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Introduction

Reservoirs are not only a signi cant source of precious water but also provide a valuable habitat to the aquatic world. Madhya Pradesh has 3.0 lakh ha of water area in the form of reservoirs and ponds out of which 2.50 lakh ha are in the form of reservoirs and 0.50 lakh ha is in the form of village ponds [1]. e contamination of water bodies with excessive amount of inorganic nitrogen and phosphorus from fertilizer runo is a pressing concern, though they give the prevalence of agriculture but alternately results in large proliferation of algae which have detrimental e ects on the aquatic biota [2].

Nitrate is nal product of mineralization process [3] which is colourless, odourless and tasteless compound. Phosphorus is present in di erent forms among which orthophosphate is the soluble reactive from of phosphorus which is also termed as inorganic phosphate. It plays a dynamic role in aquatic ecosystem which is taken up widely by phytoplankton [4]. l by e reservoir was constructed in with catchment and water spread area of 6 km

^{2} and 9 ha, shoreline 6 km and maximum depth of 2 m.

Wer samples were collected seasonally during he morning hours (6 to 1 am) from surface and bottom in winter (Jnuary), summer (Apil), monsoon (July) and pst-monsoon (October) at Patra Nala that was selected as sampling station through which the drainag waste of Bopal city enters the reservoir. Besides domestic discharg, the Nala also receives wastes from textile, distillery and straw poduct factories of Bopal. Wer samples were analysed as per Jand Dn Aoni (Figures 1 and 2).

Results and Discussion

e results about nine physico-chemical parameters of water are listed in Table 1. During the period of study the nitrate concentration was recorded maximum in monsoon which may be due to heavy downpour and subsequent runo from surrounding agricultural elds but this level is below the USEPA's [7] Maximum Contaminant Level (MCL) of 10 mg/l, and minimum value of nitrate was recorded in winter which may be due to very minimum runo from surrounding fertilizer fed agricultural elds which drains everything into the nearby water body. Nitrate (NO_3) is not dangerous for the health unless it is changed to nitrite (NO_2). Hannan and Young [8] has shown that early monsoon runo is an important contributor of nitrate-nitrogen to the reservoir.

High concentration of phosphorus in an aquatic system is an alarm of turning the system towards the eutrophic state. USEPA [7] has

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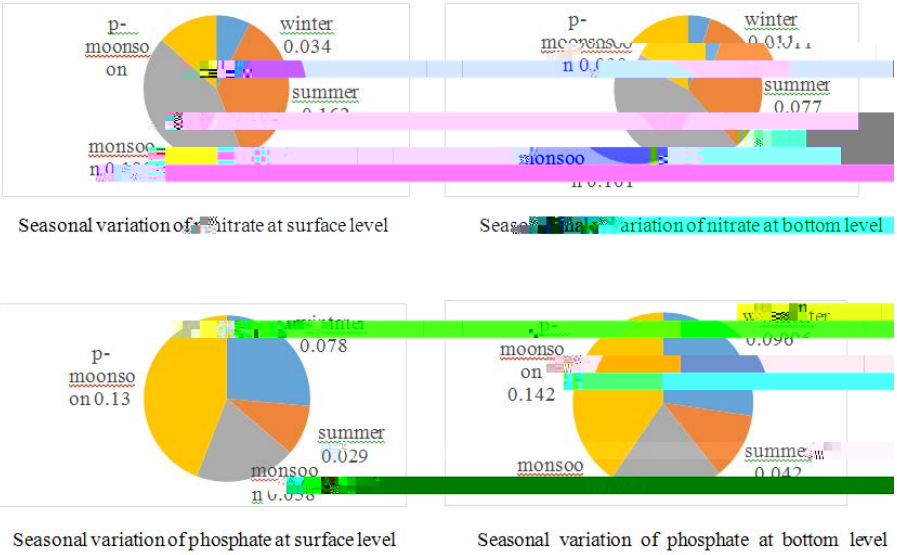

Figure 2: Seasonal variations at di erent levels.

suggested 0.08 ppm as a critical level for the occurrence of eutrophication in a water body which is less than the mean value found during the present study. e amount of phosphate in the Halali reservoir may be because of the presence of certain macrophytes (*Ipomoea, Vallisneria, Potamogeton, Hydrilla* etc.) and sediments drained by surface runo to the reservoir.

e role of phosphorus in algal growth and eutrophication has been studied by Peterson [9]. e maximum value of 0.130 mg/L at surface and 0.142 mg/L at bottom were recorded in post-monsoon which could be due to huge quantity of domestic sewage, cattle dung, detergents, organic wastes of plant-animal origin, phosphate based detergents and NPK fertilizers. e lower values of phosphate was recorded in summer which may be because of minimum surface runo and higher temperature that increases the metabolic activity of microbes picking up more and more nutrients from water body. Another reason may be huge quantity of nutrient uptake by inhabited macrophytes (*Ipomoea, Vallisneria, Potamogeton, Hydrilla* etc.) in the reservoir. e phosphate and nitrate content of Shahpura lake (Bhopal) was found in the range of 6.05 to 9.21 ppm and 2.02 to 15.22 ppm [10]. Enrichment of water body with phosphate may be attributed to the cumulative action of disintegration of phosphate bearing rocks and their subsequent washing and from surrounding catchments making use of phosphate based compounds (e.g., fertilizers) during rainy season. Phosphates also get released by the rocks lying at the bottom and by the death of plants and animals present in the reservoir by various hydrological processes. Phosphate is considered to be the most signi cant among the nutrients responsible for eutrophication- a condition characterized by growth of algae and weeds in a water body.

Eutrophication signi es the ageing of a water body. Nutrient enrichment causes variations in aquatic systems which results in the growth of primary production to nuisance properties [11]. e main cause is excessive loading of phosphorus and nitrogen into the system resulting in high algal biomass, dominance by cyanobacteria and loss of macrophytes [12].

Entrance of nutrients in a water body and the subsequent a ermath:

Increasing load of nutrients in an aquatic system can lead to the following consequences:

1. Aquatic vegetation can be due to increasing load of nutrients which enhances the growth of macrophytes like- *Vallisneria, Potamogeton, Ipomoea, Ceratopylum* etc.

2. Low DO content of water body creates anaerobic condition, suitable for growth of pathogenic microbes that makes water un t for di erent utilities.

3. Nutrient rich water requires e cient machinery (high cost) for removal of nutrients to make it suitable for di erent uses.

4. Concentration of nitrates above 10 mg/L (USEPA-MCL) cause methaemoglobinemia, also known as 'blue baby syndrome'.

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