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DIVERSITY OF DODDANALA RESERVOIR IN SANGLI DISTRICT, MAHARASHTRA (INDIA)

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ABSTRACT

The wetlands are suitable habitats for variety of animals, birds and many aquatic plants, which form a typical food web. A total number of 07 macrophytes were reported from Doddanala reservoir out of them 6 species of emergent and 01 was of submerged type. In aquatic ecosystem, the phytoplankton play an important role of primary producers. The Chlorophyceae is dominant group represented by 16 genera and 22 species whereas, Cyanophyceae showed 7 genera and 11 species. Bacillariophyceae reported with 04 genera and 05 species. Euglenophyceae, with only *Euglena acus*. Dinophyceae recorded with 2 species of 4 genera. The reservoir is secondarily being used for reservoir capture fishery. Important major carps, common carp, Chinese carp fish and 1 local species occurred in this reservoir. There were 17 species of aquatic birds were observed in the vicinity of Doddanala reservoir. Attempts have been made to observe the diversity of macrophytes, phytoplankton, fish and bird diversity to obtain the baseline data from June 2018 to May 2020.

KEYWORDS: *Diversity, Doddanala reservoir, Sangli district, macrophytes, Phytoplankton.*

INTRODUCTION

The word bio-diversity is a biological diversity, which refers to the diversity and variation among all living organisms on the earth.

Sangli district is one of the most important districts as far as agricultural development in Maharashtra. Sangli district is situated between 17.4’ 50^{o} E and 75.36N E latitudes.

Geographically, Sangli district shows two zones viz. area adjoining Krishna river basin and eastern drought prone area away from basin with low rainfall and typical arid geographical set up. The overall water level is up to 6-7 meters down but varies according to geographical area, strata and location of the particular village. The eastern part of the district shows low fertile soil because of natural set up where man-made reservoirs are source of irrigation besides the well.

Doddanala is major irrigation reservoir in Jath tahsil. It is about 145 km from district place. It is constructed during 1977-80. It is used as a drinking water source for the Jath town. It is also used for the cultivation of fishes. Purposely it is constructed for irrigation but now-a-days it is used for fishing activities and for other human activities.

MATERIALS AND METHODS

Study area: The total catchment area is 106 sq. km. the total capacity of storage is 630.90 Mcft and dead storage is 60.84 Mcft. Length of dam including slipway is 5 meter having clean overflow type of slipway. The height of dam is 18.6 meter and is of earthen type. The submergence area is 1000 hectare. The bottom of reservoir is rocky. Hence reservoir shows very less macrophytes. Reservoir was visited monthly for the period of consecutive years (June 2018 to May 2020).

Aquatic macrophytes: During every visit, aquatic macrophytes and marginal macrophytes were studied, photographed and collected from reservoir. In laboratory they were identified by using Cooke's 'The Flora of Presidency of Bombay' (1967), Flora of Kolhapur district (Yadav and Sardesai 2002) and other relevant published literature.

Phytoplankton: The phytoplankton were collected using plankton net. It was prepared by using bolting silk No. 125. Total 100 liters of water sample was filtered and concentrate was collected in 200 ml plastic bottle. Two separate sets of concentrated samples were preserved by adding 4% formalin and 1 ml of Lugol's Iodine and observed under Olympus trinocular 20C Hi microscope by focus 10 X 45X with 7.5 mega pixel camera.

Identification of phytoplankton was made following APHA (2005), Fritsch (1944), Bongale and Bharati (1978) and Prescott (1982) and consulting experts.

Fishery: The fishes captured by fishermen were observed during the regular visits of study period. Fishermen and their family members were interviewed about their whole activity and their profit. Fishes were identified following the state keys of Jhingran (1982, 1991), Jayaram (1999).

Avifauna: The birds observed in and around the reservoir were identified by using standard keys of Salim Ali (2002) and Bruce Campbell (1974).

RESULTS AND DISCUSSION

Macrophytes: The study on aquatic macrophytes is important to understand functioning of aquatic ecosystem. Most of the aquatic macrophytes may become nuisance and growing profusely.

From Doddanala reservoir, a total number of 07 macrophytes were reported out of them 06 species of emergent and 01 was of submerged type. *Ipomoea carnea* Jacq. subsp *fistulosa* (Marf. ex. Choisy) Austin, *Typha angustata* Bory & Chaub., *Cyperus rotundus* L.ssp. *rotundus*, *Fimbristylis dichotoma* Vahi, *Fimbristylis aestivalis* (Retz) Vahi, *Roralia aqatica* Lour. and *Hygroyza aristata* (Nees) were of emergent type macrophytes. *Ceratophyllum demersum* L.was submerged type of macrophyte.

The area around water reservoir was occupied by many weeds. They represent original natural set up with typical xerophytes. These were *Argemone maxicana* L., *Tridex procumbens* L., *Parthenium hysterophorus* L., *Euphorbia hirta* L., *Euphorbia microphylla* Heyne., *Cassia tora* L., *Acacia arabica* (Lamk.) Wild. *Tephrosia purpurea* (L.) Pers.,*Lantana camara* L.var aculeate (L.) Moldenke, *Pongamia glabra* Vent etc. surround the reservoir and also on dam line.

Phytoplankton: The Chlorophyceae is dominant group represented by 16 genera and 22 species where, Cyanophyceae showed 7 genera and 11 species. Bacillariophyceae reported with 4 genera and 5 species. Euglenophyceae with only *Euglena acus* during all seasons.. Dinophyceae recorded 2 genera with 4 species (Table 1).

Table 1: Seasonality of the phytoplankton occurred in doddanala reservoir.

S. N.	Name of the species	Doddanala		
		Rainy	Winter	Summer
	Chlorophyceae			
1	*Sperocystis spp.*	+	-	+
2	*Pediastrum biradiatum* Meyen	-	+	+
3	*Pediastrum duplex* var *glacilimum* West & West	-	+	+
4	*Pediastrum simplex* Meyen	-	-	+
5	*Pediastrum tetras* var *tetradon* (Corda) Rabenhorst	-	+	+

6	*Tetraedron muticum* var *punctulatum* (Reinsch) De Toni	-	-	+
7	*Dictyosphaerium pulchellum* Woood	+	+	+
8	*Westella botryoides* (W. West) de Wildmann	-	+	+
9	*Scenedesmus acuminatus* (Lag.) Chodat	+	+	+
10	*Tetrastrum triangularae* Komarek	-	-	-
11	*Ankistrodesmus spiralis* (Turner) Lemmermann	-	+	+
12	*Ankistrodesmus falcatus* var *mirabilis* (West & West) G.S. West	-	+	+
13	*Zygnema spp.*	+	+	+
14	*Volvox spp.*	-	-	-
15	*Chlorella ellipsoidae* Gerneck	-	+	+
16	*Chlorella vulgaris* Beyerineck	-	+	+
17	*Chlorococcum hunicola* (Naeg.) Rabenhorst	+	+	+
18	*Microspora spp.*	+	+	+
19	*Telimgia granulata* Bourrelly	-	+	+
20	*Haematococcus lacustris* (Girod.) Rostaf.	-	+	+
21	*irchneriella obese* var. *aperta (*Teil.) Brunnthaler	+	+	+
22	*Spirogyra spp.*	+	+	+
23	*Cosmarium depressum* Lundell	-	+	+
24	*Cosmarium tetraphtalmun* Brebission	-	+	+
	Cyanophyceae			
25	*Chorococcus disperses* var *minor* G.M.Smith	+	+	+
26	*Chorococcus limneticus* var *subsalsus* Lemmermann	+	+	+
27	*Chorococcus turgidus* (Kuetz.) Naegeli	+	+	+
28	*Merismopedia tenuissima* Lemmermann	+	+	+
29	*Merismopedia Trolleri* Bachmann	-	+	+
30	*Merismopedia elegans* var *major* G.M.Smith	-	+	+
31	*Aphanizomenon spp.*	-	+	+
32	*Lyngbya aestuaril* (Mert.) Liebmann	+	+	+
33	*Oscillatoria spp.*	-	+	+
34	*Spirulina major* Kuetzing	+	+	+
35	*Microcystis spp.*	+	+	+
	Bacillariophyceae			
36	*Cymbella spp..*	-	+	+
37	*Melosira granulate* Ralfs	-	+	+
38	*Melosira varians* Agardh	-	+	+
39	*Synedra capitata* Ehrenberg	+	-	+
40	*Cyclotella comta* Kuetzing	+	+	+
	Euglenophyceae			
41	*Euglena acus* var *rigida* Huebner	+	+	+

	Dinophyceae			
42	*Ceratium cornutum* (Ehrenb.) Claparede & Lachmann	-	+	+
43	*Ceratium hirundinella* (O.F.Muell.) Dujardin	+	+	+
44	*Ceratium carolinianum (*Bailey) Jorgensen	+	+	+
45	*Peridinium polonicum* Woloszynska	-	+	+
	Total	20	39	43

+ indicates present species.

The seasonal trend of occurrence of total phytoplankton was recorded as summer > winter > rainy. The summer maxima and rainy minima can be attributed to higher temperature and light.

The phytoplankton community is largely influenced by the interaction of number of physico-chemical factors (Jana 1973, Sankala *et. al.* 1981).

Algal abundance was highest during summer and its declining during rainy season due to turbidity, current velocity, water runoff causing dilution effect, loss of water through outlet and fluctuating water level. Similar observations are reported by Tiwari (2004) and Jadhav and Chavan (2009).

Vijaya Bhaskar *et.al* (2009) have reported the highest species diversity of Chlorophyceae in fresh water bodies of south west Maharashtra. Veerendra *et. al.* (2006) have reported in all 34 species of phytoplankton amongst Chlorophyceae with 13 species, Bacillariophyceae with 11 species, Cyanophyceae with 7 and Euglenophyceae with 3 species. Patil Alaka (2015) has recorded the total number of 22, 5, 4 and 2 species of Chlorophyceae, Cyanophyceae, Bacillariophyceae and Dinophyceae respectively in the Bhambarde reservoir of Sangli district.

Fish diversity: Economically, fishes constitute a very important group. The fishermen have established the co-operative society. This society obtains the right of fishing from government authorities for a period of five years on lease. If a tank is on lease by person or supported by co-operative society then, fishermen have to pay 10 Rs. per kg per day to lease man or co-operative society. The collected amount is used to purchase the seed of carp.

The prominent major carps are *Labeo rohita (Rohu), Catla catla, Cirrhinus mrigala (Mrigal).* The common carp is *Cyprinus carpio.* The Chinese carp is *Hypoplithalimichthys molitrix* (silver carp). Only one local varieties *Rosbara daniconius* (Dandi) was maintained well.

The nutritional and medicinal value of fishes has already been recognized by Hora and Pillay (1962), David (1969), Mishra (1952) and Jhingran (1982). Fish is an important food resource which is rich in proteins, carbohydrates and other nutritional constituents (Singh 2007).

Labeo rohita is commonly occurring fresh water major carp fish, available in the local ponds and rivers (Saradhamani *et. al.* (2007). *Cirrhinus mrigala, Catla catla, Labea calbosu, Labeo rohita, Ompok, Mastocembelus armatus* were recorded in the 11 water bodies of Assam by Kar *et. al.* (2009).

Avifauna: Even though birds are not aquatic in the real sense but they are dependent on aquatic habitat for food. Aquatic vegetation, bank side flora, trees in catchment area attracts the birds in reservoir. At Doddanala 17 species of birds were recorded during every visit (Table 2).

Table 2: Avifauna recorded in vicinity of doddanala reservoir.

S. N.	Aquatic bird	Scientific name
1	Large egret	*Casmerodius albus*
2	Grey Heron	*Ardea cinera*
3	Black Ibis	*Peeudibis papillosa*
4	Brahminy shelduck	*Tandorna ferruginea pall*
5	Nothern shoveller	*Anus clypeata*
6	Common coot	*Fulica atra*
7	Common sandpiper	*Actitis hypoleucas*
8	House crow	*Corvus splendens*
9	Indian pond Heron,	*Ardeola grayii*
10	Cattle Egret,	*Bubulcus ibis*
11	Little Egret,	Egretta garzetta
12	Common Quail,	*Coturnix coturnix*
13	Indian peafowl ,	*Pavo cristatus*
14	Indian grey Hornbill,	*Oclyceros birostri*
15	Plumheaded Parakeet,	*Psittacula cyanocephala*
16	Common Hoopoe	U*pupa epops*
17	Rock Bush Quail ,	*Perdicula argoondah*

Malkanna *et. al.* (2007) have observed large egret, Black Ibis, Shovellar, Brahmini duck, coot in the wetland areas of Raichur.

CONCLUSION

The reservoir is significant for aquaculture. The fisherman community is dependent on this reservoir for fish catch as income source. Now these days are of conservation of aquatic biodiversity. Few local diversity of aquatic ecosystem has maintained well in this reservoir.

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