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REVIEW ARTICLE

Ground Water Pollution

Ashis Kumar Panigrahi[1], Surajit Sur[2]

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ABSTRACT

If we are going to consider about the natural resources then ground water is one of them. As we know lots of cities as well as towns used to get proper water supply mainly via aquifers but unfortunately from time to time it is getting pretty polluted due to improper management. More importantly, if this kind of pollution remain persists the effect will be long term for sure. In India it has been observed that due to several human interferences mainly due to industrial purposes the level of such type of pollution become very high. Sometimes, porous as well as permeable soil creates different sorts of contaminants and as a result it can induce this kind of pollution. Now a days it has been a huge threat as for the human being because if ground water pollution from time to time enhanced it will only affect the human life as well as the nature. In addition, to be very honest residential, commercial as well as industrial and even agricultural activities all can affect the ground water quality in a larger ways. To protect from such type of pollution several water source pollution programs have been conducted to aware local people.

KEYWORDS

• Groundwater • Chemical spills • Soil • Aquifer

INTRODUCTION

Ground water pollution refers to the uninviting pollution that actually causes due to the agricultural as well as industrial factors and ultimately used to affect on a long term basis. It has been found that in Punjab the entire area for agriculture is approx. 2.5 times of that during late sixties, more importantly cropping intensity is greater than 190%. Out of the entire cropped area in Punjab, 72.5% area used for irrigation with the help of tube wells, 26.2% via canals and 1.3% by other methods (GoI, 2019). It has been analyzed that if we consider the agriculture mainly from Indian perspective it has already surpassed 76% compared with the world scenario which is 44% (Mathur *et al.*, 2005).

AUTHOR'S AFFILIATION:

[1] Professor and Supervisor, Department of Zoology, University of Kalyani, Kalyani, Nadia, West Bengal, India.

[2] Department of Zoology, Muralidhar Girls' College, Gariahat Road, Kolkata, West Bengal, India.

CORRESPONDING AUTHOR:

Ashis Kumar Panigrahi, Professor and Supervisor, Department of Zoology, University of Kalyani, Kalyani, West Bengal, India.

E-mail: panigrahi.ashis@gmail.com

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Normally, Groundwater remains less susceptible mainly to contamination and importantly to the percentage of pollution if we are going to compare with surface water bodies (Kumar and Shah, Concentration of Nitrate in Delhi remains more than 45 ppm which is very much high of normal permissible level found already in 11 states (95 districts) (Kumar and Shah). Heavy metals have been found in more than 40 districts within 13 states. In addition, fertilizers as well as pesticides sometimes create non-point pollution but the problem is it normally spread over huge areas remain great threat to fresh groundwater ecosystems.

Surrounding the pumping wells regions percentage of contamination become really high as the zone of contribution where normally water actually drawn into the well including the aquifer regions.

Now, it has been noted that if somehow tank used for storage develops any sort of leakage due to corrosion or may be ages then the contents used to move via soil which ultimately reach towards ground water. Disposal of waste particles mainly within the dry places can create long term ground water quality problems due to high amount of evaporation rate. (Singh *et al*., 2003).

Objectives of the study

1. To analyze the roles of different factors that used to cause such type pollution.
2. To understand the overall impacts on human health.
3. To discuss different kinds of sources that actually used to create such pollution.

Sources of ground water pollution

1. **Hazardous waste material:** If improper disposal of these kinds of material take place from time to time viz., substances used in industrial purposes must need to dispose in a proper way otherwise it could contaminate the source of drinking water. For ground water protection we need to follow such industries closely so the effluents should not mix with normal water bodies.
2. **Fertilizers and pesticides**: Unnecessary usage of such type of materials can definitely cause ground water pollution in a larger way. Most of the time these are very much toxic in nature as well as mobile and moreover many substances normally get attached to the sedimentary areas e.g. organic clay matter. In addition, infiltration of nitrate compounds which are actually form due to decomposition day by day polluted such type of water resources.
3. **Animal feedlots**: It used to cover comparatively small domains but such spaces are normally used for disposal of animal waste. As the nitrate level remains high both ground as well as surface water become polluted. Many times, very small feedlots used to create major problems. So, during the time of irrigation pollution take place in a larger scale (Singh *et al*., 2003).
4. **Artificial recharge**: Lots of different procedures out there as for the artificial recharge and helps during infiltration and mainly consists of water movement around the land area as well as aquatic medium. Irrigation of water, cooling of water or even effluent of sewage involve in this process during such process (Lockhart *et al*., 2013).
5. **Landfills**: Normally solid waste particles which are disposed via industrial landfills and it is throughout the country. In addition, wastes from household normally not maintained.
6. **Mines**: It can cause lots of different kinds of pollution including this one. It mainly includes pumping of mine waters around the surface area. Due to dumping such ground water pollution takes place.
7. **Drainage wells**: This is actually used within the wet part to assist drain water and transportation in deeper in soils and there might be bacteria or even chemicals used in agricultural land.

Effects:

1. Quality of drinking of water become very poor.
2. Water system becomes degraded.
3. Populations of shellfish sometimes deteriorated due to high nitrogen.
4. Biodiversity whatever present affected.
5. Nature of soils used to become changed.
6. Due to this, even cancer found in several individual from different districts in India.

Emerging challenges due to such pollution:

1. Sometimes, due to less qualified manpower as for the system operations as well as due to other factors it creates problems or challenges.
2. Though we want cost effective method for any management system but too much applications of affordable techniques create huge problem in a long time period.
3. In most of the time several fertilizers as well as pesticides scattered within huge areas really a major threat.
4. Nitrate concentration become relatively very high in several states including almost 95 districts (Richardson and Ternes, 2011).
5. Even trace metals viz., cadmium, mercury has also been found in several places in India.
6. Due to this kind of pollution, even liver cancer has also been spotted (Protano *et al*., 2000).
7. From North Gujarat it has been noted that huge amount of Fluoride has been discovered which has genotoxic effect.
8. Even radioactive materials has been identified (Virk *et al*., 2001).

Tackling of Groundwater Contamination and Pollution:

1. We can think about the water quality monitoring (WQM) for better understanding regarding different sorts of causes or even types of contamination (Chaterjee and Raziuddin, 2002).
2. In India water technology is not really at advanced stage, so most of the cases data are not at all dependable. We can apply different kinds of software to solve this.
3. Artificial recharge procedures is also a option to tackle seawater intrusion.
4. In long term prospect we can reduce the contamination caused by arsenic, fluoride etc. by artificial recharge.
5. As for industrial pollution, mechanism of removal of unnecessary water which has already been polluted from the zone of aquifer we need to treat such water up to a certain limits.
6. In developing countries to tackle arsenic pollution in-situ treatment has already been established (Molnaa, 2007).
7. Methods which are affordable technically to remove pollution from aquatic bodies normally do not exist because of high amount of toxic products.
8. To remove all kinds of unnecessary substances we can definitely think about Reverse Osmosis (RO).
9. There is another mechanism known as ferric chloride coagulation system also can be used to remove arsenic.
10. Now a days to identify and removal of arsenic on a permanent basis can be performed with the help of 'sorptive filtration' method.

Implementation of laws to protect ground water pollution:

1. To stop such type of pollution permanently several laws have been made among them 'Safe drinking water act' is one of them.
2. Under such act different kinds of programs have been prepared and applied viz., Wellhead Protection Program, Source Water Assessment Program are out there.
3. The Clean water act is another important act that has been made to control surface water pollution.
4. As for the storage as well as disposal of different kinds of wastes another act known as 'Resource Conservation and Recovery act' has been implemented (Giordano, 2009).
5. To clean up the contamination mainly from the different sorts of hazardous wastes 'Comprehensive Environmental Response, Compensation, and Liability Act' implemented.
6. To control excessive usage of pesticide 'Federal Insecticide, Fungicide, and Rodenticide Act' (FIFRA) has also been implemented.

Effects of groundwater pollution on human health and the ecosystem:

1. Nerve related disorders, cancer due to Cu, Pb, Zn or even Cd pollutant substances.
2. Eutrophication due to the effect of Ammonia.

3. Immune system disorders mainly due to the effect of antibiotics.
4. Pollution of aquifers due to the effect of several heavy metals.
5. Destruction of crops or even forests mainly due to the attack of sulfide or nitrogen oxides.

Physicochemical parameters that actually control groundwater pollution:

1. Solubility
2. Rate of decomposition
3. Rate of adsorption
4. Partition coefficient
5. Rate of toxicity

CONCLUSIONS

If we think about human life or even health or rather development in the society the Groundwater resources are pretty important or to conserve certain natural things. In most of the case lots of anthropogenic factors out there that can enhance these sorts of pollution. In addition, uranium or even radon can also contaminate soils or even the groundwater.

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