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# CAN KERWAN RESERVOIR BE CONSIDERED AS A POTENTIAL SITE FOR CONSERVATION OF THREATENED FISH? CASE STUDY OF ITS PHYTOPLANKTONS

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**ABSTRACT:** The present study comprises analyses of biological parameters of Kerwan reservoir . In fact, this parameter is complementary to other physico and chemical parameters when projected together to present an integrated image of the reservoir in regard to its suitability for propagation and multiplication of threatened fish fauna mahseer. The world-famous game fish Mahseer are declining in their numbers and sizes in different parts of India, due to indiscriminate fishing of brood stock and juveniles, fast environmental degradation of aquatic ecosystems, construction of dams, barrages, weirs, etc. under various river valley projects.The methodology adopted to conduct above mentioned study is as follows. Monthly samples of water were collected from the four sampling stations of kerwan reservoir for a period of eighteen months. The parameters were analyzed according to the Standard Methods of Golterman et al. (1978), Boyd (1979), NEERI (1986) and APHA (1995).

During the period of study it was observed that the minimum number of chlorophyceae species recorded were 23 and maximum was 37 . Minimum number of species of bacillariophyceae was 10 maximum was 15 . Number of species of cyanophyceae recorded was 6, and was minimum and 9 species were recorded , which was maximum.Number of species of euglenophyceae ranged between 1 which was minimum and 3, which was maximum.

The quantitative analysis reveals that the range of phytoplankton remained between 800 organisms/ltr. to 3050 organisms/ltr. As discussed by Welch (1952) lakes with high plankton abundance are known as eutrophic. The values of phytoplankton in Kerwan reservoir also indicate its eutrophic state, though to a lesser degree.

Thus,it could be inferred by the observations and as it has been stated by several investigators the mahseer species has shown adaptability from riverine to lacustrine condition it can be concluded that this fish can be well protected in Kerwan reservoir if managed scientifically.

## INTRODUCTION

Habitat destruction, aquatic pollution and introduction of exotic species are few reasons for decline in the number of this important game fish and food fish .There are several examples in India where this fish is being protected in lakes and reservoirs. Kerwan reservoir, which is subject to investigation in this study, is also one of such reservoirs.

Kerwan reservoir is selected to conduct study due its suitability for conservation of mahseer. The topography of this subject suits mahseer development. It is located at the

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outskirts of Bhopal, around 12 km. away from the capital city, at the latitude 23°-9'-55" N and longitude 77°-22'-25" E. The reservoir harnesses the water of Kerwan river, a tributary of Kaliasot river, which in turn joins the Betwa river system.

Only a few houses exist in the vicinity of the reservoir at the dam site. Consequently, it is not exposed to a major source of pollution. However, a certain amount of pollution is caused by the surrounding villages of the Kerwan river. Since the reservoir is also used as a popular picnic spot it is also polluted to some extent by the dumping of wastes by the visitors.

Though Mahseer is mainly herbivorous, to a lesser degree it also exhibits carnivorous habits. Its feeding preferences are filamentous algae, gastropods, insects and their larvae, aquatic weeds and their seeds, crabs, earthworms, insects and shrimps. Kerwan reservoir, which falls in the jurisdiction of M.P. Matsya Mahasangh is an irrigation reservoir that has been declared as restricted for fishing by the Mahasangh. Thus, the present study is an effort to understand the role of biological parameters(phytoplanktons) of the reservoir in reflection to its suitability for conservation of a fish species, i.e. mahseer.

## MATERIALS & METHODS

As throughout the stretch of the reservoir it is seen that there has been an apparent similarity and uniformity in the physical appearance of water . It was also observed that the aquatic macro vegetation was remarkably scarce. Four sampling stations S-1,S-2,S-3,S-4 were selected at this reservoir. Samples were collected from all the three stratas i,e surface, middle and bottom layers of the water.

For estimation of phytoplankton one ltr. of water sample was collected in a bottle.Lugol's solution was added to the bottle so as to preserve the phytoplanktons for further analysis . The sample was brought to the laboratory for quantitative and qualitative analysis. It was then centrifuged for total sedimentation. Supernatant liquid was taken out with the help of pipette and the sample was concentrated up to 10 ml. as described by Wetzel and Likens (1979).

## QUANTITATIVE ANALYSIS OF PHYTOPLANKTON

Drop count method was used for the quantitative estimation of phytoplankton. The abundance of phytoplankton was expressed as organisms per litre by using following formula -

$$\text{Organisms/ltr.} = \frac{N \times Y \times X}{V}$$

where,

N = number of organisms per drop.
V = volume of original sample.
X = total volume of the concentrated sample (ml.)
Y = volume of one drop (ml)

## QUALITATIVE ANALYSIS OF PHYTOPLANKTON

Identification of phytoplankton was done according to the keys given by Pennak (1953), Edmundson (1959), Ward and Whipple (1959), Needham and Needham (1962) and APHA (1995).

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## OBSERVATIONS AND DISCUSSION

### QUALITATIVE AND QUANTITATIVE ANALYSIS

Minimum number of chlorophyceae species recorded during the period of study were 23 at S-4 and maximum was 37 at S-3. Minimum number of species of bacillariophyceae was 10 at S-3 maximum was 15 at S-2. Number of species of cyanophyceae recorded at S-4 was 6, and was minimum and 9 species were recorded at site 2, which was maximum.

Minimum number of reported species of euglenophyceae was 1 at S-2 and at S-1 it was recorded to be 3, which was maximum(Figure 1)

During the study period at S-1 the minimum number of phytoplankton recorded were in the month of February and it was 950 organisms/ltr. and in July maximum number observed was 3050 organisms/ltr. . Similarly at S-2 the minimum number of phytoplankton were recorded in February and was 850 organisms/ltr. with a maximum number of 3000 organisms/ltr. in July .

At S-3 the minimum reading of 800 organisms/ltr. was recorded in the month of Feb and and maximum value was recorded in June and July months which was 2750 organisms/ltr. respectively. At S-4 only 800 organisms/ltr. which were noted to be minimum were recorded in the month of February and 2600 organisms/ltr. was the maximum in June .Thus the study indicated that the range of phytoplankton remained between 800 organisms/ltr. to 3050 organisms/ltr. which also shows a remarkable ascending trend in the number in the rainy season as compared with the rest of the months (Figure 2).

As the study revolves around the availability of food for the purpose of conservation of fish species, the qualitative analysis of the producers play a crucial role for deciding whether Kerwan reservoir could be considered as a conservation site or not. Sitewise readings through the qualitative analysis reports that at S-1 and S-2, sampling station Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae were represented by 26, 12, 8 and 3 and 30, 15, 9 and 1 species respectively. At S-3 sampling station Chlorophyceae 37, Bacillariophyceae 10, Cyanophyceae 6 and Euglenophyceae 2 species were recorde and 23, 12, 6 and 2 species respectively at S-4 sampling station in Kerwan reservoir. Among the species which were identified as bioindicators of eutrophic state of water quality in Kerwan reservoir were Scenedesmus abundans belonging to Chlorococcales, Cyclotella meneghiniana and Melosira granulate of Bacillariophyceae, Microcystis aeruginosa and Anabaena circinalis of Cyanophyceae.Microcystis and Cyclotella are considered as eutrophic indicators Rawson (1956) , Melosira granulata as an indicator of eutrophic waters, Teilling (1955) . Mason (1996) observed that in addition to Melosira and Microcystis, Anabaena, Stephanodiscs and Scenedemsus are also associated with eutrophic lakes.

As biological indicators react either positively or negatively to the changing parameter of water the are used for assessing the water quality. Phytoplankton, which are one of the primary producers of the organic matter in an aquatic ecosystem, are microscopic, free floating or freely swimming plant organisms known to have a typically short life span. Therefore, whenever any kind of utilization of water from a natural source is discussed, the study of phytoplankton is of primary interest. As we also know that phytoplankton posses unique ability to fix inorganic carbon and build up organic matter through primary

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productivity which makes them a subject of prime importance.Here the context of the study is to select the natural water body for the purpose of conservation of a threatened fish species thus the qualitative and quantitative analysis of the producer of this ecosystem play a very crucial role in decision , .

Welch (1952) classified the lakes with high plankton abundance as eutrophic.In the present study in Kerwan reservoir the total number of phytoplankton ranged from 800 to 3050 org/lit, these values of phytoplankton also indicate its eutrophic state, though to a lesser degree. In the summer season high values were observed in the reservoir of our interest which coincides with the findings of Oswald et al. (1957) and Vincent and Silvester (1979), who have also reported high summer values of phytoplankton.Blooms often cause heavy mortality of fish,Jhingran (1983) ,and the mortality of the fish is being variously attributed to oxygen depletion due to rich growth of algae, to the physical choking of the gills to their probable decomposition,and to the toxins liberated by the metabolism of algae. However, no such incidence of mortality of fishes was recorded in Kerwan reservoir and hence it could be assumed that there is no significant stress on fish particularly Mahseer.

## CONCLUSION

As the availability of food acts as a major factor for conservation of fish in the natural or artificial ecosystem, and this study also emphasizes on the qualitative and quantitative analysis of the phytoplanktons in the Kerwan reservoir, this would lead to a conclusion. The significance of this biological form can be considered of prime importance.. It is seen that phytoplankton comprises a considerable part of food of Tor tor. According to Bisth and Das (1981) algae, insects, crustaceans and diatoms are the major constituents of food of Tor tor. In the present study we found that the phytoplankton population ranging from 800-3050 org/lit was recorded which can be explored as a natural source of food for Mahseer species if proper stocking is practiced.

Throughout the study period we found that the quantitative analysis of phytoplanktons indicates that the reservoir is slightly heading towards eutrophic state. However, the growth of this magnitude cannot be considered as the blooming condition, which may many times prove to be fatal to fish population. Thus, in the era of ecotourism where tourism and conservation are considered as faces of coin such site could be considered for conservation of species which are dwindling in number day by day,On the basis of the above findings it can be concluded that Kerwan reservoir can provide suitable habitat for thriving the Mahseer fish, if the stocking, raising and management practices are adopted scientifically. Any conservation effort of an endangered species can be futile if the feeding ecology of particular species is not taken care of. As seen from food preferences of Narmada Mahseer for aquatic plants, and filamentous algae, the utility of this species in biological control of macrophytes in tanks and reservoirs is very promising.

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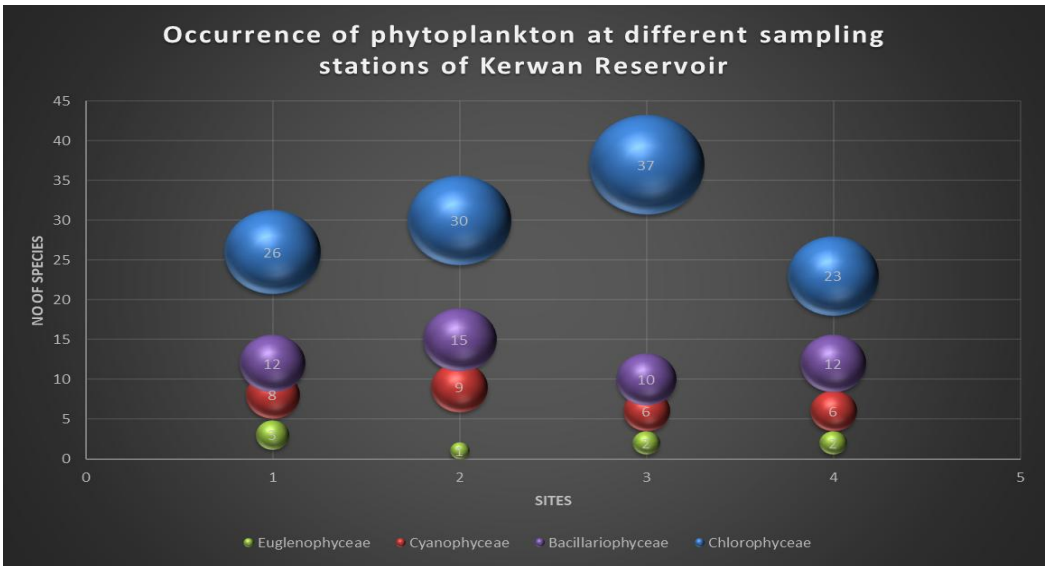


**Figure 2: Phytoplankton concentration at different sampling stations of Kerwan reservoir**