



FISH DIVERSITY IN GOWDANAKERE TANK OF BHADRAVATHI TALUK, KARNATAKA

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Abstract:

The fish diversity of the Gowdanakere tank in relation to physico-chemical parameters was studied by monthly samples taken from February 2010 to January 2011. In this study, Gowdanakere tank supported 13 fish species belonging to 04 orders, 06 families and 12 genera. Among fish families Cyprinidae was dominant. Biodiversity status (IUCN-1994) and diversity indices of fishes is also studied. Physico-chemical characteristics responsible for the occurrence and distribution of fishes in this water body is discussed. The limnological parameters indicate the higher trophic status of the tank which can be attributed to anthropogenic pressure. Hence, proper management and utilization of this fish wealth is necessary to take up the sustainable steps to monitor and conserve fish health.

Key Words: Biodiversity Status, Diversity Indices, Fish Fauna, Gowdanakere Tank & Bhadravathi Taluk

Introduction:

Wetlands are the main resources exploited for inland fisheries and understanding of fish faunal diversity which is a major aspect for its development and the sustainability management. Wetlands in India support rich variety of fish species, which in turn support the commercial potential of the fisheries (Krishna and Piska, 2006). Fish can be used for ecological assessments at all levels of biological organization; assessment procedures are available at the levels of ecosystem, populations, individuals, organs and at the cellular and molecular levels (Harris, 1995). Besides to these credits, fishes are considered as one of the important protein rich food source among the aquatic fauna (Sukla and Upadhyay, 2000; Shahnawaz Ahmad et al., 2011).

Fishes are not only important indicators of ecological health and the abundance, but also maintain a balance in the food chain by consuming plankton and small animals and form food for many animals. This balance in food chain may be affected due to pollution in aquatic system. In addition, there are many threats to fish diversity such as construction of dam, which block the spawning migrations and introduction of exotic species and over fishing. Therefore, knowing the status of fish fauna is indispensable to prevent the loss of particular species (Ramanjaneya and Ganesh, 2016). The objectives of the present study is to document the fish species in relation to physico-chemical characteristics of water in Gowdanakere tank of Bhadravathi taluk, Karnataka.

Materials and Methods

Study Area: Gowdanakere tank is located in Kudligere village of Bhadravati taluk in Shivamogga district of Karnataka and this water body is also called as Nagappanakere tank. This tank is located 24 Km towards East from district head quarters Shivamogga. 11 KM from Bhadravati town and 262 Km from State capital Bangalore. The area of the tank is about 40 acres with a depth of 8-10 ft. The water body is utilized for fish culture and agriculture.

Fish and Water Sampling: The present study was carried out on a regular basis for a period of one year from February 2010 to January 2011 and fishes were collected with the help of fisherman by using gill nets of varying mesh sizes. The fishes were identified as per Jayaram (1999) and Talwar and Jhingran (1991). The physico-chemical parameters were recorded at regular intervals and analysis was done by following standard procedures of APHA (1998) and Trivedi et al. (1998).

Diversity Indices: Fish species diversity was subjected to diversity analysis using different indices like Shannon – Weiner index (H) (Shaji and Easa, 1998); Simpson index of diversity (1-D) (Simon, 1991); Pielous Evenness (Nelson, 1976) and Margalef's index (Margalef, 1972).

Results and Discussion:

The check list of fishes is given in Table 1. The fishes are categorized in to herbivores, carnivores and omnivores. Herbivore fish include *Labeo rohita*, carnivores fishes comprise *Notopterus notopterus*, *Clarias batrachus*, *Oreochromis mossambicus* and omnivore include *Cirrhinus mrigala*. In this water body almost all fishes are useful as food fishes and *Salmostoma*, *Puntius* species are used for ornamental purpose. In

Gowdanakere tank as far as biodiversity status (IUCN-1994) is concerned, 03 species is Not assessed (23.08 %), 06 species as Lower risk-near threatened (46.15 %), Vulnerable 02 species (15.38%), Lower risk least concern is one (7.70%) and 01 species included under the category of Data deficient (7.69%) (Figure 1). Shahnawaz Ahmad et al.(2011) studied the fish diversity of Sogane and Santhekadur tanks, Shimoga and they identified about 17 fish species which were represented by 4 orders, 11 families and 14 genera. The family Cyprinidae dominated the other groups of fish in both the tanks. Thirumala and Kiran (2016) worked on the cyprinid fish diversity of three lentic water bodies in relation to physico-chemical parameters in Shivamogga district of Karnataka. They identified 15 cyprinid fish species and as far as biodiversity status (IUCN), is concerned, out of 15 species, 5 species are LR-nt (33.33 %), 2 species as LR- Ic (13.33%) and NA and VU each with 26.67 % respectively. It has been shown that physico-chemical variables influence the distribution and abundance of fishes. All fishes are useful as food fishes except Puntius species which are valuable as ornamental fishes. Thirumala et al (2011) reported the fish diversity in relation to physico-chemical characteristics of Bhadra reservoir of Karnataka,

Among the fish families Cyprinidae was most dominant (Figure 2). This indicates good correlation with overall species richness across the sites and could be utilized by the biodiversity conservation managers for prioritization of sites of conservation and habitat restoration (Bergerot et al. 2008). The fish species recorded in the tank were economically important and having high commercial significance. Fish catch is low in rainy season compared to high harvest in winter and summer seasons. Scientific fishing standard and fishing quotas are to be worked out this will play an important role in protection of the tank and its biodiversity. Fishing of the spawn, fry and immature fish should be avoided. Subsidy loan facility may be provided on large scales, which may help in high yield of fish production. Thus it is need of every individual who have to play an active role to achieve the goals of sustainable fishery development and handover the resources in healthy conditions to the future generations. Therefore, the present analysis revealed that Cyprinid fishes are found to be the more dominant group than others which is supported by Singh et al. (2006). The fish species richness, abundance and biodiversity indices in all the two sites are shown in Table 2. The highest abundance and richness is recorded in Site 1. The Shannon-Weiner and Margalef indices shows highest in Site 1. But Simpson's index of Diversity (1-D) is almost similar in both the sites (0.91). The Pielous evenness value was high in site 2 (0.9).

Physico-Chemical Characteristics: The physico-chemical characteristics of water is play an important role for fish survival. The water temperature ranged between 23 and 31 °C and pH was alkaline in nature. The increase in pH values was due to increased concentration of bicarbonate alkalinity. The same results were achieved by Mawhoob Noman Alkadas et al.(2010). The results are also in accordance with those of WHO (1984a& b). The calcium content ranged from 14 to 42 mg/l and magnesium level was less than the calcium and it fluctuated from 10 to 34 mg/l. The low values of BOD (1.4 to 2.6 mg/l) shows the less quantity of biodegradable materials. Dissolved Oxygen (DO) is an important indicator of water quality. DO affect the solubility and availability of many nutrients and therefore productivity of aquatic ecosystems (Wetzel, 1983). Significant fluctuations in DO ranged 3.8-6.4 mg/l, thus supporting the concept that lentic water bodies under natural conditions contains a high quantity of DO ending with saturation point (Welch, 1952). The total alkalinity ranged from 88 to 210 mg/l. The total hardness values deviated between 52 and 84 mg/l and showed soft to moderately hard category. The optimal values of hardness ranged between 75 and 150 mg/l which supports the total fish productivity (Das, 1996). Hence, the water of the tank is suitable for fisheries.

Conclusion:

The study of the physico-chemical parameters of Gowdanakere tank of Bhadravathi taluk, Karnataka revealed that most of the water quality parameters are under tolerable limits. This water body contains economically important and cultivable fishes as well as some ornamental fishes. However, in recent days the water holding capacity of this tank is decreasing, which might affect the survival of fish fauna. Habitat loss, environmental degradation and human anthropogenic activities also contribute towards the disruption in the balance on aquatic ecosystem. This work will provide future strategies for development and conservation of fish species. Conservation measures require plantation in catchment area and information on illegal fishing. However, it is suggested to monitor the water regularly in this tank.

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Table 1: Fish diversity in Gowdanakere Tank of Bhadravathi Taluk, Karnataka

| S.No | Systematic Name | Site I | Site II | Abundance | Biodiversity Status (IUCN, 1994) |
|------|--|--------|---------|-----------|----------------------------------|
| | Order: Cypriniformes Family: Cyprinidae | | | | |
| 1 | <i>Salmostoma untrahi</i> (Day) | + | + | A-2 | NA |
| 2 | <i>Ctenopharyngodon idella</i> | + | + | A-1 | DD |
| 3 | <i>Cirrhinus mrigala</i> (Ham) | + | + | A-2 | LR-nt |
| 4 | <i>Labeo rohita</i> (Ham-Buch) | + | + | A-2 | LR-nt |
| 5 | <i>Puntius</i> sp. | + | + | A-(3-4) | LR-nt |
| 6 | <i>Cyprinus carpio cummunis</i> (Linnaeus) | + | + | A-2 | LR-Ic |
| 7 | <i>Catla catla</i> (Ham-Buch) | + | + | A-2 | VU |
| | Order: Siluriformes Family: Bagridae | | | | |
| 8 | <i>Sperata seenghala</i> | + | - | A-(3-4) | NA |
| | Family: Claridae | | | | |
| 9 | <i>Clarias batrachus</i> (Linn) | + | + | A-2 | VU |
| | Family: Channidae | | | | |
| 10 | <i>Channa marulius</i> (Ham-Buch) | + | + | A-2 | LR-nt |
| 11 | <i>Channa punctatus</i> | + | - | A-2 | LR-nt |
| | Order: Osteoglossiformes Family: Notopteridae | | | | |
| 12 | <i>Notopterus notopterus</i> (Ham) | + | - | A-(3-4) | LR-nt |
| | Order: Perciformes Family: Cichlidae | | | | |
| 13 | <i>Oreochromis mossambica</i> (Peters) | + | + | A-(3-4) | NA |

LR-nt= Lower risk Near threatened; NA-Not Assessed, VU- Vulnerable, DD- Data Deficient ; LR-lc- Lower risk least concern.

Table 2: Fish species richness, abundance and diversity indices of Gowdanakere Tank

| | Site I | Site II |
|------------------------------------|--------|---------|
| Species Richness | 13 | 10 |
| Abundance (N) | 68 | 55 |
| Shannon-Weiner Index (H) | 2.9 | 2.6 |
| Simpson index of Diversity (1-D) | 0.91 | 0.91 |
| Pielou Evenness | 0.8 | 0.9 |
| Margalef Index of species richness | 2.2 | 1.6 |

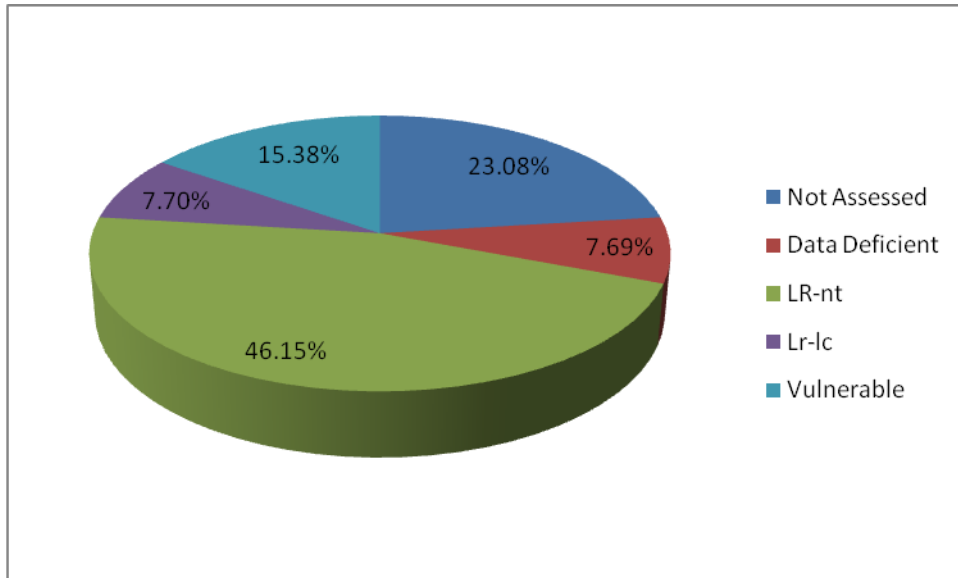


Figure 1: Biodiversity status (IUCN, 1994) of fishes in Gowdanakere Tank of Bhadravathi Taluk, Karnataka

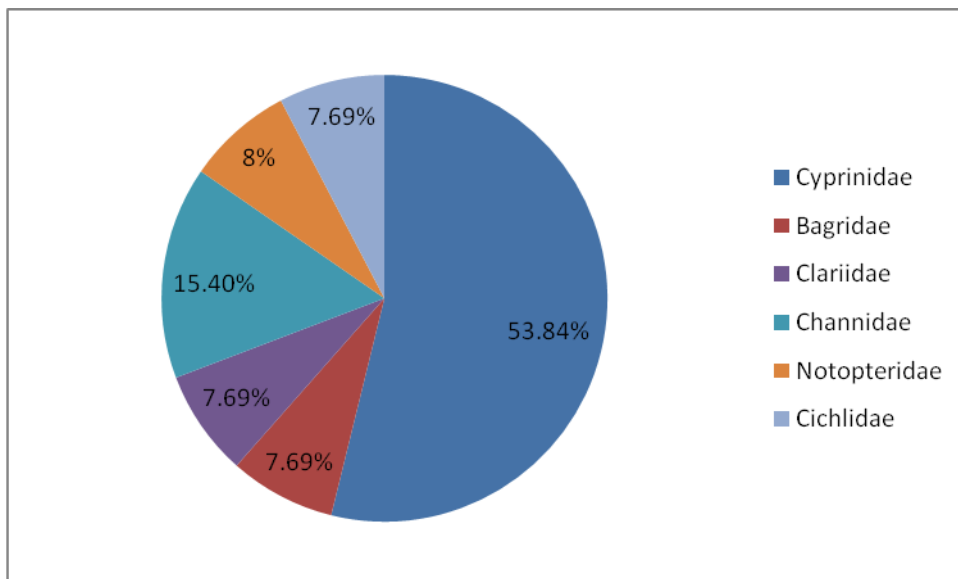


Figure 2: Percentage occurrence of fish families in Gowdanakere Tank of Bhadravathi Taluk, Karnataka