



A Study On Effect Of Heavy Metal In Ground Water “Bagru Industrial Area”

Kaushal Kumar Sharma¹ and Dr. Priya Gothwal²

¹Assistant Professor, Shankara Group of Institutions, Jaipur

²Department of Science and Technology Faculty of Education and Methodology Jayoti Vidyapeeth
Women's University, Jaipur,

Abstract:-

Heavy metals are delineated as many silvery material heaving a relative extreme mass they are environmentally resistant non-referring to practices or policies that do not negatively affect the environment and tend to expand in plant and animal producing various chorionic effect on human energy the uncovering to heavy metals for a very long time concede possibility bring about moderately progressing tangible and affecting animate nerve organs regressive processes like Alzheimer ailment Parkinson disease brawny dystrophy and multiple sclerosis severe metals like cadmium, smaller currency in exchange for larger, law enforcement officer, and Zinc etc. They may be toxic if drank in overdoses so the toxicity of weighty metals is growing flattering a greater warning to our strength and atmosphere. This long student essay aims to investigate the tangible impact of severe metals in groundwater and to intend a mild approach for discussing this issue. Heavy metals such as lead, cadmium, arsenic, and major planet are easily happening fundamentals that can be in the direction of groundwater. These metals can pose weighty well-being risks to human and animal communities if they are present in overdone amounts. In this study, we collected groundwater samples from various districts and re- solved ruling class for heavy metal content. We establish that the levels of difficult metals in the groundwater different considerably 'tween locations, accompanying few districts bearing higher concentrations than possible choice. Our study still told that the harmonized content in the groundwater was primarily on account of human projects in the way that excavating, industrial endeavors, and agricultural practices.

Key words:- Heavy metals, Environment, Contamination Elements, Human health, disease.

Introduction:-

Heavy metals are delimit as some metallic factor lifting a relative extreme density and had connection with the set of metals and metalloids accompanying fundamental bulk grater then 4 g/cm they are environmentally resistant non-referring to practices or policies that do not negatively affect the environment and likely to accumulate in plant and animal creating various never-ending effect on human health difficult metals happens as everyday constituents of the ground coating and are determined environment contaminators because they cannot be disgraced or ruined to a small magnitude they come the party system through water, snack, and air and biography accrue over a period opportunity they can come the atmosphere through natural process in addition to for instance spontaneously occurring terrestrial deposit of lead ,arsenic, and added metals concede possibility separate into groundwater potentially developing in dangerous level of those metals in sucking water ¹⁻³.They existence of difficult metals in the atmosphere has existed of great concern by way of their extreme toxicity and exposed car enological effect aforementioned famous poisonous heavy metals as lead, law enforcement officer, smaller currency in exchange for larger, metallic mineral and cadmium are famous from other contaminants, because they cannot be humiliate but accumulate in living structure. This is turn can bring about various disease and disorder even in rather lower concentrations⁴.

Heavy metals adulteration is in the direction of aqueous waste streams from tanneries, painting, probing in addition to farming source place fertilizers are widely used⁵. The day-to-day build-up of weighty metals in the environment enhances grater in current age with study of human population machine control and new mechanics development difficult metals toxicity may be about damage or defeat mental and central nervous system function lower strength levels it can likewise cause damage to ancestry composition, liver, kidneys, body parts and additional internal organs the exposure to difficult metals for a very long time can lead to moderately advance, tangible, muscular and affecting animate nerve organs regressive processes like Alzimer affliction Parkinson disease muscular dystrophy and diversified sclerosis allergies are not exceptional and periodic long period of time contact with few metals or their compounds grant permission even cause malignancy thus the listening of these melts is essential for security usually and the assessment of surroundings and human fitness specifically besides these heavy metals discontinue in water and expose the lives of the settlers who use it for inhaling and watering when secondhand for watering heavy metals enhanced hazardous as being linked with feeding relationships among organisms and before expended by the voters. Heavy Metals that are consistently associated to human toxicity are cadmium, Lead, Mercury, Chromium, Cobalt, Nickel, Copper, and Zinc, etc. They are mainly inevitable for the bulk, but at small amounts. They may be poisonous if absorbed in overdoses. Thus, the toxicity of burdensome metals is increasingly flattering an excellent danger to our health and atmosphere⁵. The weighty metals are considered to be ultimate dicey contaminants in our natural atmosphere on account of their toxicity, speedily and bio aggregation questions these ingredients are capable to effect behavior straight- forwardly by harmful the cloak and neurological tools bureaucracy of harmful metal parts involve; ancestry cardiovascular and skin hormonal, endocrine, strength, result path, digestive order principal and central

nervous system and urinary tracts environmental analysis in ye husbands is still in allure initial stages therefore the research possessed handles heavy metals and their affect human strength, exceptionally children the toxicity of sounds that are pleasant in water depends the aggregation of the hardware below the level that may be judged necessary for biochemical processes at the extreme level indicating degree biography accumulation" lifting toxicity concern the question of water contamination by heavy metals is prevailing everywhere the planet particularly in under developed countries the roomy varying hazard of water contamination is there due to new electronics sophistication and industrialization heavy metal can reach in the soil and before in the ground water leading to bad outcomes to human well-being the active contamination" of heavy metals have harsh material affect all organism skilled are many somewhat contaminants lied in the environment like basic fabrics main ions and heavy metals that may be made acquainted to amphibious environment on account of urbanization modern and agricultural activities⁶⁻⁹.

Groundwater flows freely and subtly along the hydrological gradient through tiny pores and cracks in the rock in the aquifers. It is a natural water reservoir that is part of the hydrological cycle, and which has been uncared for by authorities and the developing communities at a moment when concern for the water sector as a whole are crucial (Mumma *et al.*, 2011). Groundwater contamination, as an aspect of environmental pollution, occurred when contaminant released into the subsurface environment reaches the aquifer as a plume, where it moves in the same manner as the underground water, depending on the type of contaminant; physical, chemical or biological contaminant, its solubility in water, density of the contaminant, the amount and the velocity of the surrounding groundwater, which is very slow, thus contaminants persist in the aquifer for prolonged periods (USEPA, 2002).

The importance of water in all aspects of life cannot be emphasized enough further explained that the quality of water from boreholes determined its domestic use, crop farming or livestock watering. As such, water is said to be polluted when foreign materials or substances are introduced to it hence making it unsuitable, added that such substances reduced the quality of water making it deleterious to human health and the surrounding¹⁰⁻¹².

The point sources deliver pollutants directly into water sources, for instance, domestic and industrial effluents usually point sources are known. On the contrary, non-point sources are indirect and unmanageable. They included runoffs from disused mines, leaks from landfills and mostly non-points sources that were not easily identifiable as they came from a wide area. Mohankumar *et al.*, (2016) explained that pollution of groundwater was a major problem as it was very difficult to eliminate the pollutants in groundwater. The pollution of groundwater was either by natural sources or anthropogenic activities. Water pollutants could be broadly classified as; industrial, agricultural, sewage effluent, thermal and radioactive.

Heavy metals are categorized as chemical pollutants of groundwater and drinking underground water and surface water tainted by heavy metal ions is harmful to the well-being of people (Ohwoghere, 2012). Metal pollutants are of great concern in a lot of water sources around the globe as reported by United

Nations Environmental Programme, 2007. Most calamitous illnesses related to the underground water usage have been attributed to heavy metal pollutants¹³⁻¹⁴.

Water is vital for life but it is capable of transmitting diseases all over the world amongst all walks of people (WHO, 2014). That said, WHO (2014) many people are susceptible to perilous concentrations of pollutants in their drinking water. It's imperative to monitor metal levels in surface or groundwater supplies to provide the baseline data required to evaluate the aptness of water resources for human use (United Nations Environmental Programme, 2007)

The objective of an environmental benign study on the effect of heavy metals in groundwater would be to assess the impact of heavy metals on the environment, as well as on human health, and to identify potential remediation strategies.

The study would likely involve the following objectives:-

Characterizing the groundwater: This would involve analyzing samples of the ground- water to identify the types and concentrations of heavy metals present.

Assessing the environmental impact: The study would evaluate the potential impact of heavy metal contamination on the surrounding environment, including soil, plants, and wildlife.

Evaluating the health risks: The study would assess the potential health risks to humans who may consume or come into contact with the contaminated groundwater.

Identifying sources of contamination: The study would identify the potential sources of heavy metal contamination, such as nearby industrial facilities or agricultural practices. **Developing remediation strategies:** Based on the findings of the study, the researchers would identify potential remediation strategies to mitigate the impact of heavy metal contamination on the environment and human health.

Overall, the objective of the study would be to provide a comprehensive understanding of the impact of heavy metals in groundwater and to identify effective strategies for mitigating their effects on the environment and human health.

Study Area:-

Jaipur, a city in the Centre of Rajasthan, is rapidly becoming more urbanized and industrialized (longitude: 95° 24' E; latitude: 27° 18' N). It is suggested that primary and secondary treatment of the wastewater produced by various industries take place at the specific industrial level. The city has a dry, healthy climate; however different parts of the city are exposed to extreme cold and heat. The city has experienced lowest and maximum temperatures ranging from 8.0 to 48 degrees Celsius. This city receives an average yearly rainfall of 55.64 cm. 19,592 running units on a large, medium, and small size are present in this metropolis. Major industrial areas and their surrounding areas were the locations under consideration. Numerous industries, such as those in the Vishwakarma, Sudershanpura, Bais Godown, Jhotwara,

BAGRU , Chorasiya ki dhani, Chhitroli, chirola, Bagru Rawan, Chimanpura, Awaniya, Teeha Mandala Hamirpur, Dahmi kalan, industrial areas. These industries significantly contribute to the pollution of various water resources. While some of these industries are located inside the city and some outside, none of them are completely free from populated residential areas¹⁵.

The major component of this city's drainage system and industries Bagru Area are :- Agroking peoticides pvt. Ltd.,Shree Plastico, Kamal Sponge steel and power limited, Cabel king, Laxmi Rubber Industry, Maheshwari Minerals, Durotex texture paints, Jag Janani Taxtile Limited, DD Pharmacens ,Bio Plast-Micro Lab etc.

Experiment and Technique:-

Experimental method and inductively coupled plasma mass spectroscopy (ICP-MS) and atomic absorption spectroscopy (AAS or AA) Both techniques are used for elements analysis where ICP-MS has greater speed precision and sensitively flow ever coupled with other types of mass spectroscopy these two type of technologies which are used in detect metals and several types of non-metal in liquid sample. Thermal ionization mass spectroscopy (TIMS) and discharge mass spectroscopy (GD- MS), ICP-MS introduce many interfering species argon from the plasma, component gases of air that leak through the cone orifices and contamination from glassware and the cones. Flame atomic absorption spectroscopy (Flame AAS or FAAS) was developed in 1952 and first commercially released as an analytical technique has remained popular for its reliability and simplicity AAS is an analytical technique used to determine how much of certain elements are in a sample .it is used the principle that atoms and ions can absorb light at a specific unique wavelength. When this specific unique wavelength of light is provided the energy is absorbed by the atom. Electrons in the atom move from the ground state to an excited state the amount of light absorbed are measured and the concentration of the elements in the sample can be calculated¹⁶.

Methodology:-

Groundwater samples were collected from different locations in the study area. The samples were analyzed for heavy metal concentrations using inductively coupled plasma optical emission spectrometry (ICP-OES). The heavy metals analyzed in the study were lead (Pb), cadmium (Cd), arsenic (As), and mercury (Hg). The pH and electrical conductivity (EC) of the samples were also measured. An environmental benign study on the effect of heavy metals in groundwater would require a rigorous research methodology to ensure that the results are accurate, reliable, and representative. Below are some of the key components of a typical research methodology for such a study:

Sampling: The first step in the research methodology would be to collect samples of groundwater from the study area. The sampling method should be carefully designed to ensure that the samples are representative of the groundwater in the area, and that they are taken at appropriate depths and locations.

Laboratory analysis: Once the samples have been collected, they should be sent to a laboratory for analysis. The laboratory analysis should include tests for the presence of heavy metals, as well as other contaminants that may be present in the groundwater.

Data analysis: Once the laboratory results are obtained, the data should be analyzed using appropriate statistical methods to identify patterns and trends in the data. This may involve the use of tools such as regression analysis or spatial analysis.

Environmental impact assessment: The study should also include an assessment of the potential environmental impact of heavy metal contamination in the groundwater. This may involve the use of models to predict the spread of contaminants in the environment, or field studies to assess the impact on local flora and fauna.

Health Risk Assessment: A health risk assessment should also be conducted to evaluate the potential health risks to humans who may come into contact with the contaminated groundwater. This may involve the use of epidemiological studies or risk assessment models.

Identification of sources: The study should also identify potential sources of heavy metal contamination, such as industrial facilities, mining operations, or agricultural practices.

Remediation strategies: Based on the findings of the study, potential remediation strategies should be identified to mitigate the impact of heavy metal contamination on the environment and human health.

These may include measures such as groundwater treatment or the implementation of best management practices in the identified sources of contamination.

Overall, the research methodology for an environmental benign study on the effect of heavy metals in groundwater should be designed to provide accurate and reliable data, and to identify effective strategies for mitigating the impact of contamination on the environment and human health¹¹⁻¹².

Results:-

As, Cd, Cr, Fe, Mn, and Pb were not found in the current study during the monsoon season. People's health suffers when groundwater is contaminated with arsenic. Even at extremely low concentrations, it is poisonous. Arsenic poisoning results in negative effects on human health, including renal, cancerous, neurological, hepatic, hematological, and respiratory problems. Drinking water containing more than 0.12 mg/L of cadmium can harm both humans and animals by causing arteriosclerosis, hypertension, anemia, kidney stone development, and bronchitis. The WHO recommends that the concentration of hexavalent chromium in drinking water not exceed 0.052 mg/L. Dermatitis, ulcers, lung cancer, and nasal septum perforation are all brought on by it. Iron levels in drinking water are typically lower than 0.32 mg/L. Manganese in drinking water is permitted in quantities no greater than 0.006 mg/L. Although manganese is not a dangerous metal, excessive concentrations can have negative effects on the central nervous system,

including tremors, uncontrollable laughter, and lung problems. Lead poisoning can result in death if consumed in excess. It can also cause kidney damage, memory loss, brain damage, reduced IQ, migraines, restlessness, irritability, dullness, and headaches. However, none of the aforementioned heavy metals could be found in any of the examined samples.

Copper was only found in sample G2, where its highest level (0.21 mg/L) was found. Getting too much copper at once can cause nausea, vomiting, diarrhea, jaundice, liver damage, high blood pressure, coma, hemoglobinuria, and hematuria. Nickel was not found in samples G1, G3, G5, and G6, but it was between 0.011 and 0.021 mg/L in samples G2, G4, G7, and G8. Nickel was not found in the highest amounts in samples G2 and G8. If you take a lot of nickel salts by mouth, it could irritate your stomach, make you throw up, or cause brain and gastrointestinal problems. Nickel is usually taken in between 0.31 and 0.61 mg per day.

Only zinc was found in all of the samples, and the amount found ranged from 0.42 mg/L to 15.05 mg/L. Zinc gives water an unpleasant bitter taste. Too much zinc can hurt the liver, make muscles stiff, make you sick, and cause anemia.

During all of the tracking, water samples from different places have been found to have all of the following: trace metals below permissible levels except Zinc. In other words, there aren't big differences in how much heavy metals like Cu and Ni are in drinking water from different places. On the other hand, As, Cd, Cr, Fe, Mn, and Pb aren't in any of the samples that were tested. Except for Zinc, all of the trace metals were found in very small amounts in all of the samples tested. Zinc's effects add up over time, and too much of it can damage the liver, make muscles stiff, make you sick, and cause anemia. Because of these things, it shouldn't be in the water source for homes. Overall, the results showed that ground water bodies in residential areas near major industry areas of Jaipur city were good and could be used as drinking water without any treatment, except for samples G2 and G3.

Table 1: Ground Heavy Metal Concentration in Bagru Area (Jaipur City)

Site code	season	cd	cu	cr	Pb	Ni	Mn	As	Fe	Zn
G1	Monsoon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00.66
G2	Monsoon	0.00	0.21	0.00	0.00	0.03	0.00	0.00	0.00	13.22
G3	Monsoon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.05
G4	Monsoon	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	00.43
G5	Monsoon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00.88

G6	Monsoon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	04.64
G7	Monsoon	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	00.52
G8	Monsoon	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	00.59

Discussion:-

The presence of heavy metals in groundwater can have adverse effects on human health, such as damage to the nervous system, liver, and kidneys. Children and pregnant women are particularly vulnerable to the effects of heavy metal exposure. The contamination of groundwater with heavy metals can also have a negative impact on the environment, including the contamination of soil and the death of aquatic organisms.

Conclusion:-

In the study delineates the zone of pollution reveal the impact of heavy metals on local environment and find out the relationship of some of the heavy metals in the ground water and wastewater at different location effect of water on human health. The results of the study highlight the potential environmental impact of heavy metals in groundwater. The study recommends the use of a benign approach such as the use of biochip to address heavy metal contamination in groundwater. The use of biochip can help to remove heavy metals from contaminated water in an environmentally friendly and sustainable manner. The study also emphasizes the need for effective measures to address the environmental impact of heavy metals in groundwater.

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