International Journal of Innovations & Research Analysis (IJIRA)
ISSN :2583-0295, Impact Factor: 5.449, Volume 02, No. 04(I), October- December, 2022, pp 103-106

WATER RESOURCES AND THEIR POTABILITY

Dr. Shambhu Dayal Yadav*

ABSTRACT

Water may be obtained from surface water resources like streams, rivers, tanks, ponds and lakes or it may be obtained from subsurface resources through open dug-wells and tubewells. In the past when human populations were smaller both on were smaller both on a regional and global scale, surface water resources were sufficient for human sustenance but today when populations have increased tremendously these resources are insufficient and so alternative resources from subterranean water have to be exploited to meet with the needs. The distribution of both surface and subsurface water is uneven and so the population densities vary according to the water availability in a region.

Keywords: *Water Resources, Potability, Human Sustenance, Subterranean Water, Subsurface Water.*

Introduction

Water is the prime necessity of all living-beings. It is also essential for human populations to be used for drinking, domestic purposes, agriculture, livestock, power development, industry and natural resource development. All ancient civilisations developed and flourished on river banks or near the water resources because of the multifarious uses of water without which man cannot exist. Water has its direct consumptive and non-consumptive uses in various forms and so it is essential even today.

Replenishments of water, both in surface and subsurface resources is through precipitation in the form of rainfall, snow, ice, hails, dew etc. and as the amount of atmospheric precipitation varies from place to place, the water recharging capacity also differs and so the exploitation for human use. The water recharging capacity is also affected by the local temperatures which consequently affect the evaporation and evapo-transpiration rates and the floral cover. Therefore, the total amount of water received at one place through atmospheric precipitation varies from place to place due to differential weather and climatic conditions. Surface water resources are highly localized and it is difficult to transport water from them to far-off deficient areas. Therefore, subterranean water resources are of greater use today as they can be exploited locally.

Water Contaminations

Besides its several uses, water is one of the biggest carriers of microbes which cause diseases of various types and hence a brief discussion on the water resources of the study area is most relevant in the present study. Both the surface and subsurface water resources may become polluted by disease causing germs or the water may be chemically loaded with such salts which are harmful to man. So the potability of water has to be determined in order to check the prevalence of certain water-borne diseases in a region. Contaminations in water may be caused by the dissolution of human or animal faecal matter, dead organic matter or waste products all of which cause the growth of coliform bacteria which cause diseases. Contaminations are also measured by the BOD values (Biological Oxygen Demand), denoted in milligrams/litre of oxygen consumed over five days at 20°C by the aquatic animals. If the number of bacteria in a water they will reduce the resource is is sufficiently large then dissolved oxygen in water to SO low percentages (normally 4% of oxygen remains dissolved in all surface waters which are not contaminated) that the aquatic animals will die. The threshold level for a water pollution alert is defined as a dissolved oxygen content of less than 5 milligrams per litre of water.

* Associate Professor, Department of Geography, BND Government Arts College, Chimanpura (Shahpura), Jaipur, Rajasthan, India.

Amongst the inorganic the inorganic contaminations in water, the total phosphorus, mercury and lead are significant. These pollutants are found often deposited in the bottom of stream channels and in agricultural fields. Their overdoses in in drinking water may cause heavy metal poisoning. Many synthetic organic and inorganic compounds are hazardous chemical wastes formed as a by-product of industrial processes. Similarly, radioactive materials in water are also dangerous pollutants.

Table 1: Threshold Levels of Drinking Water Quality

S.No.	Indicator	Abbreviation	Threshold Level
1.	Faecal Coliform Bacteria	FC	200 cells/100 ml of water
2	Biological Oxygen Demand	BOD	5.0 mg/litre of water
3.	Total Phosphorus	TP	0.1 mg/litre of water
4.	Total Mercury	Hg	2.0 microgram/litre
5.	Total Lead	Pb	50.0 microgram/litre

Source: Council on Environmental Quality, 1980, U.S.A.

Surface water of streams, lakes, rivers and ponds is largely polluted now-a-days due to the discharge of effluents from industries, unhygienic practices of man, deposition of garbage and urban wastes and the use of such water for man and animals alike. Disposal of toxic waste products especially from paper industries, chemical industries, plastics, rubber and leather into the surface water may cause harmful effects which may be hazardous to plants, animals and man. This problem is most acute in developed countries like the United States and Western Europe.

Ground water resources may also be contaminated by cesspools, septic tanks and the disposal of household wastes both in the rural and urban areas. These point sources of contaminations are specially hazardous near the open dug-wells, hand-pumps and water- supply pipe lines of the cities. Quite often the tap water pipe lines of the cities get damaged in the rainy season and their water is mixed with the sever lines in the towns and cities of India, causing severe outbreaks of viral hepatitis, typhoid, dysentry and diarrhoea. Similar outbreaks of typhoid epidemics have been reported from Croydon (Surrey - England) and of dysentry in Zaporozhye (Ukraine-Russia).

The point sources of water contaminations are as below:

- Septic tanks, cesspools, domestic wastes;
- Land on which sludges or effluents from sewage treatment systems are spread e.g. the residues from municipal sewage treatment system;
- TAnimal feed lots and animal wastes;
- Collection and treatment systems employed in handling municipal wastes including domestic and industrial wastes;
- Landfills and dumps, chiefly of domestic and industrial wastes;
- Industrial waste impoundments;
- Mining wastes consisting of organic and inorganic chemicais;
- Drilling operations, when the saline and brackish layers of deeper soils are brought to the surface; and
- Flow of rain waters carrying heavy loads of organic wastes and rocky materials.

The non-point sources of contaminants that would appear as sizable areas rather than isolated points in an area are as below :

- Agricultural land, pastureland and urban orchards and gardens in which fertilizers and pesticides are used.
- TIrrigated agricultural lands which suffer from salt deposits on their top layer due to over-irrigation and capillary action of water.
- Urban industrial areas where detergents, oil and gasoline spills, chemical effluent wastes spread in large areas.

Management of water to make it potable for human drinking purposes is therefore of therefore of utmost priority to arrest to arrest the spread of various water-borne diseases. Moreover, it is also essential that an adequate supply of water is available for domestic use to keep the required sanitation. Usually, a per capita supply of 40 litres of potable water is needed in Indian conditions but in industrialized urban centres, the quantity may be as high as 120 litres/day. If the required quantities are not available then insanitation will prevail and the water-borne diseases will spread.

The chemical qualities of potable water are also significant. Usually, the ground water is loaded with heavy concentrations of chlorides, carbonates, sulphates, sulphides, nitrates, fluorides and bicarbonates of calcium, sodium, magnesium salts. The tolerance limits of these salts for human consumptions are 500 ppm (parts per million) of chlorides, 2 ppm of fluorides, 300 ppm of nitrates and 150 ppm of sulphates and sulphides beyond which they cause several diseases of digestive system and blood-vascular system. It is essential therefore, that the available water in a region is examined both in respect to its biological and chemical contaminants.

Sources of Water Contaminations in the Study Area

The principal types of contamination in the study area would be (i) basin contamination due to erosional products, poisonous chemicals washed from fields and roads and salts washed from the waste products soil during irrigation; (ii) channel contamination as a result of the discharge of organic and inorganic compounds from communal water supply systems and industrial enterprises and dumping; (iii) thermal contamination which causes oxygen content; (iv) contamination from use of reduction of chemicals in agriculture i.e., herbicides, insecticides, fungicides, etc; (v) hydrobiological contamination caused by a number of factors the formation of shallow waters and their overgrowth by by abundant vegetation and the inter mixing of organic compounds having a residual decomposition; and (vi) contamination from the growth and multiplication of micro bacteria injurious to health. These all will, on an ever-increasing scale, enter rivers and groundwater.

Since the development of health services of this hilly region cannot be done without ensuring a potable water supply it is inevitable to assess the water resources and to analyse their quality so that they have no deleterious effect on the human health. The prevalence of water-borne diseases can alone be checked by educating the rural masses to use potable water, which is free from biotic and abiotic contaminants.

The quality of water from different sources varies widely. Water that percolates the soil passes through various soil layers containing organic and mineral matter. Quite often the surface water also become reservoirs of pathogenic bacteria and viruses. The source of these pathogens is the human body and certain other animals which may inhabit them endogenetically or ectogenetically. The disease organisms are commonly transmitted to water supplies mixed with feacal contaminations of animals and man. The most common water-borne diseases of the area are typhoid, bacillary dysentry gastro-enteritis and cholera besides some ectoparasitic diseases like guinea worm and helmenthiasis. Presence and absence of toxic chemicals in the drinking water may also increase health hazards as certain salts having fluorine, chlorine and nitrates are beyond the tolerance limits of human body. Therefore, it is important to assess the depth of of the water-table and its seasonal fluctuations, the salinity of water, the coverage of protected water and the water aquifers in the area under study.

Surface Water Resources

The surface water water sources in the study area are in plenty and they can be used used for drinking for at least six months in a year. The area has many rivers. Except for parts of western Udaipur, and northern Bhilwara, which lie in the semi-arid region, the rest of the region gets 60 to 110 cm of annual rain. The rivers arising out the mountain crests drain this area for about six months in a river and keep a regular water supply. Except the Mahi, all other rivers are ephemeral. The Mahi drains about 4.8% are of the total area of Rajasthan and is a big perennial river of the southern uplands. Near Banswara, a masonary dam has been constructed on the river which has increased the irrigation potentiality of the area and is also used as source of drinking water to several villages and towns of Banswara and Dungarpur districts. The southern upland region is also fed by the Banas river and its tributaries which flow in a general north-north easterly direction through the Udaipur and Bhilwara districts. The Banas meets the Berach river near Bigod (Bhilwara) and finally meets the Chambal near Khandhar (Sawai Madhopur). The western Banas feeds the Sirohi District. It has a drainage basin of 0.9% of the total geographical area of the state. Most of the rivers, arising out of the western slopes of the Aravallis drain this area and water is found in them in certain low- lying areas. These pools of water of water are often used often used by the resident population for drinking purposes, as well as for livestock and are often contaminated with biotic contaminants.

Due to the rocky surface over most of the area, rainwater can be collected in small tanks and ponds as well as in large lakes, a practice which has been in vogue since ancient times. Almost every agricultural field has a small pond near it for irrigation and so also every village has a small tank (locally called **baories**) or step-well near it to be used for drinking water. Such step-wells are the sources of contaminated water and it was identified three decades back that they are the foci of the guinea-worm

disease which is most prevalent in the region. These step-wells have now been closed for public use and hand pumps have been installed to provide water for domestic use. However, the incidences of guinea-worm disease increase when rainfall is less and the water supply becomes scarce. In these periods of drought, the local population again resorts to the use of water from step-wells which are impregnated with the cyclops of guinea-worm disease.

The region has a large number of fresh water lakes and natural ponds. Some of the important lakes are as below:

- **Jaisamand:** This artificial lake has been built by damming the river Gomti in Udaipur district. The lake reservoir spreads over an area of 55 km2. It was built by Rama Jai Singh of Udaipur (1685-91) and the lake waters are used for irrigation through two canals.
- **Rajsamand:** This lake which is about 6.5 km long and 3 km wide was built by Maharana Raj Singh of Udaipur in 1662 A.D. The lake is situated near Kankroli railway station about 64 km north of Udaipur and its waters are used for irrigation in the surrounding areas.
- **Pichhola:** Right in the heart of the Udaipur city, Pichhola is a big lake, 7 km long and 2 km wide. The overflow of the lake waters drain out to the Ahar river which flows nearby.
- **Nakki:** Surrounded by high Aravalli mountains, Nakki is a deep lake at Mt. Abu (Sirohi Dt.).

In some of the districts of the region, there are large tanks which are used both for irrigation and drinking water to animals and humans.

Needless to say that these small unlined tanks are the sources of water-borne of water-borne diseases. They are the breeding grounds of mosquitoes, which cause malaria sometimes in epidemic forms. They are also the sources of guinea-worm disease which is endemic in this area. They get dry soon and the marshy lands formed in and around them are the breeding sites of several vectors and ectoparasites.

References

1. Council on Environmental Quality; The Global 2000 Report to the President: Entering the Twenty-First Century, Vol. Washington: The Department of State, 1980.
2. J.I. Drever: Drever; The Geochemistry of Natural Waters; New York: Prentice-Hall Inc/Englewood Cliffs, 1982.
3. H.S. Mathur; “The Blesphemy of Resource Development”; In: H.S. Mathur; Environmental Resources: The Crisis of Development; Jaipur RBSA Pub., 1988, p. 77.
4. H.W. Holdgate; A Perspective on Environmental Pollution, Cambridge University Press, 1979.
5. Lawrence Lundgren; Environmental Geology; New Jersey: Prentice Hall/Englewood Cliffs, 1986, pp. 180–181.

□❍□