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Correlation of Some Physico-Parameters with Chemical and Biological Parameter of Munj Sagar Talab, Dhar (M.P.) India

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Abstract: This study was aimed to estimate current status of physico-chemical characteristic of Munj Sagar Talab Dhar, Madhya Pradesh. Monthly changes in physico-chemical and biological parameters, such as water temperature, transparency, conductivity, turbidity, phytoplankton and zooplankton were analyzed for a period of 2 years from November, 2006 to October, 2008. The results indicated that physico-chemical and biological parameters of the water were within the permissible limits and can be used for domestic, irrigation and pisciculture.

Key words: Correlation, physico-chemica parameters, temperature, transparency, conductivity turbidity, phytoplankton, zooplankton

INTRODUCTION

The overall condition or health of aquatic ecosystems is determined by the interaction of its physical, chemical and biological components. In order to protect the ecosystem, understanding of environmental changes is necessary. Ecological assessment helps us to conserve and manage natural resources. There are several statistical method, such as co-relation, smoothing of data, regression and cluster analysis which may helpful in predicting and planning the ecosystem. Correlation among the water quality parameters has been reported by Somasekhara and Somasewara (1994), Prakash (1994), Tiwari and Ali (1988), Mariappan *et al.* (2000), Jeyaraj *et al.* (2002), Rao (2002), Tyagi *et al.* (2003), Mohanty *et al.* (2003) and Thirupathaiah *et al.* (2012).

MATERIALS AND METHODS

About the water body: Munj Sagar is located in the district Dhar. It was excavated by Vakpati Munja (993AD) who was the famous rulers of Paramaras dynasty. Munja was a great general, a poet of repute and a great patron of art and literature. Munj Sagar Talab is geographically located at 22°30'06.67" North and 75°17'42.67" East latitude. It covers an area of about 49.596 h .The altitude of Munj Sagar Talab is 554 m. In year 2005, it was deepen by removing the bottom soil. This water body was basically constructed for drinking water purpose but now-a-days its water is mainly utilize for irrigation and fish culture.

Physico-chemical methods of water analysis

The collection of samples: The samples were collected in the 1st week of every month from November, 2006 to October, 2008 between 7-9 a.m. For the collection of water samples, iodine treated polyethylene bottles were used. All the precautions were taken to avoid air bubbles during the sampling. Some of the physical and chemical parameters, such as depth, transparency, water temperature, dissolved oxygen, free carbon dioxide, alkalinity, hardness and chloride were determined at the sampling station because these characteristics of water might change with passage of time while the other characteristics were determined in the laboratory within a period of 5-6 h of sampling. The samples for zooplankton and phytoplankton were also collected in the continuation after the collection of water samples at each station.

Water analysis: The physical and chemical parameters of water samples were analyzed by following standard method for the examination of water and waste water and chemical and biological methods for water pollution studies.

RESULTS AND DISCUSSION

A correlation matrix and correlation significances matrix between physico-chemical and biological parameters was obtained using StatiXL software. The $p<0.05$ was considered as significant level during this study.

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The water temperature ranged in between 16.7-33.90°C in 2006-2007 and 18.03-34.03°C in 2007-2008. The minimum temperature was observed in December, 2006 and maximum was noted in June, 2008, the transparency of water varied from 23.43-49.40 cm in 2006-2007 and 21.63-47.43 cm in 2007-2008. The minimum and maximum values were found in June, 2008 and December, 2007, respectively.

The conductivity ranged from 219.0-316.33 $\mu\Omega$ cm^{-1} in 2006-2007 and 214.67-309.67 $\mu\Omega$ cm^{-1} in 2007-2008 the minimum and maximum values were noted in December and July, 2007, respectively the turbidity ranged in between 9.47-38.97 NTU in 2006-2007 and 11.13-40.33 NTU in 2007-2008. The minimum and maximum values were found in December, 2006 and June, 2008. The correlation are reported and shown in Fig. 1-4.

A positive correlation between water temperature, turbidity (Kaushik and Saksena, 1991), free carbon dioxide (Kamal *et al*., 2007), chloride (Kumarai and Anshmali, 2007), conductivity, BOD (Rajagopal *et al*., 2010) temperature and DO (Parikh and Mankodi, 2010) were described. While negative correlation with water

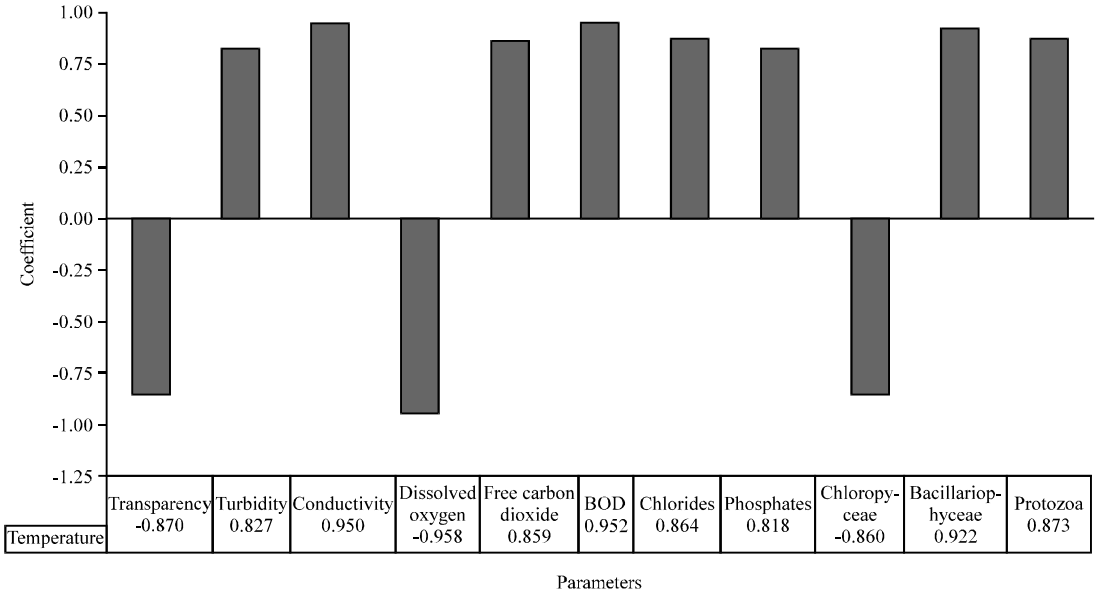

Fig. 1: The significance correlations between temperature and different parameters

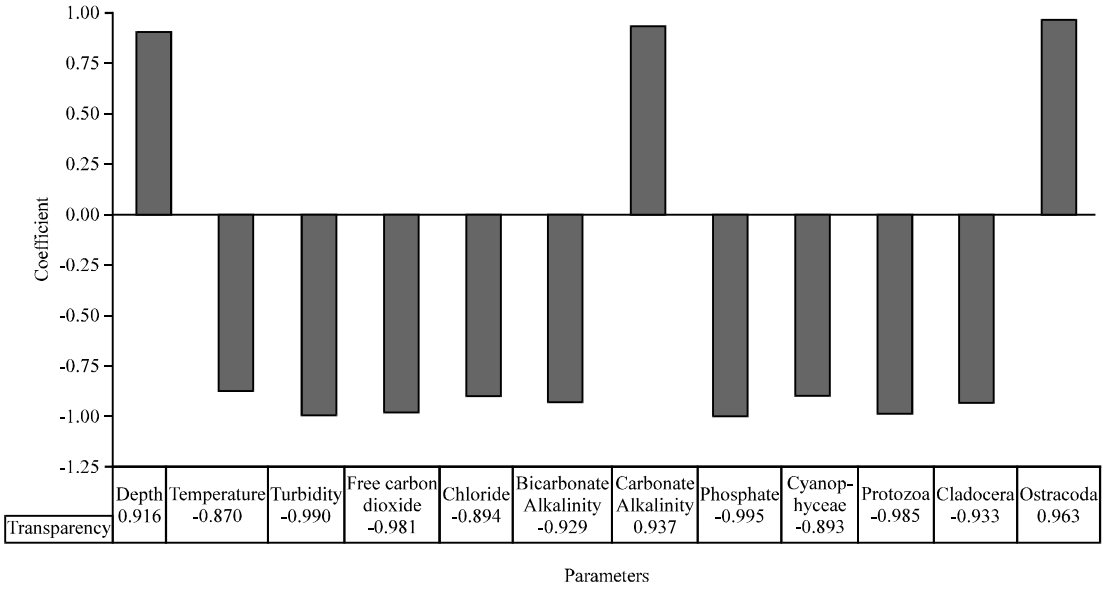

Fig. 2: The significance correlations between transparency and different parameters

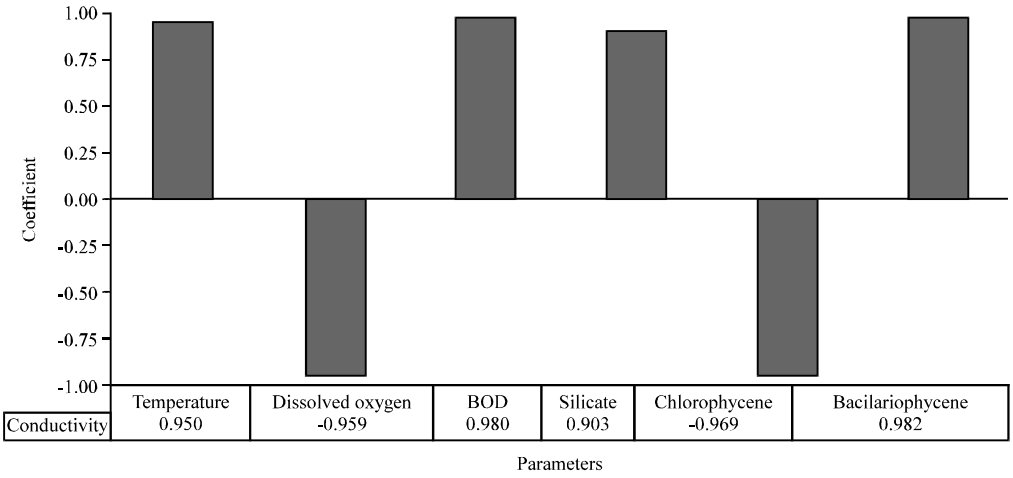

Fig. 3: The significance correlations between conductivity and different parameters

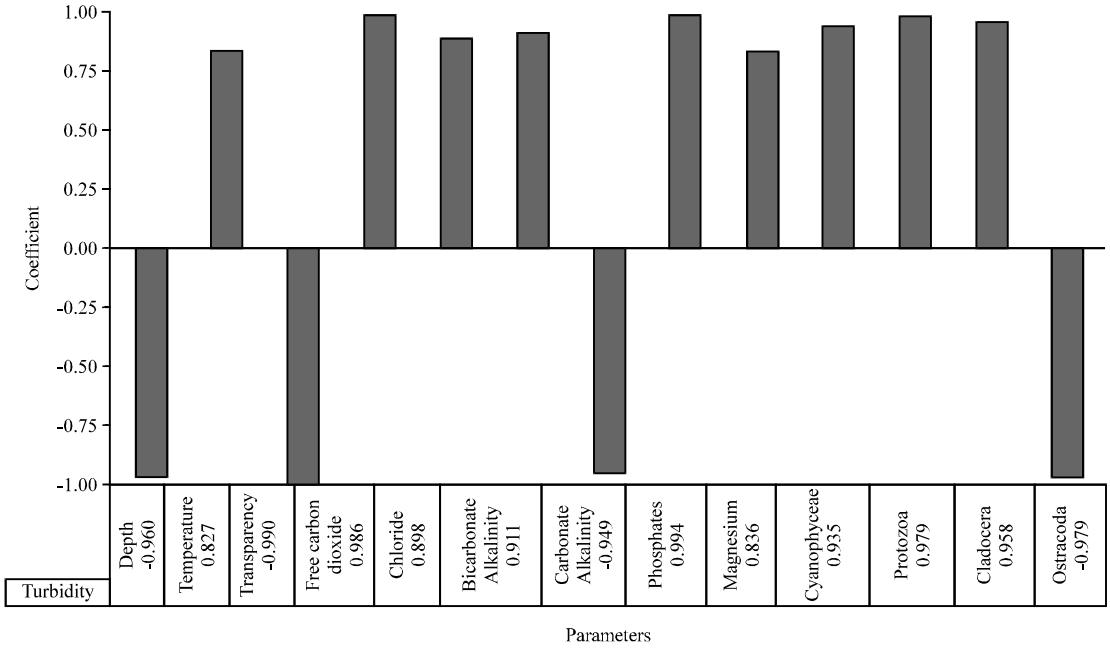

Fig. 4: The significance correlations between conductivity and different parameters; significnace corelations of turbidity

temperature and transparency (Sunita *et al*., 2007), dissolved oxygen (Hannan, 1979) was described.

In the present study, water temperature showed positive correlation with turbidity, TDS, conductivity, free carbon dioxide, BOD, chloride and phosphate while negative correlation of water temperature with transparency and dissolved oxygen was observed.

A positive correlation between transparency, phosphate, nitrate, TDS, DO, free CO_2 (Nair *et al*., 1980) while negative correlation between transparency and turbidity was observed by Kamal *et al.* (2007).

In the present study, transparency showed positive correlation with depth and carbonate alkalinity while negative correlation of transparency with temperature, turbidity, free CO_2, chloride, bicarbonate alkalinity and phosphate was observed.

A positive correlation of electric conductivity with TDS, chloride, alkalinity (Mehta, 2010), pH, turbidity, TDS, alkalinity (Bala and Mukherjee, 2010) while negative correlation between electric conductivity and DO was reported by Rajagopal *et al.* (2010). In the present study, electric conductivity showed the positive correlation with

temperature, BOD, silicate while negative correlation with DO. Abdel-Satar (2001) reported a positive correlation of TDS with conductivity.

Kumarai and Anshmali (2007) reported the positive correlation of turbidity with TDS, BOD, hardness, magnesium while negative correlation of turbidity with phosphate, nitrate was reported by Kamal *et al.* (2007).

In the present study, turbidity showed the positive correlation with temperature, free CO_2, chloride, bicarbonate alkalinity, phosphate and Magnesium while negative correlation with depth, transparency and carbonate alkalinity.

CONCLUSION

The present study summarizes, the seasonal fluctuation in various physic-chemical and biological parameters in water of Mujnj Sagar Talab as exploratory statistical data. The interrelationship between various parameters suggests the association of physico-chemical parameters with biological parameters.

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