



Utilization and Quality of Free-flowing Groundwater in Barangay Poblacion, Ibajay, Aklan

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Abstract: Groundwater is the most important natural resource used for drinking by many people around the world. In Barangay Poblacion, Ibajay, Aklan, there are eight “free-flowing” groundwater sources that is accessible to the residents twenty four hours a day. The provision of uninterrupted water supply improves the living conditions of all people in the community but the use of water should be conserved, maximized and regulated to prevent shortage. The resource cannot be optimally used and sustained unless the quality of groundwater is assessed to protect the health of water users. The study employed a quantitative descriptive approach to assess the utilization and quality of groundwater. A survey questionnaire was administered among 247 head-of-the-families to determine the utilization of water. Water sample from every source was subjected to laboratory analysis. Sixty five percent of households were utilizing groundwater and use it primarily for drinking. Further, one free-flowing source was found positive of fecal coliform bacteria but other sources conformed to pH, total hardness, heterotrophic plate count, and total coliform tests and pass the Philippine National Standard for Drinking Water. The study pointed out the need to perform periodic and complete monitoring of the potability of water in free-flowing sources for the water was basically used for drinking. Moreover, the researcher recommends a framework for water management to educate the community on proper protocol on water utilization, safety, and hygiene.

Key Words: water quality; groundwater utilization; free-flowing groundwater; fecal coliform; conservation

1. INTRODUCTION

Groundwater is the most important component and constitutes about two thirds of the freshwater resources of the world and accounts for nearly all usable freshwater. In the last few years, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. Similarly, Ananthakrishnan et al. (2012) mentioned that rapid urbanization, growing population and speedy industrialization have led to the pressure on demand for water. To reach the goal of sustainable and reasonable groundwater utilization, it is necessary to integrate groundwater quality and quantity, and a variety of factors that should be considered in the regional development of water resources (Jang et al., 2012a).

Generally, this study was conceptualized based on the Republic Act 9275 (RA 9275) or commonly known as The Philippine Clean Water Act of 2004 which mandates that the State shall pursue a policy of economic growth in a manner consistent with the protection, preservation and revival of the quality of fresh, brackish and marine waters. This Act shall apply to water quality management in all water bodies. Only 39 percent of the water bodies may be considered as potential sources of drinking water and 31 percent of illnesses in the country, monitored for a five-year period were caused by water-borne pathogens (EMB National Water Quality Status Report, 2006).

Aklan province is richly blessed with abundant supply of water. In the town of Ibajay, a third-class municipality of Aklan with approximately ten thousand households (Ibajay Municipal Profile 2013), there were groundwater sources that continuously flowing from dusk to dawn. These "free-flowing" stations exist for decades in Brgy. Poblacion and residents used it as water source. Discoveries of these water sources happened when almost several 20 feet long metal pipes were inserted on the ground and uninterrupted supply of water that gushes out of the hole under its own pressure. Most of the groundwater that flows out goes to the drainage and wasted for it is not regulated. Also, there was no study conducted yet to ensure the water safety and sanitation of the source. Increasing water demands from a growing population means that there is a

need to emphasize the wise use, proper management and protection of this resource. The health and livelihood of people depends on the availability of a safe drinking water supply. Hence, this study on the utilization and quality of water that is continuously flowing from the groundwater source in Brgy. Poblacion, Ibajay, Aklan was conceptualized.

2. METHODOLOGY

To date, there were eight free-flowing groundwater sources (Figure 1) in Poblacion, Ibajay, Aklan which were found only in a particular location in the barangay. Table 1 shows the profile of free-flowing groundwater sources. These sources vary in the depth and period of use. Several twenty feet metal tubes were inserted on the latest that was in 2012 was source 6. The deepest source which is 220 feet is source 8 located at J.C. Miraflores Street in between Conanan and Padre delos Reyes Streets while the most shallow is source 6. The entire free-flowing water sources were accessible to the community.

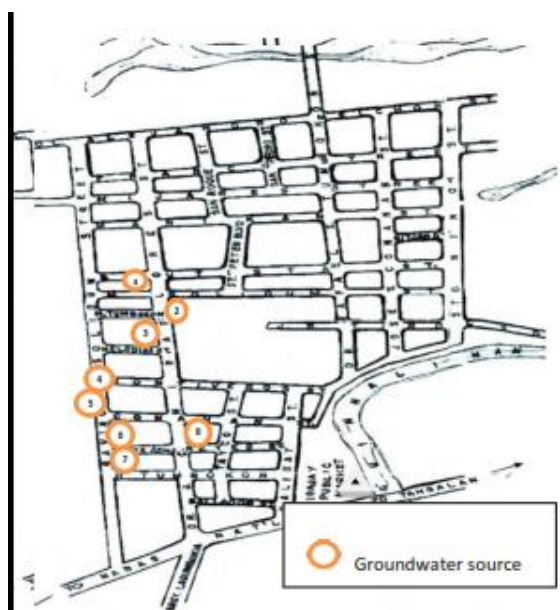


Fig. 1. Map of groundwater sources in Barangay Poblacion, Ibajay, Aklan

The respondents were the head-of-the-family in 247 households of the barangay. They were selected through convenient sampling from 629 households (Registry of Barangay Inhabitants, 2014) using Slovin's formula. A validated researcher-made questionnaire was developed as data gathering instrument which was administered once. Generally, this study used quantitative research design and employed descriptive statistics to analyze the data gathered. Frequency distribution of the multiple-response data using Microsoft Excel was applied in determining the number of households that utilizes

water from the free-flowing groundwater source, the purpose of using it and the alternative sources of water.

3. RESULTS AND DISCUSSION

Of the total 247 households, the result revealed that majority of the households answered "yes" when asked if they utilized water from free-flowing source while only 35 percent replied "no" or did not get water from this source (Figure 2).

Table 1. Profile of Free-Flowing Groundwater Sources

Water Source	Location	Period of Use (years)	Depth (feet)
1	Bautista St. " beside White House"	10	200
2	J.C. Miraflores St (back of church)	33	200
3	Melodias St.	26	190
4	Corner GavinoSolidum St. and Hontiveros St.	7	210
5	Gavino Solidum St. between Hontiveros St. and Conanan St.	20	200
6	Gavino Solidum St. between Padre delos Reyes St. and Conanan Street	3	160
7	Gavino Solidum St. near P. Tumbokon St.	35	200
8	Dr. J.C. Miraflores St. between Conanan St. and Padre delos Reyes St.	6	220

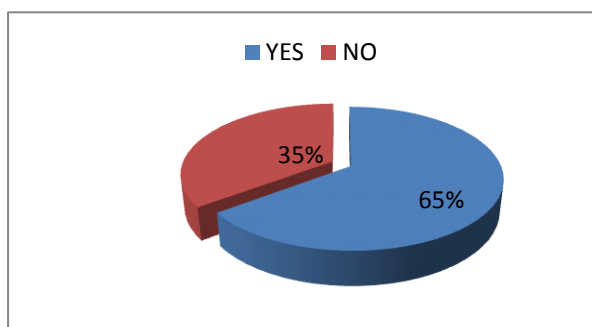


Fig. 2. Percentage distribution of free-flowing groundwater usage in the community.

Figure 3 shows the total 160 households utilizing the free-flowing water source within the barangay premises. Source 1 was ranked first the most number of users taking water from this site. This water source was observed to have the highest flow rate that made the residents fetch water faster. Of all the water sources, source number 1 was observed to be "clean" for it was far from the

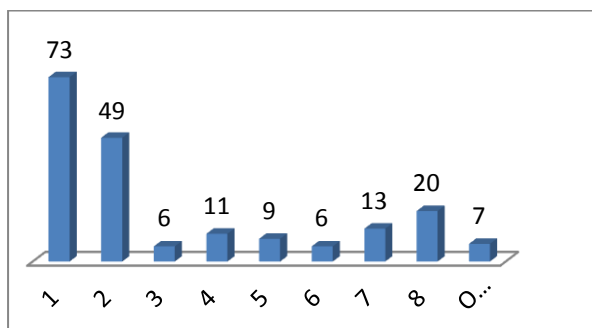


Fig. 3. Frequency of water utilization from specific groundwater source.

drainage, having a concrete flooring, and wider area for water containers. Moreover, it was situated beside a huge white mansion house, away from the rest of the houses. Water source 2 located at the back of the Catholic Church was ranked second having forty-nine household users. This station was very accessible and visible for there was no other structure that blocked the site.

The Figure 4 revealed how the groundwater was utilized in every household. The result denotes that out of 160 households, majority of users consumed water for drinking. The result further shows that groundwater was also used for cooking, bathing, and laundry.

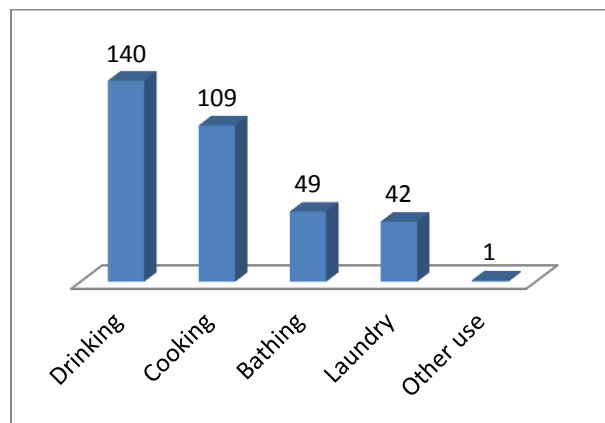


Fig. 4. Frequency distribution of groundwater utilization per household.

The alternative sources of water by residents of Barangay were shown in Figure 5. Of the 87 households who answered “no” or does not get water from free-flowing source, 46 households use the jetmatic pump as water source. Twenty six of the households took water from Ibajay Water District and while 19 households utilize water from refilling stations.

Table 2 shows the result of laboratory analysis of physicochemical and bacteriological quality of groundwater sample taken from each free-flowing source. The table revealed that the pH values of water from all sources were slightly basic and within the accepted standard for drinking water. The total hardness of all samples was below the accept-

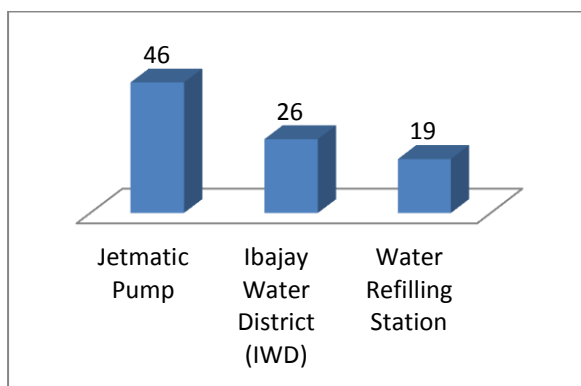


Fig. 5. Frequency distribution of alternative water sources.

able limit indicating that the water was “soft” and conforms to the standard. Water with high CaCO_3 is considered “hard” water that contains calcium and magnesium salts. Hardness does not impart a negative health effect. However, when water was heated calcium and magnesium salts fall out of solution and form scale on kettles, pans, and in plumbing. Hard water also required extra soap in the

Table 2. Physicochemical and Microbiological Quality of Water from Free-Flowing Water Source

Water Source	pH	Total Hardness, mg/L	HPC, CFU/mL	Total coliform count, MPN/100 ml	Fecal Coliform Count, MPN/100 ml	Remarks
1	7.7	178	0	<1.1	<1.1	Passed
2	7.4	147	46	>8.0	2.6	Failed
3	7.3	232	0	<1.1	<1.1	Passed
4	7.5	225	0	<1.1	<1.1	Passed
5	7.4	243	0	<1.1	<1.1	Passed
6	7.4	229	0	<1.1	<1.1	Passed
7	7.6	148	0	<1.1	<1.1	Passed
8	7.2	135	0	<1.1	<1.1	Passed
Drinking Water Standards (1mg/L = 1ppm)	6.5-8.5	> 300 as CaCO_3	<500	<1.1	<1.1	Passed



laundry, makes glasses spot in the dishwasher, and has unpleasant taste. The table also disclosed that seven out of eight sources passed the standard as drinking water. HPC of zero implied that there was no colony unit formed in every milliliter of water sample and a good measure of general bacterial composition of water source.

4. CONCLUSIONS

The water from "free-flowing" source was used by majority of households for drinking. Residents that do not get water from this source preferred an alternative from privately-owned jetmatic pump, water district, or refilling stations. One particular source was contaminated with fecal coliform making it unfit to drink.

The aim of assessing the utilization and quality of groundwater will maintain its vital existence require an integrated water resources management framework to educate the community that focuses on proper water conservation, sanitation, and environmental awareness. The participation of government agencies are also encouraged to conduct periodic monitoring of water quality and protection of water resource by strong implementation of environmental laws.

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