



ABUNDANCE OF COPEPOD FROM VASANT SAGAR. TQ . PUSAD. DIST. YAVATAMAL MAHARASHTRA

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ABSTRACTS:

Vasant Sagar was Constructed on The Penganga River. This project comes under watershed area of Pus project, which is in Godavari Valley on 20°1'41"N and 77°27'4" E. it is also known as "Upper Pus Talav / Upper Pus Lake/ Pus Dharan ".This Project was constructed as part of irrigation by the Government of Maharashtra in the year 1971. The dam impounds on Pus River. The Nearest city to dam is Pusad and it is situated in Yavatmal District of Maharashtra. Length of the dam is 744 m (2441.0 Feet). While the height is 42 m (137.8 Feet) . Spillway length is 261 m (856.2 feet). it is ungated. Catchment area of dam is 59.6 Thousand hectares. Gross storage capacity of dam is 113.92 MCM. Live storage capacity is 91.26 MCM. This Dam is also popular for Tourist attraction by its scenic beauty. Copepod diversity of Vasant Sagar was studied at four sampling stations during **July 2020 To Dec 2020**. The water body sustains heavy Zoo-planktonic biomass throughout the period of research, except in the rainy season. The seasonal abundance of the dominate Copepods are described like *Mesocyclops*, *Cyclops*, *Calanus*, *Macrocylops*, *Diaptomus*, *Microcylops*, *Tropocyclops*, *Orthocyclops*, *Eucyclop* etc. species of Copepods belonging to different groups were identified from the reservoir.

Key word: Copepods abundance, Pollution status of Vasant Sagar. Tq. Pusad. Dist. Yavatamal

Introduction:

In India, the water resources are under great stress from a plethora of human activities. Though the need for increased agricultural production, increased resource utilization, very little is known about the quality of water resources and impact of these activities thereupon. In the recent years environmental monitoring through regular assessment of water quality has become a crucial factor in the exploitation or conservation of aquatic resources. Zooplankton is abundant in the shallow areas of water body. During recent years there has been increasingly greater concern for inland fresh water resources, which are affected in different ways by all kinds of human activities. Vasant Sagar is the man made lakes and one such example of water resources, which form a part of a still larger system, the watersheds. Any human activity in the whole of the watershed is bound to influence the water in the reservoir and downstream. Deforestation, grazing and otherwise removal of vegetal in the watershed generally results in accelerated silting of the reservoir. The agricultural practices in the catchments area not only help increased silting but also responsible for addition of large quantities of nutrients, pesticides and organic matter, brought to the reservoir by the runoff through the stream. Not only the water quality in the reservoir is affected but its impact can also be left in the change in the biota, soil properties and physico-chemical status. The zooplanktons unlike phytoplankton are particularly distributed horizontally and vertically in an ecosystem. The zooplanktons forms an important group as it occupies an intermediate position in the food web, many of them feeding on algae and bacteria and in turn being eaten up on by fishes. They also indicate the trophic status of a water body, their abundance increase in eutrophic water. They are also sensitive to pollution and many species are recognized as Indicators of pollution. Water from this reservoir is being used for drinking purpose and fishery activities. On the other hand, due to increasing human and animal activities in it, the water is becoming polluted. Hence, the basic information and data on the aquatic ecosystem thought to be worked out in order to evolve effective and appropriate strategies for the management of the reservoir. The study of the reservoir in respect to Zooplankton availability is not worked out earlier. Similarly, no studies are carried out on the water quality of the lake and therefore, it was thought to study zooplankton in different parts of the lake, so that it would help in future planning for the reclamation of such lake and its utilization for intensive fish culture.

REVIEW OF LITERATURE

Planktons are important biotic components of aquatic habitat. They do determine the trophic status and the quality of water of reservoirs. A number of workers have made investigations in this fields to understand the various aspects of planktons such as plankton populations, their percent compositions, seasonal variations, productivity and their interrelationship between the biological community and its physico-chemical parameters. Dynamics of zooplanktons, diversity and community structure have been studied by Dimmick et al., (1982); Haper & Ferguson (1982); Pirako et al., (1982); Sehgal studied

Copepods and Crustaceans of fresh water ecosystem (1983); Jappensen et al. (1990) reported re-coupling between phytoplankton and zooplankton in the clear lake and lake Tohoe, which lie near opposite extremes of lake tropic status for most lakes. They suggested that linkage between zooplankton and phytoplankton may be work in lake with either extremely low or high productivity. Jappensen et al (1990). Studied plankton and fish in hypertrophic lake. The ecological status of the zooplankton in relation to prevailing ecological factors and the lake fishery of lake Naivasha was investigated by Kenneth (1990); Zooplankton investigations in case of domestically polluted ponds have been thoroughly carried out in some parts of India by several workers (Sahai & Sharma, 1988; 1990; Subbamma. 1992 and 1993; Varghese, 1992; Adholia and Vyas, 1993; Kodarkar, 1994; Kumar and Dutta, 1994; Naik and Unni, 1994; Thosar and Dande, 1994; and Bais and Agrawal, 1995).

GENERAL MORPHOLOGY OF COPEPODS:

Copepods are a group of lower crustaceans passing consecutively through a series of nauplius and copepodid stages, each transition being achieved by means of a molt. The anterior part of the body is broad and bears jointed appendages whereas the posterior part ends in a fork or furca (caudal rami) copepods vary in size from 0.3 mm to 18.0 mm almost all marine copepods have an entirely or largely vitreous body while alive preserved copepods rapidly lose their hyaline consistency and become cloudy and dark the terminology used varies with different authors the common terms used are as follows. 1) Head thorax and abdomen 2) Prosome, metasome and urosome 3) Cephalosome, thorax and abdomen. The terms used here are according to Huys and Boxshall (1991). In many species the head is not distinct from the thorax but is fused with one or more thoracic somites to form a cephalothorax or cephalosome. The body comprises of an anterior cephalosome of 6 somites and a post cephalic trunk of 9 somites plus the anal somite termed as urosome and the caudal furca, which represents the telson. The cephalosome consists of 5 cephalic somites and first thoracic somite fully incorporated into the cephalosome. The post cephalic trunk comprises the second to sixth thoracic somites each of which bears a pair of biramous swimming legs, the genital (7th thoracic) somite which bears the genital opening or openings in both sexes and 4 post genital abdominal somites. The abdominal somites are all limbless although the anal somite bears a pair of setiferous caudal rami. In many species the trunk somites are fused to each other or to the cephalosome.

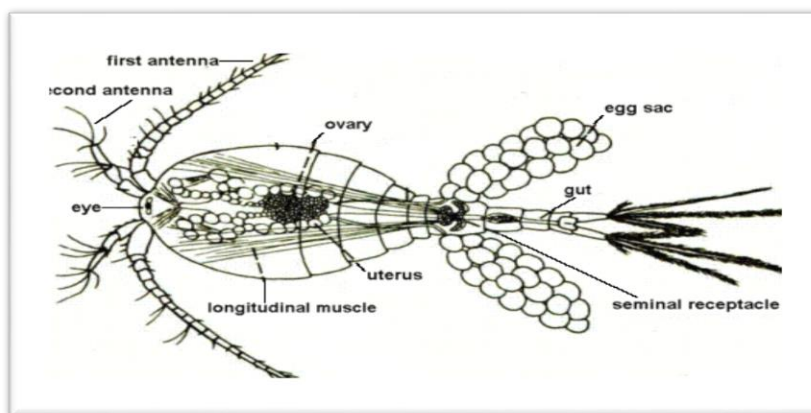


Fig : General Morphology of Copepods

HABITAT : Copepods have successfully colonized all salinity regimes from freshwater, marine and hyper saline inland water and all three regimes from subzero polar waters to springs and also in all majority are marine some are commensals and parasites.

LIFE CYCLE: The basic life cycle of copepods comprises two phases, naupliar and copepodid. The egg typically hatches into a nauplius larva defined by its small, un-segmented body and the possession of only three pairs of functional appendages, antennules, antennae and mandibles. There is a maximum of six naupliar stages and all six are retained in most free living copepods and in some parasites. Naupli may be planktonic, feeding on other planktonic organisms or lecithotrophic, relying on yolk stores for nutrients. In free living copepods there is a maximum of five copepodid stages and one body so mites is added at each molts' through this phase. In both sexes the fifth copepodid stage molts' into the adults. Mating takes place soon after the female becomes sexually receptive and adult males may engage in precopulatory mate guarding, holding pre-adult female until molt .The sequence of mating behaviors consists of mate detection, mate recognition and mate capture, culminating in copulation during which sperm containing spermatophore are transferred to the female. The full life cycle comprising six naupliar stages and five copepodid stages preceding the adult is retained in many families of parasitic copepods, especially those utilizing invertebrates

IMPORTANCE OF COPEPODS: (1) Copepods occupy a significant intermediate position in aquatic food chains, are usually omnivorous in habit, and when possible tend to be food selective. (2) A wide variety of food has been found in the copepod guts including algae, pollen, detritus, bacteria and rotifers. It was originally thought that all fresh water copepods were herbivorous filter feeders.(3) Increasingly the copepods or zooplanktons production has resulted in increased fish production.(4) Copepods have been used for the bioassay of toxins in water . (5) The importance of small planktonic copepods and their roles in the pelagic marine food webs. (6) There is a increasing evidence that some small copepods feed primarily as predators upon the heterotrophic protest rather than as grazers of phytoplankton.

MATERIAL AND METHODS:

SITE DESCRIPTION: **Vasant Sagar** is a man made reservoir located near Pusad District .Yavatmal . This project comes under watershed area of Pus project, which is in Godavari Valley on 20°1'41"N and: 77°27'4"E. It was constructed on The Penganga River

GEOGRAPHY AND DEMOGRAPHICS OF PUSAD CITY: Pusad city is located at 19.9104°N 77.5686°E. Its average elevation is 315 meters (1033 feet). it is mostly surrounded by hills. According to the 2011 Indian census, had a population of 73,046. its climate is extreme, with the temperatures reaching as high as 49 degrees Celsius (120 degrees F°) during the summer and as low as 5 degrees Celsius (41 degrees F°) during the winter. Experts believe this is the result of the "Basket Effect" (i.e. high-altitude hillside effect) since it is surrounded by hills. Two of Maharashtra's Chief Ministers, Vasantrao Naik, and Sudhakarrao Naik, were from Pusad.

GEOGRAPHY OF VASANT SAGAR:

S.No	Description	Data
1	Name of Reservoir	Vasant Sagar
2	Location :	Tq. Pusad Dist. Yavatmal
3	Basin	Godavari
4	Sub Basin	Painganga
5	Name of River	Pus River
6 (a)	Catchment Area (Sq.Km.)	596
(b)	Free Catchment area (excluding the C.A. of all U/S storages)	596
7	Type [Major / Medium / Minor / Minor (LS)]	Major
8	Year of completion	1970-71
9	Type of dam	Earthen Dam
10	Gross storage (Mm3)	113.91
11	Live Storage (Mm3)	91.26
12	Dead storage (Mm3)	22.65
13	Maximum dam height (m)	41.75

Fig. Google earth view of the **Vasant Sagar**

COLLECTION OF SAMPLES: For the study of various biotic parameters, water samples were collected from the selected four sampling stations. The water samples were collected, about 5 meter away from the shore and one-meter depth from the surface by using sieve net no. 25. Water was collected in a wide mouth polythene bottle for biological analysis. Plankton net (mesh size 64 μm) was used to filter 5 hundred liters of surface water to obtain the net plankton concentration. The sample is collected by GPA or OECD (2005), method. It was fixed with 4% formalin

Zooplankton studies: Sampler and hydrobios standard water was used for the qualitative and quantitative estimation of zooplankton. Identification of zooplankton was done by using key and monographs of Sehgal, (1983); Adoni, (1985); APHA (1985).

RESULTS AND DISCUSSION: Copepods observed from **Vasant Sagar** were represented by different species *Cyclops*, *Mesocyclops* (*M. oithonoides*, *M. dybowskii*, *M. tenuis*), etc. dominated the reservoir. Station wise abundance of copepods showed major population at stations III, IV. Station IV represented the highest population of copepods followed by station III and then station II, I. Though the abundance of us *Calanus*, *Macrocyclus*, *Diaptomus*, *Microcyclus*, *Tropocyclops*, *Orthocyclops*, *Eucyclop* was comparatively low. **Copepods** were represented by different species and among them *Cyclops* dominating the reservoir. Copepods exhibited two peaks i.e. one in summer and other in winter. This is in confirmation with the findings of George (1969); Chapman (1972) and Govind (1978). The summer peak may be due to the abundance of diatoms and blue green algae (Goswami and Selvakumar, 1977). Winter peak may be attributed to the abundance of phytoplankton in the present investigation. A decrease in rainy season may be because of predation of planktonivorous shrimps, prawns and fishes. This is well in agreement with Brandorff and De Andrade (1973). It can be concluded that the biotic components of the water of the reservoir investigated were, thus found to be dependent on large number of abiotic parameters in different combinations and these combinations, their abundance was also found to be dependent on food habits and macrophytes found in the water of reservoir and also in the catchments area. However, the results of the present study indicate the oligotrophic nature of the reservoir. Environmental variables like water temperature, alkalinity, pH, chloride, dissolved oxygen, and the nutrients like sulphates, nitrates, phosphates etc. were also found to be most important of all with respect to the productivity of the reservoir. The pollution indicator species were predominately found at certain regions of the reservoir where human activities were more, confirming that, in future, the water of reservoir may be unsafe for drinking, human welfare and also for intensive fish culture. Hence, it is concluded that, the present water body of this reservoir may become polluted. Looking towards the human welfare, phyto-planktons, zoo-planktons, Ichthyofauna & large number of visiting migratory birds, proper measures are essential to avoid the pollution of water of the reservoir so that still more migratory birds may visit in the coming years and similarly, this may lead to an increase in the fishery activities and proper use of water of the **Vasant Sagar** for the welfare of the society.

TABLE- VARIATION IN THE ABUNDANCE OF COPEPODS AT DIFFERENT STATIONS OF VASANT SAGAR

Sr. No.	Zooplankton	At Stations			
		I	II	III	IV
1	<i>Cyclops</i> *	+++++	+++++++	+++++++	+++++++
2	<i>Diaptomus</i> *	-	++++	+++++	++++
3	<i>Ectocyclops</i> *	-	-	++++	++++
4	<i>Mesocyclops</i>	++++	+++++	+++++++	+++++++
5	<i>Macrocyclus</i>	++++	+++	++++	++++
6	<i>Calanoids</i>	++	++	+++++	+++++
7	<i>Microcyclops</i>	+++++	-	++++	-
8	<i>Tropocyclop</i>	-	++	-	+++++++
9	<i>Orthocyclops</i>	-	-	+	-
10	<i>Eucyclops</i>	-	+	-	-

(+) Denotes 1000 Org/1 (-) Denotes Absent (*) Pollution Indicator Species

TABLE NUMERICAL ABUNDANCE OF COPEPODA (ORG. / L) AT DIFFERENT STATIONS OF VASANT SAGAR

Sr. No.	Zooplankton	At Stations				Total
		I	II	III	IV	
3	Copepods	20000	24000	38000	45000	127000

Table : CLASSIFIED RECORD OF COPEPODS FROM VASANT SAGAR

Phylum	Class	Family	Genus	Species
Arthropoda	Crustacean	Cyclopidae	1.Mesocyclops	<i>M.leukarti</i>
			2.cyclops	--
			3.calanus	--
	Maxillopoda	Macrocylops	4.Macrocylops	<i>M. albidus</i>
		Diaptomidae	5.Diaptomus	--
		Cyclopidae	6.Microcyclops	<i>M.varicans</i>
			7.Tropocyclops	<i>Prassinus Mexicans</i>
			8. Orthcyclops	<i>O.modestus</i>
			9.Eucyclops	<i>E.prionophorus</i>

IDENTIFICATION:1) MESOCYCLOPS *leuckarti*

2) CYCLOPES



3) CALANUS

4) MACROCYCLOPS *albidus*

5) *DIAPTOMUS*6) *MICROCYCLOPS varicans*7) *TROPOCYCLOPS prassinus mexicanus*8) *ORTHOCYCLOPS modestus*9) *EUCYCLOPS prionophorus***BIBLIOGRAPHY:**

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