

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 Chlorophyceae, followed by Bacillariophyceae and Cynophyceae.

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 14.4⁰C and means maximum temperature is 45.8⁰C 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°33' East Longitude and 20°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 10520km². 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 Cyanophyceae comprised of 6 species followed by Chlorophyceae 3 species, Bacillariophyceae 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: Cyanophyceae							
1	<i>Oscillatoria curviceps</i>	+	+	+	+	-	+
2	<i>Spirullina major</i>	-	+	-	+	+	-
3	<i>Spirullina prinnceps</i>	-	-	+	+	+	+
4	<i>Anabena spiroides</i>	+	+	-	+	-	+
5	<i>Nostoc pruniforme</i>	+	-	+	+	-	+
6	<i>Oscillatoria tenuis</i>	+	+	-	+	+	+
Class: Chlorophyceae							
7	<i>Pediastrum simplex</i>	+	+	-	-	+	+
8	<i>Spirogyra sps.</i>	+	+	-	+	+	+
9	<i>Closterium subscoticum</i>	-	-	+	+	-	-
Class: Bacillariophyceae							
10	<i>Naviculla cincta</i>	+	-	+	-	-	-
11	<i>Pinnularia gibba</i>	-	+	+	-	-	+

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

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

Cyanophyceae 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. Chlorophyceae 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*. Bacillariophyceae 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 Cyanophycean and Chlorophycean 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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Phytoplankton composition, biomass and primary production have been investigated in relation to environmental variables. Similarly, zooplankton abundance and biomass were also studied in detail and associated with limnological variables. The long-term effect on plankton community and abundance in Lake Awasa was investigated and compared with the available literature data. The trophic status of Lake Hayq, a crater and highland lake in Ethiopia, changed from oligotrophic condition to a stable eutrophic status some 20 years ago. For this shift, two hypotheses were proposed: (i) an increased nutrient to volume ratio and (ii) planktivorous Tilapia fish, which were introduced in the late 1970-ies. The microscopic plants that form the foundation of the ocean's food web are declining, reports a study published July 29 in Nature. The tiny organisms, known as phytoplankton, also gobble up carbon dioxide to produce half the world's oxygen output—equaling that of trees and plants on land. But their numbers have dwindled since the dawn of the 20th century, with unknown consequences for ocean ecosystems and the planet's carbon cycle. Researchers at Canada's Dalhousie University say the global population of phytoplankton has fallen about 40 percent since 1950. That translates or moderate ecological status, while Ayvacık Reservoir indicated a good water quality. From these results, the Med-PTI and the PTI seem to be appropriate metrics for assessing the water quality of the reservoirs in the North Aegean River Basin. Keywords: water quality, phytoplankton, Med-PTI, PTI, reservoir. January - February - March - April - May - June / Volume: 2 Issue: 1 Year: 2018. 77. Phytoplankton-based Indices and the Ecological Status of the Reservoirs. The ecological status of the reservoirs was assessed of based on phytoplankton metrics specially Med-PTI and PTI (Table 5). The highest Med-PTI and PTI values were recorded at Ayvacık Reservoir and Seviçler Reservoir respectively. With regard. Ecological relationships between phytoplankton communities and different spatial scales in European reservoirs: implications at catchment level monitoring programmes. *Hydrobiologia* 628, 27–45 (2009). <https://doi.org/10.1007/s10750-009-9731-y>. Download citation. The distribution of planktonic Cyanobacteria in Irish lakes in relation to their trophic states. *Hydrobiologia* 424: 91–99. Article CAS Google Scholar. The Late Palaeozoic phytoplankton blackout – Artefact or evidence of global change?. *Review of Palaeobotany and Palynology*, Vol. 148, Issue. 2-4, p. 73. The abundance and diversity of marine phytoplankton and the geologic timing of its major innovations and extinctions show a broad but inverse relationship to stages of terrestrial plant evolution. Successively, the first appearance of land plants, and the later major increases in global live terrestrial biomass and dead biomass in the form of plant litter, peat, coal, and soil humus, increased the retention on land of carbon, nitrogen, and phosphorus, and decreased the amount of these nutrients that was transported by rivers to the seas.