Assessment of Ground Water Quality near Municipal Solid Waste Dumping Site Area, Vijayapur, Karnataka, India.

Prof.P.Shabesha[1] Chanabasava .M[2] Aditya .H[3] Mayur. K[4] Shrinivas .B[5]
[1]Assistant Professor [2,3,4,5]Student
[1,2,3,4,5]Department of Civil Engineering
[1,2,3,4,5]Secab Institute of Engineering & Technology Vijayapur, Karnataka, India

Abstract— In this project, analysis of various physico-chemical parameters is carrying out for assessment of ground water quality near municipal solid waste dumping site area. Some samples are collecting from different locations near solid waste dumping site area indi road vijayapur. These water samples are collecting from sampling points of different bore wells near around dumping site. and will conduct various physico-chemical parameters test (pH, alkalinity, sulphate, nitrate, total hardness, dissolved oxygen, lead content, total solids, total dissolved solids, suspended solids, electrical conductivity, turbidity.) etc. For geo-referencing of study area, Toposheet No E43W11 (56D/11) OF Vijayapur Municipal Solid waste dumping site area – Latitude 16.853336 and Longitude 75.742966 of The quality of ground water assessment in the study area based on water quality index model.

Keywords: Ground Water Quality, Municipal Solid Waste Dumping

I. INTRODUCTION

Water is one of the most important, universal and most precious natural resource. It is essential in the life of all living organisms from the simplest plant and microorganisms to the most complex living system such as of human body. Water is a combination of hydrogen and oxygen atoms, with a chemical formula, H2O and it is known to be the most abundant compound (70%) on earth's surface. It is significant due to its unique chemical and physical properties. Ground water is the major source in India not only for domestic use, but also for agriculture and industrial sector. At present scenario, 85% of domestic water requirement in rural areas, 55% of irrigation water requirement of farmers, 50% of domestic water requirement in urban areas and 50% of process water requirement of industries are met by ground water. Ground water is ultimate, most suitable fresh water resource with nearly balanced concentration of the salts for human consumption. Acceptable ground water quality shows that the ground water should be safe in terms of its physicochemical parameters. International and local agencies have established parameters to determine physicochemical quality of ground water. It has been estimating hardness, fluorides, sulphides, sodium chloride, alkalinity, acidity, disease-producing pathogens such as bacteria and viruses, etc. Thus, if the physico-chemical constituents of ground water used for drinking exceed its maximum permissible limits it causes adverse health effects on the mankind. The earth 97.2% of water is salty and 2.8% is fresh water from which about 20% constitutes ground water (Rajesh Kumar, 2011) Rapid growth of industrialization, population, urbanization spoil the ground water. Once ground water get polluted, it cannot be restored by stopping the pollutants from their source. According to WHO, about 80% diseases in human being are caused by water (Neerja Kalra, 2012). In most of the growing urban cities, one of the major issues is with regard to the discharge Any form of liquid wastes which is primarily generated by domestic activities, industries, agriculture and commercial establishments This water contains different quantities of pollutants which contaminates water and makes it unfit for any productive or domestic use. Therefore, it is necessary to understand the impact of unscientific management of wastewater on the existing surface and groundwater bodies in the vicinity of major cities of India. In this context, a two-tier city of Northern Karnataka (Vijayapur) has been identified and studied for Physico chemical parameters. Vijayapur City is one of the fast-growing City in Karnataka due to its geographic location and living condition. Due to the acute shortage of water problem, the city corporation has started supplying groundwater from selected wells in the city. The city has 34 acres of municipal solid waste dumping site land and city generates a sizable amount of liquid and solid waste. The solid waste amounts to about 110 to 120 tons per day. As of 2020 concern, 120 TPD of daily waste is higher than expected. This shows that an additional 5-10 TPD of waste is generated each year. The solid waste is directly dumped into these deposits located within the Corporation limits. The most damaging waste in the Vijayapur city is in the form of sewage. The city uses about 20 mgd of both surface and groundwater and considering 20% loss about 16 mgd of sewage is generated in the area. There are no sewage treatment plants and recycling facilities within the Vijayapur City area. Safe drinking water is a fundamental human need and it is an important factor that determines the physical and social health of the people. Bullard1 inferred that polluted surface water always results in an unhealthy socio-economic environment. Increase in living standard, growing population, rapid industrialization and wide spread human activities have increased the demand for water. According to World Health Organization (WHO) about 80% of diseases of human beings are caused by drinking water. Therefore the present investigation aimed to calculate the quality of ground water in Bijapur municipal area. Talabs (Lakes) and Bowdies (Wells) constructed by Adil Shahi Rulers in 16th and 17th century and now tube well and many open wells are the water resources of Bijapur city. Capacity of these source is determined by rain. Bijapur is situated in semi-arid area with average rain fall of 553 mm and suffering critically from shortage of water. In past few decades the municipal authorities trying to solve the water crisis, by using Almatti Reservior as a source of water which is about 70 Km away. But still Bijapur is facing water quality problem as well as water shortage specially during summer and large number of people are suffering from several health problems due to consumption of contaminated locally available water. Due to rapid growth of industrialization and urbanization much sewage water is disposed off that

generates fair chance of ground water pollution and Bijapur is not an exception for this phenomena. Information on water quality of resources of Bijapur city are scanty. Hence the present work draws the conclusion on the quality of water and provides information about suitability of water for drinking purpose. Comparison of water test results with WHO Guidelines values and Indian Standard Institute tolerance limit helps to address the specific problem of water sources and to select the appropriate method of water treatment before use. Therefore, it is desirable to control the intake of these potentially toxic chemicals from drinking water. Hence, the aim of this study is also to examine the levels of some physico-chemical parameters of drinking water or general ground water quality near municipal solid waste dumping site area Vijayapur Karnataka.

II. MSW SCENARIO IN VIJAYAPUR

The MSW management of the city is done by the Vijayapura City Corporation. Primary collection is conducted by a combination of door to door collection and by disposal from waste generators in open locations and collection bins. The collection bins are of 3 m^3 and 4.5 m3 capacity. There are 135 bins placed across the city. The sweeping, collection and drain cleaning activities are divided into 7 packages which will be contracted out to private parties for efficient service. The transport happens with the twin bin dumper placers and tractor trailers. The waste is transported and dumped at the dumping site. The dumping site land of 34 acres is owned by VCC Vijayapura. Bio medical waste generated by hospitals and clinics is separately collected and disposed at a dedicated facility at the landfill. The biomedical waste landfill is a separate site adjacent to the dumping ground which has an area of 3 acres. The VCC is spending about Rs. 13.15 Crore per annum for solid waste management at an average cost of Rs. 3000 per ton of waste collected. There is a vibrant informal waste collection system in the city collecting on an average about 120 tons of waste per day. Vijayapura city has made efforts in last few years to improve the Municipal Solid Waste Management. However there is still a need to make substantial improvements in the MSWM system of the Vijayapura city and make it in accordance with Municipal Solid Waste (Management & Handling) Rules 2000, notified by Ministry of Environment and Forests. The MSW 2000 rules lay down procedures for waste collection, segregation, storage, transportation, processing and disposal.

III. LITERATURE REVIEW

1) Atun Roy Choudhury, Koteswara Rao Bolem, Laxman Kumar Duvva1 and Lakshmi Prasad Boyina (April 2021) The quantity of municipal solid waste (MSW) generation is escalating at an alarming rate with every passing year alongside the modernization of our economy. Unfortunately, the majority of this waste remains uncollected or ends up in open dumping and followed by uncontrolled burning. Citing the deep-rooted consequences, open dumping should be abandoned, and scientific interventions should be aggressively exercised to reclaim the municipal brownfields. The present research undertook the judicial task of assessing the comparative feasibility of biomining and scientific capping as a technology selection for reclamation of about a decade-old 120 million tons of waste chunk laying at Jawahar Nagar dump yard.
2) Recently, G. Sheeba, Anjaneyulu, Jalaja, and Padma Venkatasubramanian (November 2017) conducted the study on various parameters of ground water in peri urban Bengaluru. They found that the ground water was poor in quality with refence to its chemical and various other parameters.
3) Dr. Balasubramanya N and Dr Shankar B.S (June 2014) conducted the study of ground water quality in Vrishabhavathi Valley Basin, Bangalore, India and it was found the groundwater of all the affected areas are completely unfit for human consumption. Moreover, the progressive deterioration of the ground water quality was observed Therefore, it may be possible that the residents of Bangalore Urban, Karnataka, India dwelling in Nagawara, Jakkuru, etc may be utilizing ground water which is unhygienic. Thus, this is one of our motive to carry out this project. Hence, if we do a research on the physico-chemical analysis of the ground water quality this will help in determining the ground water quality of few areas of bangalore urban where this sort of analysis has not been done yet.
4) Dr.Gunjan Bhalla, Dr.Prabhata Swamee, Dr. Arvind Kumar and Dr.Ajay Bansal (January 2012) conducted study on Leachate generated from municipal solid wastelandfill site affects the groundwater quality in the adjacent areas through percolation in the subsoil. In this study, Aggregate Index method is applied to determine the quality of groundwater around a municipal solid waste dumping site. As the aggregate index is an increasing function of the distance from the landfill site, the groundwater quality improves as one move away from the landfill site. Aggregate index decreases with increase in time. Thus, water quality goes down with time. It may be due to the reason that with the passage of time the solid waste material gets degraded and the waste constituents percolate down along with rainwater thereby polluting groundwater.
5) Dr.Manoj Kumar Mishra, Dr.Surendra Prasad and Dr.A. M. Jha (10 November 2016) st Inadequate and improper management of municipal solid waste disposal site pose serious environmental threats to their surrounding and nearby resident due to groundwater contamination, pollution problems and health risks. The present investigation was carried out to assess the groundwater contamination due to dumping of waste at landfill site in a small town of North Bihar. Water sample from hand pumps were collected during pre-monsoon and post monsoon seasons from Jan to April, 2015 and September to December 2015 and were analyzed for the water quality parameters such as pH, electrical conductivity (EC), turbidity, hardness, total dissolve solid (TDS), sulphate and nitrate. The results showed that water samples of many hand pumps were contaminated. Therefore, this landfill is a threat for environment as well as for the local people and the local authority must pay their attention to prevent further contamination of groundwater in this area.

IV. MATERIAL AND METHODS

Water samples collectet from some spots near Bijapur city muncipal solid waste dumping site area in plastic (PVC) containers of 1000 mL. The samples collecte and analyse as per the standard methods prescribed by APHA-AWWA. In case of tube well, the water flushed out for ten minutes to get the fresh water and then the samples collecte. The grab sampling method will be followed in case of collection of samples from open wells.The containers will be sealed, labeled and the samples will be protectd from direct sunlight during transportation. Turbidity (Turb), pH and Electrical Conductance (EC) of the samples will determine on the day of collection to minimize the alteration of original sample condition, using Systronics Digital Turbidity Meter-132, Systronics Digital pH Meter MK-VI and Systronics Digital Conductivity Meter-304, respectively. Total Dissolve Salt (TDS) of the samples determine gravimetrically by evaporation at 103-105oC. Total hardness (TH) of the samples were determine by complexometric titration with EDTA using Erichrome Black-T as an indicator. Total alkalinity of water samples determine by titrating against 0.02 N H2SO4 using phenolphthalein and methyl orange indicators. The chloride ion (Cl-) concentration determine by titrating against standard AgNO3 solution using K2CrO4 solution as indicator, at neutral pH adjusted with H2SO4. Sulphate ion content in the water samples determine by titrating against EDTA as prescribed by Jackson. Fluoride (F-) content of the samples determine by SPADNS method.

V. CONCLUSION

1) Landfill leachate discharged at the sites is major contributer to ground water contamination.
2) The situation is currently bad and it expected to become worse in the near future.
3) The increase of the main indicator concentraion Nitrate, Amonia, Choride, COD and Electric Conductivity in the downstream site area and evidence of ground water contamination in the two sites.
4) The ground water under the two landfills is non-portable at most of the examined physical and chemical parameters exceeds the permissible limits.

REFERENCES

[1] P., Balakrishnan, Abdul Saleem and N.D., Mallikarjun. Groundwater Quality Mapping using Geographic Information System (GIS): A Case Study of Gulbarga City, Karnataka, India. African Journal of Environmental Science and Technology. 2011. 5 (12) 1069 1084.
[2] A., Thangavelu. Mapping the Groundwater Quality in Coimbatore city, India based on Physico-Chemical Parameters. IOSR Journal of Environmental Science, Toxicology and Food Technology 2013. 3 (4) 32-40.
[3] T., Subramani, S. Krishnan, and P.K., Kumaresan. Study of Groundwater Quality with GIS Application for Coonoor Taluk in Nilgiri District. International Journal of Modern Engineering Research. 2012. 2 (3) 586-592.
[4] K. L. Prakash and R. K. Somashekar. Groundwater quality - Assessment on Anekal Taluk, Bangalore Urban district, India. Journal of Environmental Biology October 2006, 27(4) 633-637 (2006)
[5] W. E. Bullard, Effect of Land use on Water Resources in Ecology of Man, An Ecosystem Approach, Herper and Row Publisher, New York (1972)
[6] R. Venkatasubramani, T. Meenambal and P. Livingston Peter Goldwyn, A Correlation Study on Ground Water in Coimbatore District, Poll. Res., 25(2), 313-374 (2006).
[7] H. D. Navadiya and H. G. Vagasia, Quality Analysis of Ground Water of B-Ward in Municipal Area of Bhavanagar (Gujarat), Int. J. Chem. Sci., 7(3), 1775-1778 (2009).
[8] World Health Organisation (WHO) Guidelines for Drinking Water Quality, 3rd Edition Geneva (2004).
[9] R. K. Trivedi (Edition), Quality Criteria for Drinking Water Prescribed by Indian Standard Institute in Environment Directory of India (1990) pp. 279-28
[10] APHA-AWWA-WEF (American Public Health Association, Americana Water Work Association-Water Environment Federation, 20th Edition (1998).
[11] H. Z. Goltman, R. S. Clymo and M. A. M. Ohnstad, Methods for Physical and Chemical Analysis of Fresh Water, IBPH, 2nd Edn., Blackwell Scientific, Oxford (1978).
[12] R. K. Trivedi and P. K. Goel, Chemical and Biological Methods for Water Pollution Studies, Environmental Publication, Karad, India (1984).
[13] P. K. Gupta, Soil, Plant, Water and Fertilizer Analysis: Agrobios (India), Jodhpur (2006) pp. 334-335.
[14] Sandeep Mitharwal, R. D. Yadaw and R. C. Angasaria, Emerging Water Quality Issue at Bagar: The Education Hub of Shekhavati, Int. J. Chem. Sci., 7(3), 1725-1732 (2009).
[15] Meenakshi, V. K. Garg, R. Kavita and A. Mallik, Ground Water Quality in Some Villages of Haryana, India, Focus on Fluoride and Fluorosis, J. Hazard. Mater, 106, 85-97 (2004).

