Biological Times

Volume No. 2 | Issue No. 10 | Pages 9-10

Improper wastewater disposal and its use for irrigation cause mixed pollutants (organic and inorganic) to enter soil in area of Faisalabad Pakistan

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ABSTRACT

Wastewater disposal is a significant concern in Pakistan as it is discharged untreated into open drains, canals, ponds, lakes, and rivers. The city of Faisalabad in Pakistan has a population of over 2 million and is known for its diverse industrial sectors. The wastewater of North Western Faisalabad flows into Paharang Drain, which discharges into the River Chenab. Likewise, the South Eastern areas drain into Maduana Drain, which empties into the River Ravi. Farmers use urban municipal wastewater for agriculture due to its nutrient-rich properties. Most heavy metals and petroleum hydrocarbons in this wastewater enter the food chain during irrigation, causing severe health problems to the consumer. Analyze wastewater contaminations and temporal variations in heavy metal and petroleum hydrocarbon concentrations.

Introduction

Faisalabad is a third biggest city of Pakistan and it has large number of textile industries. There are many industries in Faisalabad which utilized the ground and surface water as a useful resource. Their effluents are responsible for direct pollution of quality of water. There are many other anthropogenic activities which might be additionally deteriorating the natural sources of water i.e., fast growing rate of populations, development and social exchange. Pakistan may be facing scarcity of fresh water resources and develop into water stressed state. In Pakistan, 82 % of the populations are facing the stress of fresh water, 40% patients are due to water borne diseases and 80% newborns die (WHO, 2008). Wastewater disposal and effluent coming from industries and municipal cooperation is a very important issue in Pakistan. The wastewater is openly discharged into nearby rivers, canals, open fields, sewer system without any treatment. The farmers are making of this wastewater as it carries a number of nutrients. They penetrate soil and exist in surface water reservoirs. Water is essential for all living organisms. The body is made of complex materials in water. Humans can survive 40 days without food, but only 4 days without water. Water is vital for life. Throughout history, adaptability has been crucial for survival. Water is crucial for human existence. It can be in liquid, solid, and gas states [1].

Solid state in the form of ice of glaciers

In solid state, ice forms glaciers. The liquid state is like shallow and ground water. Water on Earth can be found in lakes, rivers, streams, and oceans. Groundwater sustains life despite the importance of all forms of water. People have used underground water to solve problems. Aquifer characteristics, like water amount and level, are influenced by surrounding conditions that impact well water extraction. Surface water is from melting glaciers.The absorption of the significant metals go into stomach and changed over into their expected oxidation-state i.e. As^{3+}. $As^{2+,}$ Cd^{2+},Ni^{2+}, Pb^{2+} and are make different bounds with other biomolecules like enzymes and proteins. The metals will be isolated or characterized into sub-innovative, oncogenic and mutagenic types based on their character and properties of causing toxic effects. When metals enter into the living creatures, they produce many health diseases due to various harmful effect of heavy metals (As, Al, Cd, Hg, Ni, Cu, and Pb) in human beings e.g. seizures, cardiovascular disarranges, the runs, burden, gastric issues, hemoglobinuria loss of development, pneumonia, stomatitis, stun and pain and different others when capricious vapors and gasses are inhaled. Wastewater contains nutrients which are beneficial for plant growth. However, it has very serious health issues due to presence of heavy metals and different constituents [2].

Petroleum hydrocarbons compounds

Petroleum hydrocarbons are compounds resisting for longer periods of time in environment, mutagenic and unsafe for living entities and there is remarkable stress about their natural area, basically their possible for bioaccumulation in food chains. Moreover, heavy metals are non-biodegradable they are also present in wastewater. Heavy metals in human organs from food may be harmful. Nature of those may be destructive (outrageous, never-ending or sub-enduring), neurotoxic, teratogen. Intake of petroleum hydrocarbons and many heavy metals present in the water has badly affected the health of human beings in many parts of the world. Humans were using vegetables which irrigated by wastewater. Research shows that food crops grown with wastewater have higher levels of pollutants. The issue of wastewater pollution is prevalent in modern times. Industrialization has led to major worries about water pollutants. Industries like refineries, pharmaceuticals, and agriculture contribute significantly to this pollution. The composition of waste is key component regarding the severity of toxic contamination in soil [3].

Indicators of toxins and quality of water

The pH and amount of O_2 in wastewater are the indicators of those toxins and quality of water. The use of wastewater for agriculture requires more attention because this extremely affects the health of human. The release of contaminated soil harms human well-being and necessities. Pakistan's municipal and industrial discharges are major water pollution sources. It's a major environmental concern. Pakistan ranks 17th for future water scarcity, per World Bank. Around 180M people in Pakistan lack safe drinking water. Asian water quality is ranked 80th out of 120 due to poor management and monitoring. Due to poor management and regulation, only 1% of wastewater is treated before being disposed into nearby water sources. Wastewater contains organic and inorganic contaminants like dyes, oil, pharmaceuticals, heavy metals, waste, radioactive substances, and other harmful chemicals. Due to water scarcity in Pakistan, contaminated wastewater is used for agriculture. Harmful pollutants from wastewater are introduced to soil, eventually entering the food chain. Proper waste management is crucial for community well-being as it prevents health issues. Improving water and soil will enhance soil health, preventing pollutants in the food chain. The presence of oil in soil requires a strategic plan to reduce contamination. Petrol hydrocarbons can cause cancer and disrupt biochemical functions in organisms when they accumulate in the food chain. It is crucial to treat petroleum-polluted soil [4].

Important issue of the Arabian Gulf

A major concern in the Arabian Gulf is water, air, and soil contamination from toxins. The Arabian Gulf is a section of the Indian Ocean between the Arabian Peninsula and Iran. Iraq and Iran claim to be top global oil producers, accounting for about 25% of oil production. Many metals are ever-present in the earth due to both naturally and human exercises. People were producing many pollutants in different way of life. Wastewater system, strong waste transfer, vehicular fumes and modern exercises are responsible of soil pollution with large metal. These large metals were taken up by crops and produced many health diseases. Wastewater results in the contamination of water system through release of heavy metals and petroleum hydrocarbons. All of these contaminations were taken up by vegetables where this

To cite this article: Riaz H, A Ahmad, F Feroz, A Akram & T Iqbal. Improper wastewater disposal and its use for irrigation cause mixed pollutants (organic and inorganic) to enter soil in area of Faisalabad Pakistan. 2(10): 9-10

wastewater was used as a source of water. These crops and vegetables were containing a huge amount of heavy metals and other contaminants which produced many health problems for human beings. The burning of fossil fuels released many contaminations into the earth. A number of them are very harmful to earth (Cr, As, Pb, Cd, Hg,) a few were converted to less toxic form in the soil (Pb, Zn). Flowers and microorganisms may be used to remove heavy metals like mercury from soil. Some plants can gather harmful metals via roots and move them to their above-ground parts. Tailings are incinerated to extract valuable metals. Many metals are characterized and evaluated on the basis of toxicity potential regardless of their nuclear weight: "considerable metal harming" can incorporate unreasonable measures of remediation for manganese, iron, aluminum, mercury, or beryllium (the fourth lightest component) or such a semimetal as arsenic. The bismuth was the heaviest of roughly stable components, as a result of its low lethality [5].

Oil hydrocarbons compounds found in crude form

Oil hydrocarbons are a term used to show a large number of compounds that were found in crude form. All of crude oil components are known as oil hydrocarbons that initially originated from unrefined petroleum. Unrefined petroleum is utilized to make oil based commodities, which can pollute the earth. Since there are such a large number of various chemicals in raw petroleum and in other oil based goods, it is not down to earth to every one independently. Be that as it may, it is valuable to call the aggregate sum as total petroleum hydrocarbons. Hydrocarbons are mostly made of hydrogen and carbon. Scientists group petroleum hydrocarbons into distinct oil hydrocarbon groups based on appearance in soil or water. These meetings are called oil hydro portions. Each section has various substances. Chemicals in total petroleum hydrocarbons could include hexane, distillate fuels, mineral oils, benzene, toluene, xylenes, naphthalene, fluorene, and other petroleum-based products and gas components. It is likely that total petroleum hydrocarbons will include few or mixed substances [6].

Water pollution by heavy metals

The high levels of heavy metals in water pose a major concern for human health and the environment, causing alarm. Heavy metals' strong lethality, even at low concentrations, causes concern. They are found in water in various forms, including colloidal, particulate, and separated forms. Occurrences in water bodies can be natural or human-caused. Smart waste exchange system, current or adjacent waste products discharged. Some metals vital for life, like calcium, magnesium, potassium, and sodium, must be readily available to meet the body's needs. Cobalt, copper, manganese, molybdenum, and zinc are necessary in small quantities to stimulate motivation. Heavy metals can also result in slow progressing of body, strong and neurological deteriorating structures that resemble Alzheimer's illness, Parkinson's pain, strong dystrophy, numerous issues gangrene, diabetes mellitus, hypertension and ischemic coronary disorder Some of the heavy metals have very toxic properties that might result even in tumors for some heavy metals, lethal toxicity signs are observed after sometime than others. In any case, heavy metals have been excessively released into nature due to rapid industrialization, manufacture of excrements and to the excessive formation of mechanical waste. It's quite eminent that groundwater resources are mostly used water resources throughout the sector. Total human population is of 7 billion (UNFPA, 2011) but around 1.1 billion of them want entry to upgraded drinking water supplies and use dangerous surface and groundwater assets. Study to examine the fitness of water of river Longai located in the Karimganjtown India. Sampling was conducted in the summer season with 15 samples at equal distance in sampling area. Water samples were tested to check the contamination if any. Chemical analysis revealed that the concentration of manganese, iron, chromium, cadmium, arsenic and copper was above the safe limits while total hardness, total solids (suspended and dissolved solids) were observed within the safer limits. Iron was ten times and arsenic was four times higher than the permissible limits [7].

Conclusion

Techniques reduce unsafe additives in wastewater for horticultural fields. In some developing countries, untreated wastewater is used. Treatment workplaces lack convenience due to people's lack of awareness regarding health and environmental risks and unfeasible WHO rules. Limited understanding of treatment costs and benefits in developing countries, as well as data on risks of untreated urban wastewater. The Water management Institute assessed using urban wastewater in Pakistan. Some Pakistani cities use sewage wastewater for water machines. This water is used untreated due to expensive treatment plants, while ranchers use untreated wastewater. Ranchers know water increases yields. They are unaware of the risks of using untreated wastewater. Untreated wastewater in Pakistan is likely to have high levels of enteric pathogens due to common infections security risk with wastewater interaction. Increased populations and economic growth have led to reduced water quality, with heavy metals found in aquatic ecosystems. Metals from human activities are frequently found in water. Currently, multiple sources provide metals, including environmental deposits, weathering, agriculture, and residential and industrial products. Human activities like electroplating, mining, and mineral handling have significantly affected metal cycles on both local and global scales.

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