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ICHTHYOFAUNAL DIVERSITY IN DUGLAPURA LAKE OF CHIKMAGALUR DISTRICT, KARNATAKA

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Abstract:

The fishes plays an important role in human health and national economy. The current study was undertaken with the purpose of assessing the fish diversity in Duglapura lake of Chikmagalur district, Karnataka during June to December 2009. The present study has shown that lake supports low fish diversity and hence 12 fish species were recorded belonging to 4 orders, 6 families and 11 genera. Among the families Cyprinidae was the most dominant in the assemblage composition with 58.33% and rest of the families viz., Channidae, Cichlidae, Gobiidae, Notopteridae and Heteropneustidae each with 8.33% respectively. As far as Biodiversity status is concerned (IUCN-1994), 05 fish species are categorized into LR-nt, 3 Not assessed 3 Vulnerable and one as LR-lc respectively. Economic value of fishes is discussed in this paper. Therefore, for the proper management and utilization of this fish wealth, it is necessary to take up the sustainable steps to monitor and conserve this fish health in this lake.

Key Words: Biodiversity Status, Duglapura Lake, Economic Importance, Fish Fauna

Introduction:

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 indispensible to prevent the loss of particular species (Ramanjaneya and Ganesh, 2016; Thirumala and Kiran, 2017).

Water available on the earth is saline in the nature; only small quantity exists as fresh water. Fresh water has become a scare commodity due to over exploitation and pollution. Water is necessary for the existence of man who appeared earth in the early Pleistocene about two or three million years ago. In the recent years rapid increase in growth of population took place. This has brought stress on agricultural and industrial sector to cope up with the demand (Abhishek Giri and Shriparna Saxena,2017). The main objectives of the present study is to know the fish diversity` in relation to physico-chemical characteristics of water in Duglapura lake of Chikmagalur district, Karnataka

Materials and Methods:

Study Area:

Duglapura lake is a perennial man made water body and it lies in between 75° 72' 0" E longitude and 13° 72' 0" N latitude. It receives water from rainwater, agriculture run off and water from the Bhadra channel. Earlier the water was used for drinking purpose. But now a days due to anthropogenic activities, the water has become unhealthy for consumption. The water spread area of the lake is about 0.072 square km and depth is about 1.8 meters. The catchment area is 3.1 square kms. The water storage capacity is about 367 million cubic feet. The water is used for agricultural and fishery purposes.

Methods:

The study was conducted regularly for a period of six months (June-December 2009) and fishes were collected with the help of fisherman by using nets. Fish sampling was done by using a variety of fishing nets of varying mesh sizes viz gill nets, cast nets and dragnets. The fishes were identified as per Jayaram (1999), Talwar and Jhingran (1991) and Dutta Munshi and Shrivastava (1988). The physico-chemical parameters were estimated at regular intervals and analysis was done by following the standard procedures of APHA (1995) and Trivedy and Goel (1986).

Results and Discussion:

A total of 12 species of fishes belonging to 11 genera and 04 orders recorded. Among the families, Cyprinidae was the most dominant in the assemblage composition with 58.33% and rest of the families viz., Channidae, Cichlidae, Gobiidae, Notopteridae and Heteropneustidae each with 8.33 % respectively (Figure 1). Table 1 depicts abundance, biodiversity status and economic importance of fishes in Duglapura lake. Among the fish orders, Cypriniformes was dominant with 07 species (58.33%), followed by Perciformes with 03 species (25.0%). Siluriformes and Osteoglossiformes with one species each respectively (8.33%; Figure 2). As far as biodiversity status (IUCN, 1994) is concerned, out of 12 species, 05 species as lower risk-near threatened

(41.67%), Not assessed 03 species (25.0%) vulnerable 03 species (25.0%) and remaining one is included under the category of lower risk least concern (8.33% ; Figure 3). Figure 4 depicts the economic value of fishes in Duglapura lake. In this study, 50% of the fishes are included under food fishes, 33.67% belongs to Ornamental/food fishes and remaining 16.67% are included under the category of ornamental fishes.

Mawhoob Noman Alkadasi et al (2010), Shivashankar and Venkataramana (2012) and Narasimha Ramulu and Benarjee(2013) have studied fish diversity in relation to physico-chemical variables in the water bodies of India. Our studies have shown that water quality parameters including DO are the factors for the distribution of fishes. Our results are in confirmatory with above researchers.

The species of *Channa* and *Heteropneustes* have air breathing organs and fetch good market value as live fish. While, *Puntius* species have ornamental value due to small size and bright colors and are used as aquarium fishes. Though commercially important species are available they are not abundant to make fishery commercial and economical.

Thirumala et al (2011) studied the fish community of the Bhadra reservoir, Karnataka in relation to physico-chemical parameters. They identified 33 fish fauna belongs to Cyprinidae 18 species, Channidae 2 species, Bagridae and Siluridae with 3 species and a species each of Mastacembelidae, Ambassidae, Cichlidae, Claridae, Notopteridae, Cobitidae and Heteropneustidae. Besides identification, relative occurrence and economic importance of fishes were discussed by them. Narasimha Ramulu and Benarjee (2013) recorded the fish fauna of Nagaram tank, Warangal (AP state) and they reported 30 species belonging to 13 families. Among them 13 species of Cypriniformes, order Siluriformes consists of 7 species, Channiformes consists of 03 species, Perciformes 05 species, Osteoglossiformes 01 and order Atheriniformes consists of 01 species.

Thirumala and Kiran (2016) identified 18 fish species from Kudligere tank of Bhadravathi taluk, belonging to 04 orders, 07 families and 15 genera. They reported that among fish families Cyprinidae was dominant with 08 species followed by Bagridae with 03 species, Siluridae and Channidae with 02 species. While, Clariidae, Notopteridae and Cichlidae each with single species respectively.

The fish diversity of the Gowdanakere tank in relation to physico-chemical parameters was studied by Thirumala and Kiran (2017). They reported that, Gowdanakere tank supported 13 fish species belonging to 04 orders, 06 families and 12 genera. They concluded that among fish families Cyprinidae was dominant.

Physico-Chemical Characteristics:

The water temperature ranged from 26 to 27 °C. pH of the lake water was alkaline in nature and it deviated from 7.9 to 8.3. 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 Turbidity values fluctuated from 45 to 51.5 NTU. While, TDS content ranged between 310 and 370 mg/l. The calcium level ranged from 36 to 46.3 mg/l and magnesium level was less than the calcium and it fluctuated from 32.4 to 38.4 mg/l.

The moderate values of BOD (3.5 to 3.8 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 4.4-5.2 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 chloride content shows the range between 34.5 and 54.6 mg/l. The sulphate level ranged from 123 to 138.4 mg/l. The total hardness values deviated between 178 and 210.5 mg/l and showed moderately hard to hard category. The optimal values of hardness ranged between 75 and 150 mg/l which supports the total fish productivity (Das, 1996).Nitrate and phosphate contents fluctuated from 0.12 to 0.26 mg/l and 0.2 to 0.32 mg/l respectively.

Conclusion:

The present study shows the record of 12 freshwater fish species from Duglapura lake of Chikmagalur district, Karnataka. This ichthyo faunal study indicates that the water body is low in fish fauna which needs to formulate sustainable strategies to explore more and save fish community of this lake as a whole. The study of the physico-chemical parameters of Duglapura lake of Chikmagalur district, Karnataka revealed that the majority of the water quality parameters are under tolerable limits. This water body contains economically important and cultivable fishes as well as some ornamental fishes. Conservation measures require plantation in catchment area and information on illegal fishing.

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Table 1: Fish Abundance and Biodiversity status in Duglapura Lake of Chikmagalur district, Karnataka

Scientific Name	Abundance	Biodiversity Status	Economic Value
I. Order:Cypriniformes Family: Cyprinidae			
Salmostoma untrahi (Day)	A-2	NA	Ornamental/ Food Fish
Catla catla	A-3	VU	Food Fish
Cirrhinus fulungee	A-2	LR-nt	Food Fish
Labeo rohita (Ham-Buch)	A-2	LR-nt	Food Fish
Cyprinus carpio cummunis (Linnaeus)	A-2	LR-Ic	Food Fish
Puntius chola	A-2	VU	Ornamental
Puntius sophore	A-2	NA	Ornamental
II. Order:Siluriformes Family: Heteropneustidae			
Heteropneustes fossilis (Bloch)	A-2	VU	Food Fish
III. Order:Osteoglossiformes Family: Notopteridae			
Notopterus notopterus (Ham)	A-(3-4)	LR-nt	Ornamental/ Food Fish
IV. Order: Perciformes Family: Cichlidae			
Oreochromis mossambica (Peters)	A-(3-4)	NA	Food Fish
Family: Channidae			
Channa marulius (Ham-Buch)	A-2	LR-nt	Ornamental/ Food Fish
Family: Gobiidae			
Glossogobius giuris	A-1	LR-nt	Ornamental/ Food Fish

A1-rare; A2-common; A (3-4) - very common ; LR-nt= Lower risk Near threatened; NA-Not assessed, VU-Vulnerable, LR-lc- Lower risk least concern.

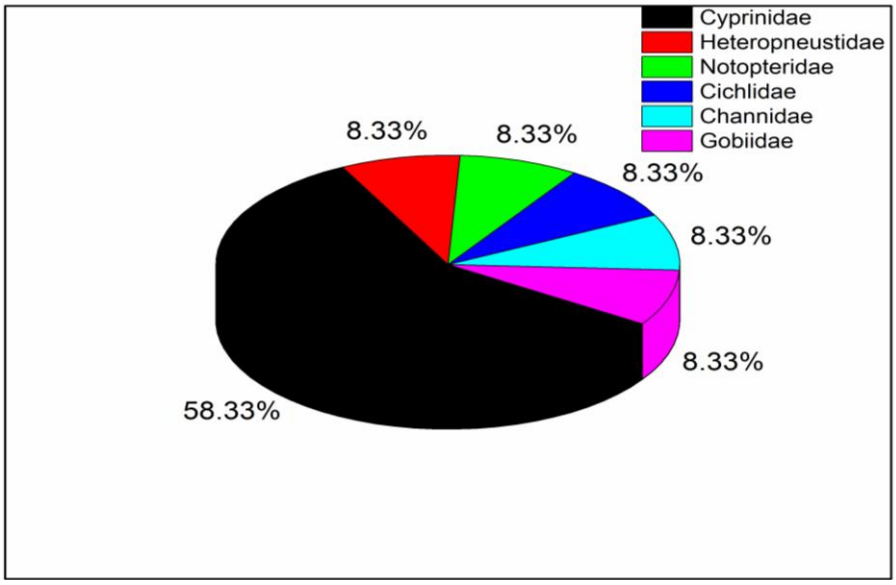

Figure 1: Percentage occurrence of Fish families in Duglapura Lake, Karnataka

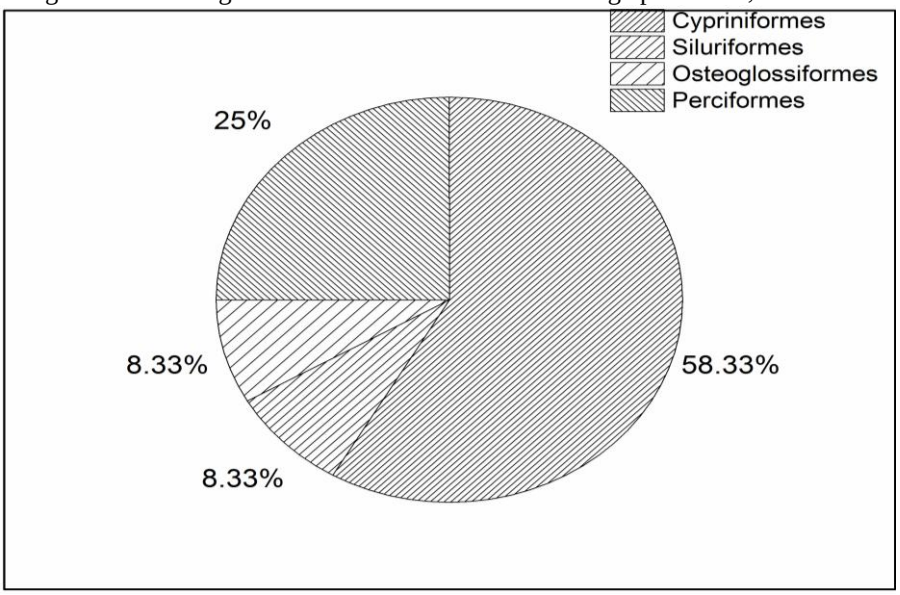

Figure 2: Percentage occurrence of Fish orders in Duglapura Lake, Karnataka

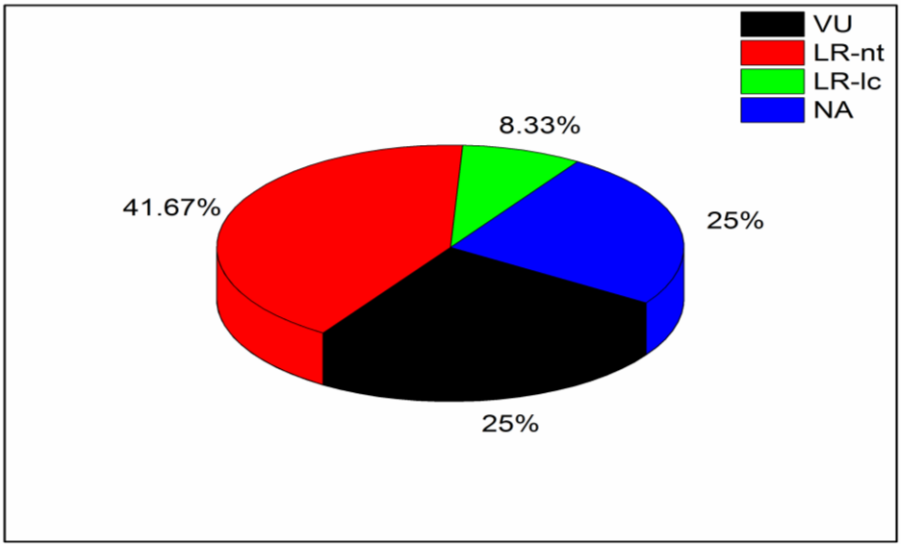

Figure 3: Biodiversity status of fishes in Duglapura lake of Chikmagalur district

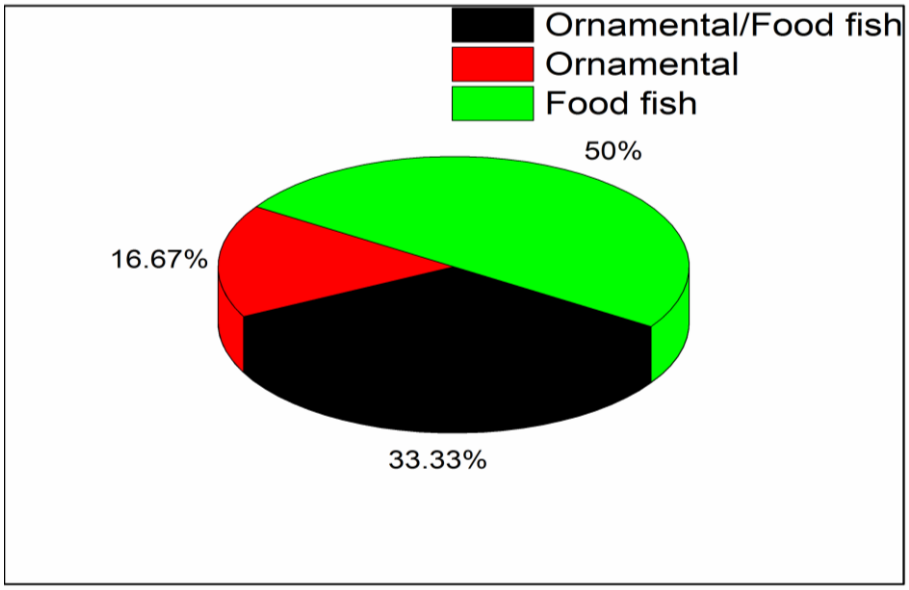

Figure 4: Economic value of fishes in Duglapura lake