

Assessment of Heavy Metals in Surface and Ground Water of Gozara District, Herat Province, Afghanistan

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Abstract

Water is essential for life as the main material for drinking, washing, and use in agriculture and industry. Water is contaminated by any material that dissolves in it and directly threatens human health. The most important contaminants are heavy metal cations such as (Fe), Cobalt (Co), Mercury (Hg), Silver (Ag), lead Pb, Nickel (Ni), (Mn), Manganese. Arsenic (As) and Chromium (Cr) are poisonous to drink and sometimes deadly, respectively, with higher concentrations than the International Range (WHO). Therefore, studies in the field of water quality are very important. The purpose of this study was to analyze the cations present in the Assessment of Heavy Metals in Surface and Ground Water of the Gozara District. The approach of this research is practical and the method is still experimental. Analysis of Experimental Samples by the German Method by IRAffinity-IRAffinity-IS Series Spectroscopy Sampling In this research, a cross-sectional analysis of water samples was analyzed in four stages of four seasons, and the results in graphs. Have been compared and compared with the International Rang (WHO). The results show that the concentrations of Ammonia, Barium, Manganese, Nickel, Lead, Mercury, Cadmium and arsenic cations in surface waters of the Behdaye village were higher than in the international Range (WHO). Underground Ammonia cation content was higher than range.

Keywords: Surface ‘Ground Water ‘Heavy Metals ‘Water Quality.

I. INTRODUCTION

The growing population of the world is increasing the number of water consumed and increase its quantity, and on the other hand, the development of urbanization enhances the industrial and agricultural activities, drainage and wastewater effluent. The receiver of surface water which reduces its quality. It can certainly be said that the most important part of environmental pollution that has affected human communities rapidly and in real-time is water pollution, the treatment of contaminated water supplying safe and potable water. Wastewater is basically the water consumed by the community which, in different applications, is not contaminated and usable for the intended use. In terms of production resources, municipal wastewater can be considered a combination of waste that is transported by water from residential, office, and commercial and industrial facilities within the city and maybe groundwater, surface water or floodwater depending on the conditions. They have been mixed (Shahmara, 2013).

Contaminants in water are caused by the introduction of wastes into the water, causing changes in its composition and properties. Spraying agricultural fields and adding chemicals to the water to control organisms also cause water pollution.

Soluble salts such as iron cations, magnesium, lead, mercury, silver, nickel, cobalt are among the most important impurities in water that can cause various diseases in the human body.

It is imperative to know the constituents in the Assessment of Heavy Metals in Surface and Ground Water of Gozara District in these waters and this should be investigated. The importance of this research is to find out the extent of contamination of Baha'i village waters and to predict solutions to prevent over-contamination of the water that - for the health of those in it. Where they live is important. Research Question: The amount of heavy cations in the waters of Baha'i village is the same size. Guzara district is in

Herat province which would not be appropriate to introduce this area as well. Located 19 kilometers north of the Herat-Kandahar Highway, 207 Zafar military Camp.

Research Proposal: Investigating the Heavy Elements in the Environment by Mansouri, Nabi Allah in 2016, he concluded that heavy elements in groundwater can cause cancer, the environment in Grain, Fruit, and Vegetable Tissues are Installed That Worry, Azimzadeh, Hamid Reza In 2016, research on the bioaccumulation of lead, cadmium, jump, iron, nickel, chromium and copper in tissue Muscle, liver, hepatic, and skin of silver and ordinary capers in Gheshlagh Dam in Shahr-e-Zendegar The results of a study showed that the average concentration of heavy metals (with the exception of metal in all types) Silver filling) The muscle tissue of both ordinary silver and copper-silver was lower than the FAO standard, indicating that both species are healthy. The results of this study are in line with those of Mansouri, Nabiollah in 2016.

Importance of Water

If the planet is seen from a high altitude, it will be seen as a blue sphere because much of its surface is surrounded by oceans and seas. Of the 510 million square kilometers of land, 361 million square kilometers are covered with water. Nowadays, all countries of the world regard water as the national capital and it is predicted that the main cause of future conflicts will be water, and in the near future, the water resources will be more valuable than oil wells (Adib far, 2010).

About 97% of the water on Earth is saltwater, oceans, and seas, and only 3% is freshwater. Out of this 3% of freshwater, more than 90% of it is frozen in the Arctic and Antarctic and is out of reach of humans (Shaabani, 2013).

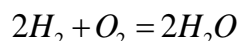
Cycle of Water

Earth's water is always rotating from one state to another, moving from place to place. During which, it traverses various complex paths and stages and returns to its original state. This flow of water in nature is called the cycle or cycle of water in nature. The main cause of this cycle is the position of the Earth in the Solar System because two phenomena would have happened if the Earth had not been within 3 million kilometers of the sun. Either all the water evaporated from the heat, or the ice age would never end. The water available in the universe naturally exists in many different shapes and places. For example, there are air, land, Underground and oceans (Panahi, 2009).

Properties of water

Water is a compound made of both oxygen and hydrogen. Water is not classified as a mixture because the water properties are neither similar to the hydrogen properties nor the oxygen properties, resulting from the combination of two hydrogen atoms and one oxygen atom, a water molecule. A drop of water contains a myriad of water molecules (Amiri, 2009).

The chemical equation and the interaction between hydrogen and oxygen from water as follows:



Water, as it has the ability to, holds the minerals insoluble and suspended amounts. And many of the organic matter dissolved in water or colloidal (Amiri, 2009).

Physical Properties Of Water

Often little attention is paid to the physical properties of water While it plays an important role in water use. Temperature, viscosity, specific gravity, color, and turbidity are important physical properties of water. Heat affects the viscosity and specific gravity of the water. The water boils at 100 ° C but this boiling point is due to the abnormal water molecular position. If the water was a Mali colic compound, it should be boiled at 63.5 ° C. 90% of the water is added to the volume when it is frozen. The boiling point of water plays an important role in the life of living things. The gravity of water intermolecular is higher than the intermolecular gravity of other solutions such as methanol, ethanol (Maroufi, 2012).

Chemical properties of water

Natural waters have some soluble chemicals due to their solubility, which can be either gas or salt in the water. Chemical properties include: **pH**

The hydrogen ion is always present in water if it exceeds a certain level, affecting water quality. The concentration of hydrogen ions is measured based on a pH scale of fourteen. High pH (low concentration of hydrogen ions, cellulose) inhibits water corrosion and low pH (high concentration of hydrogen ions, sharpness) increases the water corrosion effect. At high pH, some mineral water may precipitate. The activity of many algae (algae) increases the pH of the water because the algae use carbon dioxide for photosynthesis as carbonic acid in the water (Adib Far, 2010).

Water Hardness

Water hardness is the presence of salts such as calcium, magnesium, strontium, iron, aluminum, manganese, and oxides with soluble carbonates, bicarbonates, chlorine, sulfite, silicates, and nitrite. There is water. Total Hardness includes Temporary Hardness of Carbonates and Permanent Hardness of Non-Carbonates Hardness. Temporary hardening by boiling the precipitated water forms

the eel in containers containing carbonate and bicarbonate minerals calcium and magnesium. Boiling the water for a few minutes results in the decomposition of the bicarbonates and the excretion of the carbon dioxide gas and the absorption of calcium and magnesium carbonates. Permanent hardness is due to elements such as sulfite and calcium chloride and magnesium that do not precipitate by boiling.

Hardness is usually expressed in milligrams per liter in terms of calcium carbonates (Alizadeh, 2017).

Biological Properties of water

Aquatic organisms have a significant impact on water quality. For example, algae taste to water and water. Some algae produce clogs and other promises of gelatinous viscous masses on water bodies, tanks, and walls. Iron and sulfur bacteria can corrode or corrode ferrous materials such as iron pipes. Some bacteria can block nets, valves, and pumps. Some bacteria cause an unpleasant taste in water. Pathogenic germs, viruses, and protozoa cause various diseases (Ghalikandi, 2005).

Surface Water

It forms part of the snowmelt and precipitation of surface waters. Surface waters are in the form of creeks, rivers, and lakes. This water is used for drinking, agricultural and industrial purposes. Part of this water is driven by water channels to the water storage area such as dams and catchments. The type and amount of material in surface water depend on the route of the waterway. Surface water quality varies due to the amount of soluble and suspended material due to floods and storms and changes in temperature during different seasons of the year, but surface water contamination is generally higher than groundwater (Nad, 2013).

Properties of Surface Water

- 1) They are not obvious.
- 2) The pH of these waters is about (1-2).
- 3) The organic matter in these waters differs in different points. They may contain substances such as oil, heavy oils and metals.
- 4) They are usually infected with microorganisms.
- 5) Ammonia and nitrite may be high in these waters.
- 6) If surface water comes from agricultural water, they have nitrite and te phosphate, especially in areas where chemical fertilizers are used (Mohammadi, 2013).

Underground Water

Humans have come to earth from different times and use it. The main source of water is atmospheric precipitation that passes through soil and rock particles. Part of the water of this source is naturally available to artesian springs and wells on the surface of the water, and the other part of the water of this source is provided by drilling and supplying waterways such as aqueducts and wells. Groundwater is flowing like surface water and its movement depends on the geological position of the area. In underground water, the amount of suspended material is very low. But in general, the amount of mineral solution is higher than that of surface water, but the amount of organic matter and its suspended content is lower (Adibfer, 2010).

Underground Water Properties

- 1) The substances in them are very low.
- 2) It may contain sand particles.
- 3) They have very low organs.
- 4) These waters contain $\text{Fe}_{(aq)}$ solution and sometimes Mn^{2+} solution. When the water is exposed to the atmosphere it is exposed to air by the oxidation of brownish-yellow particles.
- 5) Carbon dioxide may be high in these waters and the pH of these waters is usually (6.9-7.9).
- 6) Deep wells are free of germs and other microorganisms, but shallow wells are contaminated with microorganisms.
- 7) Due to the minor solubility of minerals, these waters have high salts or salts of about 500 ppm, most of which are calcium bicarbonates.

8) These waters are usually hard but their hardness is temporary and can be eliminated by heating (Adibfer, 2010).

Research Methods

The present study was a quantitative and quantitative cross-sectional analysis. At first, water samples were collected from four different points in four seasons and measured in science labs, training camps, and training of Herat University, Kathion-Hassan Sangin. The results were analyzed in Excel, SPSS software. Field Research Instruments: Special Bottles Containing 0.001% Nitric Acid, Pipette, Gloves, Mask, Laboratory Research Instruments: Including Cationic Elements, Baker, Testube, Microscope, Source, Centrifuge Heat, Effect, Sensor Scale 0.001 grams, D6000 Spectrophotometer.

Due to the extremely high risk in Assessment of Heavy metals in surface and groundwater of Gozara District Province, the results were compared with international standards (WHO) (The World Health Organization is used to stabilize the concentration of light and heavy elements in surface and groundwater and to compare them with standards) In combination with these investigated waters, heavy metal cations with varying amounts were measured in a laboratory at 3mlit / lit as measured by the Advanced Science Laboratories, Herat University Education and Training Institute.

After a calculation, we will find out what the above cations share in one liter of water. (For example, calculate the amount of arsenic and Mercury cation as follows).

Arsenic Cation Calculation (As)

$$\begin{array}{rcl} 3\text{mlit} & & 0.01\text{mgr} \\ 1000\text{mlit} & \times & \\ x = \frac{1000\text{mlit} \times 0.01\text{mgr}}{3\text{mlit}} & = & 3.33\text{mgr/lit} \end{array}$$

Mercury Cation Calculation (Hg)

$$\begin{array}{rcl} 3\text{mlit} & & 0.12\text{mgr} \\ 1000\text{mlit} & \times & \\ x = \frac{1000\text{mlit} \times 0.12\text{mgr}}{3\text{mlit}} & = & 40\text{mgr/lit} \end{array}$$

Research findings

The research finding has been explain by graphs below

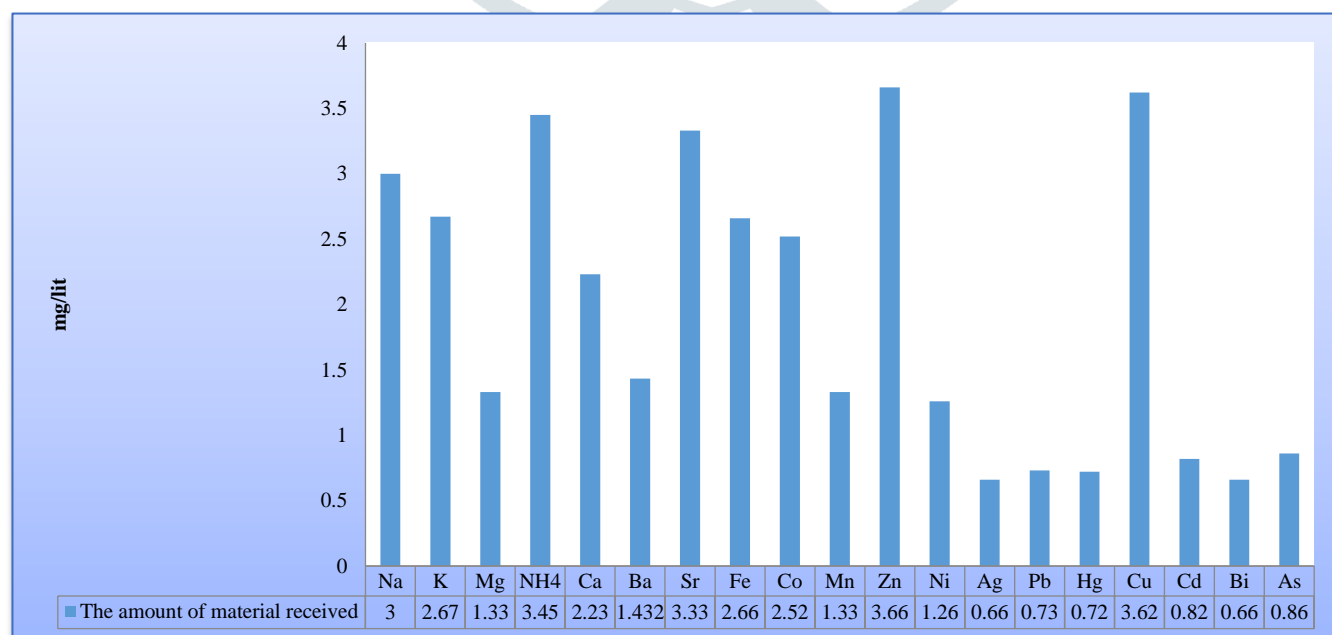


Figure 1: The Amount of material received lower district

Figure (1) the number of cationic elements in the surface waters of the Lower Behdaye village of Gozera district of Herat province, Reference (ultra-design laboratory 2019).

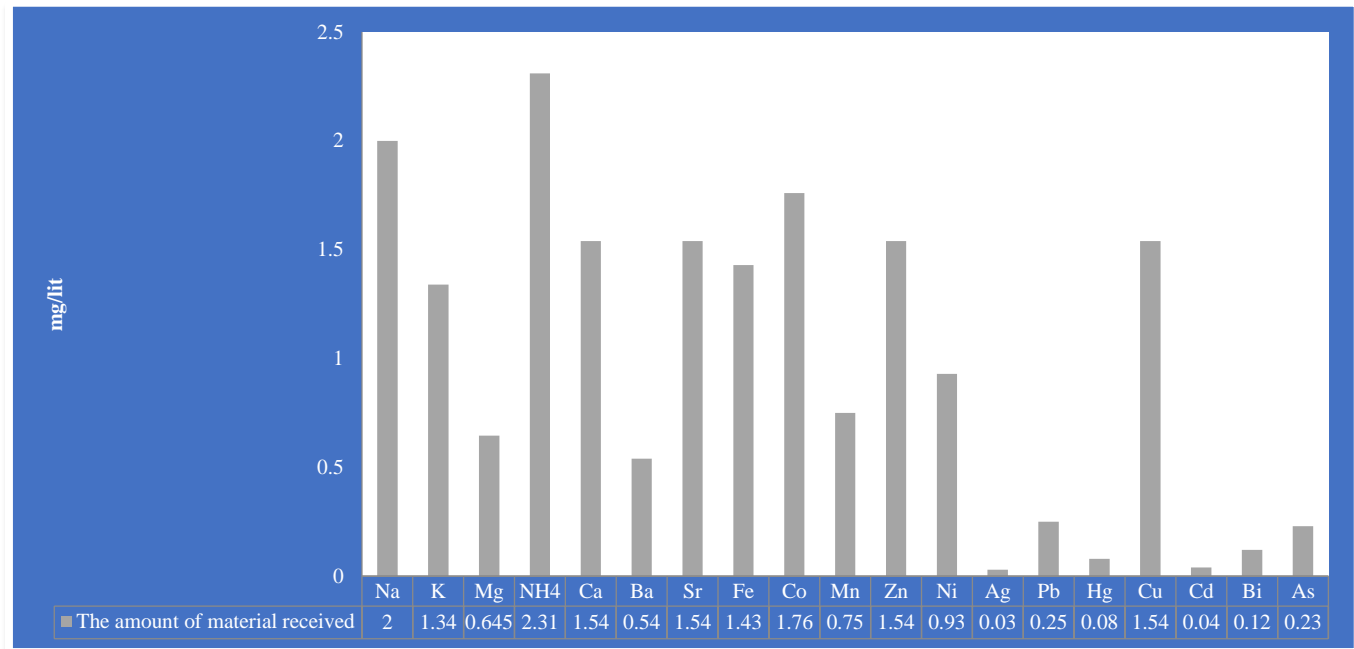


Figure 2: The amount of material received from ground water : Reference (ultra-design laboratory 2019)..

Figure (2) the number of cations of elements present in groundwater in the Lower Behdaye Village of Gozera District .

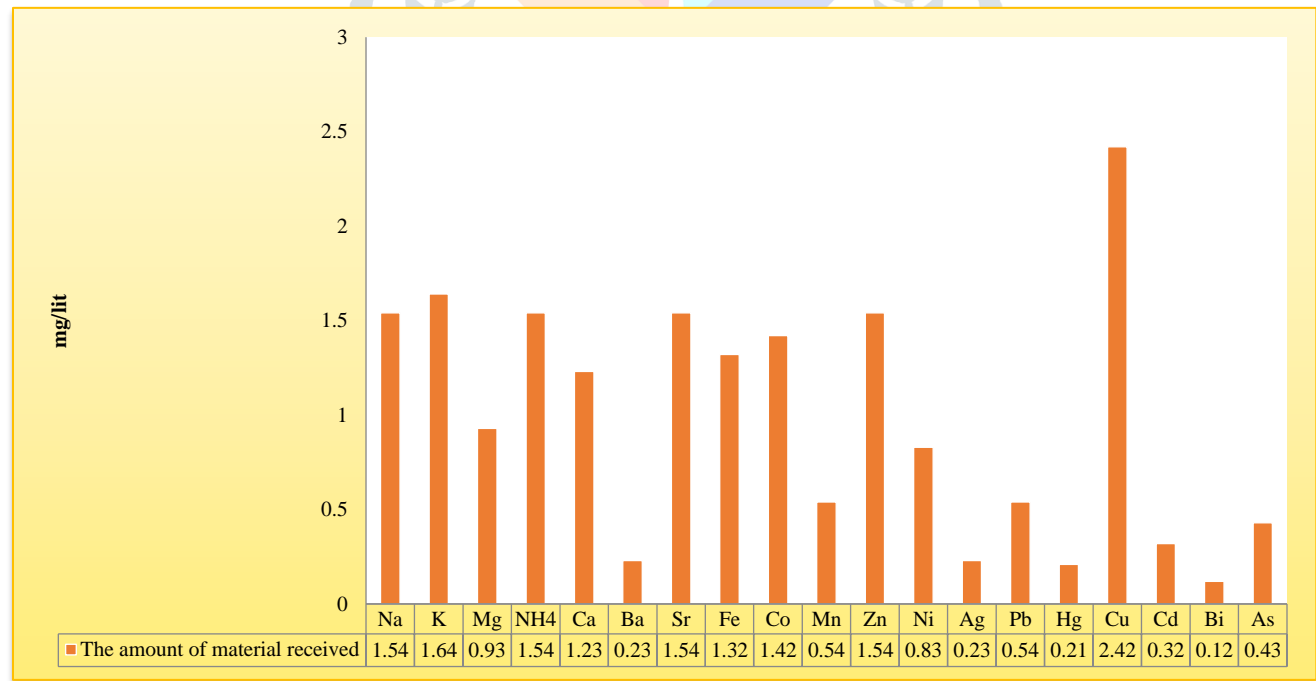


Figure 3: The amount of material received from the surface water upper district

Figure (3) the number of cations in the surface waters of the upper district of Behdaye Village neighborhood of Gozera district of Herat province, Reference (ultra-design laboratory 2019)..

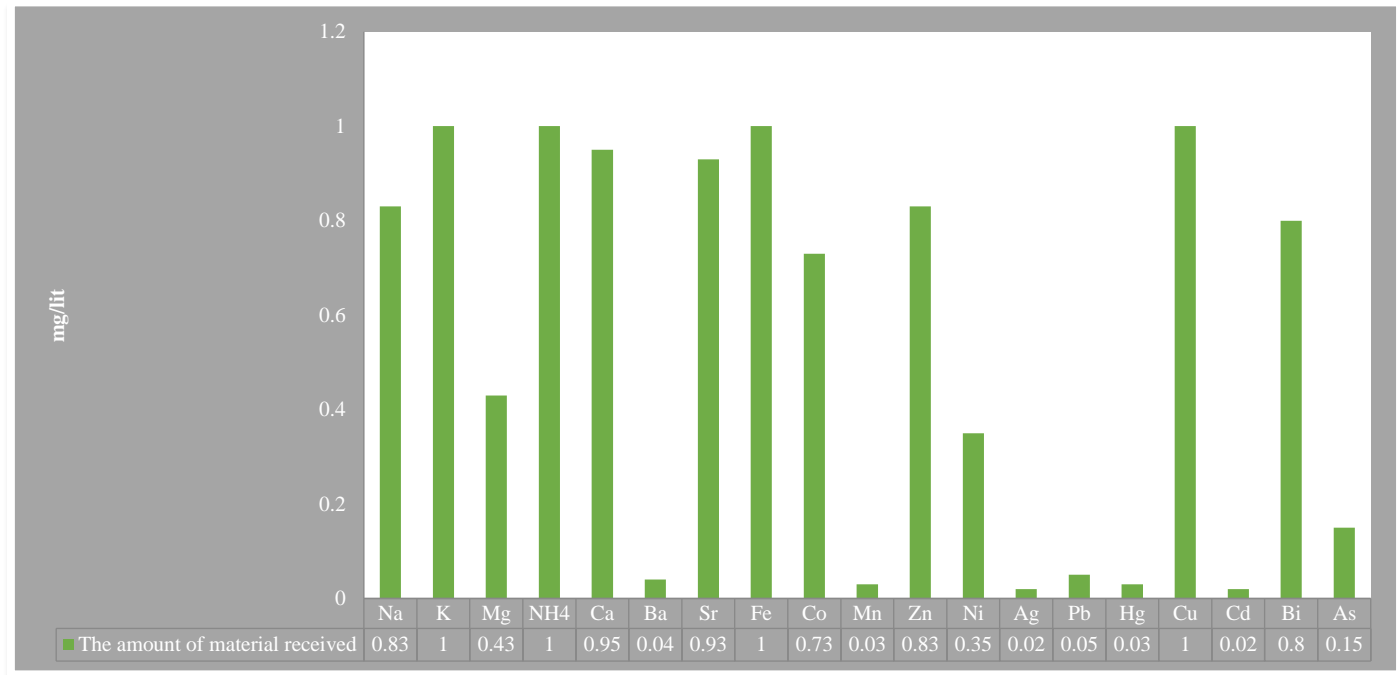


Figure 2: The amount of material received from ground water of village in the neighborhood of Behdaye

Figure (4) the number of cations of elements present in the groundwater of the village above in the neighborhood of Behdaye district of Gozera district of Herat province. Reference (ultra-design laboratory 2019).

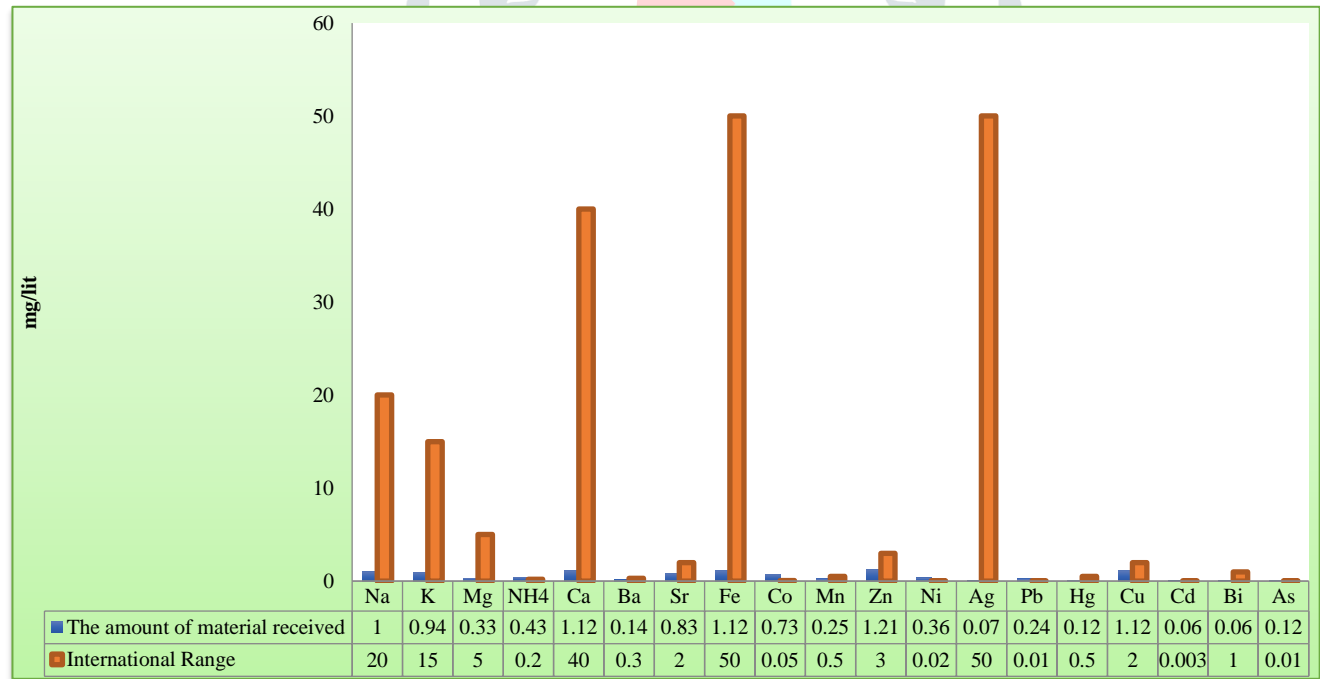


Figure 3: A comparison of international range and the amount of material received from surface water of Behdaye

Figure 5 shows the number of cations in the surface waters of Behdaye village of the Gozara district of Herat province and comparison with WHO in this graph. It is high in international rangeland and can cause these serious problems in agriculture

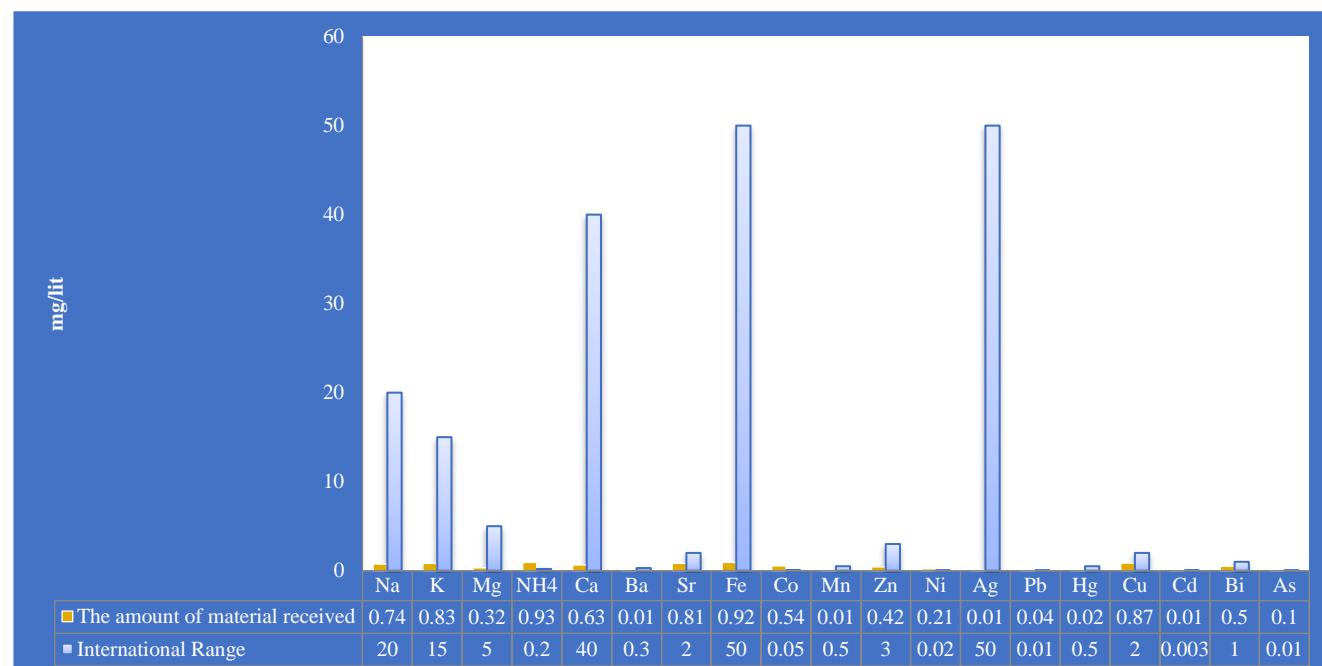


Figure 4: A comparison of international range and the amount of material received from ground water of Behdaye.

Figure (6) the number of cations of elements in groundwater of Behdaye village of Gozara district of Herat province and its comparison with international rings. In this graph, the amount of cations of ammonia from international rings is high and the rest is elements with rings. It is internationally compliant and its use is permitted Reference (ultra-design laboratory 2019).

Conclusion

Iron, lead, manganese, copper, Mercury silver, nickel, chromium, arsenic, barium cations are always present in surface and groundwater. If these cations are higher than international standards, many water- Surfaces and surfaces are used. These problems affect the living cells of the living beings and cause a mutation in the cell where this change is caused by the elevation of the graph of the elements mentioned above in the waters. That a cell can divide as quickly as possible and become a diet. This can be a cause of cancer. After graphs of surface and underground waters of the Behdaye village, the WHO standards for Ammonia cations 0.2mg / lit, Barium 0.3mg / lit, Manganese 0.5mg / lit, Nickel 0.0mg / lit, Lead determined 0.01mg / lit, Mercury 0.001 mg / lit, Cadmium 0.003 mg / lit and 0.01 mg / lit for Arsenic. Results are presented in graphs and compared with WHO rings. The results show that the concentrations of cations of Ammonia, Barium, Manganese, Nickel, -lead, Mercury, Cadmium, Arsenic in surface waters of international standard (WHO) The above is a problem in the agricultural sector for efficient and unproductive crops, due to contamination of surface waters of Behdaye village sewage system of Herat 207 Zafar province, whose wastewater is not properly treated. Its water enters the village and the farmers use it to irrigate their fields, with lead, mercury, and arsenic elements most likely to cause pollution. And also in groundwater, the concentration of Ammonia cation is higher than the International Ridge (WHO) and its use has little effect.

Suggestions

- 1- For the use of agriculture in the surface waters of the village of Behdaye the sewage treatment plant of the 207 Zafar camp should be restored.
2. To be used in drinking water, water must be filtered by large devices into the reverse osmosis filtration system in accordance with WHO and ANSA international standards.
3. This water is not a problem for fruitless trees and should not be used for fruit trees and farms.

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