HYDROCHEMICAL ASSESSMENT OF GROUND WATER QUALITY AT KAMPONG JAYA GADING

ABDULMALEK KHLED MOHAMMED BADRADDIN

B. ENG(HONS.) CIVIL ENGINEERING

UNIVERSITI MALAYSIA PAHANG

SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor Degree of Civil Engineering

_____

(Supervisor's Signature)

Full Name :

Position :

Date :

_____

(Co-supervisor's Signature)

Full Name :

Position :

Date :

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

_____

(Student's Signature)

Full Name : Abdulmalek Khaled Mohammed Badraddin

ID Number : AA14262

Date : 14/01/2019

HYDROCHEMICAL ASSESSMENT OF GROUND WATER QUALITY AT KAMPONG JAYA GADING

ABDULMALEK KHLED MOHAMMED BADRADDIN

Thesis submitted in fulfillment of the requirements
for the award of the
Bachelor Degree in Civil Engineering

Faculty of Civil Engineering and Earth Resources

UNIVERSITI MALAYSIA PAHANG

JAN 2018

ACKNOWLEDGEMENTS

First of all, I would like to thank to Almighty Allah that gave me the strength and guidance in doing this research work. Then, I would like to thank my supervisor, Dr. Mir Sujaul Islam for being patient with this troublesome student and never feeling tired to give her full guidance on completing this research. Besides that, I would like to thank to all my friends that had helped me through thick and thin while doing this research. Without all of you, I would not be able to do this research all by myself. Last but not least, I would like to thank my beloved family for their everlasting moral support and endless love to make me have the courage to go on in completing my study.

.

ABSTRAK

Di Malaysia, air bawah tanah merupakan salah satu sumber air bersih, selain daripada air sungai dan hujan. Oleh itu, kajian ini dilakukan untuk menentukan kualiti air bawah tanah dan telaga sebagai sumber air yang baik dari bawah tanah. Antara parameter yang terlibat adalah PH, Penebat Elektrik Kekeruhan ,TDS, TSS, COD, BOD, Mangan, Besi, Tembaga, Zink, Plumbum, Nitrat, Ammonium, Jumlah Coliform dan E- Coli dalam kajian ini. Sampel air diambil dari tiga telaga yang berbeza. Keputusannya dibandingkan dengan Standard Kualiti Air Minum Nasional (NDwQs) untuk mengetahui kelas air bawah tanah bagi setiap telaga. Ia menunjukkan bahawa air bawah tanah tersebut telah tercemar oleh Kromium dengan kepekatan 1.59 mg / L. Namun begitu, ia dianggap sebagai relatif yang rendah kepekatan walaupun lebih tinggi dalam kepekatan unsur daripada standard yang dinyatakan oleh Standard Kualiti Air Minum Nasional (NDWOS). Dalam kajian ini, hasil daripada analisis biologi menunjukkan bahawa jumlah Koliform dan E-Coli merupakan pencemaran yang tertinggi dimana kepekatan bagi Koliform adalah 28 MPN / 100 mL dalam telaga terbuka manakala 14 MPN / 100 mL bagi telaga tertutup. Bagi kepekatan E-Coli pula adalah 8.6 MPN / 100 mL dalam telaga terbuka manakala 0MPN / 100 mL dalam telaga tertutup. Kesimpulannya, kualiti air tanah terselamat daripada kepekatan logam berat tetapi telah tercemar dengan unsur Koliform dan E-Coli. Kualiti air bawah tanah adalah sama penting dengan kuantiti kegunaan air untuk pelbagai tujuan.Amoako J.

ABSTRACT

In Malaysia, groundwater is one of the sources of clean water, other than fresh river water and rain. Thus, this research had been done to determine the groundwater quality and also the effective type of well that can contribute to the good quality of groundwater. The parameters were considered such as PH, Electrical Conductivity, Turbidity, TDS, TSS, COD, BOD, manganese, iron, copper, zinc, lead, nitrate, total coliform and E.coli in this study. The water samples were collected from three different wells. The results were compared to the National Drinking Water Quality Standard (NDWQS) to know the class of the groundwater for each well. The result showed that the groundwater had been contaminated by the chromium with concentration of 1.59 mg/L which found in all wells. This result considered as relatively not in very high concentration even the concentration of element is higher than the standard stated by National Drinking Water Quality Standard (NDWOS). Meanwhile. for biological analysis result showed that total coliform and E.coli have highest contamination which was found in open wells with total coliform concentration 28 MPN/100 mL in opened well and 14 MPN/100 mL in closed well .E.coli concentration is 8.6 MPN/100 mL and 0MPN/100 mL in closed wells . As the conclusion, the groundwater quality was harmless from heavy metal concentration but highly contaminated with total coliform and E. coli. Quality of groundwater is equally important to its quantity owing to the suitability of water for various purposes.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Introduction

Groundwater is considered to be one of the most important and indispensable sources of natural resources which are formed from rainwater and rivers. Water quality can affected by environmental factors surrounding. Malaysia has some water problems such as lack of rain in some seasons. Water quality is a term used to describe the chemical and biological properties of water and its general composition. These characteristics affect water quality and suitability for human use. (Gajendran, 2013) .Groundwater quality comprises the physical, chemical, and biological qualities of ground water. Temperature, turbidity, color, taste, and odor make up the list of physical water quality parameters. Since most ground water is colorless, odorless, and without specific taste, we are typically most concerned with its chemical and biological qualities. Although spring water or groundwater products are often sold as "pure, "their water quality is different from that of pure water. Water is a chief natural resource essential for the existence of life and is a basic human entity. Water resources are harnessed for various purposes like drinking, agricultural, industrial, household, recreational, and environmental activities, etc. Groundwater is one of the major sources of drinking water all over the world (Jayaprakash , 2008).

Of the 37 Mkm3 of freshwater estimated to be present on the earth, about 22 % exists as groundwater, which constitutes about 97 % of all liquid freshwater potentially available for human use (Shar AH, 2010). There has been tremendous increase in the demand for fresh water due to over exploitation and growth in population. Since groundwater is a renewable natural resource and a valuable component of the ecosystem, it is vulnerable to natural and human impacts. It is estimated that approximately one-third of the world's population use groundwater for drinking and about one million people are directly dependent upon the groundwater resources in Asia alone (Oyeku OT, 2010).

Quality of groundwater is equally important to its quantity owing to the suitability of water for various purposes. , the chemistry of groundwater is not only related to the lithology of the area and the residence time the water is in contact with rock material, but also reflects inputs from the atmosphere, from soil and weathering as well as from pollutant sources such as mining, land clearance, saline intrusion, industrial and domestic wastes. Groundwater used for domestic and irrigation purposes can vary greatly in quality depending upon type and quantity of dissolved salts. It contains a wide variety of dissolved inorganic chemical constituents in various concentrations, resulting from chemical and biochemical interactions between water and the geological materials. Dissolved salts should be present in irrigation water in relatively small but significant amounts. They originate from dissolution or weathering of the rocks and soil, including dissolution of lime, gypsum and other slowly dissolved soil minerals. (Amoako J,2009)

Naturally, ground water contains mineral ions. These ions slowly dissolve from soil particles, sediments, and rocks as the water travels along mineral surfaces in theories or fractures of the unsaturated zone and the aquifer. They are referred to as dis-solved solids. Some dissolved solids may have originated in the precipitation water or river water that recharges the aquifer. (Rizwan, 2009)

1.2 Problem statement

Surface water is more than 98 of the water consumed in Malaysia. The water consumption in Malaysia will increase due to the increasing of the population. In addition, surface water may need special treatment, which can be affected by climatic conditions. Water is currently being treated as more of a commodity than a social good. This dissertation develops a scheme to better understand groundwater resources and reserves in a manner similar to the method used in determining oil and gas resources. The method of estimating groundwater resources and reserves is also used to establish a reasonable governance scheme.

Groundwater quality affects not only human health but also society and the national economy. It is used in agriculture, drinking water supply for humans and animals,

industry, and in many processes such as cooling and disposal of waste and industrial waste. It is also used in the production of energy and exploration for oil and heating purposes Groundwater quality affects not only human health but also society and the national economy. It is used in agriculture, drinking water supply for humans and animals, industry, and in many processes such as cooling and disposal of waste and industrial waste. It is also used in the production of energy and exploration for oil and heating purposes cooling and other miscellaneous uses cooling and other miscellaneous uses. (Ramesh, 2012)

The technology and appropriate methods can treat the imbalances and help to provide water suitable for human use. Water pollution is very dangerous to the life of humans and organisms in general. We can know the validity of this water by detecting the chemical composition of this water.

1.3 Significance of Study

Groundwater is also very important as it supplies springs, and much of the water in our ponds, marshland, swamps, streams, rivers and bays. Although it is "out of sight," it is critical that we learn about groundwater, how it is part of the water cycle, and the importance of protecting and maintaining the quality and quantity of this water resource. Future generations of human beings will be the most consumed by water resources, and this increasing consumption is causing their life-threatening decline to a distant perspective. If we consider that there are nations will be terminated because of the lack of water, we may emerge from our absence and work since this moment to act with great interest to meet the needs of human consumption of water in a guide to avoid the problems that will appear in the future because of this growing negligence (Ansari, 2013)

In another hand Students can benefit from the good practice of environmental engineering and experimentation in the laboratory. The area of study will benefit from this research by proposing solutions to treat the groundwater to be in high quality and a good source for drinking.

REFERENCES

Amoako J., Karikari A.Y., Ansa-Asare,2011. O.D., Physicochemical quality of boreholes in Densu Basin of Ghana, Appl Water Sci, 1:41–48 DOI 10.1007/s13201-011- 0007-0 .

Ansari, K ,2013. Water quality index for assessment of water samples of different zones in Chandrapur city. GROUND WATER, 3(3)

Arshid Jehangir ,2011 et al Geochemistry and Irrigation Quality of Groundwater along River Jhelum in South Kashmir, India, Recent Research in Science and Technology, 3(6): 57-63 .

.

CGWB.2010, Report Groundwater information of Aurangabad district, Maharashtra .

Gajendran C,2013, Assessment of groundwater quality in Tirunelveli District, Tamil Nadu, India. International journal of Environmental sciences, 3(6):1874-1880.

Jain C.K. and et al.2009 Assessment of ground water quality for drinking purpose, District Nainital, Uttarakhand, India, Environ Monit Assess, Springer, 166, 663-673

Jayaprakash M,2008. Characterization and evaluation of the factors effecting the geochemistry of Groundwater In Neyveli .India. Environmental Geology,(4): 855-866

Liu,2008. Characterization of groundwater quality in Kinmen Island using multivariate analysis and geochemical modelling. Hydrological Processes, 22, 376–383.

Muthulakshmi, L, 2013. Application of correlation and regression analysis in assessing ground water quality, Virudhunagar, India. International Journal of chemtech Research, 5, 353-361.

Negrel, 2011. Understanding groundwater systems and their functioning through the study of stable water isotopes in a hard-rock aquifer (Maheshwaram watershed, India). Journal of Hydrology, 397, 55–70.

Oyeku OT. 2014,Heavy Metal Contamination of Groundwater Resources in a Nigerian Urban Settlement. Journal of Environmental Science and Technology. 4(4).

Patil, 2010. Physicochemical Analysis of Selected Groundwater Samples of Amalner Town in Jalgaon District, Maharashtra, India. E-Journal of Chemistry. 7(1): 111-116.

Parihar 2012. Physico- Chemical and Microbiological Analysis of Underground Water in and Around Gwalior City, MP, India. Research Journal of Sciences. 1(6): 62-65.

Rizwan U, 2012 Assessment of Groundwater Contamination in Industrial City, Sialkot, Pakistan. Journal of Environmental Science and Technology,3(12), 429-449

Ramesh, K,2009 Hydrochemical Analysis and Evaluation of Groundwater Quality in and around Hosur, Krishnagiri District, Tamil Nadu, India. International Journal of Research in Chemistry and Environment. 2(3): 113-122.

Rajankar, P ,2009. Water quality assessment of groundwater resources in Nagpur Region (India) based on WQI. Journal of Chemistry, 6(3), 905-908.

S10500, B. I. S. ,2012. Indian Standard Drinking Water– Specification (Second revision). Bureau of Indian Standards (BIS), New Delhi

Shar AH, 2010, Drinking Water Quality in Rohri City, Sindh, Pakistan. African Journal of Biotechnology 9(42), 7102-7107

Singh, 2013. Integrated assessment of groundwater influenced by a confluence river system: Concurrence with remote sensing and geochemical modelling. Water Resources Management, 27, 4291–4313.

Statutory Authority: N.J.S.A. 58:10A-1 et seq. And 58:11A-1 et seq. Date Last Amended: August 9, 2018 (see 50 N.J.R. 1963(a)).

Tewari, A. 2010. A study on physico-chemical characteristics of ground water quality. J Chem Phar Res. 2(2): 510- 518.