarrhea, cholera)</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	148	98.67
No	2	1.33
<b>Total</b>	<b>150</b>	<b>100</b>
<b>Poor water quality impact on human health</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	149	99.33
No	1	0.67
<b>Total</b>	<b>150</b>	<b>100</b>
<b>Most common in your area due to poor water quality</b>	<b>Frequency</b>	<b>Percentage</b>
Diarrhea	92	61.33
Typhoid	17	11.33
Cholera	31	20.67
Skin infections	9	6
I don't know	1	0.67
<b>Total</b>	<b>150</b>	<b>100</b>

Sources: Survey Data, 2025

The findings highlight the significant socioeconomic and health impacts of water pollution on the households surveyed. According to the results presented in Table 4.7, 44% of respondents indicated that water pollution had a moderate impact on their livelihoods, while 32.67% reported a slight impact. Although 17.33% claimed that there was no effect, a small percentage (0.67%) experienced severe impacts. Hence, pollution is a contributing factor to livelihood challenges.

When asked about the specific ways their livelihoods had been affected, 32.67% of respondents indicated a loss of work related to tourism and recreation, followed by 31.33% who reported higher costs for water or water treatment. Additionally, 22.67% mentioned reduced fish catches or poor fish quality, while 13.33% faced crop loss due to polluted irrigation water. These findings demonstrate that water pollution negatively affects both agricultural and non-agricultural livelihoods, particularly for those relying on natural water resources.

Regarding household finances, 48% of respondents stated that they were spending slightly more on health care and clean water due to pollution, while 11.33% reported spending significantly more. This suggests that a substantial proportion of

families are facing increased living costs directly related to deteriorating water quality.

The survey also revealed health impacts caused by polluted water. A total of 98.67% of respondents reported suffering from waterborne diseases such as diarrhea or cholera and others. Furthermore, 99.33% believed that poor water quality adversely affects human health, reinforcing the strong connection between environmental conditions and community well-being. In terms of disease prevalence, diarrhea emerged as the most common illness, affecting 61.33% of respondents, followed by cholera at 20.67% and typhoid at 11.33%. This data clearly illustrates the public health risks associated with ongoing water pollution in the study area.

In summary, these findings emphasize that water pollution not only undermines environmental sustainability but also leads to economic burdens, livelihood insecurity, and serious health challenges for local communities. Effective water management strategies and pollution control measures are essential to mitigate these impacts.

## **CHAPTER V**

### **CONCLUSION**

#### **5.1 Findings**

The purpose of this study is to investigate the effect of water pollution on livelihood conditions of onshore communities along Yangon Riverbank in Yangon region. The data were 150 respondents who are living along the Yangon riverbank by using structured questionnaires. The study focused on assessing the demographic and socioeconomic characteristics of respondents who were experiencing water pollution and knowledge and awareness of water pollution, its impact on the socioeconomics conditions and health. Therefore, the findings provide the valuable insights into how water pollution negatively affect socioeconomic conditions of the respondents as well as the public health.

According to demographic analysis of respondents, the findings show that the majority were male household representatives, suggesting that responsibility for water-related decisions and household duties predominantly falls on men in these onshore communities. Additionally, the study revealed that young and middle-aged adults (ages 19 to 54) were the most economically active members of the population engaged in addressing water pollution issues. With a significant portion of respondents having completed secondary education, awareness regarding environmental and health problems was notably high. Educational attainment was strong, with most of respondents having completed secondary education and university education. This indicates that the onshore community possesses a solid educational foundation conducive to participating in environmental awareness campaigns and public health education efforts.

The study found that a large majority of households earned modest incomes ranging from 100,001 MMK to 300,000 MMK per month, placing them within the lower-middle-income bracket. Households in this income group are especially vulnerable to the financial burdens caused by the need to purchase clean water, invest in basic water filtration systems, and cover medical expenses stemming from waterborne illnesses. Over 57% of households reported additional expenditures

directly related to water-related issues, with 67.33% indicating that illnesses were the main reason for increased household expenses. These findings suggest that water pollution is not only an environmental issue but also a direct contributor to heightened financial burdens for vulnerable families.

Regarding with the impact of water pollution on socioeconomic conditions of the respondents, there is a significant portion of households is financially strained by water pollution, leading to increased household expenditures. Additionally, most of respondents incurred medical expenses and it emphasize that water pollution creates a multifaceted financial burden for households. The results point out that poor water quality not only burdens household livelihoods but also disrupts business operation. Due to unsafe water supply, the respondents face significant challenges for socioeconomic condition. Poor water quality contributes to increased medical expenditures and affects household income by reducing productivity due to illness. The health impacts are not merely temporary inconveniences; in many cases, they represent chronic challenges, particularly for families lacking access to convenient healthcare or clean water sources. This indicates an urgent need for targeted interventions in environmental management and improvements in access to affordable and safe drinking water for onshore communities.

Concerning with respondents' knowledge and awareness for reducing water pollution in the Yangon River, the result shows the low willingness to pay for clean and safe water, with most of the respondents expressing reluctance to contribute financially to water improvement programs. In addition, it is also found out that most of respondents agreed that all stakeholders, including the government, industries, and local communities, must collaborate to tackle water pollution problems. This study underscores the difficulty individual households in these communities' face when it comes to making financial contributions.

Regarding with the effect of water pollution on socioeconomic conditions and health conditions, the findings indicate that water pollution negatively affect socioeconomic conditions, and health conditions of the respondents. The findings also demonstrate that water pollution negatively affects both agricultural and non-agricultural livelihoods, particularly for those relying on natural water resources. For household finances, the respondents spend slightly more on health care and clean water due to pollution. It highlight that the respondents are facing increased living costs directly related to deteriorating water quality.

The findings emphasize that water pollution not only undermines environmental sustainability but also leads to economic burdens, livelihood insecurity, and serious health challenges for local communities. Effective water management strategies and pollution control measures are essential to mitigate these impacts. This study demonstrates that water pollution disrupts both personal livelihoods and broader community economic activities, creating ripple effects that can hinder local development and prosperity. In addition, the findings emphasize the multifaceted impacts of water pollution, highlighting issues such as public health crises, household financial instability, and local economic downturns.

## **5.2 Suggestions**

According to the findings, the households with limited incomes disproportionately bear the burden of water pollution. This leads to additional expenses, health issues, and disruptions to livelihoods. Therefore, it is essential for policy responses to integrate environmental, health, and economic strategies to mitigate the adverse impacts of water pollution and support the resilience of vulnerable communities. Therefore, it is important to reduce the effects of water pollution and improve the living conditions of onshore communities along Yangon riverbank.

Policy makers and community leaders are responsible for environmental protection and public health should prioritize monitoring and regulating sources of water pollution. Enforcement of laws is crucial to prevent industries and agricultural operations from contaminating water sources. Investments should be made in safe drinking water initiatives, water filtration facilities, the expansion of municipal clean water networks, and the subsidization of household-level water purification systems for low-income families.

It is also essential for conducting public awareness campaigns that mitigate the health risks associated with water pollution and the importance of safe water consumption. Educational programs at the community level will help households adopt better practices related to water consumption. Additionally, local businesses affected by the consequences of water pollution should receive technical or financial assistance to adapt their operations. Residents of onshore communities can actively participate in identifying pollution sources and contribute to creating cleaner environments, leading to more sustainable and effective solutions.

As industrial waste disposal is associated with water pollution, the policy makers should revise the environmental laws related to industrial waste disposal and illegal dumping. Industries must take responsibility for preventing the discharge of waste into rivers. Public participation is critical, and community-driven waste management programs, supported by the government, are essential to reducing water pollution.

It is needed to implement health education campaigns by collaboration with non-governmental organizations for preventing waterborne diseases, detecting illnesses, and promoting hygiene practices. Transparent management of water services and clear communication regarding how public contributions will be utilized can help rebuild community trust and encourage participation in payment schemes for improved water services.

Central, regional, and local governments should work together with industries to address water pollution comprehensively and sustainably. Therefore, a well-coordinated and inclusive approach is essential to solve the water pollution problems in the Yangon River and protect the future well-being of onshore communities.

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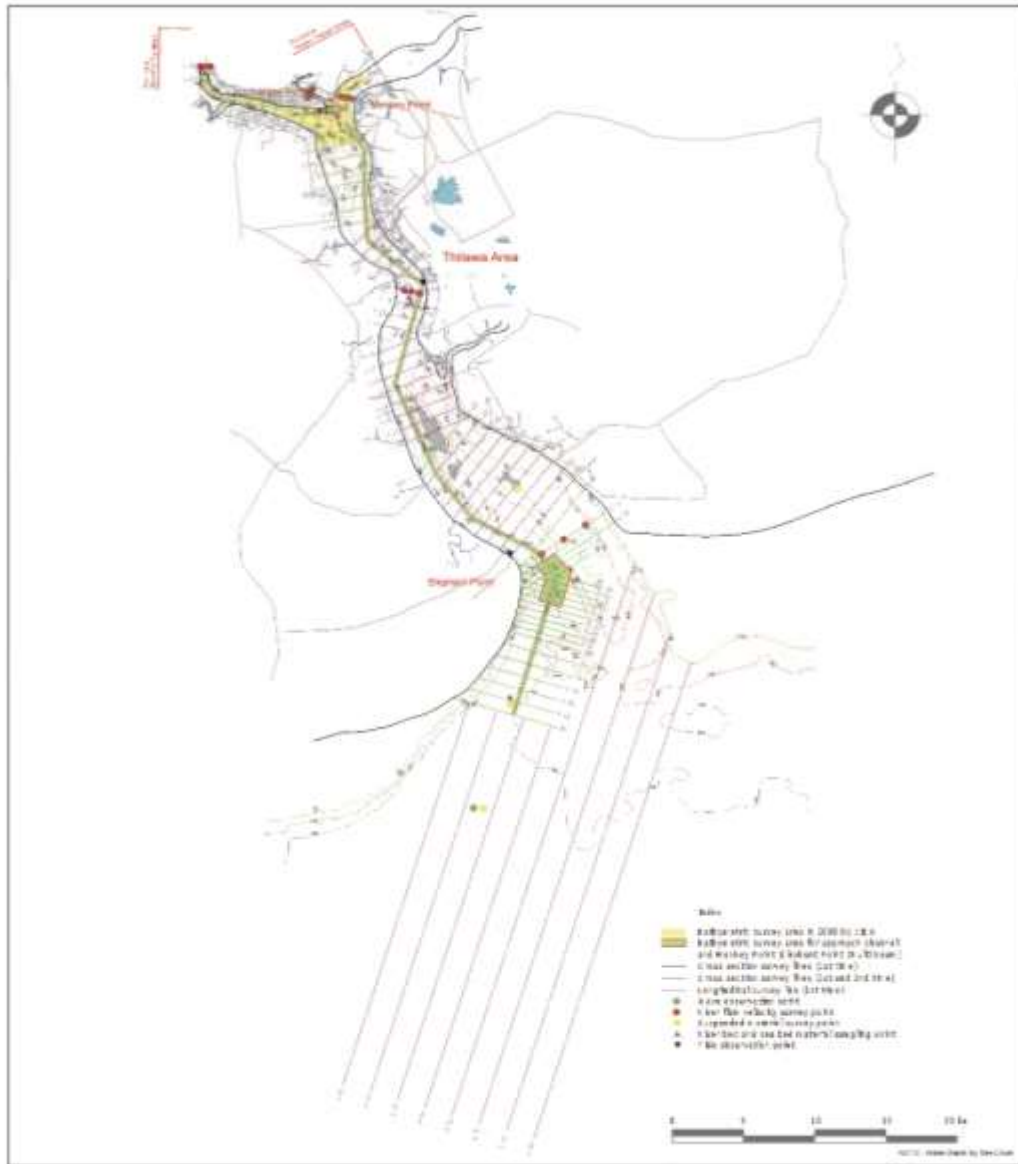
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# APPENDIX

## Appendix (A)

### Yangon River Map



Sources: Myanmar Port Authority (MPA), 2016.

**Survey Questionnaire**

Dear respondents,

The purpose of this study is to examine the Water Pollution in Myanmar: Case Study in Yangon River. This survey is concerned with the people living along the Yangon Riverbank. Please kindly answer the following questions, as it is very important for me to have your response. All your responses are confidential and will only be used for the purposes of this research. Thank you in advance for taking the time to complete this survey.

**Profile of Respondents**

**Section (A)**

**No -----**

**Demographic Characteristics**

Please, Tick  $\checkmark$

(1) Gender

Male

Female

(2) Age

1 - 18 years

19 - 36 years

37 - 54 years

> 55 years

(3) Marital status

Single

Married

Divoced

Separated

(4) Respondent

Head of household

Wife

Other

(5) Education level

No formal education

- Primary
  - Secondary
  - University graduate
- (6) What is your occupation?  
 .....

**Section B**

**Water Pollution and Socioeconomic Impacts**

- (7) income level:
- 0 – 100,000
  - 100,001 – 300,000
  - 300,001 – 500,000
  - > 500000
- (8) Has water pollution affected your household expenses (e.g., buying clean water, medical costs)?
- Yes
  - No
  - Not sure
- (9) If yes, which of the following costs have increased due to water pollution?  
 (Select all that apply)
- Health/medical expenses
  - Cost of buying bottled/clean water
  - Cost for water filtration systems
  - Reduced income due to illness
  - Other: \_\_\_\_\_
- (10) Do you think that local businesses in your area are affected by poor water quality (e.g., restaurants, food processing, factories)?
- Severely affected
  - Slightly affected

- Not affected
- Not sure

**Section C**  
**Awareness and Knowledge**

(11) What do you use local water sources for?

- Drinking
- Cooking
- Washing clothes/dishes
- Bathing
- Fishing
- Agriculture (irrigation, livestock)

(12) What are the main sources of water pollution in Myanmar?

- Industrial waste
- Sewage/Microbial pollutants
- Agricultural runoff
- Deforestation
- Illegal dumping
- Others

(13) What environmental problems have you noticed in rivers nearby?

- Dead fish or aquatic animals
- Murky or colored water
- Bad smell
- Algae blooms
- Illegal dumping
- None

(14) In your opinion who should be most responsible for reducing water pollution at the Yangon River?

- Central government

- Provincial government
- Local government
- Industries
- Agriculture department
- All above
- Other

#### **Section D**

##### **Impact of water pollution in Yangon River on onshore communities**

(15) Do you believe industrial waste is a major contributor to Yangon River pollution?

- Yes
- No
- Not sure

(16) Have you seen or smelled pollution (e.g., chemical odors, discoloration) near the riverbanks?

- Frequently
- Sometimes
- Rarely
- Never

(17) Do you feel safe using water from the Yangon River for any of the following?

- Washing clothes
- Fishing
- Bathing
- None of the above

(18) Have you experienced economic losses due to water-related issues?

- Yes
- No

(19) Would you be willing to pay a small monthly fee for a clean and safe water supply?

- Yes
  - No
  - Maybe
- (20) Where do you think most of the polluted water in your area comes from?
- Nearby factories or industries
  - Drains and canals from households
  - Farms and plantations
  - Urban waste from nearby towns
  - Don't know

**Section E**  
**Water quality and Health**

- (21) How has water pollution affected your livelihood or income?
- No effect
  - Slight impact
  - Moderate impact
  - Severe impact
  - Not sure
- (22) If affected, in what way has your livelihood been impacted?
- Reduced fish catch or quality
  - Crop loss or poor yield from polluted irrigation
  - Higher cost of water or water treatment
  - Loss of work related to tourism/recreation
  - Other: \_\_\_\_\_
- (23) Have you had to spend more money on health or clean water due to pollution?
- Yes – a lot more
  - Yes – a little more
  - No change
  - Not sure

(24) Have you or anyone in your household suffered from waterborne diseases (e.g., diarrhea, cholera)?

- Yes
- No
- Not sure

(25) Do you believe poor water quality impact on human health?

- Yes
- No

(26) How concerned are you about the health impacts of water pollution?

- Very concerned
- Somewhat concerned
- Neutral
- Not very concerned
- Not concerned at all

(27) What type of illnesses are most common in your area due to poor water quality?

- Diarrhea
- Typhoid
- Cholera
- Skin infections
- I don't know
- Other

(28) Do you think it is safe to drink water from Yangon River directly?

- Yes
- No
- Don't know

(29) How serious do you think the threat of water pollution is to Myanmar's environment?

- Very serious
- Serious
- Moderate
- Minor
- Not serious at all

**“Thank You for Your Cooperation”**