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ORIGINAL ARTICLE

SEASONAL VARIATION IN PHYSICOCHEMICAL CHARACTERISTICS OF KORADI LAKE, DISTRICT- NAGPUR IN INDIA.

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Abstract:

The study of fresh water bodies such as ponds, lakes, river and reservoirs have gained much attention in recent years due to its importance. Freshwater bodies have great aquaculture, ecological and recreational potential. Fresh water, its availability, equity and sustainability are posing a global challenge and there is an all-round acceptance of the fact that world is facing fresh water crisis (Kodarkar, 2003).

The lakes and reservoirs, all over the country without exception, are in varying degrees of environmental degradation. The degradation is due to encroachments, eutrophication (from domestic and industrial effluents) and silt. The population explosion during last century without corresponding expansion of civic facilities, converted lakes and reservoirs as a sink for contaminants.

KEYWORDS:

physicochemical , Seasonal , characteristics , Material and Method , Temperature.

INTRODUCTION

A water body affects the environment in its vicinity, like charging of ground water tables, climatic conditions etc. most of the peoples living in the vicinity depend on this water source in various ways. Any damage to this water source will not only make living being on risk but that will also disrupt the aquatic ecosystem. It is therefore necessary to study the quality of water, based on physico-chemical parameters to assess its potability and the trophic status of water body.

Koradi Lake is a water body situated beside famous Koradi devi tample, this lake is created as water reservoir for thermal plants present in this area. Water from the pench dam is brought to this reservoir and then used by thermal plants. Beside this, the reservoir is also used for fishing and domestic purpose by the temple authorities and people living in this area. In view of this, we try to investigate the present status of this reservoir.

MATERIAL AND METHOD

The Koradi Lake is situated in koradi, 0.5 km from Nagpur- Chindwada highway and about 7 km away from Nagpur city. Three sampling spots were selected at reservoir consecutively based on different characteristics such as bundh area, aquatic vegetation etc. The selected sampling spots were named as KS1, KS2 and KS3 from which monthly samples were collected for a period of one year, from September 2011 to October 2012.

The water samples were collected from all sites in morning hours between 6.30- 8.30 am.

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Parameters like humidity, temperature, pH were analyzed at the reservoir site where as parameters like dissolved oxygen, total dissolved solids, free CO_2, alkalinity, COD, BOD, nitrates etc. were analyzed in the laboratory on the same day.

The various physico-chemical parameters were analyzed by using methods as given in standard methods for examination of water, sewage and industrial wastes (APHA, 1998; Kodarkar et al. 2006).

RESULT AND DISCUSSION

Monthly, variation of the physico-chemical parameters analyzed are represented in figures 1 to 7.

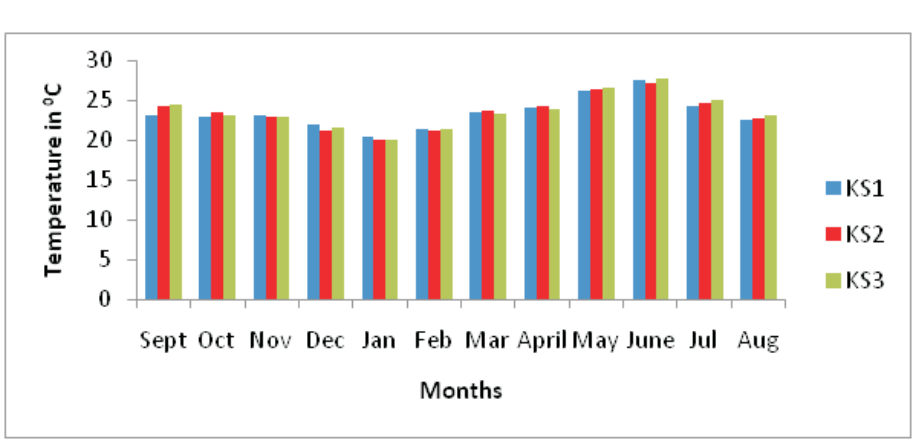

Fig.1 Histogram showing monthly variation in temperature

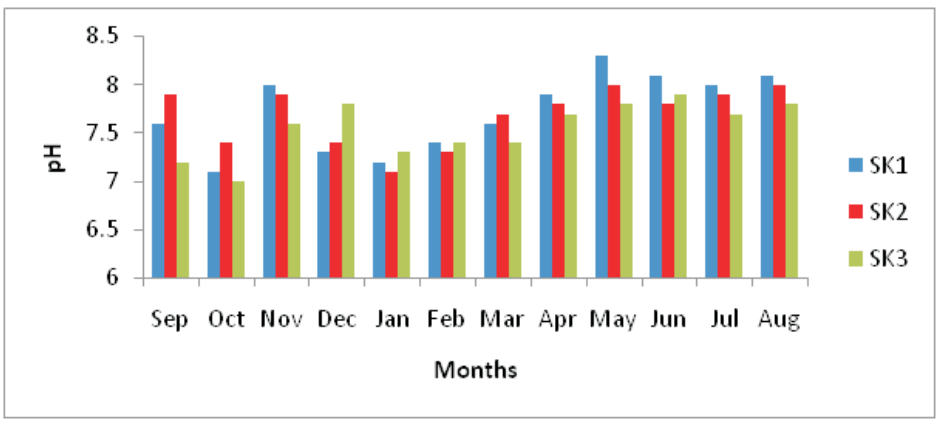

Fig.2 Histogram showing monthly variation in pH

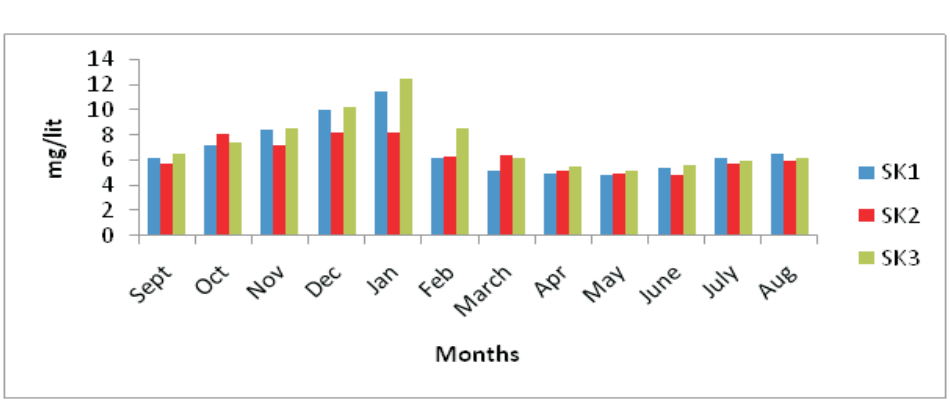

Fig.3 Histogram showing monthly variation in Dissolved O_2

Fig.4 Histogram showing monthly variation in Dissolved Co_2

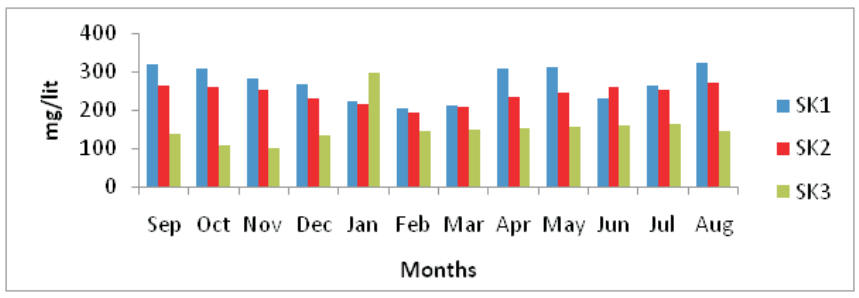

Fig.5 Histogram showing monthly variation in total Alkalinity

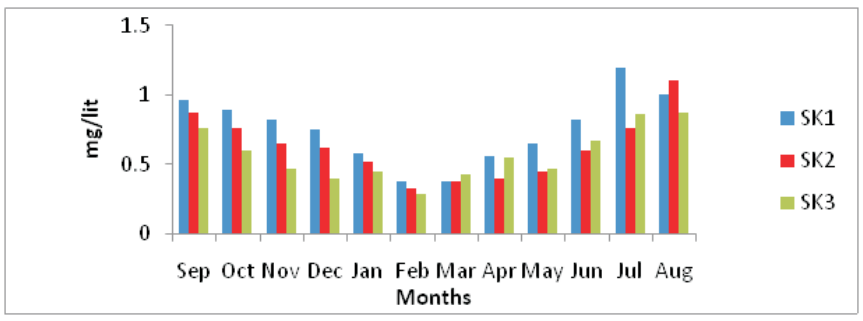

Fig.6 Histogram showing monthly variation in Phosphate

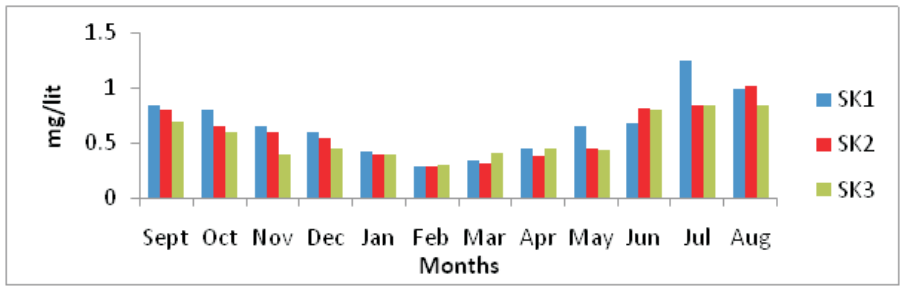

Fig.7 Histogram showing monthly variation in Nitrate

In an ecosystem, physico-chemical environment has profound influence on its biotic components.

The physical and chemical parameters exert their influence both individually and collectively and their interaction produces a biotic environment, which ultimately conditions the origin, development and finally succession of biotic communities (Salaskar and Yeragi, 1997).

Temperature is one of the most important parameter in an aquatic environment and profoundly influences the physiological as well as biological activities of water body. Temperature is one important parameter, which influence some chemical reactions in aquatic system.

The temperature of water sample of this Lake fluctuated between 20.10°C to 27.9° C during investigation. The minimum water temperature was recorded in January and the maximum water temperature was recorded in June at spot KS3. Maximum water temperature was recorded in summer and minimum water temperature was recorded during winter. Water temperature plays important role in thermal stratification, which has some effect on chemical and biological activities of aquatic media like DO, CO_2. The variation in water temperature followed more or less the trend of atmospheric temperature.

The variations in pH values were noted to be well within the normal limits for better productivity since pH<4 and >10 are hazardous to aquatic life. During the period of investigation the pH of reservoir was recorded which ranges between 7.00 and 8.30. The minimum pH 7.0 was recorded in May and maximum value 8.30 was recorded in May. According to Jhingran and Sugnnan (1980) the pH ranged between 6.0 to 8.5 were medium productive reservoirs, more than 8.5 were highly productive and less than 6.0 were low productive reservoirs. Present study indicates the medium productivity of the reservoir. Throughout the study period pH value was slightly alkaline which favors the growth of fishes (Swingle, 1967).

The occurrence of DO in water may be due to diffusion from atmosphere and photosynthetic evolution by aquatic autotrophs. Oxygen is one of the most important factors in any aquatic ecosystem. The optimum range of DO in natural water is 4 to 6 mg/lit (Jayasree, 2002). Tarzwell (1957) has stated that for supporting aquatic life minimum 3 mg/lit DO is essential. During present investigation the range of DO was between 4.8 mg/lit and 12.5 mg/lit. The minimum value were recorded the month of May and maximum in January. Reported maxima of DO during winter and minima during summer can be attributed to the higher solubility of oxygen at low temperature. It has been observed that DO concentration more than 5 mg/lit favors good growth of flora and fauna.

Respiratory activity of aquatic organism and process of decomposition are important sources of CO_2 in water bodies. As CO_2 is highly soluble in water, it is found to be in larger amount in polluted water compared to fresh water body. It is minimum in December at site SK1 and maximum in June at site SK3. It shows reverse relationship with the concentration of O_2.

According to Jhingran and Sugunan (1980), the highly productive reservoir has the carbonate content more than 80 ppm and total alkalinity more than 90 ppm. They concluded that the reservoir with less than 35 ppm of carbonate and less than 40 ppm alkalinity were belong to low productive reservoirs. Natural water with higher alkalinity is generally rich in phytoplanktons, especially blue-green algae. Water with more than 50 ppm total alkalinity is considered as a conductive for fish production (Piska, 2000). Total alkalinity in the reservoir were ranges from minimum 100 mg/lit during January and maximum 324 mg/lit during August.

Phosphate is the key nutrient in determining the primary productivity of water in reservoirs (Piska, 2000; Nair et al., 1999). Phosphates and nitrates are nutrients; their concentration above normal range is found to cause eutrophication.

During investigation maximum content of phosphate is 1.2 mg/lit during the month July while it's minimum content i.e. 0.28mg/lit, was recorded during the February, which is within the normal range.

Nitrogen is essential for synthesis of proteins; hence it is a limiting factor along with phosphorus controlling growth of phytoplankton in natural waters (Pendleton, 1983). Nitrogen containing compounds and especially nitrates are the most noxious pollutants of water thus nitrate content in drinking water is limited to 50 mg/lit.

The nitrates ranged from 0.30 mg/lit to 1.25 mg/lit during the investigation. The nitrate values were maximum 1.10 mg/lit during the month July and minimum 0.3 mg/lit during February. The values were maximum during pre-monsoon and minimum during post-monsoon months. According to Jhingran and Sugunan (1990) the water with 0.2 to 0.5mg/lit of nitrates is of high productive reservoirs.

Physico-chemical analysis is the prime considerations to assess the quality of water for its best utilization like drinking, irrigation, fisheries etc. The status of any reservoir are often better understood when biotic factors are correlated with physico-chemical data.

On the basis of above findings it may be concluded that, most of the water quality parameters during the study are within the normal range and suitable for aquatic life. The study also indicates that the koradi reservoir is highly productive in nature, but to know the exact tropic status of lake, more extensive study, particularly of the biotic factors is needed.

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