

## Water Pollution Studies with Special Reference to Ajmer Rajasthan India

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### Abstract

Only 30 % of fresh water in India is fit for consumption. Whole world is suffering from the same problem. The sources of pollution are sewage discharge, small industries discharge, agriculture runoff. Sewage discharge is increasing due to increasing population. The causes of water pollution are discussed in the present paper.

**Keywords:** Water Pollution, Sewage Discharge, Pesticides, Industrial Discharge

### Introduction

Only 30 % of fresh water in India is fit for consumption. Whole world is suffering from the same problem. The sources of pollution are sewage discharge, small industries discharge, agriculture runoff. Sewage discharge is increasing due to increasing population. The causes of water pollution are discussed in the present paper. We cannot survive without water due to increasing population demand of water is also increasing. In 1972 conference held at Stockholm to discuss human Environment. Environment is an important issue [1]. Gleick explained resources of water. Falkenmark showed importance of pure water. Edwards studied multidimensional aspect of water. Dugan discussed chemical and biological aspect of water. According to Bandy urban people require more water and discharge toxic water, whereas rural people require less water and quality of discharge are not toxic. Mishra studied management of fresh water pond in Varanasi.

### Status of Ground Water

Annual replenishable groundwater resources 319.56 mcm. Gross annual ground water draft (Rajasthan) 392.4mcm. Annual requirement of water worldwide is 7000 km<sup>3</sup>. Ground water reserve is 70,000,00 km<sup>3</sup>. This plethora amount of water goes into ground by the process of precipitation. But due to limited rainfall in last year's restock water table is lowered. Due to construction of roads there is no percolation so there is shortage of water due to altitude, soil composition, and vegetation cover. Water planning should be done, water recycling and reuse plant should be there in every house. Underground Water storage tank should be there in every house. Surface water resources can be known by aerial photography and other methods but underground water can be known by limited methods only.

### Fresh water pollution (Lake) in India

Almost every lake in India is polluted. According to National Env. Eng Research institute (NEERI) Nagpur 70% of water in India is

polluted. Physiochemical properties of fresh water in India has degraded and still degrading. Reports show presence of pathogenic and nonpathogenic microorganisms in fresh water beyond the limit. Pollution in Tungabhadra reservoir was studied by Rao and Govind Pc properties of water of Hoogly estuary at various points was conducted by Basu Conducted pollution studies in Ganga and Yamuna at Allahbad [2]. Prasad and Saxena conducted study river Gomati with respected to blue green algae. In India Rivers are treated as Goddess. Neyyar, Nair Kanhan studied river in Nagpur Deshmukh.

### International Studies on Water Pollution

At International level studied quality of river Raisin in Canada [3]. Reichert studied quality of river Glatt in Switzerland. Quality of river Nile with respect to macrophytes was done by Obeid and Chadwick Physiochemical properties of river Amazon was studied by Gibbs Rai and Hill focus at its microbiological aspect. River Rhone Nutritional characters studied by Fauvet Welsh river in U.K. was studied by Brooker Mississippi river physiochemical characters were studied by Bollinger Missouri river by Berner Detroit River in Michigan studied by Manny Heavy metal pollution in the same river by Menny and its impact on biotic component was studied by Manny and Kenaga The previous literature shows that problem of water pollution is not only in India but it is in whole world.

Multidisciplinary study of river Aliakman in Greece was conducted by Lazaridou studied eutrophication in costal river of Israel [4]. Marshall and Falconer studied Lake Mellwaine in Rhodesia. Stream pollution was studied by Ellis studied pollution content of river Odzi in Zimbabwe [5]. Imevbore studied river Niger. Heavy metal analysis in estuary of France was conducted by Cossa and Noel Center and Spencer studied growth of macrophytes in some lake of Florida.

### Sources of pollution

The pollutants come from prominent sources are:

1. Industrial effluents discharge into river without pretreatment.
2. Sewage discharge
3. Agriculture runoff where chemical fertilizers, pesticides, insecticides are used.

## List of pollutants

1. Heat
2. Acids,
3. Alkalies
4. Anions (sulphide, sulphite, cyanide)
5. Detergents
6. Domestic sewage (Detergent, nutrient, metals, pathogens and variety of other compounds) [6].
7. Farm manure
8. Food processing water
9. Gases (Chlorine and ammonia)
10. Metals (Lead, Cadmium and zinc)
11. Nutrients (Phosphates nitrates)
12. Oil and oil dispersants
13. Organic toxic waste (Formaldehyde and phenols)
14. Pathogens
15. Pesticides
16. Polychlorinated biphenyls
17. Radionuclides
18. Oxidizable material

Studied silicon and nitrate in fresh water [7]. Ray and David studied Effect of sewage on the quality of River Ganga in Kanpur. Singh and Bhowmik studied Effect of sewage on the quality of River Ganga in Patna. Oake found heavy metal in sewage sludge. Oake found heavy metals in sewage sludge. chemistry of urban runoff water [8]. Kothandaraman studied sewage of Ahemdabad. Effect of sewage Effect of sewage disposal in water bodies had been studied by Cooke Biology of Sewage was studied by Sutton and Ornes Balmforth Studied pollution aspect of sewage overflow. Agarwal studied change in the chemistry of Chambal River due to sewage. Sauer studied chemistry of runoff water containing bird and animal Waste. Crude agriculture practice is imp source of water pollution. Detected pesticide in river water [9]. Detected agriculture pesticide in river water [10]. Large number of toxic and hazardous waste are present in industrial effluents.

**Table1: Toxic chemical production in India**

Pollutant	Amount Released (thousand tons)
Pesticide	39.6
Dyes and pigments	29.8
Organic chemicals Petrochemicals	42600
Fertilizers	8500
Steel	9500
Caustic Soda	558
Pharmaceuticals	5.08

### Source

GOI Publication, India, 1988-89. Industries generate large amount of effluents. Dairy effluent is rich in microbial Population Industrial effluent affects BOD and COD (Gajghate and Reddy Chemistry of sugar mill effluent was studied by Verma studied pharmaceutical industrial waste affecting microbial population [11]. studied industrial units discharging heavy metals [12]. Kudesia and Verma Studied river Kali sugarcane, chemical distillery And rubber industry discharge. Bhuyan studied water of ancient tanks Sibsapur. Balachand and Nambisan studied paper mill effluent. These are the sources of water pollution. But remedial measures should be followed to control water pollution. Administration should implant

strict rules to control water pollution.

**Table 2: Water quality standards**

Parameter	BIS/WHO
Temperature	40
EC	.07
pH	6-8.5/7-8.5
DO	5 or more
BOD	3 or less
COD	20 or less
Chloride	250
Alkalinity	80-120
Nitrate	45
Phosphate	0.1
Sulphate mg/l	200
Total hardness	300
Total solid	500
Calcium	75
Magnesium	30
Potassium	20
Sodium	20

Standard of water have been prescribed by different health agencies. US Public health drinking water standards (USPHS) [13]. Indian council of Medical Research (ICMR) .Quality of water effects human health.

### Components of Polluted Water

Nutrient Content Nitrate and phosphate which is most often present in the runoff water of rural as well as urban area act as nutrient in the waterbodies. Concentration of the same in water, sediment and macrophytes was conducted by [6].

### Temperature

Temperature plays an important role in aquatic ecosystem. Some industries discharge hot water in aquatic ecosystem because of thermal pollution and disturb it. The industries which cause thermal pollution are nuclear powers, power generators. In these industries water is used as coolant. All industries cause thermal pollution. Thermal pollution reduces bacterial population of surrounding aquaic Ecosystem [14]. Temperature effects Electrical conductance of water this is responsible for biodiversity modification. Increase in temperature reduces oxygen content of water Rate of biodegradation of organic matter is directly proportional to temperature; this again reduces DO and nutrient accumulation. Studied distribution pattern of plant with respect to light and temperature. Studied nitrogen and phosphorus accumulation in hyacinths [15]. Blue baby is symptom of nitrate pollution in ground water. Thermal pollution disturbs foodchain and foodweb resulting in abnormalities. Nitrogen level in lotic ecosystem was studied by [16]. According to phosphorus in aquatic ecosystem is recycled by plant absorption [17].

### Do (Dissolved Oxygen)

The total oxygen content in dissolved water (1 liter) is called dissolved oxygen.

## **Bod**

BOD of a water sample is amount of oxygen spent for biochemical processes during 5 days at 200 C.

## **COD**

COD is quantity of oxygen required for complete oxidation of all reducing substances of organic as well as inorganic origin present in water. Studied relationship between BOD COD in river Ganga. Mittak and Ratra BOD are affected by presence of toxic metals. DO affect sewage treatment DO affected by turbidity which restricts solar radiation. Roots of aquatic plants increase DO by photosynthesis maximum are green and contain chloroplast.

## **Turbidity**

SPM (suspended particulate matter) affects turbidity of water. Michell and Furnas (2001) Logger an instrument to monitor aquatic SPM.

## **Turbidity**

Trace elements detected in SPM of many rivers. SPM affects biotic community Yerra river Australia Trace elements detected Chemistry of water affects the chemistry of SPM and sediments and Turbidity reduces photosynthetic activity of water body reduces DO and cause suffocation to plants and animals [18].

## **Ph**

PH is negative log of H<sup>+</sup> ion concentration. PH is essential for survival of organisms. PH affects enzyme activity and mobilization. PH also affects distribution of plants. studied changing phytoplanktonic composition with lowering pH in Canada.

## **Organic Matter**

Organic matter and inorganic carbon affects aquatic ecosystem. Organic matter and inorganic carbon affects eutrophication Organic matter and inorganic carbon affects chemistry of water Sharma studied pollution caused by spillage. Studied org pesticides in river of Buenos Aires and Argentina [19]. Toxic organic contaminants of agriculture waste in water bodies were studied by Thana Pocklington and Tan 1987, seasonal variation in organic content of waterbodies. Specific odour is due to presence of particular org comp. Hydrophytes growing in c rich medium having capacity to absorb inorganic carbon for photosynthesis Selected microorganisms absorb organic phosphates. Dead plants fall in water increase org content [20].

## **Heavy Metals**

Heavy metals present in industrial effluents are absorbed by hydrophytes According to these metals precipitate in sediments [21]. Staves and Kanaus studied Chromium absorption by duckweed. Sinha studied Cr and Mn uptake by Hydrilla. Risgard and Hansen Reported Hg in hydrophytes and herbivorous fishes. Pacakova Studied metal content of various strata of river. Some plants are also known as biological filters due to their nutrient absorption property Rai and Chandra reported accumulation of Cd, Hg, Pb, and TI by Hydrodictyon algae. Cd and Pb accumulation by rooted aq plts shown by Mayes. Cd, Hg, Pb, TI are present in nutrient rich lakes. (Mathis and Kavern 1975) Azolla and Lemna bioaccumulate Pb and Zn Bioaccumulation of Hg and Cr has been studied by Jana Water Hyacinth accumulated Zn [22]. Guilizzoni reported uptake of Zn, Cd, and Pb by Lemna. Ciba Metals in Composted Municipal waste. Ceratophyllum accumulate Cr Lichen Peltigera absorb Cd Eichhornia absorb Cd [23]. Gobeil reported Ag in sediments of

ivers and estuaries. Singh studied Chemical composition of waste water in Amritsar. Srivastava studied behr of Lanthanide -920-dye complex in water. Tiwari studied metal dye complex in waste water. Heavy metal (Cd, Cu, and Ni.) accumulation in animals causes gall bladder cancer. They reach gall bladder through food chain.

## **Microbial Pollution**

Microorganisms are present in sediments of ocean [24]. Microorganisms remove nutrients from water. Underground water also contains bacteria [25]. Hiraishi relation between coliform bacteria and organic pollution. Studied coliform number in water body. The microbes have reached underground water also. Ground water should be protected [26].

## **Water Pollution and Its Effects**

Water biochemistry controls distribution of fauna and flora Stevenson studied effect of bathing water on water quality. Manawar studied effect of pollution on Euglena. Guilizzoni studied effect of heavy metals on Macrophytes. Effect of acidification on aquatic fauna studied by Pamela and Stokes, Smith pollutants concentrating in sediments. Heavy metals are present in grains, vegetables, fruits, milk. Heavy metals cause large number of diseases. More than 85 % mortality is due to water pollution.

## **Conclusion**

Level of water pollution has increased very much. Water is polluted in most parts of world. Our body contains more than 1000 hormones and enzymes which are specific in working and heavy metals and polluted water can change their working. We also consume DDT, BHC, Aldrin and many other pesticides. We also consume heavy metals. Entry of heavy metals and xenobiotics should be avoided. Pre seasonal fruits and vegetables require chemical fertilizers and pesticides to develop adverse effects. Accumulations of xenobiotics in our body in specific organs cause death. We should move towards sustainable development. Stop water pollution and we should think for future generations. We should check accumulation and biomagnifications of heavy metals and xenobiotics [27-43].

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