I, Jalisa Harris, hereby submit this original work as part of the requirements for the degree of Master of Community Planning in Community Planning.

It is entitled:
Public Perceptions of Drinking Water in Rural Thailand: Surveying Households in Ban Thakhonyang, Ban Don Man and Ban Nong Khon, in Kae Dam District in Mahasarakham Province

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Public Perceptions of Drinking Water in Rural Thailand: Surveying Households in Ban Thakhonyang, Ban Don Man and Ban Nong Khon, in Kae Dam District in Mahasarakham Province

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ABSTRACT

A better understanding of how the public perceives their available water supplies can contribute to improvements in water management, drinking water safety and can potentially pressure public suppliers to improve service quality and quantity. This study uses a questionnaire to understand the public’s perceptions of drinking water quality at the village level in rural Thailand. This paper discusses some of the main insights in regards to attitudes and behavior of water availability and options, services and quality. A total of 92 households completed the survey. This research concluded that households at the village level lack sufficient access to abundant, clean and secure drinking water. Therefore, it is recommended that a drinking water quality management plan is created to ensure that Thailand’s most vulnerable population has clean drinking water on a consistent basis. Additionally, this plan will only be effective if routine monitoring and evaluation aspects are incorporated into the plan. Otherwise, this drinking water quality management plan (specifically designed for the village level) will fail as resources tend to get dropped off by government agencies and/or volunteer groups to villages and then neglected due to a failure of government agencies and/or volunteer groups to regularly monitor and evaluate resources.
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CHAPTER 1

1.1 INTRODUCTION

Bordered by Lao People’s Democratic Republic and Myanmar in the north, Lao People’s Democratic Republic in the east, Malaysia and Cambodia to the south and southeast, and Myanmar to the west, Thailand is considered a mid-level-income country in Southeast Asia (Juntopas and Naruchaikusol, 2011). In 2008, Thailand’s Gross Domestic Product (GDP) was worth US $274 billion; this figure classifies the country as the second-largest economy in Southeast Asia after Indonesia (Ibid.). Additionally, Thailand ranks as the fourth-richest nation in Southeast Asia following behind Singapore, Brunei, and Malaysia (Ibid.).

Two thirds of Thais live in rural areas, provincial towns, communes or villages (Ibid.). The Department of Provincial Administration reported that Thailand is divided into 76 provinces, further divided into 877 districts, and then further divided into approximately 7,355 sub districts (Tambons) and 74,000 villages (Muban) (Ibid.).

Over the last fifty years, Thailand has improved many of the country’s sectors. For example, the poverty rate has declined extensively over the last thirty years from 67% in 1986 to 11% in 2014, the proportion of underweight children has fallen by nearly half, and owing to the 2001 Universal Health Coverage Scheme, Thailand has largely achieved its goal of providing access to affordable health care to all of its citizens (World Bank, 2015).

The World Bank (Ibid.) further notes that over ninety-seven percent of Thais, in both rural and urban areas, have access to clean water and sanitation. Yet, despite Thailand’s high priority placed on water and sanitation, the quality of water supplies in rural Thailand is lagging behind that of the country’s urban population.
1.2 PROBLEM STATEMENT

Without water, life could not be sustained. Water is a fundamental need for all living organisms. It is vital to the functioning of everyday life that families and individuals have access to clean drinking water. For many people in the Western world, the concept of water scarcity is an abstract concept; however, for others it is a stark reality. From 1986 to 1991, the Kingdom of Thailand was considered one of the fastest growing economies in the world (Dixon, 2001). The Thai economy grew at an average of 1.1 percent quarter-on-quarter from 2000-2011 due to industrial and agricultural exports and, to a lesser extent, by domestic consumption (Ti and Facon, 2001). Unfortunately, this growth has proven to be problematic for the largely agricultural based country. The acceleration of economic growth along with population increase has created a tremendous demand on Thailand’s water resources—a demand the country is struggling to meet. Agricultural production accounts for only twelve percent of GDP despite the fact that nearly sixty percent of the population engage in it (Ibid). More importantly, the agricultural sector consistently remains the highest user of available water, at seventy-one percent of total water demand (Ibid.).

Nationally, access to an improved water supply in Thailand rose from a low ten percent in 1973 to the current level of over ninety percent, an improvement that has led to a positive change in the life of many women and children in rural areas who no longer have to travel long distances for water (Juntopas op.cit.). However, despite Thailand’s achievement of high basic sanitation coverage, there still continues to be a gap between urban and rural areas when it comes to accessing clean water and hygienic sanitation facilities.

Nearly eighty percent of Thailand’s urban population and about seventy percent of Thailand’s rural population have access to piped water (Ti op.cit.). Interestingly, only fifteen
percent of all households in Thailand’s rural areas drink water from these piped systems (Juntopas op.cit.) despite the fact that seventy percent have access to it. Instead, Thailand’s rural population have to depend on other water resources such as, but not limited to, rainwater and wells for household consumption (Ti op.cit.). This is partly due to the fact that, despite the increased access to piped water, water quality in rural areas remains a problem.

Additionally, piped water, or tap water, has its own issues with contamination. Although piped water is treated, it is still exposed to microorganisms, and is thus not one hundred percent clean (Azlan, Khoo, Idris, Amin, and Razman, 2012). Therefore, Geldreich (1996) asserts that tap water should be boiled prior to drinking as the supply is likely to be contaminated with microbes from water pipe corrosion. According to Zani et al. (2005), high levels of chlorine can cause degenerative diseases or toxicity. With this in mind, these concerns and others can pose great health risks in rural areas where piped water systems are not properly maintained.

In 2013, the UN Special Rapporteur on the human right to safe drinking water and sanitation, Catarina de Albuquerque, requested the Government of Thailand to implement, “an independent water and sanitation regulator and to take prompt action to fully realize the human rights to water and sanitation for all” (The Office of the United Nations High Commissioner for Human Rights, 2013). Special Rapporteur de Albuquerque noted that although water sanitation has improved in rural Thailand, rivers and other sources of water are progressively becoming polluted due to the direct discharge of untreated human feces—seventy-nine percent of the community wastewater produced daily in Thailand is left untreated (Ibid.). Additionally, Special Rapporteur de Albuquerque also noted that there is a stark difference between Thailand’s urban and rural populations:

The contrast between people who have access to water and sanitation in modern and formal zones in cities and those who suffer from the lack of access to these
basic services and have been left behind, including informal settlements and hill tribe communities was striking. While the great majority of Thai people have experienced rapid development, millions of people, including stateless people and undocumented migrant workers, have not reaped these benefits (The Office of the United Nations High Commissioner for Human Rights, 2013).

Given the fact that there is indeed a disparity between clean water access in urban and rural Thailand, this research seeks to understand the public perceptions regarding drinking water supplies in rural villages in Thailand. Considering that Northeast Thailand is the poorest and driest part of the country, their access to clean water is a dire and persistent issue (Chamratrithirong, 1995). With this in mind, three rural villages in Mahasarakham Province will be used as a case study to understand the perceptions regarding drinking water supplies.

1.3 PURPOSE OF STUDY

The purpose of this study is to understand the public’s perceptions of their drinking water supplies in three villages in Mahasarakham Province, Thailand: Ban Nong Khon, Ban Don Man and Ban Thakhonyang. This study seeks to identify the public perceptions, behavior and attitudes of the quality of water on a village level scale in rural Thailand.

**Reason:** A better understanding of a community’s perception of their drinking water supplies or access to drinking water can contribute to improvements in water management, drinking water safety, and can potentially put pressure on public suppliers to improve service quality and quantity.

**Objective 1:** To understand the public’s perception about drinking water within the three selected villages. A series of questions was developed to understand the public perception of:

- Water health (quality and quantity of drinking water resources)
- Organoleptic properties (taste, smell, color)
Objective 2: To understand the public’s current attitudes toward drinking water issues within the three selected villages. A series of questions was developed to understand the public perception of:

- Top concerns about water used for drinking
- Responsibility for drinking water resources

Objective 3: To understand the public’s perception of water safety within the three selected villages. A series of questions was developed to understand the public perception of:

- The safety of rainwater harvesting
- The safety of tap water

1.4 SIGNIFICANCE OF STUDY

By understanding the public perceptions and attitudes of drinking water at the village level, water suppliers are able to improve water services. Additionally, although public perception surveys have been done to some degree around the world, little research regarding the perception of water quality have been done in Thailand.

1.5 RESEARCH QUESTIONS

This research seeks to answer the following question:

- What are the public perceptions and attitudes regarding access to clean drinking water at the village level?
1.6 ASSUMPTIONS

There are several assumptions made in this study. The first assumption was that survey administrators understood the content and context of the survey questionnaire. Secondly, it was assumed that survey participants understood the content and context of questionnaire. Thirdly, it was assumed that survey participants would answer questions truthfully. Lastly, the assumption was made that survey participants would translate responses truthfully and accurately.
CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

Public perception surveys are ideal instruments to use when attempting to understand feelings, attitudes and behaviors regarding specific situations. Understanding the public perception of a particular product, situation, etc. is useful when attempting to solve cultural and/or social problems, to analyze/address the needs of a particular community and/or environment, or answer pivotal questions pertaining to why a particular group responds to a particular situation in a particular manner.

To fully understand the scope of this thesis, it is imperative that one is familiar with water and the perception that the public has about their access to clean and safe water. Such an understanding will help establish the reason people have certain perceptions and attitudes toward water quality, which, in turn, impact peoples’ perceptions and attitudes toward the taste and odor of their drinking water.

Additionally, it is important to understand Thailand, in terms of the history of the country’s efforts to provide water at the village level, as this historical information highlights some of the established issues that contribute(d) to the discrepancy in drinking water at the village level. A thorough understanding of the history will be beneficial in understanding the reasons why people have certain perceptions and attitudes with regard to the water quality problem.

2.2 WATER QUALITY

For the purposes of this thesis, water quality is described as the chemical, physical, and biological characteristics of water that help determine whether water is suitable for human usage (Sanctuary, 2011)—in particular for human consumption. The concentration of dissolved
oxygen, bacteria levels, the level of salinity, and the turbidity level are measurable factors used to determine the condition of drinking water (Ibid.). The condition of drinking water should be safe for human consumption, as safe water is essential to the quality of a person’s life. The World Health Organization (WHO) defines water as safe when water “does not represent any significant risk to health over the lifetime of consumption, including different sensitivities that may occur between life stages” (Vichian, 2013). Safe water is constituted as being free from pathogenic organisms, clear (colorless), tasteless, low in concentrations of toxic compounds, and lacks interaction with transmission pipes/fitting and storage containers (Ibid.) It is important to remember that the major focus of this dissertation is on perceived quality of water at the village level in rural Northeast Thailand.

Owing to the fact that Thailand is an agriculture-based country, water is the primary resource used to fund the growth of both agricultural activities and productivity (Global Water Partnership, n.d). Yet, Thailand’s swiftly growing economy and increase in population have placed a stress on water demand, ultimately causing the country to be faced with water problems such as, but not limited to pollution, shortages, droughts, and floods (Ibid.). The added stress placed on Thailand’s water supplies is particularly stressful for small rural communities. At the village level, water issues for consumption pertaining to quality (and quantity) are real-life obstacles facing villagers as observed by the author.

Thai villages are supplied with water through two types of rural water supply systems: ground water and surface water (Soticha, Jareeya, Sudjit, and Prapat, 2014). Both types of rural water supply systems are exposed to pollution. Much of the pollution can be attributed to Thailand’s rapidly growing economy and population increase (Juntopas op.cit.). The increase in population has led to an increase in sewage disposal. In fact, natural waterways in Thailand are
being used as a sewage receptacle for domestic and industrial waste (Cheevaporn and Menasveta, 2003). Using waterways to dispose of waste has been a critical issue in Thailand, particularly in Bangkok—Thailand’s capital and most populous city. For example, the Chao Phraya River and the Gulf of Thailand have approximately sixty-seventy percent of domestic waste from the residential community being discharged into them (Ibid.). Additionally, not only do waterside buildings freely pump waste into the Chao Phraya River, but the river is also used by boats with diesel truck engines that emit exhaust directly into the water (Janofsky, 2015). Yet industrial and domestic waste are not the only sources of water pollution, as “there are also high levels of bacterial contamination close to populated and industrialized areas in Thailand, and these untreated wastes are discharged directly or indirectly to canals, rivers and sea” (Cheevaporn op.cit.).

2.3 HISTORY OF WATER IN RURAL THAILAND

Access to safe drinking water in rural areas has been a major concern for the Thai government since the early 1900s. In 1909, in an attempt to improve and modernize infrastructure and public services, piped water systems were introduced in Bangkok (Juntopas op. cit.). After the initial introduction, the improved and modernized infrastructure and public services expanded to nearby municipalities. This expansion continued until 1946 when service growth was halted due to a limited supply of electricity (Ibid.). After 21 years, Juntopas and Naruchaikusol assert that “water works and electricity services were transferred into a state enterprise for improved operation and efficiency” (Ibid. p. 7). By transferring water and electricity services into a state enterprise, expansion in the sector resumed.

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¹ Due to limited research on the history of water quality in Thailand, the author was unable to find multiple sources to support this section of the thesis?
Although Bangkok was introduced to piped water supply systems in 1909, rural areas did not receive any attention until nearly four decades later. The supply of water to rural regions was started by the Ministry of Public Health (MOPH), which eventually led to the formation of a special committee consisting of the Department of Public Health Works (within in the Ministry of Interior), the Ministry of Interior (MOI), and the Department of Health (DOH) within the MOPH (Ibid.).

To ensure the program was a success, the following agencies had specific responsibilities for the rural water supply program. The Department of Public Works was responsible for implementation and growth, while the Bureau of Civil Work under the Department of Health was in charge of building water treatment facilities and locating raw water sources, and the MOPH’s and MOI’s responsibility was to manage remote rural communities (Ibid.).

Juntopas and Naruchaikusol summarize the implementation of the rural water supply program in four phases. In phase one, from the mid-1960s to 1970s, a strategic program to supply water to rural regions was created. The plan included different departments being responsible for villages with a certain amount of residents. For instance, under the MOPH, the Bureau of Rural Water/DOH was responsible for villages with a population of 1,000-5000 persons and under the MOI, the Bureau of Waterworks/Department of Civil Engineering for communities with populations over 5,000 persons (Ibid.). However, during the first phase, the demand for better services increased. To address this demand, there was a shift from multiple agencies managing and operating rural water services to one agency managing and operating rural water services—Provincial Waterworks Authorities (PWA). PWA became responsible for delivering water to cities and municipalities in an attempt to improve and enhance flexibility and
efficiency under one organization (Ibid.). However, the DOH remained responsible for servicing villages with populations under 5,000 (Ibid.).

Phase two, from 1982-1992, was a period of ‘clean water supplies to rural areas’ declared by the government under the fifth and sixth National Economic and Social Development Plans (Ibid.). The intentions of this period was to improve water access at the village level covering “90% of the rural population with 45 liters of water per capita per day for all domestic uses” (Ibid. p. 8). Out of the forty-five liters, at least five liters would be used for drinking.

Juntopas (Ibid.) assert that during this 1982 – 1992 time period the Thai government put Thai Baht (THB) 36,547.6 million ($1,058,568,304.59 billion US)—which was twenty percent of the total rural development budget—to the creation of water supply and infrastructure in rural regions. Furthermore, the DOH, who initially was responsible for servicing small towns with populations below 5,000, extended its operation to also service remote villages as well (Ibid.).

Phase three was especially important, because although the first two phases were successful to a certain extent, the targets set in the first two phases had not been achieved. By 1991, ninety percent of the rural population did not have access to clean water supply systems. Therefore, the new goal for phase three was to provide service for seventy percent of villages in Thailand by 2001 by building an additional 41,150 village water supply systems (Ibid.). With the new goal set in motion, the government wanted to encourage community participation and empower citizens at the village level with water resources. Juntopas note that, “the guiding principle for water delivery demanded that communities should have full ownership of their own water services, and eventually become financially independent and capable of managing their own services” (Ibid. p. 9).
Phase four, 2001 to present, is about efficiency and decentralization. In 1995, decentralization started in Thailand by establishing sub-district bodies, the Tambon Administrative Organizations (TAOs) (*Ibid.*). TAOs are important because “one TAO covers around ten villages, or populations in the range of 10,000 people. The TAO has revenue-raising powers, and at the same time has taken responsibility for a broad range of local government functions”—including rural water supply (*Ibid.* p. 9). Securing clean and sanitized water at the village level is primarily now the responsibility of TAOs.

At the date of the Juntopas (*Ibid.*) report, the researchers stated that ninety percent of the population (including rural and urban with higher access in urban areas) had access to safe water. In 2015, the World Bank reported that over ninety-seven percent of the urban and rural population had access to safe water. However, both of these reports fail to recognize that although piped water access has increased in many areas, reality and perception may not align as much as researchers believe. The reality is that piped water access has increased, which leads to the perception (from a government level) that access to safe drinking water has also increased. However, the author observed that many communities’ members do not perceive piped water to be safe for human consumption. In fact, with bottled water being very inexpensive, and rainwater as a popular choice at the village level (which has its own issues), many Thais claim to not drink from the tap, especially at the village level.

Despite increased overall water supply access for both urban and rural populations, villagers still have insufficient access to clean drinking water due to agricultural pollution, poor community internal management, poverty and technical solutions, lack of sustainable development and infrastructure for water supply systems, and other water related issues as a
result of rapid development, industries, and inadequate waste disposal methods (Boontham, 2015). This will be discussed more in the results and discussion section of the thesis.

2.4 THAI RAINWATER JAR PROGRAM

There are three seasons in Thailand: the hot/dry season from March to May, the rainy/wet season from June to October and the cool season from November to February. Although it barely rains during both the cool and dry seasons of Thailand, rain is still abundant. In fact, the annual rainfall in all regions of the country is 1,200 to 1,800 mm (Luong and Luckmuang, 2002). During the rainy season, the weather is still warm with heavy and short downpours usually occurring during the early mornings and/or late afternoons. For the Northeastern region of Thailand—which is the driest and poorest region of the country—some of the major issues surrounding drinking water have to do with access to clean and safe drinking water year-around and water storage methods. Like many other rural communities in developing countries, villages in rural Thailand lack (and still do in some settlements) household water connections. Rainwater harvesting is seen as an effective and feasible solution to the region’s drinking water issues.

Facing a critical need to solve the water scarcity problem in rural Northeast Thailand, the Thai Government introduced a rainwater jar program during the 1980s. This water resource development program addressed the Northeast region’s lack of access to safe drinking water year-round. Officially beginning in November 1985, the rainwater program’s objective was to “provide an alternative and supplementary water supply in rural areas with an emphasis on self-sufficient and conservation” (Ibid. p. 1). Ariyabandu (2001) notes (as cited in Luong and Luckmuang, 2002), that the program had a “decentralized focus with coordination and planning responsibilities given to the districts and managed by local authorities with user-community participation” (Ibid. p. 1).
Prior to the rainwater jar program, villagers in Northeast Thailand stored their rainwater used for drinking in small clay jars; during the dry season, it was still common for villagers to drink from shallow wells and ponds (Hewison and Tunyavanich, 1990). During the 1970’s groundwater from tube wells became an unacceptable source for drinking water due to saline and iron contamination (Ibid.), thus creating the perfect opportunity for the government to encourage rainwater harvesting at the village level. 

The use of jars for rainwater harvesting proved to be a cost-effective method for improving water access, both in terms of quality and quantity (Hewison op. cit.). Additionally, the Thai water program had an added benefit: rural job creation. Technical groups were formed where villagers were trained in the art of jar- and tank- construction at a central location; afterwards they (the workers) would distribute the jars and tanks to households (Luong op. cit.). Since rainwater was a feasible solution to the lack of safe drinking water in rural Northeast Thailand, a demand and supply effect was ultimately created. As the demand for safe drinking water (rainwater) increased, the supply of jars and tanks, and ultimately skilled workers—trained under the government-funded program—also increased in order to satisfy the safe drinking water demand. As this new field of occupation thrived, many villagers either started their own small jar-making enterprises or were hired by small contractors (Ibid.).

The rainwater jar program proved to be very successful. By 1986, 1.7 million jars had been distributed to households (Ibid.); one year later the number of jars distributed reached five million (Hewison op. cit.), and by 1988 there were approximately nine million large capacity jars throughout Thailand (Hewison op. cit.). In Mahasarakham Province alone, the focus of this

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2 A tube well, according to Oxford Dictionaries, is a well that employs an iron pipe to drive a tube into the earth to a stratum that bears water (Oxford Dictionaries, n.d.)
thesis, jar ownership rose from 80,000 in 1985 to 213,000 in 1987 (Hewison op. cit.; Hewison, 1987). Nearly 30 years later the Thai Jar program is still in effect.

2.4.1 HOW WATER IS COLLECTED AND STORED

Rainwater harvesting by rooftop catchment is a popular method for collecting rainwater for many rural households in Thailand. There are four basic elements needed for rooftop harvesting to be feasible in rural Thailand. The first element needed is a roof, normally made out of corrugated zinc steel. Generally, many of the Thai households at the village level have sloped rooftops. The steepness of the roof helps the rainwater reach the second basic element needed, the gutter, quickly. Once the rain reaches the gutter, it then travels down the connecting pipe (third element) into a storage jar/container (fourth element).
Figure 1: Corrugated Zin Steel Rooftop, Gutter and Connecting Pipe
Source: Author

Figure 2: Rainwater Travelling Down Gutter into Connecting Pipe
Source: Author
One household will typically own two to three 2,000-6,000 liter cement jars used to collect rainwater. Additionally, some households use metal jar lids to protect their rainwater storage from debris and other forms of contamination.
Other common methods of storing rainwater include large containers with taps and water towers.

![Figure 5: Large Water Container](image1)
Source: Author

![Figure 6: Water Tower](image2)
Source: Author

### 2.4.2 RAINWATER ANALYSIS

One in ten people around the world (or 663 million) lack access to clean safe drinking water (World Health Organization and UNICEF Joint Monitoring Programme, 2015). For countries facing water problems, such as Thailand, rainwater harvesting is seen as “one of the most promising alternatives for supplying freshwater in the face of increasing water scarcity and escalating demand” (United Nations Environment Programme, n.d.). To ensure that rainwater
harvesting is safe for human consumption, a rainwater analysis test can be conducted to confirm that rainwater supplies have not been contaminated.

In a study conducted by Lekouch et al. (2010), a chemical analysis was performed on dew and rainwater samples collected over the course of three years in Zadar, Croatia. In their study, the goal was to compare and contrast the chemical properties of dew water versus rainwater to determine the acceptability of these sources to be used as drinkable water (Ibid.). The samples were tested for pH, electrical conductivity (EC), major anions, and major cations levels. Their study concluded that the chemical analysis of rainwater and dew both met the standards of the World Health Organization (WHO).

A bacterial analysis study led by Pinfold et al. (1993) also determined that rainwater not only met the WHO standards, but was also purer than other sources of drinkable water. In this study, researchers conducted bacterial testings on rain jar water supplies in rural villages in Northeast Thailand. In 60% of rain jars tested in one village *E. coli* was absent compared to the other 46% of vessels used for storing drinking water in the home of the villages. Pinfold (Ibid.) notes that when it comes to safe drinking water in Thailand, while many studies have illustrated that rainwater typically does meet the chemical and physical guidelines of the WHO, bacterial quality varies considerably. There are multiple factors that cause variances in the bacterial analysis of rainwater including, but not limited to, the methods used for analysis, jar features (i.e. taps, lids), and the criteria used for presenting analysis results (Ibid.). Additionally, the study discovered that contamination increased more during the rainy season than dry season due to rooftop harvesting (Ibid.). Variances in bacterial quality are also related to handling, storage, and sanitation methods. In fact, unhygienic handling methods during the rainy season can also increase the risk of contamination (Ibid.).
A well-known study conducted by Wirojanagud et al. (1989), on 189 rainwater storage tanks and jars, determined that 57% of the 189 samples contained no fecal coliform, but *E. coli* was present in twelve of the samples. Furthermore, the study revealed that only around forty percent of the tanks and jars met WHO drinking water standards. The samples indicated that the sources of fecal contamination from rooftops and gutters was from creatures such as birds and rodents, but not from humans. Wirojanagud (*Ibid.*) recommended improving storage, handling, filtering, and sanitation methods to protect the quality of stowed rainwater.

In a five-year study carried out by Abbott et al. (2007), a microbiological analysis was performed on rainwater collected from the rooftops of 560 private dwellings in New Zealand. Similar to the findings of Wirojanagud, the researchers concluded that at least half of the samples analyzed showed fecal contamination from animals and insects such as birds, frogs, rodents, and dead animals. The study revealed that the rainwater was being contaminated from the roofs, gutter, and the water tank and/or jar itself due to a lack of maintenance, poor disinfection/filtration methods, poorly designed equipment such as delivery systems and storage tanks, and a failure to physically perform tactics to protect the collection of rainwater from microbiological contamination (Abbott *op.cit.*).

To ensure that rainwater once stored remains safe from contamination and mosquito breeding, Loung (*op.cit.* p. 2) suggest the following:

• Drain away the first and the second rain falling on the rooftop collected in the gutter at the beginning of the rainy season each year, as the first and the second rain in the gutter invariably contain the dirt and the bird droppings deposited on the rooftop during the dry season.
• Keep the connecting pipe between the gutter outlet and the tank inlet, or the jar mouth, movable for easy draining away the first and the second rain when the rainy season starts.
• Clean the tank and jar annually, prior to the start of the rainy season, for ready storage of the fresh rain.
• Cover the tank inlet with a piece of nylon net to prevent mosquitoes from entering into the tank.
• Keep the mouth of tank and jar covered to avoid mosquitoes and dirt from getting into the rain tank and jar.
• DO NOT empty the tank and jar completely at any time. Maintain a level of water inside the tank and jar at the bottom up to the tap level during dry season to prevent cracking of the tank and jar.

In section 2, question 8 of the survey, respondents were asked to check either a yes or no box, indicating whether they exercised the suggested recommendations listed above.

2.5 PUBLIC PERCEPTION AND ATTITUDES ABOUT WATER QUALITY

In regards to the quality of drinking water, perception can be more important than reality (Doria, 2010). *Oxford Dictionaries* defines perception “as the ability to see, hear, or become aware of something through the senses” (Oxford *op.cit.*). Public perceptions have a major influence on water drinking decisions. If consumers perceive their water source as unsafe, then they will not drink it. Public perceptions and attitudes about water quality result from a complex mix of diverse factors (Doria, *op. cit.*). Some factors influencing the perception of drinking water include, as stated by Doria (*Ibid.*):

• Organoleptic properties (flavor, odor, color and turbidity)

• Water interruptions, if consumers live in areas where there are water shortages (i.e. droughts)

• Experienced water related health problem(s) (i.e. diarrhea, cholera)

• Water supply type (i.e. piped connections, groundwater, rainwater)

• Information (i.e. newspapers, social media, for rural areas impersonal and interpersonal information)
• Prior experience

• Trust (or lack thereof) in government, authorities and water supply companies

The above list contains factors that can affect perception and drinking water related decisions made by families and individuals.
CHAPTER 3
METHODOLOGY

3.1 DESCRIPTION OF STUDY AREA

Mahasarakham Province is located in the northeastern region of Thailand and is considered the center of education for the Isan region. The province is subdivided into thirteen districts (amphoe). The districts are further subdivided into 133 subdistricts (tambon) and 1,804 villages (muban).

Figure 7: Map Showing Mahasarakham Province
Source: German Thai Link

Three villages were selected by the staff of the Mahasarakham University (MU) based on the villages’ proximity to the school. The villages were strategically picked based on varying
distances from one another, but still rather accessible for the author to travel to each village from the university. Owing to the fact that the author did not have their own transportation while in Thailand and had to rely on MU staff to get to and from villages, it was important to select villages that were easy for MU staff to travel to. The first and largest village is Ban Thakhonyang. Ban Thakhonyang is five kilometers from MU. In Thakhonyang households have access to piped water connections, rainwater, and bottled water. The second village is Ban Don Man and it is located in-between Ban Thakhonyang and Ban Nong Khon. In Nong Khon, households have access to rainwater, bottled, and some households have access to piped connections. At this village residents did not have piped water connections and either buy bottled water or drink rainwater. Ban Nong Khon is the furthest village from MU at twenty kilometers distance.

**Figure 8: Houses in Ban Thakhonyang**

Source: Author
3.2 SELECTION OF SUBJECTS

Given the small size of each village (under 200 residents per village), a convenience sample was conducted in which the unit of analysis was single households. The population survey as all households in each village. It is important to note, that households in Thailand are unique.
Surveying the entire population (every available household) allowed a higher confidence interval: +/-5%.

This research is a descriptive study of the public’s general knowledge, attitudes, and perception of water quality at the village level in Mahasarakham, Thailand. After the data were collected, all of the information was compiled using Microsoft Excel.

3.3 THE SURVEY

Household surveys are imperative because they assist researchers with comprehending how water travels to households (Centers for Disease Control and Prevention, 2008). A household survey can help determine if water reaching the home is safe for consumption and therefore reliable. Furthermore, it can also provide information on the community’s perceptions of their water sources, how water is managed in the home and how water is treated in the home.

A questionnaire was developed for this project by the researcher. This survey was designed by referencing “A Guide to Conducting Household Surveys for Water Safety Plans” by the U.S. Centers for Disease Control and Prevention (Ibid.) and the “Core Questions on Drinking-water and Sanitation for Household Surveys” developed by the United Nations Children’s Fund (World Health Organization and UNICEF, 2006).

3.4 SURVEY TRANSLATION METHOD

The process of translation is an essential component in cross-cultural studies and research (Cha, Kim and Erlen, 2007). When translating a survey into another language, it is important for researchers to understand the importance of cultural and linguistic appropriateness in study design and implementation. Anyone who is fluent in another language or who has ever tried learning a second language knows that, without a doubt, translation can be very challenging. Translation, at times, can also be politically challenging because some countries use the same language with
different conventions (McGorry, 2007). For Taiwanese people for example, reading something written in the traditional Chinese character set is okay; however, for mainland Chinese, the simplified set of characters is preferred (Ibid.). The alphabet, phonology, pragmatics, semantics, grammar and morphology are the essential components that make up a language. These essential components are also what make translating between languages tough. It is very easy for meaning to get lost in translation. It is also easy to confuse words, and say something completely different than what was intended.

For instance, in 2012 elementary playground signs—one English sign and one Spanish sign—posted in Southern Delaware said something completely different from one another. The English sign read “Parental or guardian supervision is required for the use of this playground equipment. Play at your own risk” (Costantini, 2012). The Spanish sign, on the other hand, read, “Ustedes debe tener un permiso para jugar en este campo. Violadores seran susceptibles a accion policial” which translates in English saying “You should have a permit to play in this field. Violators will be susceptible to police action” (Ibid.). Google’s Spanish to English translation, on the other hand, translates the Spanish sign as the following, “You must have a permission to play in this field. Rapists are susceptible to police action”. Violadores, which in the ABC News article was translated as violators, is translated to rapists on Google Translator. This example illustrates how important context is in language, and therefore in survey translation. One word can have multiple meanings, and understanding linguistic context will help in regards to survey design and comprehension.

If surveys are not properly prepared for cross-cultural research, they risk the possibility of producing inaccurate results and conclusions. McGorry (op.cit.) lists two to three common issues that usually occur when studies employ survey research methods in a cross-cultural environment: (1) researchers neglect to provide adequate detail regarding the development of survey, (2) only
one method of survey translation is described, or (3) any description of survey development is fully omitted or left out. These three points made by McGorry (Ibid.) illustrate the importance of why survey translation methods is pivotal to cross cultural studies. If survey method design is going to be improved for cross-cultural environments, then more researchers need to explain their procedures for developing and evaluating questionnaire translations for surveys administered in multiple languages. This description will aid in the advancement of survey translation methods. As it creates an environment where other researchers can explore multiple survey translation methods to evaluate if these methods result in an accurate instrument.

With regard to this survey, a pilot study translation method was used where two translators were asked to assist in a double, or back-translation process. The double translation process is the most commonly used translation process. In double translation, a minimum of two bilingual persons participate in translating a survey where one person translates a survey into the target language and the second person translates the survey back into the original language. The differences between the two translated surveys are considered as potential translation problems. This survey translation method is used to evaluate if a survey is understood in the same context by different members involved in the survey design process (Zavala-Rojas, 2014). Although Marin and Marin (1991) (as cited in Zavala-Rojas, cit. op.) consider the double translation process one of the most acceptable translation processes, this method still has its limitations. One of the main arguments against this approach is that the target text is not evaluated, but rather a version of it in the original language (Zavala-Rojas, op. cit.). McGorry (op. cit.) discovered that in regards to a pilot study she conducted, the double translation process did not result in an accurate instrument for a survey translation method.
To minimize the risk of experiencing similar results as McGorry, the author emphasized the importance of maintaining the same meaning, concepts and interests of both the English and Thai versions of the survey in order to avoid a direct translation where meaning could be lost or misinterpreted.
CHAPTER 4
RESULTS

4.1 INTRODUCTION

To fully understand the findings of this thesis, it is imperative that one is familiar with the structure of families in Thailand and how these family dynamics impacted the results. Unlike western cultures where one generation often lives in a household, Thai households are made up of several generations, sometimes under one roof, other times in adjacent houses (under multiple roofs).

The Thai culture, emphasizes family units above individuals. At the village level, living in neighboring individual houses is still considered one household when neighboring houses belong to one (the same) family. This is because family structures in Thailand functions and operates as one (i.e. all meals are ate together, members can sleep in either houses, all money is used to support the family as one unit etc.).

Family units in Thailand can be understood in three stages:

In the first stage, the family consists of the father, mother, and their children who are very young and not yet married. In the second stage, in addition the father, mother, and unmarried children, the spouse of the married daughter and their children are also included. In the third stage, when the second daughter in the family marries, the elder daughter who married first and has lived for some time with her parents, leave[s] the house with her husband and children to settle in [a] new house within the same compound; the newly married daughter and her husband move into her parents’ home. Although separated, the newly established family still depends upon their parents (Sirivongs et al., 1979 cited in Pongsapich, 1990 p.7)

When the parents die, each family separates and becomes economically and socially independent (stage one) until eventually the independent families grow into their own stage two and then stage three. (Ibid.) In regards to this thesis, a house was interpreted as a physical structure that provides shelter to inhabitants where as a household was interpreted as one or more
individuals collectively living together as one unit, in one or more houses. Houses that were
vacant, where inhabitants refused to participate in survey, or where inhabitants were away was
assumed to be one individual household.

4.2 RESULTS

A total of 92 households completed the survey, of which 24 were located in Ban
Thakhonyang, 37 were located in Ban Nong Khon, and 31 were located in Ban Don Man.
Thakhonyang has a total of 53 houses, of which 10 households refused to participate in the
survey and 7 households were rented by students who were away, 5 households were either
vacant or abandoned and another 7 houses were owned by one or more household. Nong Khon
has a total of 65 houses, of which 2 households refused to participate in the survey, 8 households
were either vacant or abandoned, 6 households belonged to migrant workers who were away, and
another 12 houses were owned by one or more household. All 31 households located in Don
Man participated in the survey.

Figure 11: House/Household Breakdown by Village

<table>
<thead>
<tr>
<th>Village Name</th>
<th>Total number of houses</th>
<th>Number of households who completed survey</th>
<th>Number of households who refused</th>
<th>Number of households were inhabitants were away</th>
<th>Number households vacant/abandoned</th>
<th>Total number of households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thakhonyang</td>
<td>53</td>
<td>24</td>
<td>10</td>
<td>7</td>
<td>5</td>
<td>46</td>
</tr>
<tr>
<td>Nong Khon</td>
<td>65</td>
<td>37</td>
<td>2</td>
<td>8</td>
<td>6</td>
<td>53</td>
</tr>
<tr>
<td>Don Man</td>
<td>31</td>
<td>31</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>31</td>
</tr>
</tbody>
</table>

Source: Author

The results of this survey include 26% of its respondents from Thakhonyang, 40% of
respondents from Nong Khon, and 34% of respondents from Don Man. All respondents
participated in a face-to-face interview with a bi-lingual Thai-native surveyor. The surveyor,
using a laptop, read survey questions to interviewees and marked responses accordingly. Survey
questions were pre-tested by surveyors, in which surveyors were paired together to assist in a
double, or back-translation process method, one persons asked question in Thai, the other person translated asked question back in English. Questions were pre-tested in order to (1) help and ensure that surveyors understood the intent and purpose of each question (that way they could explain to interviewees if necessary) and (2) to ensure that questions asked what they were intended to ask. The results of the pre-test caused several questions to be rephrased. Additionally, all surveyors’ participated in an additionally pilot study where the survey was administrated to a few random individuals to ensure that interviewees were able to comprehend questions.

The survey was aimed at all households living within the selected villages. The low number of responses limits the author’s ability to understand in depth the perceptions and attitudes towards water at the village level. However, survey results can serve as a starting point for policy makers, planners, and researchers alike for understanding trends regarding the perceptions of drinking water at the village level.

4.2.1 SECTION 1 – PRIMARY AND ALTERNATIVE SOURCES OF WATER

In section one of the survey, households were asked to identify their primary and alternative sources of drinking water during the dry, wet and cool seasons. The purpose of these questions was to understand if sources of water were dependent upon the season. For instance, do respondents drink rainwater during the dry season as well as the wet season, or is bottled water preferred during the dry season instead? Section one was comprised of five questions, of which three were multiple choice, one was a dichotomous question (yes, no, don’t know) and one was short answer.

It appears that bottled water is the preferred drinking source during the dry season for villagers living in Thakhonyang and Don Man. For all villages, 61 households (or 66%) reported using bottled water as the primary source of drinking water. The largest consumers of bottled
water during the dry season are villagers living in Thakhonyang (88%). This percentage is not surprising considering that Thakhonyang is closer to Mahasarakham University and is a dusty village due to the high traffic in this area.

Villagers living in Nong Khon are more divided on which source of water they primarily use during the dry and cool seasons. 19 households (or 51%) reported rainwater as their primary source while 18 households (or 49%) reported using bottled water as theirs.

**Figure 12: Primary Source of Drinking Water - Dry Season**

<table>
<thead>
<tr>
<th></th>
<th>All villages</th>
<th>Thakhonyang</th>
<th>Nong Khon</th>
<th>Don Man</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottled</td>
<td>66%</td>
<td>88%</td>
<td>49%</td>
<td>71%</td>
</tr>
<tr>
<td>Rainwater</td>
<td>32%</td>
<td>8%</td>
<td>51%</td>
<td>26%</td>
</tr>
<tr>
<td>Both</td>
<td>2%</td>
<td>4%</td>
<td>0%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source: Author

Nong Khon is the village furthest from Mahasarakham city of the three, and rainwater harvesting is still widely practiced. Interestingly, in all three villages, there is no difference between the choice of primary water source according to either dry or cool season. This is a significant finding considering that the wet season is in-between the dry and cool seasons. This finding indicates that those who do harvest rainwater are not likely to drink stored rainwater as a primary source once the rainy season is over.
The wet season is where households indicated a change in their primary source of drinking water. However, the reported changes are only slight differences. For instance, in Don Man during both the dry and cool seasons 22 households (or 71%) drink bottled water and 8 households (or 26%) drink rainwater, but during the rainy season the number of households who drink bottled water during the dry and cool seasons drops from 22 to 19 (or 71% to 61%), while the number of households who drink rainwater during the dry and cool seasons increased from 8 households to 11 (or 26% to 35%) during the wet season (9 households plus 2 households who drink both rainwater and bottled). Similarly, this slight change is also evident in Thakhonyang and Nong Khon. Due to the abundance in rainwater during the wet season, it is actually cost-efficient for villagers to rely more on a rainwater supply than spending money to buy bottled water (even though bottled water is inexpensive in Thailand).
When asked if households believed that their primary source of drinking water is safe during the dry, cool, and wet seasons, at least 45 (or 49%) of households across all three villages believe their primary source of drinking water is safe in any given season. As before, there is no change between the perception of safety during the dry and cool seasons. Respondents are consistent with their answers. However, there are slight changes of the perception of safety during the wet season. Villagers living in Don Man perceive their primary source of water as safer (58%) during the wet season as opposed to the other two seasons (52%). Don Man was the only village where a change of perception was indicated. However, this 6% difference is a statistically insignificant finding. In Don Man, 16 households indicated that they perceived their primary source of water as safe during the dry and cool seasons. When asked about the wet season, 18 households indicated that they perceived their primary source of drinking water as safe. When dealing with small sample sizes, slight changes can “appear” to cause significant findings, yet the 6% difference in this case represented only two households.
The findings also revealed that at least half of respondents in all villages either perceived their primary source as unsafe or expressed a level of uncertainty regarding the safety of their primary source in any given season. The reasons behind those percentages will be discussed in later sections.

4.2.2 SECTION 2 – RAINWATER STORAGE AND COLLECTION METHODS

In section two of the survey, households were asked questions relating to their rainwater storage and collection methods. If respondents did not drink rainwater, they were asked to answer the first question (which asked why they do not drink rainwater) and then proceed to section three (see below). The purpose of section two is to assess if households engage in proper rain harvesting treatment methods. Poor methods of rainwater harvesting can negatively impact
human health. Systems that are improperly cared for can expose the rainwater supply to various contaminants such as, but not limited to, debris, minerals, metals, and pathogens. Section two was comprised of eight questions, of which the first question was only asked to those who do not drink rainwater, seven questions were multiple choice, and one was dichotomous.

46 households (or 50%) indicated that they do not drink rainwater. The primary reason indicated by 74% of those households was that rainwater is not clean. In Don Man, only 10 households indicated that they do not drink rainwater, or which all said it is because rainwater is not clean. During the interviews, it was revealed that many believe that rainwater is contaminated by dust, bacteria and chemicals.

**Figure 16: Reasons for Not Drinking Rainwater**

<table>
<thead>
<tr>
<th>Reason</th>
<th>All villages</th>
<th>Thakhonyang</th>
<th>Nong Khon</th>
<th>Don Man</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>17%</td>
<td>21%</td>
<td>24%</td>
<td>0%</td>
</tr>
<tr>
<td>Smell</td>
<td>17%</td>
<td>21%</td>
<td>24%</td>
<td>0%</td>
</tr>
<tr>
<td>Taste</td>
<td>13%</td>
<td>21%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Not clean</td>
<td>74%</td>
<td>58%</td>
<td>76%</td>
<td>100%</td>
</tr>
<tr>
<td>Not safe</td>
<td>13%</td>
<td>21%</td>
<td>12%</td>
<td>0%</td>
</tr>
<tr>
<td>Better Options</td>
<td>4%</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>9%</td>
<td>16%</td>
<td>6%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: Author
Of the remaining 50% of households who drink rainwater, all (100%) collect rainwater through rooftop harvesting. When asked how rainwater is stored, 87% of households in all villages responded that they store their rainwater supply in large cement jars.

**Figure 17: How Collected Rainwater is Stored**

| Source: Author |

<table>
<thead>
<tr>
<th></th>
<th>All villages</th>
<th>Thakhonyang</th>
<th>Nong Khon</th>
<th>Don Man</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Cement Jars</td>
<td>87%</td>
<td>40%</td>
<td>20%</td>
<td>86%</td>
</tr>
<tr>
<td>Small Clay and Ceramic Jars</td>
<td>15%</td>
<td>60%</td>
<td>5%</td>
<td>14%</td>
</tr>
<tr>
<td>Cement Tanks</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>10%</td>
</tr>
</tbody>
</table>

4.2.3 SECTION 3 – PIPED WATER

In Thailand, roughly seventy percent of the rural population has access to piped water systems (Sethaputra et al, n.d.). Yet, it was observed by the author that piped systems are not used for human consumption. Even in casual conversations with the author, various Thais from different economic backgrounds expressed the same sentiments of not drinking water from piped systems. Instead, piped water appears to be used more for domestic activities such as cleaning and washing.

In section three of the survey, households were asked questions pertaining to piped water quality, access, and services. The intent of section three was to (1) investigate the validity of claims that Thais do not drink from piped systems and to understand why, if this is the case, and (2) verify if surveyed villages had access to piped water systems given the fact that seventy
percent of the rural population should. Section three was comprised of thirteen questions, of which nine were multiple choice and four were dichotomous. Depending on how households responded to questions, some questions were skip-able to ensure that households only answered questions that were related to their individual family. For instance, question one of section three asked if households had access to piped water. If answered yes, they were directed to move to question six. If answered no, they were directed to question two.

In all villages, 52 households (or 57%) indicated that they do not have access to piped water systems; water piped into either the dwelling or the yard, while 40 households (or 43%) said they did have access. In Don Man, all households lack access to piped water systems, and therefore have to rely on rainwater harvesting or bottled water for all water-related uses. Additionally, in Don Man, there is a pond that is used for cleaning, cooking, washing clothes etc. In Thakhonyang, all households have access to piped water into dwelling systems and one household indicated that they have access to both piped water into dwelling and piped water into yard.
Figure 18: Do You Have Access to Piped Water?

Source: Author

For households without access to piped water systems, 49 households in Nong Khon and Don Man combined (or 94%) indicated that they would like access. For the small percentages of households who indicated that they would not like access (which is a total of three households), they indicated that was because they didn’t need it. For the 94% of households that said they would like access, 63% said they would not drink from these piped connections. When asked why not, 35% of households indicated that they have other reasons for not drinking piped water systems. The interviews revealed that one reason why households refuse to drink piped water is because they have not seen anyone else drink from it.
Surprisingly, 12 households (or 40%) in Don Man and 6 households (or 32%) in Nong Khon would drink from piped sources if they had access. This finding suggests that if these households would drink from piped sources that they do not have access to, then there are probably Thais at the village level (at least) who do drink from the piped connections to which they have access.
Therefore, the statement, that Thais do not drink water from piped connections may not be as accurate a statement as expressed by the various Thais the author encountered.

For the 40 households who said they did have access to piped connections, 24 households were located in Thakhonyang and 16 were located in Nong Khon. When asked if households drink from their piped connections 98% of households in both Thakhonyang and Nong Khon said no. Only one household, which was located in Nong Khon, indicated that they drink from their piped connection, which is an inside connection (piped into dwelling). For the one household that does drink from their piped connection, the water is filtered through a water filter and then again strained through a cloth prior to consuming.

**Figure 21: Do You Drink from Your Piped Connections?**

![Bar chart showing the distribution of households by access to piped connections.]

Source: Author

In Thakhonyang, smell and taste are the primary reasons why households elect not to drink from their piped connections. This finding differed from Nong Khon where the smell of piped water is not the primary concern but rather 8 households (or 53%) indicated “other” reasons as the highest ranked reason for not drinking piped water. Similar to the “other” reasons expressed by those who indicated that they would like access to piped water connections but wouldn’t
drink from them, 4 households (or 50%) indicated that they do not drink from their piped connections because they have never seen anyone else drink from those connections. Another 50% marked other because they believe that the water is not clean.

**Figure 22: If Not, Why Not?**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Thakhonyang</th>
<th>Nong Khon</th>
<th>Both Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad/old pipes</td>
<td>0%</td>
<td>13%</td>
<td>5%</td>
</tr>
<tr>
<td>Smell</td>
<td>79%</td>
<td>0%</td>
<td>49%</td>
</tr>
<tr>
<td>Taste</td>
<td>54%</td>
<td>33%</td>
<td>46%</td>
</tr>
<tr>
<td>Appearance</td>
<td>25%</td>
<td>13%</td>
<td>21%</td>
</tr>
<tr>
<td>Other</td>
<td>17%</td>
<td>53%</td>
<td>31%</td>
</tr>
</tbody>
</table>

Source: Author

**Figure 23: Other Reasons Expressed by Households in Nong Khon**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Nong Khon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Clean</td>
<td>50%</td>
</tr>
<tr>
<td>Afraid water is unsafe</td>
<td>38%</td>
</tr>
<tr>
<td>Haven't seen anyone drink from it before</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: Author
4.2.4 SECTION 4 – BOTTLED WATER AND GOVERNMENT SUPPLIERS

Bottled water in Thailand is very inexpensive. At convenience stores such as 7-11, a person can pay 20 baht ($0.58 cents) for a 5 liter bottle. There are also many street vendors who sell bottled water in Thailand for about 10-20 baht ($0.29-$0.58 cents) for different size bottles. Section four of the survey asked households about bottled water and government suppliers such as how much money is spent on bottled water a day and who is most responsible for ensuring the quality and quantity of drinking water resources for your household? The purpose of section four was to gain insight on how much money households spend on bottled water per day for their families and to gain insight on how households perceive government relations. Section four was made of seven questions, of which five were multiple choice, one was ranking and one was open ended.

In all villages, 71 households (or 77%) buy bottled water. Thakhonyang had the highest percentage of households who buy bottled water at 92%. On average, 73% of households spend less than 20 baht on bottled water per day. In Don Man, two households marked other in regards to how much money per day is spent on bottled water. For one household, the total cost spent on bottled water varies per day but does not exceed 140 baht ($4.07 USD). The other household belongs to a monk who receives bottled water as offerings from other households.
When asked who is the most responsible for ensuring the quality and quantity of drinking water resources to your household, 41 households (or 45%) indicated that they are the most responsible. 45% of all households believe that individual households are responsible for ensuring that their household has enough water and that their water supply is safe for human consumption; however, 17% believe that village leaders should have that responsibility.
In section four question six of the survey, households were asked to rank government agencies in their performance of fulfilling their responsibility of ensuring satisfactory drinking water quality and quantity to their villages. In all villages, 49 households (or 53%) were neutral on the Ministry of Interior’s performance at ensuring satisfactory drinking water quality and quantity to their village whereas 54% of households felt that village leaders did a good job at ensuring that their villages have acceptable drinking water quality and quantity.
Although most households did not rank government agencies as doing a poor or very poor job, households were still vocal in discussing what they need from the government. Question seven of section four of the survey was an open-ended question in which households were asked if there was any way the government can improve the quality and quantity of drinking water supplies for your village. In Don Man, a common theme expressed by households (by twenty households) is that they want more water supplied to their village. This finding is unsurprising considering that Don Man lacks piped connections, and other than having access to rainwater and bottled water, there is only a pond in which the water is used for cleaning, cooking, washing clothes etc. Households in Don Man also expressed that they wanted the government to supply their household or village with water filters. One household stated that they would like the government to create a water management project that is carried out by regional water companies that employ villagers and makes water more accessible. According to this household, right now water projects have high labor costs and are not accessible to people living in villages. A different household expressed that they would like to see the government supply water jobs for
community members and that water related decisions should be made by the community they are servicing. Lastly, approximately ten households expressed that they would like the government to monitor their water supplies to ensure that the quality is safe for human consumption.

Similar to Don Man, households in Nong Khon would also like the government to supply their village with water filters. One household said that every house in Nong Khon should have water filters to purify water so that people are kept safe. Also, similar to Don Man, households want the government to monitor the quality of their water to ensure that supplies are free from contaminants and safe for human consumption. Unlike Don Man, however, households (ten households) expressed that they wanted the government to supply water during the hot season. One household said that during the hot season they do not have enough water for their family. Another household said that during the dry season, the government should supply villages with free bottled water. Two households expressed that they feel like there is not much the government will be able to do with the lack of water resources at the village level. However, one household (out of the two) went on to say that they would like access to piped water and that they believe the government should establish some kind of system that ensures households at the village levels have clean water.

In Thakhonyang, the primary theme expressed by almost all households in regards to question seven is that they want the government to supply a filtration system to their village.
Figure 28: What Households Would Like From the Government

<table>
<thead>
<tr>
<th>Village Name</th>
<th>More water supplied to village</th>
<th>Water Filters</th>
<th>Water management program</th>
<th>Water jobs for community members</th>
<th>Regularly monitor drinking water supplies</th>
<th>More water during the dry season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thakhonyang</td>
<td>22 households</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nong Khon</td>
<td>33 households</td>
<td></td>
<td></td>
<td>24 households</td>
<td>10 households</td>
<td></td>
</tr>
<tr>
<td>Don Man</td>
<td>20 households</td>
<td>28 households</td>
<td>1 household</td>
<td>1 household</td>
<td>10 households</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

4.2.5 SECTION 5 – PROBLEMS WITH DRINKING WATER SUPPLIES

In section five of the survey, households were asked questions addressing any issues they’ve experienced with their drinking water supplies. The intent of this section is to further understand the quality of available drinking water supplies at the village level. This section asked households questions related to piped water, rainwater, water shortages and potential health issues caused by drinking water supplies. This section was comprised of nine questions of which two were multiple choice, three were dichotomous, and four were short answer.

25 households (or 54%) of all households who drink rainwater have noticed mosquito larvae in their stored rainwater supplies. In Thakhonyang, however, 80% of households indicated that they have not seen any mosquito larvae in their rainwater supplies. Yet, due to the small sample size of households who drink rainwater in Thakhonyang (only 5 households indicated that they drink rainwater), this finding is statistically insignificant.
When asked if households have noticed any animal feces in their stored rainwater supplies, 19 households (or 41%) have seen animal feces in their stored rainwater supplies used for drinking. Any signs of animal feces or mosquito larvae are a sign that the water is contaminated and thus should not be consumed. In villages that lack sufficient supplies of drinking water, the act of discarding drinking water supplies can be a hardship for many households.

Source: Author

Figure 29: Have You Noticed Any Mosquito Larvae in Your Stored Rainwater Jars?

Source: Author

Figure 30: Have You Noticed Any Animal Feces in Your Stored Rainwater Jars?

Source: Author
When asked if there was ever a time when water was not available, 74 households (or 80%) said no. Thailand is known for having droughts, but it was communicated to the author by households that free bottled water is typically supplied to villages in the case of severe droughts. The last three questions of section five of the survey were open ended. One question, in particular, was an opened-ended question that was a follow up to five, which stated “has there ever been a time when water was not available to members of your household?” Question six asked households to recount their experience of when water was not available. In question five, 18 households (or 20%) said yes, therefore at least 18 households should have responded to question six. Yet, only 9 households supplied answers for question six, and overall, the majority of households left the last three questions blank or wrote “nothing” as their response.

In regards to the 9 households who did respond to question six (six responses from Nong Khon and 3 responses from Don Man), water wasn’t available in Nong Khon due to animals falling into the cement jars and causing water to spoil. In Don Man, water wasn’t available due to a drought but eventually the village was supplied with free bottled water.

**4.2.6 SECTION 6 – RATING VARIOUS SOURCES OF WATER**

In section six of the survey, households were asked questions asking them to rate the taste, smell, color (clarity), safety and their satisfaction level with various drinking water sources available to them based on a five point scale (very poor/unsafe/unsatisfied = 1, poor/unsafe/unsatisfied = 2, adequate = 3, good/safe/satisfied = 4, and very good/safe/satisfied = 5). Section six was comprised of eight questions of which five were Likert scales and three were open ended.

The mean score across the five questions about rainwater ranged from 3.82-4.22, and variation in responses between respondents was low (standard deviation ranges from 0.59 to 0.95). The number of responses per rank are displayed in table two. In regards to the taste, color
and satisfaction level, households mostly identified their rainwater supplies in those categories as good.

**Figure 31: Rating Rainwater All Villages**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scale Range</th>
<th>Mean Rank</th>
<th>Median</th>
<th>Standard Deviation</th>
<th>Number of Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smell</td>
<td>Very Poor (1) to Very Good (5)</td>
<td>3.93</td>
<td>4</td>
<td>0.85</td>
<td>46</td>
</tr>
<tr>
<td>Taste</td>
<td>Very Poor (1) to Very Good (5)</td>
<td>4.11</td>
<td>4</td>
<td>0.77</td>
<td>46</td>
</tr>
<tr>
<td>Color (Clarity)</td>
<td>Very Poor (1) to Very Good (5)</td>
<td>4.22</td>
<td>4</td>
<td>0.59</td>
<td>46</td>
</tr>
<tr>
<td>Safety</td>
<td>Very Unsafe (1) to Very Safe (5)</td>
<td>3.80</td>
<td>4</td>
<td>0.91</td>
<td>46</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>Very Unsatisfied (1) to Very Satisfied (5)</td>
<td>4.02</td>
<td>4</td>
<td>0.95</td>
<td>46</td>
</tr>
</tbody>
</table>

Source: Author

The mean score across the five questions about bottled water ranged from 3.71-4.26, and variation in responses between respondents was low (standard deviation ranges from 0.59 to 0.88). The number of responses per rank are displayed in table three. Unlike rainwater, more households view the quality of bottled water to be adequate.

**Figure 32: Rating Bottled Water All Villages**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Scale Range</th>
<th>Mean Rank</th>
<th>Median</th>
<th>Standard Deviation</th>
<th>Number of Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smell</td>
<td>Very Poor (1) to Very Good (5)</td>
<td>3.78</td>
<td>4</td>
<td>0.72</td>
<td>92</td>
</tr>
<tr>
<td>Taste</td>
<td>Very Poor (1) to Very Good (5)</td>
<td>3.97</td>
<td>4</td>
<td>0.67</td>
<td>92</td>
</tr>
<tr>
<td>Color (Clarity)</td>
<td>Very Poor (1) to Very Good (5)</td>
<td>4.26</td>
<td>4</td>
<td>0.59</td>
<td>92</td>
</tr>
<tr>
<td>Safety</td>
<td>Very Unsafe (1) to Very Safe (5)</td>
<td>3.72</td>
<td>4</td>
<td>0.88</td>
<td>92</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>Very Unsatisfied (1) to Very Satisfied (5)</td>
<td>3.90</td>
<td>4</td>
<td>0.71</td>
<td>92</td>
</tr>
</tbody>
</table>

Source: Author
5.1 SUMMARY OF FINDINGS

Survey response rate was low, with 92 completed surveys. The results of this survey include 26% of its respondents from Thakhonyang, 40% of respondents from Nong Khon, and 34% of respondents from Don Man. The survey results provide a starting point for understanding the perceptions of drinking water quality at the village level in Thailand. However, a small sample size limits a researcher’s ability to understand in depth the perceptions and attitudes towards water at the village level. Yet nonetheless, a small sample size still provides a starting point and can help researchers identify some problems a community is experiencing and thus provide some solutions for those problems.

In section one of the survey, findings revealed that some households who do harvest rainwater are not likely to drink stored rainwater as a primary source once the rainy season is over. During both the dry and cool seasons, which had identical percentages, 61 households (or 66%) reported using bottled water and 29 households (or 32%) reported using rainwater as their primary source of drinking water. 2 households (or 2%) reported using both rainwater and bottled water as their primary sources during the cool and dry seasons. However, during the rainy season the percentage of households who drink rainwater as their primary source increased by 5% while the percentage of those who drink bottled water as their primary source decreased by 3%. This finding illustrates that stored rainwater may not be an optimal choice for households once the rainy season is over owing to the fact that the rainy season is in-between the dry and cool seasons. However, it is not clear as to why this may be the case.

In section two of the survey, 46 households (or 50%) indicated that they do not drink rainwater, of which 74% of those households said it is because they perceive rainwater to be
unclean. This finding illustrates that households at the village level are questioning the safety of rainwater for human consumption. What is not clear, however, is what is meant by not clean which causes households to question the safety of rainwater. Is it that households believe that rainwater itself is not clean or do households think that rainwater in rain jars cause the water to be contaminated? The survey, in this regard, failed to fully measure the scope of why households elect not to drink rainwater when selecting not clean as an option.

Section two also revealed that all households who harvest rainwater (46 households), claimed to use jar lids. However, observations made by the author and surveyors contradicted survey results. It was observed that many households had jars that were either uncovered or worn out/bent. Also, recall section five of the survey when households in Nong Khon said water was not available due to animals falling into their cement rain jars. This finding illustrates that perhaps jar lids are not used as often as they should be. Furthermore, 29 households or (63%) claimed to use mosquito nets. Yet the author nor the surveyors observed any mosquito nets being utilized during the days of the survey. There is a possibility that lids and mosquito nets are not employed during the working day, but instead are used as protective measures during the night. This theory would explain why the author and surveyors failed to see any mosquito nets or witnessed jars uncovered.

The issue of safety was raised in section three of the survey. In this section, 39 households (or 98%) with and 31 households (or 63%) without piped water connections indicated that they did not or would not drink from their piped connections. In Thakhonyang, all households have access to piped water but refuse to drink from their piped sources owing to the smell and taste of piped water. The interviews also revealed that one reason why households refuse to drink piped

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3 Please refer to figures 1, 2, and 3.
water is because they have not seen anyone else drink from it. It appears the issue of safety is what the real concern is. No one has demonstrated (by continuously drinking from these sources) to these particular participants that piped water is a safe option for themselves and their families.

In section four of the survey, households were asked an open ended question in which households were asked if there was any way the government can improve the quality and quantity of drinking water supplies for their village. In all villages, households indicated that they wanted the government to supply their village with water filters. It was concluded that households in all villages, do not feel that their water supply systems are safe and therefore could benefit from a filtration system. This is an interesting finding considering that (referring back to figure 15) 49% of all households indicated that their primary sources of drinking water were safe in both the dry and cool seasons and in the rainy season this percentage increased to 51%. Therefore, this leads to questioning the validity of how safe households really perceive their drinking water sources to be. After all, in section four question seven of the survey, many households expressed that they wanted the government to supply their village with water filters, and create a system where government agencies monitor the cleanliness of their water supplies.

So, is it that households truly feel their primary sources of drinking water are safe, but need water filtration for alternative sources, or are households less likely to mark responses that may favor the government in a negative light? Currently in Thailand, the government is under strict military control. Although Thais can criticize the government (however, it is illegal to criticize the royal family) topics and/or discussions about the government can still be rather sensitive. What could be happening is that some households may have been more reluctant to choose more favorable responses in multiple choice and dichotomous questions that do not necessarily portray
the government in a negative light, and may have felt more comfortable in the open ended question where they could say what they needed from the government without criticizing them.

In section five of the survey, the last three opened-ended questions were practically entirely skipped. The 11-page survey took households at least 45 minutes to complete. By the time households reached the end of page 8, which is the end of section five, it was concluded that they became tired and thus eager to hurry up and finish the survey. This was a learning lesson for the author. Although long surveys typically can mean more accurate research and findings there is also a trade off in that you are risking losing participants’ attention and receiving lazy responses. Nonetheless section five revealed that in regards to rainwater, 54% of households have noticed mosquito larvae and 41% of households have noticed animal feces in their stored rainwater jars. This finding indicates that some households at the village level are vulnerable to water borne diseases. What the research reveals, despite the low sample size, is that villages are in need of some type pf system to protect the quality of drinking water supplies.

5.2 RECOMMENDATIONS

Over all, the study revealed issues related to drinking water supply quantity, water access, and sanitation. To address these issues, a drinking water quality management plan should be initiated and implemented on the provincial level to help villages’ secure clean drinking water.

A drinking water quality management plan focuses on protecting public health and drinking water quality (Milone and MacBroom, 2008). Poor sanitation and water quality threatens public health. Therefore, drinking water quality management plans seek to ensure that areas around the world are maintaining or working towards ensuring that people have access to high quality drinking water supplies. This plan can be described in six steps.
The first step in creating the drinking water quality management plan is to identify the issue(s). The issue identification process should address the community needs, how land development will affect drinking water supplies, and the vision for the future (Berke & Godschalk, 2009) in regards to drinking water. For example, the issue is that households at the village level need sufficient access to clean drinking water supplies. Perhaps the vision for the future for this issue involves all households having access to piped water connections, and then drinking from those connections. Addressing the issues first, will help provinces and villages reach their goals in ensuring sufficient access.

Step two, the plan should outline the specification of goals and policies. Goal setting will help in the achievement of objectives while policies will create the necessary guidelines to achieve long-term and short-term goals. In this step, the province should work with community leaders in various villages to set specific drinking water and sanitation targets.

Once goals and policies are in place, the third step should assess the current uses and cost associated with drinking water at the village level. This step will help in understanding how households use their drinking water supplies as well as the associated costs of drinking sources at the village level.

Creating an implementation plan for the drinking water quality management plan will be vital to the success of the drinking water plan. The implementation plan should include: “commitments to carry out policy-driven actions, timelines for actions, organizations identified that are responsible for actions, and sources of funding to support actions” (Ibid.) Step four will safeguard plans from falling short or falling through.

The drinking water quality management plan should have protocols established to measure the plan’s progress. Provinces along with village community leaders should work together to
regularly review and monitor the drinking water quality management plan to “make sure measures are implemented and goals are realistic and are being accomplished” (U.S. Department of Energy, n.d.). In step five, there should be provisions to track change in community conditions and a timetable for updating the plan based on the monitoring of changing conditions (Berke op.cit.).

Lastly step six of the drinking water quality management plan should prepare for contingencies. As stated earlier in this thesis, Thailand is known for having droughts which can be particularly hard for villages. Thus a contingencies plan should address how water needs will be met in case of emergencies (i.e. droughts or other water shortages) (U.S. Department of Energy op.cit.).

If implemented properly, the drinking water quality management plan can be successful and address the issues related to drinking water supply quantity, water access, and sanitation. The plan should also provide water management employment opportunities at the village level. For example, village community leaders can be employed to regularly monitor and evaluate drinking water supplies in their villages. In return, this will not only provide villagers with a source of additional income to provide for their families, but it will also increase community participation and community empowerment. Furthermore, the drinking water quality management plan will make provinces responsible for their villages while also strengthening the province-village relationship.

5.3 LIMITATIONS

There are five limitations to this study. The first limitation is a language barrier between the lead investigator and that of the survey administrators and survey participants. Given the fact that the primary researcher does not speak Thai, an attempt was made to hire bi-lingual survey
administrators that had experience working with native English speakers, and who had an intermediate English proficiency. Additionally, the survey was tested using a back-to-back translation method wherein the original survey was written in English, translated into Thai by a third party, and then translated back to English by survey administrators to 1) check for consistencies and comprehension, and 2) to verify survey administrators’ comprehension of the questionnaire. The survey was originally translated into Thai by a native Thai speaker who teaches English and received her education in the U.K. Furthermore, survey administrators underwent two training sessions prior to conducting interviews with questionnaire.

A second limitation was the number of participants. Due to varying sizes of the villages, an attempt was made to survey every household present during survey days in order to get a broad representation of the village community. Village leaders are responsible for knowing how many people live in their village; however, it was discovered that this information is not kept up to date.

A third limitation was the length of the survey. This 11-page survey was not only time consuming for the households, but the surveyors and the author as well. The lengthiness of the survey resulted in limited responses for open-ended questions. Analyzing the data (transcribing and coding) proved to be time consuming for the author as well. In the future, a slightly shorter survey is recommended to reduce the amount of time participants spend completing the survey (hopefully resulting in more questions being answered).

A fourth limitation to this study is detail. Some survey questions did not provide households with an opportunity to elaborate on their responses. For example, 74% of households said they do not drink rainwater because it is not clean. The survey failed to ask households to elaborate
on what is meant by “not clean” thus lacking essential detail for that would have advanced the survey results.

The final limitation to this study was time. The author and surveyors only had a total of five days to administer surveys to three villages. Moreover, the author was only in Thailand for three months. The lack of time spent in Thailand and visiting villages, limited the author’s ability to measure drinking water perceptions over time. More time would have allowed the author to measure change and stability over time while also giving the author the ability to assess any inconsistencies in results.

5.4 FUTURE RESEARCH

To extend on this study, researchers should consider conducting a bacterial and chemical analysis on both rainwater and piped water connections. This will address the concerns of drinking water safety many households expressed. It is further recommended that researchers perform a bacterial and chemical analysis on two different types of rainwater water samples: rainwater freshly fallen from the sky, and rainwater stored in rain jars. This finding will allow for a comparison in results which could further verify for households whether or not these sources are safe options.

Future research should also involve studying the drinking water patterns and behaviors of villages for a minimum of one year. This study was conducted over the course of five days. Studying the villages for a year will allow researchers to gather more data about how households manage drinking water supplies throughout the year. This will also give researchers further insights on whether or not drinking water habits change based on the season (i.e. wet, cool, or dry). Additionally, researchers will be able to document over a course of a year whether or not
households employ protective measures to safeguard their rainwater supplies from contamination.

Lastly, researchers can expand upon this study by gathering more details on specific findings. For example, from section one of the survey, it was unclear why households were more likely not to drink stored rainwater during the dry and cool seasons. This is an interesting finding and if explored more, could help researchers understand the drinking water practices of households at the village level more in-depth.


Sanctuary, F. K. (2011, April 07). Water quality describes the condition of the water, including chemical, physical, and biological characteristics, usually with respect to its suitability for a particular purpose such as drinking or swimming. Retrieved from http://floridakeys.noaa.gov/ocean/waterquality.html


APPENDIX A

ENGLISH VERSION OF SURVEY

Dear Participant,

This questionnaire is a part of a social science research to understand the local perceptions and attitudes of drinking water quality and water practices at the village level. Your participation will provide researchers with information that can be used to best advise people on the management of drinking water resources in the future.

This survey is optional; at any point when filling in this questionnaire you can stop and have the survey removed. Your identity will be strictly confidential; no personal information that could be used to identify you will be used in this study. Additionally you will not be contacted the future for any further information that would cause you inconvenience.
SECTION 1: The first set of questions asks you to identify your sources of drinking water

1. Thinking about your drinking water sources for the **Dry/Hot Season**, please use the table below to indicate your main source of drinking water along with any alternative sources? *Only mark sources that are used for drinking*

<table>
<thead>
<tr>
<th>Water Source</th>
<th>Main Source (Source primarily used)</th>
<th>Alternative Source (Source not always used)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainwater</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Bottled Water</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Piped Water into Dwelling</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Piped Water to Yard/Plot</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Public Tap/Standpipe</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Tubewell/Borehole</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Surface Water (river, dam, lake, pond, stream, canal, irrigation channels)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

2. Thinking about your drinking water sources for the **Rainy/Wet Season**, please use the table below to indicate your main source of drinking water along with any alternative sources? *Only mark sources that are used for drinking*

<table>
<thead>
<tr>
<th>Water Source</th>
<th>Main Source (Source primarily used)</th>
<th>Alternative Source (Source not always used)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainwater</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Bottled Water</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Piped Water into Dwelling</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Piped Water to Yard/Plot</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Public Tap/Standpipe</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Tubewell/Borehole</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Surface Water (river, dam, lake, pond, stream, canal, irrigation channels)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

3. Thinking about your drinking water sources for the **Rainy/Wet Season**, please use the table below to indicate your main source of drinking water along with any alternative sources? *Only mark sources that are used for drinking*
4. Do you think your primary source of drinking water is safe to consume during the following seasons?

<table>
<thead>
<tr>
<th></th>
<th>Dry/Hot Season</th>
<th>Rainy/Wet Season</th>
<th>Cool Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>NO</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>I DON'T KNOW</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

5. What indicators help you determine whether the quality of your drinking water supply is safe?

[Blank space for response]

---

SECTION 2: The next set of questions are about rainwater storage and collection (If you do not drink rainwater please only answer the first question and then move to section 3)

1. What are your reasoning’s for not drinking rainwater? (Mark all that apply) Only ask this question if respondent does not drink rainwater

- Taste
- Smell
- Informed that rainwater is not safe to drink
- Other___________________________
- Not clean
- Better options for drinking water

2. For the purposes of drinking, how do members of your household collect rainwater?

- Rooftop Harvesting
- Surface Runoff (dug well)
- Other___________________________

3. For the purposes of drinking, how is collected rainwater stored? (Mark all that apply)

- Small Clay and Ceramic Jars
- Big Cement Jars
- Cement Tanks
4. For the purposes of protecting stored rainwater, do members of your household use any of the following methods? (Mark all that apply)

☐ Jar Lids  ☐ Mosquito Nets  ☐ Taps
☐ Hose  ☐ Drainage Plug
Other___________________________
☐ No methods

5. If no methods are used at all, why not?

☐ Do not have the resources  ☐ Other____________________

6. For the purposes of drinking, is collected rainwater filtered/cleaned/treated prior to consumption? (Mark all that apply)

☐ Yes, Boiled  ☐ Yes, Sand Gravel Filter  ☐ Yes, Sponge Filter
☐ Yes, Straining it through a cloth  ☐ Yes, Add Bleach/Chlorine
Other___________________
☐ No, not filtered/cleaned/treated before drinking

7. If no, why not?

☐ Do not have the resources to filter/treat/clean water  ☐ Not sure why water needs to be filtered/cleaned/treated
☐ Not enough time  ☐ Belief that water does not need to filtered/cleaned/treated
Other__________________

8. To ensure that the rainwater collected is safe for human consumption, do members of your household practice any of the following methods. (Mark all that apply)

<table>
<thead>
<tr>
<th>METHOD</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain away the first and the second rain falling on the rooftop collected in the gutter at the beginning of the rainy season each year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keep the connecting pipe between the gutter outlet and the tank inlet, or the jar mouth, movable for easy draining away the first and the second rain when the rainy season starts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean the tank and jar annually, prior to the start of the rainy season, for ready storage of the fresh rain.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cover the tank inlet with a piece of nylon net to prevent mosquitoes from entering into the tank.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keep the mouth of tank and jar covered to avoid mosquitoes and dirt from getting into the rain tank and jar.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain a level of water inside the tank and jar at the bottom up to the tap level during dry season to prevent cracking of the tank and jar.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION 3: The next set of questions are about piped water

1. Do you have access to piped water? (If answered yes, skip to question 6)
   □ Yes, piped water into dwelling □ Yes, piped water to yard/plot
   □ Yes, both piped water into dwelling and to yard/plot □ No

2. If no access, would you like access to piped water? (If no, skip to question 5, then move on to section 4)
   □ Yes | □ No

3. If yes, would you drink from the piped water sources? (If yes, move to section 4)
   □ Yes | □ No

4. If no, why not?
   □ Taste □ Smell □ Appearance □ Bad/Old Pipes
   □ Other ____________________ □ Not clean

5. If no, why not?
   □ Too expensive □ Don’t need
   □ Other ____________________

6. Who supplies piped water to your village?
   □ Provincial Water Authority (PWA) □ Metropolitan Waterworks Authority (MWA)
   □ Private Suppliers □ Other ____________________ □ I Don’t Know

7. What is the cost per month of piped water for your household?
   □ < 20 baht □ 20-60 baht □ 60-100 baht □ 100-200 baht
   □ >200 baht

8. Is this cost made affordable for your household?
   □ Yes | □ No

9. Do you drink from the available piped water? (If answered yes, skip to question 11, if answered no answer question 10 then move to section 4)
   □ Yes, drink from piped water into dwelling □ Yes, drink from piped water to yard/plot
   □ Yes, drink from both piped water into dwelling and to yard/plot □ No, I do not drink piped water

10. If no, why not? (Mark all that apply)
    □ Taste □ Smell □ Appearance □ Bad/Old Pipes
    □ Other ____________________

- 70 -
11. Is piped water cleaned/filtered/treated before drinking? (If answered yes answer question 12 and then move on to section 4, if answered no skip to question 13 then continue on to section 4)

☐ Yes | ☐ No

12. How do members of your household clean/filter/treat the piped water before drinking? (Mark all that apply)

☐ Boiling it ☐ Adding bleach/chlorine ☐ Straining it through a cloth
☐ Using a water filter (ceramic, sand, composite, etc) ☐ Solar disinfection
☐ Letting it stand and settle ☐ Other__________________________

13. What are the reasons for not filtering/cleaning/treating piped water before drinking (Mark all that apply)

☐ Do not have the resources to filter/treat/clean water ☐ Not sure why water needs to be filtered/cleaned/treated
☐ Not enough time ☐ Belief that water does not need to filtered/cleaned/treated
☐ Other__________________________

SECTION 4: The next set of questions are about bottled water and government suppliers

1. Do you buy bottled water? (If answered no skip to question 4)

☐ Yes | ☐ No

2. How much do you spend on bottled water a day?

☐ < 20 baht ☐ 20-60 baht ☐ 60-100 baht ☐ 100-200 baht
☐ >200 baht

3. Is the price of bottled water made affordable for your household?

☐ Yes | ☐ No

4. Who supplies bottled water to your village?

☐ Provincial Water Authority (PWA) ☐ Metropolitan Waterworks Authority (MWA)
☐ Buys from another village ☐ I Don’t Know ☐ Other__________________________

5. In your opinion, who is most responsible for ensuring the quality and quantity of drinking water resources for your household?

☐ Ministry of Interior ☐ Provincial Government ☐ Local Administration ☐ Village Leaders
☐ You are responsible ☐ I Don’t Know ☐ Other__________________________
6. How do you feel each of these groups perform in fulfilling their responsibility of ensuring satisfactory drinking water quality and quantity to your village?

<table>
<thead>
<tr>
<th></th>
<th>Very Good</th>
<th>Good</th>
<th>Neutral</th>
<th>Poor</th>
<th>Very Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Interior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provincial Government</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Local administration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Village Leaders</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other________________</td>
<td></td>
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</tbody>
</table>

7. In your opinion, is there any way the government can improve the quality and quantity of drinking water supplies for your village? Please explain why either yes or no.

SECTION 5: The next set of questions are about problems with drinking water supplies

1. What are the conditions of the pipes available to you? (Piped into dwelling/piped in yard/plot)
   - Outstanding
   - Needs improvement
   - Good
   - Poor
   - Adequate
   - Not Applicable

2. If selected needs improvement or poor, what is wrong with the conditions of the pipes? (Mark all that apply)
   - One or more pipes are broken
   - One or more pipes are leaking
   - Loose pipes
   - Sediments in water from pipes
   - Corrosion
   - Noisy pipes
   - Other________________

3. Have you noticed any mosquito larvae in your stored rainwater used for drinking? (Only ask this question for those that harvest rainwater)
   - Yes | No

4. Have you noticed any animal feces in your stored rainwater used for drinking? (Only ask this question for those that harvest rainwater)
   - Yes | No

5. Has there ever been a time when water was not available to members of your household? (If no, skip to question 6)
   - Yes | No
6. If yes, explain what was going on during this time, and how you were able to manage (get by).

7. Within the last 2 years, have you or a member of your household ever gotten sick from drinking from one of your available water sources? If yes, please name the source of water, the symptoms and if possible the name of the sickness and why you believe it was caused by drinking the water?

8. What do you think are the biggest water-related health problems currently facing your family (or village)?

9. If any, list your top three concerns with the quality of your drinking water in your village?
   1.
   2.
   3.

SECTION 6: this next set of questions asks you to rate various sources of water

1. Please rate the smell of the following drinking water sources:

<table>
<thead>
<tr>
<th>Source</th>
<th>Very Good</th>
<th>Good</th>
<th>Adequate</th>
<th>Poor</th>
<th>Very Poor</th>
<th>Don’t Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainwater</td>
<td></td>
<td></td>
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<tr>
<td>Bottled Water</td>
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<tr>
<td>Municipal Water (tap)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public tap/standpipe</td>
<td></td>
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<tr>
<td>Tubewell/borehole</td>
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</tr>
<tr>
<td>Surface water (river, dam, lake, pond, stream, canal, irrigation channels)</td>
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</tr>
</tbody>
</table>
2. Please rate the taste of the following drinking water sources:

<table>
<thead>
<tr>
<th>Source Hierarchy</th>
<th>Very Good</th>
<th>Good</th>
<th>Adequate</th>
<th>Poor</th>
<th>Very Poor</th>
<th>Don’t Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainwater</td>
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<tr>
<td>Bottled Water</td>
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<tr>
<td>Municipal Water (tap)</td>
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<tr>
<td>Public tap/standpipe</td>
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<tr>
<td>Tubewell/borehole</td>
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<tr>
<td>Surface water (river, dam, lake, pond, stream, canal, irrigation channels)</td>
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<tr>
<td>Other sources (specify)</td>
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</tbody>
</table>

3. Please rate the color (clarity) of the following drinking water sources:

<table>
<thead>
<tr>
<th>Source Hierarchy</th>
<th>Very Good</th>
<th>Good</th>
<th>Adequate</th>
<th>Poor</th>
<th>Very Poor</th>
<th>Don’t Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainwater</td>
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<tr>
<td>Bottled Water</td>
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<tr>
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<tr>
<td>Tubewell/borehole</td>
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<tr>
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<td>Other sources (specify)</td>
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</tbody>
</table>

4. Please rate the safety of the following drinking water sources:

<table>
<thead>
<tr>
<th>Source Hierarchy</th>
<th>Very Safe</th>
<th>Safe</th>
<th>Adequate</th>
<th>Unsafe</th>
<th>Very Unsafe</th>
<th>Don’t Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainwater</td>
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<tr>
<td>Tubewell/borehole</td>
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</tr>
</tbody>
</table>
5. Please rate your level of satisfaction with the following drinking water sources:

<table>
<thead>
<tr>
<th>Source</th>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Adequate</th>
<th>Unsatisfied</th>
<th>Very Unsatisfied</th>
<th>Don't Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainwater</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Bottled Water</td>
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<tr>
<td>Municipal Water (tap)</td>
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<tr>
<td>Public tap/standpipe</td>
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<tr>
<td>Surface water (river, dam, lake, pond, stream, canal, irrigation channels)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other sources (specify)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

6. Over all, what source of drinking water do you prefer the most and why?

___________________________________________________________________________________________________________________________________

___________________________________________________________________________________________________________________________________

7. Over all, what source of drinking water do you think is the safest and why?

___________________________________________________________________________________________________________________________________

___________________________________________________________________________________________________________________________________

8. If you could improve the drinking water conditions in your village, what would you do?

___________________________________________________________________________________________________________________________________

___________________________________________________________________________________________________________________________________

___________________________________________________________________________________________________________________________________
### SECTION 7: Respondent’s Profile

#### 1. Respondent information

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age</th>
<th>Marital Status</th>
<th>Years of School</th>
<th>Are you the head of household?</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Male</td>
<td>☐</td>
<td>☐ Single</td>
<td>☐ Can’t read/write</td>
<td>☐ Yes</td>
</tr>
<tr>
<td>☐ Female</td>
<td>☐</td>
<td>☐ Married</td>
<td>☐ Elementary (level 1-6)</td>
<td>☐ No</td>
</tr>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐ Separated/Divorced</td>
<td>☐ Junior High (level 7-9)</td>
<td></td>
</tr>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐ Widow/er</td>
<td>☐ Senior High (level 10-12)</td>
<td></td>
</tr>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐ College and above</td>
<td></td>
</tr>
</tbody>
</table>

**Occupation:**

#### 2. Not including yourself, how many people are living in the household?

<table>
<thead>
<tr>
<th>Age bracket</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-17 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-30 years</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>31-59 years</td>
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<td></td>
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<tr>
<td>60 and up</td>
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<td></td>
</tr>
</tbody>
</table>
APPENDIX B
THAI VERSION OF SURVEY

คำชี้แจง

แบบสอบถามนี้เป็นส่วนหนึ่งของงานวิจัยทางสังคมศาสตร์เพื่อศึกษาการรับรู้และทัศนคติของประชากรระดับหมู่บ้านที่มีต่อคุณภาพน้ำดื่มและศึกษาพฤติกรรมการใช้น้ำในระดับหมู่บ้าน ภารกิจส่วนรวมในการให้ข้อมูลกับงานวิจัยของท่านครั้งนี้จะช่วยให้เกิดข้อเสนอแนะที่เป็นประโยชน์ต่อการจัดการแหล่งน้ำดื่มในอนาคต

การสำรวจข้อมูลครั้งนี้เป็นแบบมีตัวเลือกตอบด้วยการเครื่องหมายลงในแบบสอบถามและการกรอกข้อมูล โดยท่านสามารถเห็นและทำการแก้ไขตัวตอบได้ทุกเมื่อ ในกรณีมีข้อสงสัยเกี่ยวกับข้อมูล ท่านจะสามารถตอบได้ทุกคำถามที่ถามในแบบสอบถามได้ทุกประเด็น โดยท่านสามารถดำเนินการได้ทุกคำถามที่ถามในแบบสอบถามได้ทุกคำถามที่ถามในแบบสอบถามได้ทุกคำถามที่ถามในแบบสอบถามได้ทุกคำถามที่问答

งานวิจัยนี้ได้รับการสนับสนุนจากมหาวิทยาลัย Cincinnati และคณะสถาปัตยกรรมศาสตร์ ผังเมือง และนฤมิตศิลป์ มหาวิทยาลัยมหาสารคาม
หมวดที่ 1: คำถามเพื่อจัดประเภทแหล่งน้ำดื่มของท่าน

1. แหล่งน้ำดื่มใน ฤดูร้อน/ฤดูแล้ง (Dry/Hot Season) ของท่านคือแหล่งใด กรุณาตอบคำถามลงในตารางด้านล่างนี้ เพื่อระบุแหล่งน้ำบริโภคหลักพร้อมทั้งแหล่งน้ำบริโภคทางเลือกอื่นๆ ที่ท่านเลือกบริโภคสาระจากแหล่งน้ำหลัก ท่านควรหมายเหตุแหล่งน้ำสำรองสิ่งที่เท่านั้น

<table>
<thead>
<tr>
<th>แหล่งน้ำดื่ม</th>
<th>แหล่งหลัก</th>
<th>แหล่งทางเลือก</th>
</tr>
</thead>
<tbody>
<tr>
<td>น้ำฝน</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำบรรจุขวด</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำประปาภายในที่พักอาศัย</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำประปาบริโภคสำนักหรือแปลงสิน</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำสะอาด ก่อนการรสรและน้ำบาดาล</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำจากการชุ่มชื้น</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำฝั่งธาร  (คลอง ลำธาร หนองน้ำ ทะเลสาบ เชื่อ แม่น้ำ)</td>
<td></td>
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</tr>
</tbody>
</table>

อื่นๆ กรุณาระบุ____________________________________

2. แหล่งน้ำสำหรับเดิมใน ฤดูฝน (Rainy/Wet Season) ของท่านคือแหล่งใด กรุณาตอบคำถามลงในตารางด้านล่างนี้ เพื่อระบุแหล่งน้ำบริโภคหลักพร้อมทั้งแหล่งน้ำบริโภคทางเลือกอื่นๆ ที่ท่านเลือกบริโภคสาระจากแหล่งน้ำหลัก ท่านควรหมายเหตุแหล่งน้ำสำรองสิ่งที่เท่านั้น

<table>
<thead>
<tr>
<th>แหล่งน้ำดื่ม</th>
<th>แหล่งหลัก</th>
<th>แหล่งทางเลือก</th>
</tr>
</thead>
<tbody>
<tr>
<td>น้ำฝน</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำบรรจุขวด</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำประปาภายในที่พักอาศัย</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำประปาบริโภคสำนักหรือแปลงสิน</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำสะอาด ก่อนการรสรและน้ำบาดาล</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำจากการชุ่มชื้น</td>
<td></td>
<td></td>
</tr>
<tr>
<td>น้ำฝั่งธาร  (คลอง ลำธาร หนองน้ำ ทะเลสาบ เชื่อ แม่น้ำ)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

อื่นๆ กรุณาระบุ____________________________________

- 78 -
3. แหล่งน้ำสำหรับเด็กใน ฤดูหนาว (Cool Season) ของท่านคือแหล่งใด  กรุณาตอบคำถามลงในตารางด้านล่างนี้ เพื่อระบุแหล่งน้ำบริโภคหลักพร้อมทั้งแหล่งน้ำบริโภคทางเลือกอีกทั้งคุณสมบัติของแหล่งน้ำบริโภคหลักที่ท่านเลือก แหล่งน้ำดื่ม แหล่งหลัก (แหล่งที่ใช้เป็นพื้นฐาน) แหล่งทางเลือก (แหล่งที่ใช้บางครั้ง)

<table>
<thead>
<tr>
<th>แหล่งน้ำดื่ม</th>
<th>แหล่งหลัก (แหล่งที่ใช้เป็นพื้นฐาน)</th>
<th>แหล่งทางเลือก (แหล่งที่ใช้บางครั้ง)</th>
</tr>
</thead>
<tbody>
<tr>
<td>น้ำผัน</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>น้ำบรรจุขวด</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>น้ำประปาภายในที่พักอาศัย</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>น้ำประปาบริเวณสำนักหรือแปลงเดิน</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>อาจมีน้ำแบบอื่นก่อตัวสารน้ำ</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>น้ำบาดาล น้ำจากผลกระทบ</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>น้ำฝั่งน้ำ คือแหล่งน้ำทะเล เชื้อ แม่น้ำ</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

อื่นๆ กรุณาระบุ_____________________________________

4. แหล่งน้ำดื่มหลักที่ท่านเลือกในแต่ละฤดูกาลดีกว่าคุณภาพน้ำดื่มที่ท่านจัดหามาหรือไม่

<table>
<thead>
<tr>
<th>ฤดูร้อน/ฤดูแล้ง</th>
<th>ฤดูฝน</th>
<th>ฤดูหนาว</th>
</tr>
</thead>
<tbody>
<tr>
<td>ใช่</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>ไม่ใช่</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>ไม่ทราบ</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

5. อะไรคือตัวชี้วัดที่ช่วยให้ท่านตัดสินได้ว่าคุณภาพน้ำดื่มที่ท่านจัดหามานั้นปลอดภัย


หมวดที่ 2: คำถามเกี่ยวกับการกักเก็บและการรองน้ำฝน (หากคุณไม่ได้คิ้ม น้ำฝน เท่านั้น โปรดตอบคำถามแรก และ จากนั้นย้ายไป มาตรา 3)

1. อะไรคือเหตุผลที่ไม่ใส่น้ำฝน (เลือกได้มากสุดที่ท่านใช้) ถามคุณได้บ่อยไหมที่ท่านใช้
☐ รสชาติ  ☐ กลิ่น  ☐ รูปลักษณะ  ☐ ไม่สะอาด  ☐ ถูกบอกว่าน้ำฝนไม่สะอาด  ☐ มีทางเลือกที่ดีกว่าน้ำฝน  ☐ อื่นๆ__________________________
2. สมาชิกในครัวเรือนของท่านเก็บน้ำฝนสำหรับดื่มอย่างไร

☐ รองน้ำฝนผ่านหลังคา ☐ จากน้ำที่ไหลผ่านผิวดิน (บ่อน้ำชด) ☐ อื่นๆ__________________________

3. ท่านจัดเก็บน้ำฝนไว้สำหรับดื่มอย่างไร (เลือกได้ทุกข้อท่านใช้)

☐ โอ่งดินเหนียวหรือดินเผาขนาดเล็ก ☐ โอ่งซีเมนต์ขนาดใหญ่ ☐ ถังซีเมนต์ขนาดใหญ่
☐ อื่นๆ__________________________

4. เพื่อป้องกันน้ำฝนที่กักเก็บไว้เปื้อน สมาชิกในครัวเรือนของท่านใช้วิธีดังต่อไปนี้หรือไม่ (เลือกได้ทุกข้อท่านใช้)

☐ ฝาโอ่ง ☐ ตาข่ายกันยุง ☐ กอก
☐ สายยาง ☐ ท่อฉลุทองระบายน้ำ ☐ อื่นๆ__________________________
☐ ไม่มีวิธี

5. หากไม่ใช้วิธีข้างต้น เหตุใดจึงเป็นเช่นนั้น

☐ ไม่มีบริเวณ ☐ อื่นๆ__________________________

6. นำฝนที่ท่านเก็บไว้ถูกกรอง/บีบัด/ทำให้น้ำสะอาดก่อนนำมาดื่มหรือไม่ (เลือกได้ทุกข้อท่านใช้)

☐ ใช้โดยคัดน้ำ ☐ ใช้โดยกรองด้วยกรวดและทรัพย์ ☐ ใช้โดยกรองด้วยผ้า
☐ ใช้โดยใช้ฝาถัง ☐ ใช้โดยใส่ผลิตภัณฑ์สำหรับฟอกน้ำ/คลอรีน
☐ อื่นๆ__________________________
☐ ไม่ได้กรอง/บีบัด/ทำให้น้ำสะอาดก่อนนำมาดื่ม

7. หากไม่ใช้วิธีข้างต้น เหตุใดจึงเป็นเช่นนั้น

☐ ไม่มีบริเวณสำหรับกรอง/บีบัด/ทำให้น้ำสะอาดก่อนนำมาดื่ม
☐ ไม่มีวิธีจำเป็นต้องกรอง/บีบัด/ทำให้น้ำสะอาดก่อนนำมาดื่ม ☐ ไม่มีเวลา
☐ เชื้อว่า ไม่จำเป็นต้องกรอง/บีบัด/ทำให้น้ำสะอาดก่อนนำมาดื่ม ☐ อื่นๆ__________________________

8. เพื่อให้มั่นใจได้ว่า น้ำฝนที่ท่านเก็บไว้นั้นปลอดภัยสำหรับการบริโภค สมาชิกในครัวเรือนของท่านใช้วิธีใดดังต่อไปนี้ในการรักษาคุณภาพน้ำ (เลือกได้ทุกข้อท่านใช้)

<table>
<thead>
<tr>
<th>วิธีการ</th>
<th>ใช้</th>
<th>ไม่ใช้</th>
</tr>
</thead>
<tbody>
<tr>
<td>ในแต่ละปีที่เริ่มต้นฤดูฝน ปล่อยให้ฝนตกกระทบลงอยู่เสมอ และเมื่อฝนตกกระทบลงที่สวยงามน้ำตกหลั่นที่เชื่อมกับหลังคาบาน</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>คอยดูแลท่อหรือฝำน้ำฝนที่ไหลเข้าสู่ท่อของเครื่องหรือโอ่งน้ำอยู่เสมอ โดยจัดวางท่อหรือฝำน้ำอยู่เสมอและนำน้ำไหลใส่ตะจอก เพื่อการระบายน้ำฝนที่เกินกว่าที่กำหนดไว้ด้วยกลมขึ้นหรือแช่หิ้นก่อนจะนำฝนที่สะสมอยู่</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>ทำความสะอาดโอ่งประตักก่อนปั่นน้ำเป็นประจุทุกปี ถนนจะเข้าสู่ถังน้ำเพื่อความพร้อมในการเก็บน้ำฝนขึ้นใหม่</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>ห่อหุ้มปั๊กถังรับน้ำด้วยผ้าดิบในละแวกเพื่อป้องกันยุงเข้าไปในถังน้ำ</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>คอยดูแลหรือปรับน้ำด้วยสะอาดในละแวกเพื่อป้องกันยุงเข้าไปในถังน้ำ</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
หมวดที่ 3: คำถามเกี่ยวกับน้ำประปา

1. ทานเข้าถึงระบบน้ำประปาหรือไม่ (ถ้าใช่ กรุณาเขียนไปตอบในข้อ 6)
   - [ ] ใช่ น้ำประปาภายในตัวบ้าน
   - [ ] ไม่ใช่ น้ำประปาบริเวณสวนหรือแปลงที่ดิน
   - [ ] ใช่ ทั้งน้ำประปาภายในตัวบ้านและบริเวณสวนหรือแปลงที่ดิน

2. หากเข้าไม่ถึงระบบน้ำประปา ทานต้องการเข้าถึงระบบบริการน้ำประปาระหว่างหรือไม่ (ถ้าไม่ กรุณาเขียนไปตอบข้อ 5 จากนั้นข้ามไปตอบคำถามหมวดที่ 4)
   - [ ] ใช่
   - [ ] ไม่ใช่

3. ทานต้องการเข้าถึงระบบน้ำประปา ทานต้องน้ำจากระบบประปาระหว่างหรือไม่ (ถ้าใช่ กรุณาเขียนไปตอบคำถามหมวดที่ 4)
   - [ ] ใช่
   - [ ] ไม่ใช่

4. หากตอบไม่ กรุณาระบุเหตุผลของการไม่ต้องการน้ำประปา
   - [ ] สะอาด
   - [ ] กลิ่น
   - [ ] รูปลักษณ์
   - [ ] ท่อน้ำเก่า/เสีย
   - [ ] อื่นๆ ________________

5. หากตอบไม่ กรุณาระบุเหตุผลของการไม่ต้องการเข้าถึงระบบน้ำประปาระหว่าง
   - [ ] ราคาสูง
   - [ ] ไม่ต้องการ
   - [ ] อื่นๆ ________________

6. ใครคือฝ่ายจัดหาน้ำประปาระหว่างท่าน
   - [ ] กำรประปามunicipal (กปม)
   - [ ] กำรประปา national (กปน)
   - [ ] เอกชนเป็นผู้จัดหา
   - [ ] อื่นๆ ________________

7. ค่าน้ำประปาระหว่างของท่านต่อเดือนคือ
   - [ ] < 20 บาท
   - [ ] 20-60 บาท
   - [ ] 60-100 บาท
   - [ ] 100-200 บาท
   - [ ] >200 บาท

8. ท่านน้ำประปาระหว่างเป็นราคาที่ท่านสามารถจ่ายได้
   - [ ] ใช่
   - [ ] ไม่ใช่

9. ทานน้ำประปาระหว่างที่มีหรือไม่ (หากตอบ ใช่ กรุณาตอบคำถามข้อ 7 แต่หากตอบ ไม่ใช่ กรุณาตอบคำถามข้อ 6 จากนั้น ข้ามไปตอบคำถามหมวดที่ 4)
   - [ ] ใช่ ค้าน้ำประปาระหว่างในตัวบ้าน
   - [ ] ไม่ใช่ ค้าน้ำประปาระหว่างในตัวบ้านและบริเวณสวนหรือแปลงที่ดิน
   - [ ] ไม่ใช่ ค้าน้ำประปาระหว่าง
10. หากทานไม่คิดน้ำประปาเป็นเพราะสาเหตุใด (เลือกได้ทุกสาเหตุ)

- ราษฎร
- กลิ่น
- รูปลักษณ์
- ท่อน้ำเก่า/เลีย
- อื่นๆ

11. ทานกรอง/ปั๊บด/ทำให้น้ำปราปะให้สะอาดก่อนนํามาดื่มหรือไม่ (หากตอบ ใช่ กรุณาตอบคํามาถามข้อที่ 8 จากนั้นชําบให้ตอบคำถามในหมวดที่ 4 ต่อไป แต่หากตอบ ไม่ กรุณาถามไปตอบคำถามข้อที่ 9 จากนั้นจึงตอบคำถามต่อในหมวดที่ 4 ต่อไป)

- ใช่
- ไม่ใช่

12. สมาชิกในครัวเรือนของทานนําประปามา กรอง/ปั๊บด/ทำให้นํามาสะอาดก่อนนํามาดื่มอย่างไร (เลือกได้มากกว่า 1 ข้อ)

- นํามาต้ม
- เค็มเกลือกันชาสําหรับฟอกอากาศ/คลอรีนลงไป
- ใช้ผ้ากรอง
- ใช้ตัวกรอง (เซรามิก ทรัพย์ ชั้นหิน อื่นๆ)
- ข้าวเชื่อผานพลังงานแสงอาทิตย์
- ปล่อยให้นํามันิ่งและตกตะกอน
- อื่นๆ

13. เหตุใดจึงไม่มีการนําประปามากรอง/ทำให้สะอาด/ปั๊บด/กรองนํามาดื่ม (เลือกได้มากกว่า 1 ข้อ)

- ไม่มีอุปกรณ์สําหรับกรอง/ปั๊บด/ทำให้นํามาสะอาด
- ไม่แน่ใจว่าทำไมจึงต้องกรอง/ปั๊บด/ทำให้นํามาสะอาด
- ไม่มีเวลา
- เชื่อว่าไม่จำเป็นต้องกรอง/ปั๊บด/ทำให้นํามาสะอาด
- อื่นๆ

หมวดที่ 4: คำถามเกี่ยวกับน้ำเติมบรรจุขวด และการจัดหาน้ำโดยหน่วยงานราชการ

1. ทานซื้อน้ำเติมบรรจุขวดหรือไม่ (หากตอบ ไม่ กรุณาตอบคํามาถามข้อ 4)

- ใช่
- ไม่ใช่

2. ทานมีค่าใช้จ่ายสำหรับซื้อน้ำบรรจุขวดกี่บาทต่อวัน

- < 20 บาท
- 20- 60 บาท
- 60- 100 บาท
- 100 – 200 บาท
- >200 บาท

3. ราคาเบี้ยขั้นต้นเป็นราคาที่ครัวเรือนของทานสามารถจ่ายได้

- ใช่
- ไม่ใช่

4. ใครคือผู้จัดหาน้ำบรรจุขวดมาจากสู่หมู่บ้านของทาน

- การประปามณฑลสุธีภาค(กป.ท.)
- การประปามณฑลท้อง(กป.ท.)
- ซื้อจากหน่วยบ้านอื่น
- ไม่ทราบ
5. ในความคิดเห็นของท่าน ใครคือผู้มีหน้าที่รับรองต่อคุณภาพและปริมาณของแหล่งน้ำที่ดื่มในครัวเรือนของท่าน มากที่สุด

☐ กระทรวงมหาดไทย □ หน่วยงานราชการระดับจังหวัด □ หน่วยงานส่วนท้องถิ่น □ ผู้นำระดับหมู่บ้าน

☐ เป็นหน้าที่ของท่านเอง □ ไม่ทราบ □ อื่นๆ __________

6. ท่านรู้สึกพึงพอใจต่อการปฏิบัติงานตามหน้าที่ของฝ่ายต่างๆ ในด้านการรับรองคุณภาพและปริมาณน้ำที่ดื่มในหมู่บ้านของท่านอย่างไร?

<table>
<thead>
<tr>
<th>หน่วยงานราชการระดับจังหวัด</th>
<th>หน่วยบริหารส่วนท้องถิ่น</th>
<th>ผู้นำระดับหมู่บ้าน</th>
</tr>
</thead>
<tbody>
<tr>
<td>สีมาก</td>
<td>เฉยๆ</td>
<td>แย่</td>
</tr>
<tr>
<td>สีกลาง</td>
<td>แย่</td>
<td>แย่</td>
</tr>
<tr>
<td>สีน้ำเงิน</td>
<td>แย่</td>
<td>มำก</td>
</tr>
<tr>
<td>สีน้ำตาล</td>
<td>มำก</td>
<td>ไม่ทรำบ</td>
</tr>
<tr>
<td>สีเขียว</td>
<td>ไม่ทรำบ</td>
<td>อื่นๆ</td>
</tr>
</tbody>
</table>

7. ในทรรศนะของท่าน หน่วยงานราชการสามารถปรับปรุงคุณภาพและปริมาณน้ำที่ดื่มในหมู่บ้านของท่านได้หรือไม่ กรุณาอธิบายทั้งในกรณีที่ท่านคิดว่าได้หรือไม่ได้ __________

____________________________
____________________________

หน่วยที่ 5: คำถามเกี่ยวกับปัญหาในการจัดหาน้ำดื่ม

1. สภาพของท่อน้ำที่ท่านใช้นั้นเป็นอย่างไร (คำถามในข้อ1-2สำหรับท่านที่บริโภคค้นน้ำประปาภายนี้พักอาศัย)

☐ สภาพดีเยี่ยม                                   ☐ สภาพดี                                    ☐ สภาพพอใช้ได้

☐ สภาพดีเยี่ยม                                   ☐ สภาพพอใช้ได้                                    ☐ สภาพใช้งานไม่ได้

2. หากคำตอบคือ มีสภาพที่ต้องปรับปรุงหรือมีสภาพแย่ ท่อน้ำมีสิ่งใดคัดปิดติด (เลือกได้ทุกข้อที่เกิดขึ้น)

☐ ท่อแตกหนึ่งแห่งหรือมำกกว่ำนั้น                    ☐ ท่อรั่วหนึ่งแห่งหรือมำกกว่ำนั้น                        ☐ ท่อสึกกร่อน

☐ ท่อแตกหนึ่งแห่งหรือมำกกว่ำนั้น                    ☐ ท่อรั่วหนึ่งแห่งหรือมำกกว่ำนั้น                        ☐ ท่อสึกกร่อน

☐ อื่นๆ __________

3. ท่านได้สังเกตหรือไม่ว่า มีลูกน้ำยุงอยู่ในน้ำฝนที่รองไว้สำหรับดื่ม (คำถามนี้ใช้สำหรับท่านที่เก็บเกี่ยวผ่านฟิลเตอร์ไว้ใช้เท่านั้น)

☐ ใช่ | ☐ ไม่ใช่

- 83 -
4. ท่านได้สังเกตเห็นหรือไม่ว่ามีมูลสัตว์ในน้ำฝนที่รองไว้สำหรับดื่ม (คำถามนี้ ใช้สำหรับท่านที่เก็บกักน้ำฝนไว้ใช้เท่านั้น)

☐ ใช้ | ☐ ไม่ใช้

5. มีบ้างหรือไม่ที่สมาชิกในครอบครัวไม่สามารถนํามาจากดื่มได้ (หากตอบ ไม่ กรุณาฆ่ามไปตอบคำถามข้อที่ 6)

☐ ใช้ | ☐ ไม่ใช้

6. หากตอบ ใช้ กรุณาอธิบายเหตุการณ์ในขณะนั้นและท่านสามารถจัดการปัญหาให้ผ่านพ้นไปได้อย่างไร

__________________________________________________________________________
__________________________________________________________________________

7. ภายในเวลา 2 ปีที่ผ่านมา ท่านหรือสมาชิกในครอบครัวมีอาการป่วยมาจากน้ำฝนในแหล่งน้ำที่ท่านใช้ หรือไม่ หากตอบ ใช้ กรุณาแจ้งแหล่งที่มาจากน้ำ อาการป่วย และหากเป็นไปได้ กรุณาระบุชื่อโรค และอธิบายสาเหตุที่ทำให้ป่วย

__________________________________________________________________________
__________________________________________________________________________

8. หากคิดว่าจะใช้ คือปัญหาสุขภาพที่เกี่ยวกับน้ำมาจากที่สุด ซึ่งครอบครัวหรือหมู่บ้านของท่านได้เผชิญมาเร็วๆนี้

__________________________________________________________________________
__________________________________________________________________________

9. หากตอบว่า มี กรุณาแจ้งปัญหา 3 ข้อหลักที่มาจากคุณภาพน้ำดื่มของท่าน

4.
5.
6.
หน่วยที่ 6: คำถามเพื่อการประเมินน้ำดื่มจากแหล่งน้ำต่างๆ

1. กรุณาประเมิน กลิ่น ของแหล่งน้ำดื่มต่อไปนี้:

<table>
<thead>
<tr>
<th>แหล่งน้ำ</th>
<th>ดีมาก</th>
<th>ดี</th>
<th>ปานกลาง</th>
<th>แย่</th>
<th>แย่มาก</th>
<th>ไม่ดีมี</th>
</tr>
</thead>
<tbody>
<tr>
<td>น้ำฝน</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำบรรจุขวด</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำประปา(ก๊อก)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>ท่อจ่ายน้ำแบบอิน/กอกรักษาณะ</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำบาดาล/น้ำจากการขุดเจาะ</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำฝั่งคืน (จำกแม่น้ำ เชื่อม ทะเลสาบ หนอง น้ำล้นสาร คลอง เชื้อ)</td>
<td>○</td>
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<td>○</td>
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<td>○</td>
<td>○</td>
</tr>
<tr>
<td>แหล่งอื่นๆ (กรุณาระบุ)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

2. กรุณาประเมิน รส ของแหล่งน้ำดื่มต่อไปนี้:

<table>
<thead>
<tr>
<th>แหล่งน้ำ</th>
<th>ดีมาก</th>
<th>ดี</th>
<th>ปานกลาง</th>
<th>แย่</th>
<th>แย่มาก</th>
<th>ไม่ดีมี</th>
</tr>
</thead>
<tbody>
<tr>
<td>น้ำฝน</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำบรรจุขวด</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำประปา(ก๊อก)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>ท่อจ่ายน้ำแบบอิน/กอกรักษาณะ</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำบาดาล/น้ำจากการขุดเจาะ</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำฝั่งคืน (จำกแม่น้ำ เชื่อม ทะเลสาบ หนอง น้ำล้นสาร คลอง เชื้อ)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>แหล่งอื่นๆ (กรุณาระบุ)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

3. กรุณาประเมิน สี (ความใส) ของแหล่งน้ำดื่มต่อไปนี้:

<table>
<thead>
<tr>
<th>แหล่งน้ำ</th>
<th>ดีมาก</th>
<th>ดี</th>
<th>ปานกลาง</th>
<th>แย่</th>
<th>แย่มาก</th>
<th>ไม่ดีมี</th>
</tr>
</thead>
<tbody>
<tr>
<td>น้ำฝน</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำบรรจุขวด</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำประปา(ก๊อก)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>ท่อจ่ายน้ำแบบอิน/กอกรักษาณะ</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>น้ำบาดาล/น้ำจากการขุดเจาะ</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
4. กรุณาประเมิน ความปลอดภัย ของแหล่งน้ำดื่มต่อไปนี้:

<table>
<thead>
<tr>
<th>แหล่งน้ำ</th>
<th>ปลอดภัยมาก</th>
<th>ปลอดภัย</th>
<th>เฉยๆ</th>
<th>ไม่ปลอดภัย</th>
<th>ไม่ปลอดภัยมาก</th>
<th>ไม่ดื่ม</th>
</tr>
</thead>
<tbody>
<tr>
<td>น้ำฝน</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>น้ำบรรจุขวด</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>น้ำประปา(ก๊อก)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>ท่อจ่ายน้ำแบบอิน/ก๊อกน้ำสาธารณะ</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>น้ำบาดาล/น้ำจากกำรขุดเจาะ</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>น้ำผิวดิน (จำกแม่น้ำ เขื่อน ทะเลสาบ หนองน้ำ ลำธาร คลอง เขื่อน)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>แหล่งอื่นๆ (กรุณาระบุ)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

5. กรุณาประเมิน ระดับความพึงพอใจ ต่อน้ำดื่มจากแหล่งน้ำดื่มต่อไปนี้:

<table>
<thead>
<tr>
<th>แหล่งน้ำ</th>
<th>พอใจมาก</th>
<th>พอใจ</th>
<th>เฉยๆ</th>
<th>ไม่พอใจ</th>
<th>ไม่พอใจมาก</th>
<th>ไม่ดื่ม</th>
</tr>
</thead>
<tbody>
<tr>
<td>น้ำฝน</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>น้ำบรรจุขวด</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>น้ำประปา(ก๊อก)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>ท่อจ่ายน้ำแบบอิน/ก๊อกน้ำสาธารณะ</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>น้ำบาดาล/น้ำจากกำรขุดเจาะ</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>น้ำผิวดิน (จำกแม่น้ำ เขื่อน ทะเลสาบ หนองน้ำ ลำธาร คลอง เขื่อน)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>แหล่งอื่นๆ (กรุณาระบุ)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

6. โดยภาพรวมแล้ว แหล่งน้ำดื่มที่ท่าน ชอบ มากที่สุดคือน้ำจากแหล่งใด เพราะเหตุใด
7. โดยภาพรวมแล้ว แหล่งน้ำดื่มที่ท่านคิดว่า ปลอดภัยมากที่สุดคือ น้ำจากแหล่งใด เพราะเหตุใด

8. หากท่านสามารถปรับปรุงสภาพน้ำดื่มในหมู่บ้านของท่านได้ ท่านจะทำอะไร

หมวดที่ 7: ข้อมูลผู้ตอบคำถาม

1. ข้อมูลผู้ตอบคำถาม

<table>
<thead>
<tr>
<th>เพศ</th>
<th>อายุ</th>
<th>สถานภาพสมรส</th>
<th>ระดับการศึกษา</th>
<th>ท่านเป็นหัวหน้าครัวเรือนหรือไม่</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ชาย</td>
<td>☐หญิง</td>
<td>☐โสด</td>
<td>☐แต่งงานแล้ว</td>
<td>☐แยกกันอยู่/หย่า</td>
</tr>
<tr>
<td>☐ชาย</td>
<td>☐หญิง</td>
<td>☐แต่งงานแล้ว</td>
<td>☐แยกกันอยู่/หย่า</td>
<td>☐หย่า</td>
</tr>
</tbody>
</table>

หากไม่ใช่: เพศของหัวหน้าครัวเรือนคือ ชาย □ หญิง ความสัมพันธ์ระหว่างท่าน กับท่านนี้คือ คู่สมรส □ ลูก □ ผู้ปกครอง □ พี่น้อง □ อื่นๆ ___________
อาชีพ:

2. จำนวนสมาชิกในครัวเรือน โดยไม่รวมท่าน มีทั้งหมดกี่คน

<table>
<thead>
<tr>
<th>ช่วงอายุ</th>
<th>ชาย</th>
<th>หญิง</th>
<th>รวม</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 ปี</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-17 ปี</td>
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</tr>
<tr>
<td>18-30 ปี</td>
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<tr>
<td>31-59 ปี</td>
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<tr>
<td>60 ปีขึ้นไป</td>
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