

University Grants Commission (UGC)

Minor Research Project

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File No. 47-022/12 (WRO) dated 05 Feb. 2013

Title of Project: **“Limnological studies of Majalgaon Reservoir of Marathwada, Maharashtra State”**

Executive Summary

In any aquatic ecosystem limnological characteristic can affect both fauna and flora. Biodiversity contribute both directly and indirectly to human such as food for good health, security, social relationship, life and freedom for choice etc. In last decade people interfere with ecosystem and over exploitation of natural resources its result that biodiversity decreases. But the losses in biodiversity and change in ecosystem service have adversely affected the well-being. The present study is relevant to limnological study, biodiversity of zooplankton and fishes (species) in Majalgaon Reservoir. This study explains that Majalgaon Reservoir is in rich biodiversity of zooplankton, fishes and need to conservation in future.

The investigation generated some important baseline data on the pollution status Zooplankton and fish community structure of the reservoir. These data would be helpful in planning for future policy decisions on using the reservoir in the better conservation and management of the precious wildlife in the world-famous sanctuary. Analysis and interpretation of the data on diversity of biota and water quality parameters provided the necessary information to assess the impact of local people, researcher, and scientist related activities on the limnology of the reservoir.

Physicochemical parameters:

The present study is aimed to the water quality of Majalgaon reservoir is useful for the drinking purpose and recreational activity is to be introduced in the reservoir. In the present investigation the physic-chemical parameters was analyzed and to obtain the range of the parameters are within the prescribed limit of WHO and ISI. It may be used for the drinking purpose it is necessary to the proper treatment before to use as drinking purpose. The range of physic-chemical parameter is suitable for the fishery activities.

Throughout the study period the atmospheric temperature and water temperature both the values were high in the summer, moderate in monsoon and lower in the winter. The transparency values were maximum during summer and minimum during monsoon. Low value of transparency in monsoon may be due to influx of rain water from catchments area, clouding, less penetration of light and high turbidity due suspended inert particulates matter. However, high valued of transparency in summer may be due to clear atmosphere and high light penetration. The maximum pH was (8.6) recorded in summer and minimum pH was (7.3) in winter. The high range of pH may be due to the biological activates. Significant changes in pH also occur due to disposal of drainages, seasonal variations may be due to variation in the photosynthetic activity which increases pH due to consumption of CO₂ in photosynthetic process due to alkaline in nature. Total solids ranged from 300 to 500mg/l. Minimum total solids were recorded in December and maximum total solids were recorded in September. Seasonal analysis states that low total solids recorded in winter season while maximum value in monsoon due to addition of solids from surface runoff. Total suspended solids ranged from 102 to 173 mg/l. maximum total suspended solids were recorded in monsoon months and minimum TSS in winter and to be followed by summer seasons. Seasonal analysis states that low TSS recorded in winter season while maximum value in monsoon due to addition of solids from surface runoff. The maximum value of total dissolved solids was recorded in rainy season 409 mg/l and minimum were recorded in winter season 164 mg/l. The high value of TDS during rainy months may be due to addition of domestic waste water, garbage and sewage etc.

The maximum value of chlorinity was recorded (26.5mg/lit) in March and minimum value was recorded (19.1mg/lit) in September. The Maximum values of chlorides were recorded during summer season because of scanty rain and high rate of evaporation. The maximum dissolved oxygen was recorded (8.5mg/lit) in August and minimum dissolved oxygen was recorded (7.3 mg/lit) in May. In the present investigation it was observed that dissolved oxygen is maximum in monsoon season and minimum in summer season. Carbon dioxide value ranged from 2.2 to 3.2mg/l. 2.2 values recorded in monsson and maximum value 3.2mg/l carbon dioxide recorded summer months. The maximum alkalinity value (144mg/lit) in December at site 1 and it was recorded minimum (104mg/l) in June at site S₃. In present investigation results show that the total alkalinity was low in rainy season and high in winter season due to evaporation of water and increase in biological activity. During the study period the total

hardness of water was recorded (120mg/lit) maximum in December at site S₁ & S₂ and minimum (86mg/lit) in April at site S₂. The low values of hardness were recorded during summer season and higher values were recorded during winter season. Chemical oxygen demand values ranged from 4.9 to 8.43mg/l. Minimum 4.9mg/l. 4.9mg/l COD was recorded in February at site S₂ & S₃ and maximum COD recorded 8.43mg/l in April month at site S₂. BOD value during rainy season 7.10mg/l and lowers during summer season 2.31 mg/l. The BOD in different season in the present study indicates pond as moderately polluted.

Zooplankton Diversity

Zooplankton studies for diversity and density were carried out and revealed four major groups (Rotifera, Cladocera, Copepoda, Ostracoda and protozoa). The studies for the diversity of zooplankton revealed that the

1. Rotifera represented by 8 species viz. *Brachionus calyciflorus* (Pallas, 1834), *Brachionus caudatus* (Barrois and Daddy, 1894), *Brachionus forficule* (Weirzejski, 1891), *Brachionus angularis* (Gosse, 1851), *Brachionus bidentata* (Jokubsky, 1912), *Trichotria tetractis* (Ehrenberg, 1830), *Polyarthra major* (Burckhardt, 1900), *Filinia terminalis* (Plate, 1886).
2. Cladocera represented by 6 species viz. *Moina macrocopa* (Straus, 1820), *Moina micrura* (Kurz, 1874), *Diaphanosoma excisum* (Sars, 1865), *Daphnia longirimis* (Sars, 1861), *Leydigo acanthocercoids* (Fischer, 1854), *Ceriodaphnia cornuta* (Sars, 1885).
3. Copepoda represented by 5 species viz. *Heliodyptomus viduus* (Gurney, 1916), *Trpocyclop prasinus* (Fischer, 1886), *Paracyclop fermbrialis* (Fischer, 1853), *Mesocyclop leucarti* (Claus, 1857), *Mesocyclops hyalinus* (Rehberg, 1880)
4. Ostracoda represented by 2 species viz. *Hemicypris fossulata* (Baird, 1845), *Cypris globosa* (Baird, 1845).
5. Protozoa represented by 2 species Viz. Paramecium cadatum, Vorticella companula

The occurrence of zooplankton seasonal variation in Majalgaon reservoir as following order-

Winter : Rotifera > Ostracoda > Copepoda > Cladocera > Protozoa

Summer : Rotifera > Copepoda > Cladocera > Ostracoda > Protozoa

Rainy : Rotifera > Copepoda > Cladocera > Ostracoda > Protozoa

All five groups of zooplankton showed highest density in summer months, lowest density in winter months except copepoda and ostracoda. Summer highest density due to higher temperature, higher standing crop of primary producers leading to availability of food, higher alkalinity and less quantity of water (dilution effect), simultaneously dissolved oxygen and hardness of water was also favorable for planktonic growth.

Ichthyofaunal diversity:

The results of present study confirm the occurrence of 42 fish species belonging to 29 genera, 15 family to 9 orders. (Table 1) The order Cypriniformes was dominant with 20 species to be followed by order Siluriformes with 8 species, Channiformes with 4 species, Perciformes with 3 species while the orders of Clupeiformes & Mastcembeliformes 2 species, and rest of the orders Angulliformes, Beloniformes and Mugiliformes by single species.

In reservoir most of the important fishes Commercial food fishes, fine food fishes are abundantly found due to high primary productivity is occurring in reservoir. Most important advantage of this reservoir is Exotic carp and Indian Major carp fish seed introduced by local fisherman which is produced by Maharashtra Fish Seed Production Centre (MFSC) and productivity given by them.

Reservoirs fisheries of India is also important from social economic point of view as it has the potential of providing employment to about 2 million people (Khan et al. 1999).

Recommendations

- Conservation and ecofriendly utilization of biotic potential like fishery.
- Creation of awareness in the mind of people related to the water body about importance and survival of the water body through seminars, field study visiting etc.
- The Majalgaon reservoir is highly potential and can yield substantial quantity of fish production if advanced scientific fish culture technology is implemented and by avoiding excessive fishing throughout the year.
- To establish fish breeding center, which will helpful for fish culture and its production it will also helpful to solve the some unemployment.
- To establish ornithological center.

- It is also recommended that the Majalgaon water reservoir is not only the source of water for population but it is important source of fishery and it is an important aquatic ecosystem.
- Hence combined intensive effect of hydrobiologists, taxonomists, biotechnologists can be helpful for the survival and effective utilization of precious water body.

Research Paper Published:

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2. Rajkumar T. Pawar- Zooplankton diversity and Seasonal Variation of Majalgaon Reservoir, Maharashtra State, India. International Journal of Environmental Sciences. Vol. 6, no. 5., pp 718-725. 2016.
3. R.T. Pawar and C.J. Hiware-Studies on the Physicochemical parameters of Majalgaon Reservoir from Marathwada region, Maharashtra State. National Conference Proceedings on population growth Environmental Degradation: Problems and Prospects **Radheya Publication, Beed**, 2016, pp-23-34