ECOLOGICAL STATUS OF ADAN RESERVOIR IN RELATION TO PHYTOPLANKTON POPULATION.

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ABSTRACT

Adan reservoir is a perennial reservoir located in Washim District. Studies were carried out from July 2017 to December 2018. In this survey ecological status of reservoir in reference to phytoplanktons found were studied. Most of the Phytoplankton diversity observed were belongs to Chlorophyaceae, followed by Bacillariophyaceae and Cynophyaceae.

Keywords : *Adan reservoir, Ecological status ,Phytoplankton diversity.*

Introduction

Adan reservoir is an earthfill and rockfill reservoir on Adan river near Karanja, Washim district in state of Maharashtra in India. During monsoon reservoir gets enough water but in post monsoon period particularly March and April water level is very much reduced. The reservoir is surrounded by red laterite soil and black cotton soil. The inland reservoir is fed by seasonal drainage to its periphery and nearby local streams and springs. After detailed survey of the reservoir, 04 convenient stations were fixed for studying ecological status of dam in relation to phytoplankton population .

Sr. No.	Feature	Measurements
1.	Coordinates	20°25′17.55″N77°33′47.07″E
2.	Type of dam	Earthfill
3.	Impounds/ Source	Adan river
4.	Height	30.13 m (98.9 ft)
5.	Length	755 m (2477 ft)
6.	Dam volume	1428 km^3(343 cu mi)
7.	Total capacity	67,250 km^3(16,130 cu mi)
8.	Surface area	10,520 km^2(4,060 sq mi)

Table 1: The features of Adan Reservoir

Environmental Characteristics of Reservoir

Climate: The winter season is from December to about the middle of February followed by hot summer season which last up to May. June to September is the south-west monsoon, whereas October and November constitutes the post-monsoon season.

Temperature: Area experiences extreme variations in temperature with very hot summers and very cold winters. The mean minimum temperature is 14.4^0C and means maximum temperature is 45.8^0C at town in the district. The summers are extremely hot while the winters are dry and very cold the temperature may drop to 5 °C.

Rainfall: The rainfall analysis for reveals that the normal annual rainfall over the district varies from 750 to 950 mm from south west monsoon during June to September (Falling Rain genomics, 2018).

Humidity: Except during the southwest monsoon season when the humidity ranges

between 60 to 80 % the air is generally dry over the area. The summer months are the driest when the relative humidity is even less than 20% in afternoon on many days.

Cloudiness: The skies are heavily clouded during monsoon season in the latter half of the summer season and the post monsoon season there is moderate cloudiness particularly in the afternoons. In the rest of the year, clear or lightly clouded.

Wind: Winds are generally light with some strengthening in speed in the latter part of the hot season and in the early part of the monsoon season. The winds are mostly from the northeast or east during the post monsoon and yearly cold weather season. With February, wind become westerly to north western and continued to be so until June. In southwest monsoon season wind direction between southwest and northwest are most common. Hailstorms are common during February to April and also during the post monsoon period from November to January.

and is geographical coordinates are$77^0 33'$East Longitude and $20^0 24'$North Latitude. The height of dam is 30.13m and length 755m with gross storage capacity of 67,250 million per cubic meters. Its surface area is 10520km^2. We get all our daily needs from nature, in various forms such as sunlight, air as well as water which man can't prepare in the laboratory. So we are all dependent upon the earth and ocean to fulfill our requirements. Still the rate of production of aquatic components such as phytoplanktons zooplanktons, weeds varies according to the fluctuations such as availability of water, temperature, and of course consumption by predators. Lot of research have been carried out in this aspects by various workers such as Belsare D.K. (1986), Hynes H.B.N.(1975), Meshram C.B. (2006).

Materials and Methods

Field Stations For convenient monitoring, systematic field study and regular sampling stations were fixed at the reservoirs, after detailed survey of the reservoir four stations were fixed. The outlets, inlets, morphometric features were the important factors considered during selection of the sampling stations. These stations were designated as A, B, C and D.

- Station A: Inlet area – West Side
- Station B: Storage Area – North Side
- Station C: Storage Area - South Side
- Station D: Outlet Area – East Side

Water Sample Collections

Water samples were collected for the study of all the phytoplankton. The phytoplanktons were collected with the help of filtering net. The known quantity (1000 liter) of water filtered from sampling site through zooplankton net which is made up of fine mesh and phytoplankton collected in to 100 ml bottle which is attached at the bottom of net. Trivedy and Goel (1986) and APHA (1998).

The samples were then stained and preserved with Lugol"s Iodine solution. Such plankton samples were centrifuged at 1500-2000 rpm for 10-12 min. Then the abundance of phytoplankton was estimated by counting their presence on slide. Phytoplanktons were identified by using Adoni (1985), Smith (1950), and Manual of fresh water algae Tamilnadu.

Result and Discussion

Phytoplanktons are the major producer of all aquatic ecosystems, shows a great diversity. The plankton studies were noticed that total 11 species of plankton belonging to 9 genus under the 3 classes.(Table no 1). Among these Cyanophyaceae comprised of 6 species followed by Chlorophyaceae 3 species , Bacillariophyaceae 2 species were recorded. Moderate amount of planktons were found in July but the number was increased in December. Similar results were observed by Laskar and Gupta (2009) in Chatla lake, Aasam.

Adan Reservoir is an rain fed perennial water body. The reservoir was slightly

muddy due to deposition of surface runoff. The average range of variations in phytoplankton diversity at 4 sampling spots during July 2017 to December 2018 shown in table.

Sr No.	Name of Algae	Jul	Aug	Sep	Oct	Nov	Dec
	Class: Cyanophyaceae						
1	*Oscillatoria curviceps*	+	+	+	+	-	+
2	*Spirullina major*	-	+	-	+	+	-
3	*Spirullina prinnceps*	-	-	+	+	+	+
4	*Anabena spiroides*	+	+	-	+	-	+
5	*Nostoc pruniforme*	+	-	+	+	-	+
6	*Oscillatoria tenuis*	+	+	-	+	+	+
	Class:Chlorophyaceae						
7	*Pediastrum simplex*	+	+	-	-	+	+
8	*Spirogyra sps.*	+	+	-	+	+	+
9	*Closterium subscoticum*	-	-	+	+	-	-
	Class:Bacillariophyaceae						
10	*Naviculla cincta*	+	-	+	-	-	-
11	*Pinnularia gibba*	-	+	+	-	-	+

(+) = Present, (-) = Absent.

Table No. 2. List of algae at Adan Reservoir Karanja (Lad) in the month of Jully 2017 to December 2018

Cynophyaceae is a prominent group of algae in which photosynthetic pigments are present at the peripheral region of the protoplast. Nucleus is of primitive type and lacks nucleolus and nuclear membrane. *Oscillatoria , Spirullina, Anabena, Nostoc* these 4 genera were recorded. Few species of *Nostoc, Anabaena, Scytonema* form a thick substratum over the soil resulting a reclamation of land. About twenty two (22) filamentous members of Cyanophyceae like *Nostoc, Anabaena, Aulosira, Anabinopsis, Calothrix, Scytonema* etc. can fix atmospheric nitrogen and form nitrogenous compounds. These compounds are further absorbed by the plant for their metabolic activity and increase yield. All the above members have heterocyst. But certain non-heterocystous members like *Plectonema boryanum* are able to fix atmospheric nitrogen in anaerobic condition. Chlorophyaceae is a group of algae in which photosynthetic pigments are present in the form of chromatophores . In the present study 3 genera were found *viz. Pediastrum, Spirogyra* and *,Closterium* . Bacillariophyaceae includes mainly diatoms and are generally unicellular but colonial. 2 genera were observed *viz Naviculla* and *Pinnularia.*

Conclusion

The results obtained indicate healthy ecological status of the Adan Reservoir. As Cynophycean and Chlorophyacean members were abundantly observed due to which oxygen level of dam is found to be moderate. And the water is potable and can be used for household and agricultural purpose. Species diversity of phytoplankton and planktonic forms indicate good ecological condition of the dam.

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