

Surface Water Quality Modeling: A Review of the Analysis of Uncertainty

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Abstract— After the origin of life in water everything of living organisms is sustained by water. Not only biotic components, abiotic components on the Earth depend on water. Water is not only essential to life but is predominate inorganic constituent of living matter forming nearly three quarters of the weight of a living cell. In short water is essential for life and plays a unique role virtually as medium in all biological process. This report showed an overview of the water supply situation in Indore. It was considered appropriate to undertake an independent assessment of the water supply to Indore as well as a review of all water demand management activities being undertaken in the supply area. The degree of pollution is assessed generally by studying physical and chemical characteristics of the water body. Any undesirable change in the physico-chemical characteristics of water brings about water pollution. This change is mainly due to human activity such as rapid urbanization and industrialization coupled with injudicious exploration of natural resources. The discharge of domestic sewage and industrial effluents into natural water resources such as rivers, streams as well as lakes and reservoirs results in alteration of their physical and chemical properties leading to objectionable conditions.

Key words: Water Pollution, Physico-chemical, Domestic Sewage and Industrial Effluents

I. INTRODUCTION

Water is the common name applied to the liquid form (state) of the hydrogen and oxygen compound H₂O. Pure water is an odorless, tasteless, clear liquid. Water is one of nature's most important gifts to mankind. Essential to life, a person's survival depends on drinking water. Water quality includes all physical, chemical and biological factors that influence the beneficial use of water.

Indore city is the largest city in Madhya Pradesh state in central India and is situated on the Malwa plateau at an altitude of 553 m above sea level, on the banks of two small rivulets-the Saraswati and the Khan. They unite at the centre of the city where a small 18th Century Temple of Sangamnath or Indreshwar exists. The name Indore is due to this deity. It is the commercial capital of the state of Madhya Pradesh. The requirement for water for drinking, industry and municipal purposes have accordingly increased manifold. Being situated on flat Malwa plateau and at the edge of vindhyan mountain ranges from where most of rivers of the region originate, Indore is at disadvantage for not having good reservoir sites and rivers with adequate water resources in its reasonable proximity. Due to above said reason, Indore depends on Narmada river, 70 km. away and at 420 m. depth from Malwa Plateau, for about 75% of its water supply; this dependence will further increase in future. Indore receives about 171 MLD to 199.5 MLD from Narmada Project, Yeshwant Sagar, Bilawali and municipal tube wells. This is 52 to 67 liters per capita per day - very

low in view of CPHEO recommendation of 135 LPCD. There are 91 km. of bulk supply mains and 1400 km. length of distribution pipe line with 34 Nos. service reservoirs with a total capacity of 84 MLD. 400 km. of additional distribution pipe line is required to cover the complete municipal area. Despite per capita supply being low, it is given for 1 hour at low pressure and on alternate days. In 2010-11, only 57% of population in municipal area was covered by piped water supply. The administration of all urban matter of Indore lies under jurisdiction of Indore Municipal Corporation. The IMC on the other hand adheres to regulation of the M.P Nagar Palikaka Nigam Adhinyam 1956. In Indore water supply sources are: Surface Water: Narmada River, Yashwant Sagar, Bilawali tank, Sirpur talab. Ground water Resources: Hand pumps, wells, tube wells etc.

II. HYDROBIOLOGICAL REVIEW

Dhakad NK, and Chaudhary Preeti¹ (2005), Hydrobiological study of Natnagra pond in Dhar district (M.P.) with special reference to water quality impact on potability, irrigation and aquaculture. Paper deals with the hydrobiological studies of Natnagra pond with special reference to physico-chemical characteristics. This pond plays an important role in maintaining the drinking water supply of Dhar district. It was found that the water is suitable for drinking only after proper treatment because of the presence of high level of coliforms. However, the water is suitable for irrigation.

Lomate Varsha, and Samant Jay³ (2005), Drinking water pollution – a case study of Kolhapur city. A study on pollution of drinking water of Kolhapur city was carried out for two subsequent years during different seasons. The samples were analyzed for physical chemical and microbiological parameters. The results were compared with the water quality standards of different agencies. The results obtained during the study were used to correlate the efficiency of the drinking water treatment methods used in the respective filter houses.

Nayak BK⁶, et.al, (2004) Variation of water quality in Chilka lake, Orissa. The water quality parameters were studied for the entire Chilka lake covering a maximum of 23 sampling stations. The pH of water was alkaline throughout the lake and both pH and salinity varied widely. Higher pH with low salinity zones reflected disintegration of submerged weeds. Correlation analysis supported the increase of pH, high photosynthetic activity, high nutrients as well as phosphate depletion due to phytoplankton utilization in the fresh water zone.

Paul MK, and Misra AK⁷ (2004), An assessment of pollution of water used for domestic purposes in Lumding town, Assam, India. Study reports on the quality of water used for domestic purposes based on 12 parameters from 10 different sources in the area of Lumding and its vicinity. Water samples were collected in four seasons for two years

and analyzed for temperature, total dissolved solids, total suspended solids, conductivity, acidity, free CO₂, bicarbonate, chloride, dissolved oxygen, total hardness, calcium and magnesium. The result is discussed in relation to the health hazards due to water quality.

Sawane AP⁸, et.al (2004), Assessment of water quality of river Irai (Distt Chandrapur) on the basis of seasonal fluctuations in DO and BOD. Study deals with assessment of pollution status of river Irai (Dist. Chandrapur). The increased values of BOD in river water are indicative of increased quantity of industrial effluents. The reduced DO content is due to hot ash slurry from thermal power plant. The analysis of river water to assess potability indicates that it is adversely affected by industrial effluents. The data collected from present study reveals that there is inverse relationship between DO and BOD and potability of Irai river water is below the standard permissible limit.

Singh RP, and Mathur P¹⁰, (2005), Investigation of variations in physico-chemical characteristics of a fresh water reservoir of Ajmer city, Rajasthan. Study deals with the physico-chemical studies of an ancient but famous fresh water lake 'Ana Sagar' Ajmer, Rajasthan. Data were collected over a period of six months. The result obtained in the investigation shows that this lake is highly polluted, its water is extremely alkaline and the nitrate and phosphates are high in comparison to standard limits as of an eutrophic lake

Kumar Dinesh², et.al, (2005), Physico-chemical characteristics of Amanishah Nallah and neighbouring ground water sources in Sanganer, Jaipur. Monitoring of Sanganer nallah and surrounding tube wells was carried out during rainy season. The results revealed that the discharge of untreated industrial effluents and sewage in to nallah have contributed considerable pollution in the ground water in its vicinal areas, and is harmful for use in agriculture and drinking purposes. The quality parameters were compared with the drinking water standards laid by WHO and ICMR. The levels of nitrate and fluoride concentration are high in tube well water samples, and need serious attention.

Murhekar Gopalkrushna H⁵ (2011), Determination of Physico-Chemical parameters of Surface Water Samples in and around Akot City, The results were compared with standards prescribed by WHO (1973) and ISI (10500-91). It was found that the water samples collected from various sites in and around akot city was contaminated. All sampling sites showed physicochemical parameters above the water quality Standards and the quality of water are very bad and it is unfit for drinking purpose.

Sharma Shraddha⁹ et.al (2011), Evaluation of Water Quality of Narmada River with reference to Physicochemical Parameters at Hoshangabad city, MP, India, physico-chemical parameters indicate the pollution of river in ecosystem due to domestic wastes, municipal sewage, industrial effluent from Security Paper Mill (SPM) and agricultural run-off that influence the water quality directly or indirectly. Statistical analysis carried out through correlation method and also evaluates Average values (AV), Standard Deviation (SD), Standard Variance (SV), Standard Error (SE) and 95% Confidence Limit (CL) to assess the pollution load assessment. The results revealed that most of

the water samples were below or out of limited; according to the WHO, BIS standards.

Minu Kumari⁴ et al (2013), Comparative Studies of Physico-Chemical Parameters of Two Reservoirs of Narmada River, MP, India, The various Physico-chemical parameters of Narmada River at Indra Sagar Dam and Omkareshwar Dam. At Punasa Dam Maxima of Chloride and Sulphate were observed during June, BOD and T.D.S in August, Total hardness in November, Temperature in May and PH was highest in March and April. At Omkareshwar Dam Maxima of BOD and Total hardness were recorded in October, Chloride in November, Sulphate in August, T.D.S and Temperature in July, Maxima of PH was recorded in February.

III. CONCLUSION

There can be little doubt that water is a basic necessity for the survival of humans. There is interplay of various factors that govern access and utilization of water resources and in light of the increasing demand for water it becomes important to look for holistic and people-centered Approaches for water management. The whole city is violating the rules and ethics of the drinking water supply network. There is need to restrict the land use regulations especially for water supply sector which will ultimately help to improve the water sustainability and quality. A lot of work and struggle is required to make a behavior change of the community regarding uses, conservation and disposal of water. A mega funding should be provided by the Government to make a major change in the infrastructure of water supply system to get rid of the contamination problems. Modern and state of the art techniques are required to improve the management systems.

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