ASSESSMENT OF WATER QUALITY AND PLANKTON DIVERSITY OF DABKA AND KAAVI

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ABSTRACT

The present study explores the diversity of plankton and water quality of freshwater of dabka and marine water of Kaavi. The fact that most development activities still rely on water and that many great civilizations in history emerged along or close to water bodies emphasizes the significance of water. The physical-chemical analysis and plankton diversity of dabka and kaavi are the subjects of the current research. This study was carried out from December 2022 to March 2023 over a four-month period. These sites' water samples were taken, and their physicochemical properties, such as pH, EC, turbidity, alkalinity, BOD, DO, COD, chloride, total hardness, calcium hardness, and TDS, were analyzed. Plankton are the bioindicators that are used to evaluate the present condition of the ecosystem. All ecosystems contain planktons, which are essential for preserving the balance and health of the ocean and its vast food webs. rom the two locations, a total of 38 phytoplankton species have been identified, with Cyanophyceae dominating the other phytoplankton classes. A number of physico-chemical factors, including temperature, pH, salinity, dissolved oxygen, total dissolved solids, and electrical conductivity at both sites, were positively linked with the zooplankton. Arthropods dominated the other zooplankton species, which included a total of 45 species that were qualitatively recognized.

Keywords: Bioindicators, planktons, Arthropods, Diversity, Cyanophyceae.

INTRODUCTION

A vital component of monitoring environmental pollution is water quality. Poor water quality has an impact on both the local the environment and aquatic life. All the factors that impact the water quality in the environment are described in this section. These characteristics can be physical, chemical, or biological elements. Physical characteristics of water quality include pH, temperature and turbidity. Chemical properties include elements like pH and dissolved oxygen. Algae and planktons are biological markers of water quality.

Plankton are those organisms which spends either part or all of their life in a drifting state, with no ability to swim against a current. Phytoplanktons produce their own food and thus are very important part of food chain and food web. They act as very good indicators of health of water resource. Plankton can be divided into two basic categories:

(a)Phytoplankton: The phytoplankton is defined as the microscopic plant life of the water, which functions as primary produced synthesizing the food. It belongs to the class Algae, which besides chlorophyll possess other characteristic pigments. The productivity of an aquatic system is directly related to diversity of phytoplankton. They are the source of food for zooplankton, fishes and other aquatic organisms. Phytoplankton is a group of free-floating microalgae that drifts with the water current and forms an important part of the ocean, sea, and freshwater ecosystems. Some examples of phytoplankton include diatoms, green algae, cyanobacteria, coccolithophores, etc.

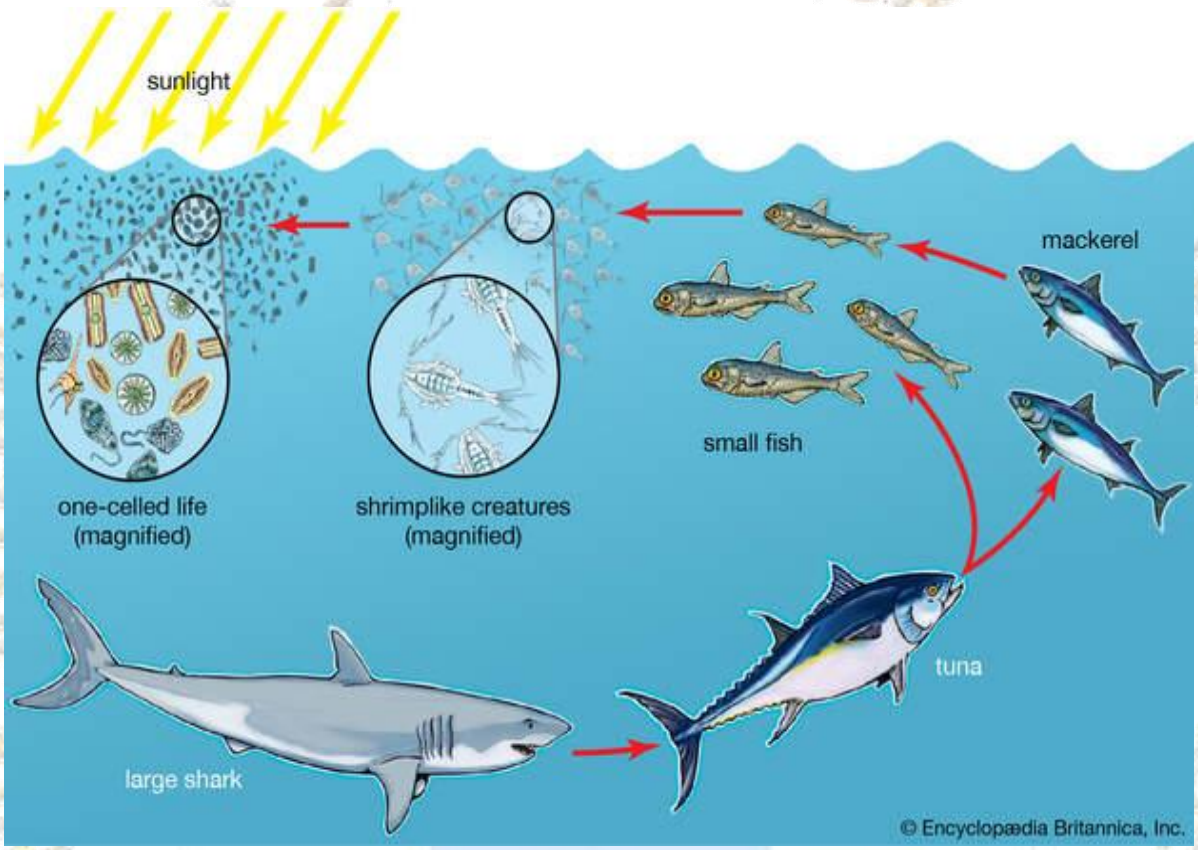
(b)Zooplankton: Organisms that are animal like. Zooplankton is a group of small and floating organisms that form most of the heterotrophic animals in oceanic environments. Some examples of zooplanktons include animals like radiolarians, krill, jellyfish, young mollusks, amphipods, etc. The zooplanktons contribute significantly to the secondary production of aquatic ecosystem and occupy an intermediate position in the food web by transferring energy from lower trophic level to higher trophic level (*Dhanasekaran et al., 2017)*. There are four types of zooplanktons groups, such as Rotifer, Cladocera, Copepoda and Ostracoda. Most of them depend largely on bacterioplankton and phytoplankton for their food. Factor such as light intensity, food availability, dissolved oxygen, low pH and higher salinity can reduce their diversity and density.

LENTIC SYSTEM:

Lentic ecosystem (also called the lacustrine ecosystem or the still water ecosystem). A lentic ecosystem entails a body of standing water, ranging from ditches, seeps, ponds, seasonal pools, basin marshes and lakes. Deeper waters, such as lakes, may have layers of ecosystems, influenced by light. Ponds, due to their having lighter penetration, are able to support a diverse range of water plants.

LOTIC SYSTEM:

lotic ecosystem (also called the riverine ecosystem). The term lotic comes from Latin lotus meaning washing. Its is a running water bodies such as stream and river. Lotic or flowing ecosystem is river channels and other related aquatic environment creek, brook, spring or stream. They vary in size and shape. It includes small waterfalls to various big sized river water bodies. This ecosystem contains two main zones such as pools and rapids.



STUDY SITES:

- **DABKA (study site 1)** is a Village in Padra Taluka in Vadodara District of Gujarat State, India. It is located 26 KM towards west from District headquarters Vadodara. Geographically located at latitude 22.2473° N and longitude 72.9564° E Water of river mahi flowing through dabka.
- **KAAVI (study site 2)** which is small village town that is located near gulf of Khambhat, also known as gulf of cambay, is an inlet of the Arabian sea located along the north-western coast of India. This study site is marine water site. Geographically located at 22.1982^{o} N and longitude 72.6341^{o} E.

Figure 1 study site dabka

Figure 2 study site kaavi

WATER QUALITY ANALYSIS:

Water samples were collected every month from December to march Water samples were collected in 900 ml plastic bottles at a depth of about 0.3 m for analysis. The water samples were collected for the analysis of ph.

Alkalinity, Chloride, Turbidity, BOD, TDS, EC, Hardness, Calcium hardness, Magnesium Hardness using standard protocols. (APHA).

SR NO.	PARAMETERS STUDIED	METHODS
1	pH	Digital pH meter
2	Temperature(ºC)	Thermometer
3	TDS (mg/l)	TDS Meter
4	EC (µs/cm)	EC Meter
5	Alkalinity(mg/l)	Neutralizing with standard HCL
6	Dissolved oxygen(mg/l)	Wrinkler method
7	Total hardness (mg/l as CaCO3)	EDTA Titration
8	Calcium hardness (mg/l as CaCO3	EDTA Titration
9	Chloride (mg/l)	Titration with AGNO3
10	COD (mg/l)	Open reflux method
11	BOD (mg/l)	Incubation method

PLANKTON SAMPLING:

Plankton samples were collected at monthly intervals along with water samples. For plankton analysis the surface grab sample were collected from study sites. The sampling was done through pre-cleaned sampling bottles during morning hours from December to march, the approximately depth of sample collection was 3 to 5 centimetres. Water samples are preserved with Lugol's solution that preserve phytoplanktons and zooplanktons are preserved with formalin solution.

The water sample is poured into a filter cup. The water sample while passing through the filter cup is sucked by a vacuum pump.

A special filter paper (Nylon 6,6 Membrane, 0.2 micrometer) is clamped between the filter cup and the conical flask.

The planktons present in the water sample remain stuck on the filter paper which are then observed under 10x and 4x magnification.

figure 3 plankton filtration

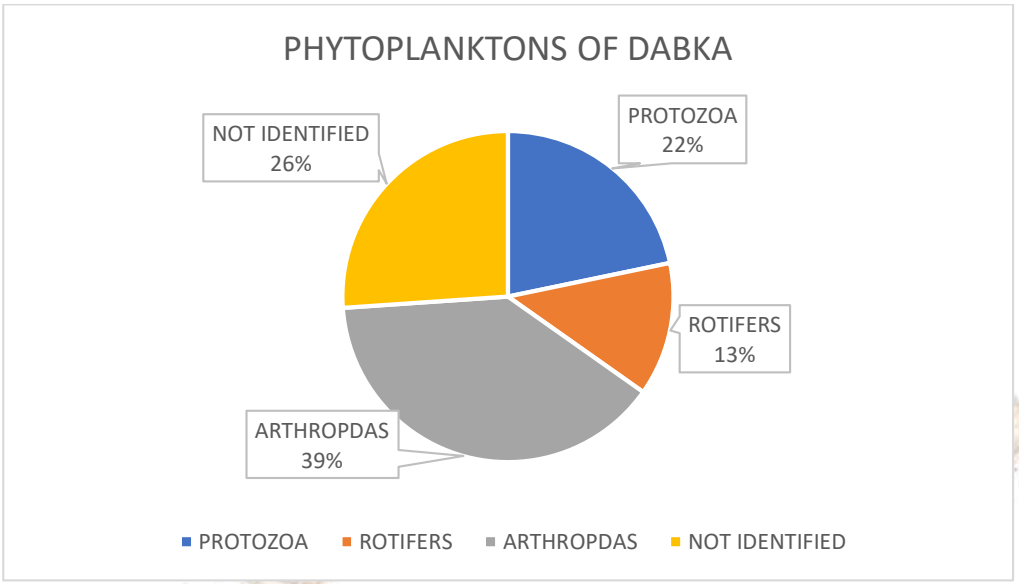
RESULT AND DISCUSSION:

Table 1 result of physiochemical parameters

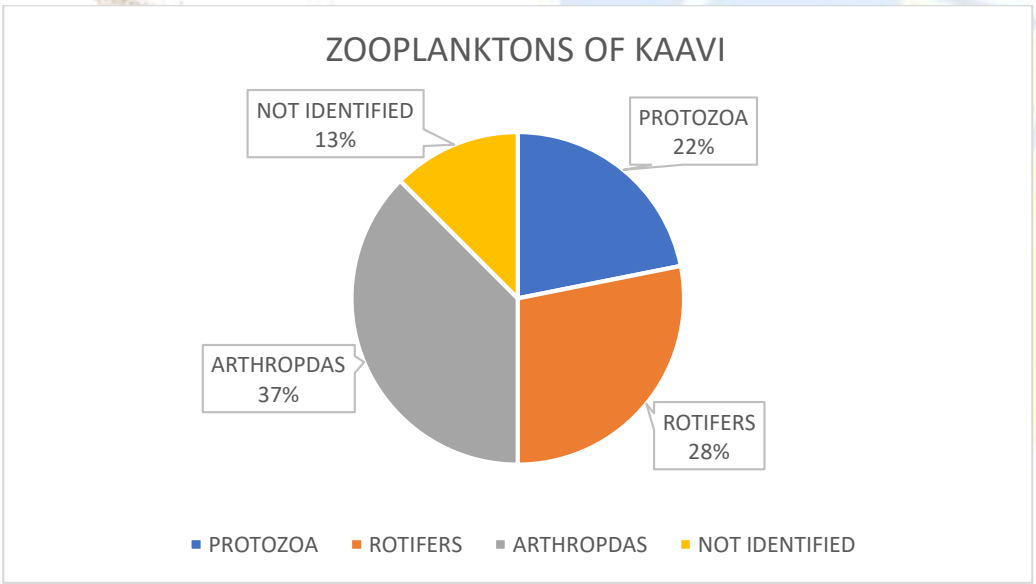
PARAMETERS	DABKA (SITE 1)	KAAVI (SITE 2)
pH	8.5	8.3
Temperature (°C)	21.7	21.6
Alkalinity (mg/l)	310	492.5
DO (mg/l)	8.02	8.1
BOD (mg/l)	2.4	3.15
Total Hardness (mg/l)	166	4565
Calcium Hardness (mg/l)	77	1342.5
Magnesium Hardness (mg/l)	89	3222.5
TDS (mg/l)	321	8533.25
EC (µs/cm)	362.5	1872.75
Chloride (mg/l)	111.6	632
COD (mg/l)	24.6	48.25

- ***All the parameters except temperature (°C), pH, Conductivity (µs/cm) are expressed in mg/l.***

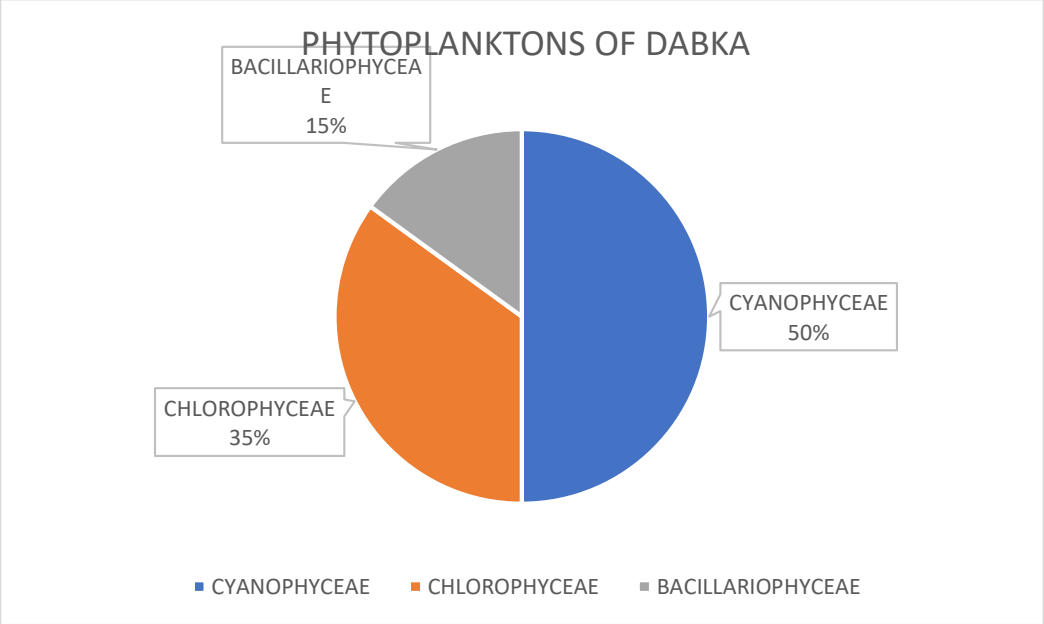
Percentage of zooplankton found from dabka (study site 1):



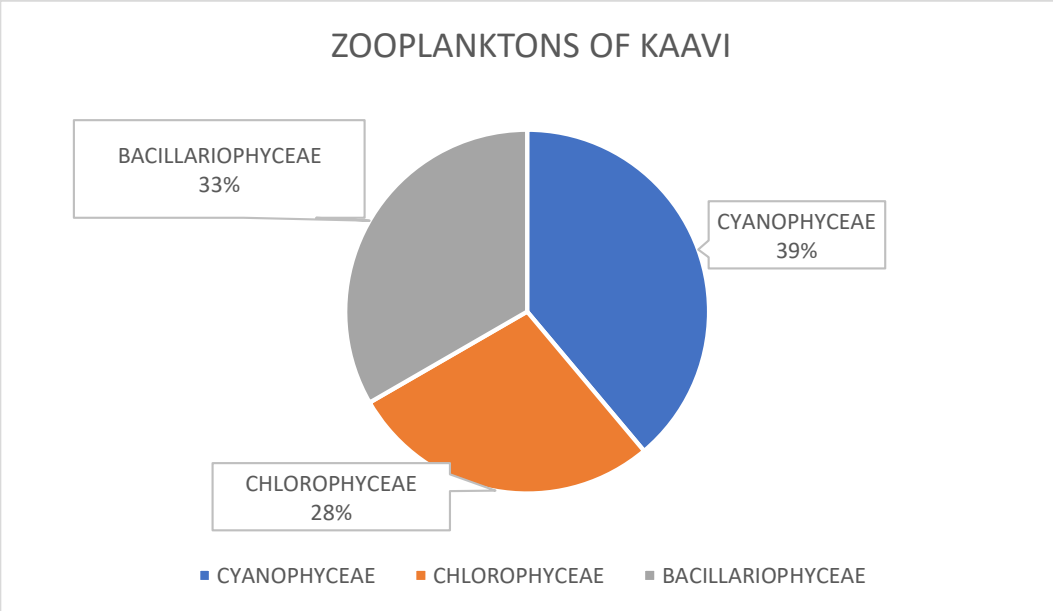
Percentage of zooplankton found from kaavi (study site 2):



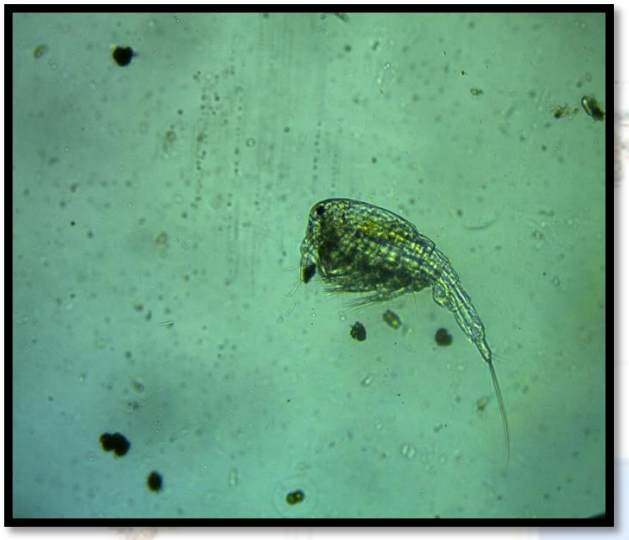
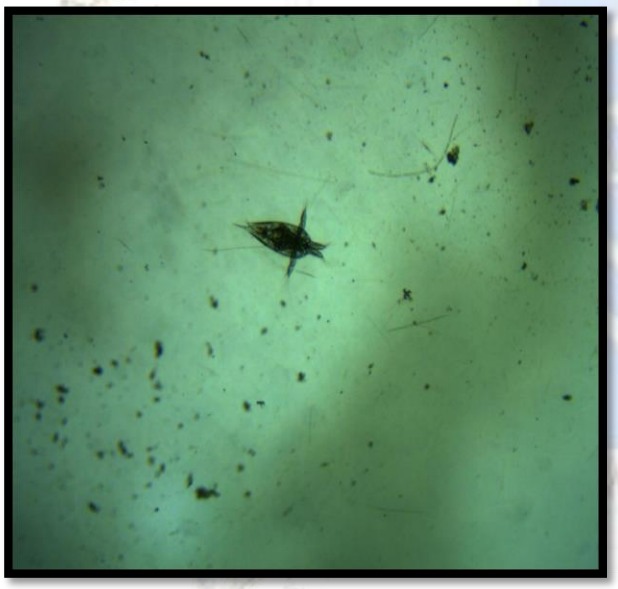
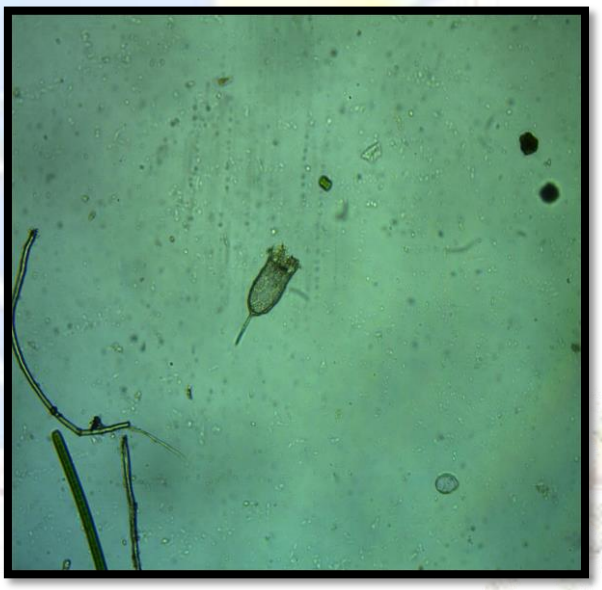
Percentages of phytoplankton found from dabka (study site 1):



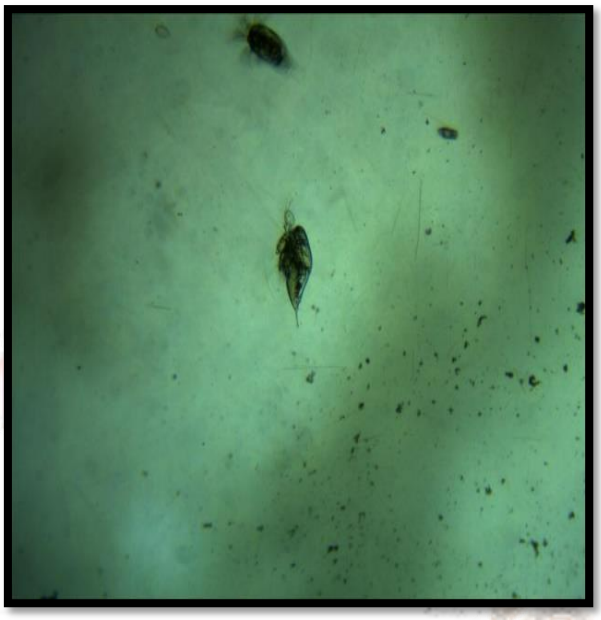
Percentages of phytoplankton found from kaavi (study site 2):



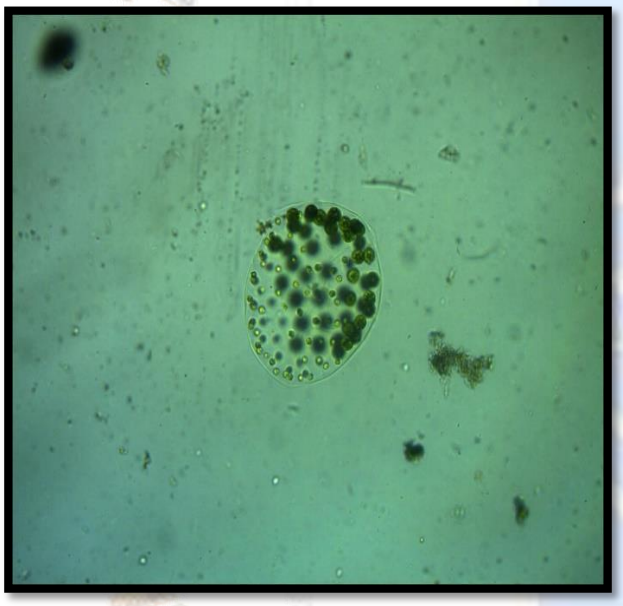
Diversity of planktons were recorded from both the sampling sites.

PLANKTON FOUND IN DABKA	PLANKTON FOUND IN KAAVI
 **NAME:** Cyclopoid copepod	 **NAME:** Calanoida copepods
 **NAME:** Copepod Nauplius	 **NAME:** Keratella cochlearis

NAME: Acartia naupius

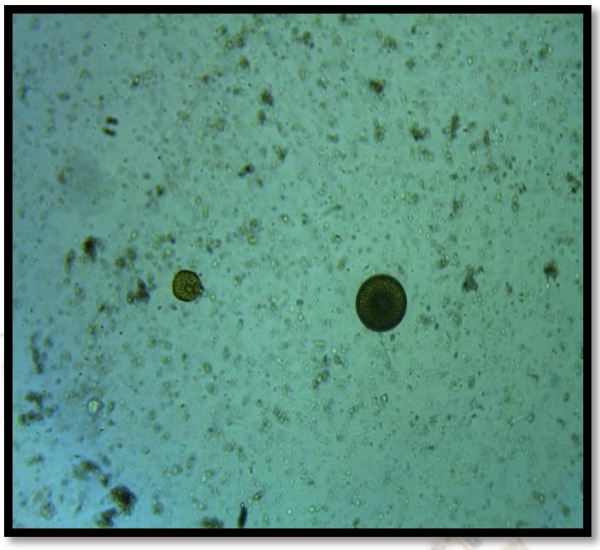


NAME: Daphnia magna



NAME: Volvox

NAME: Anabaena

	
NAME: Oscillatoria	**NAME:** Coscinodiscus radiatus

SR. NO	FAMILY	ZOOPLANKTON NAME
1.	ARTHROPODA	• Acartia sp. • Daphnia magna sp. • Copepod Nauplius sp. • Calanoida copepods sp. • Cyclopoid copepod sp.
2.	ROTIFERS	• Keratella sp. • Colurella adriatica sp.

Table 2 list of zooplanktons

SR. NO	FAMILY	PHYTOPLANKTON NAMES
1.	VOLVOCAEAE	• Volvax sp. • Pondarina sp.
2.	OSCILLATORIACEAE	• Oscillatoria sp. • Oscillatoria obtuse
3.	COSCINODISCACEAE	• Coscinodiscus radiatus
4.	NOSTOCACEAE	• Anabaena sp.
5.	BACILLARIACEAE	• Nitzchia sp. • Bacillaria paxillifer

Table 3 list of phytoplanktons

CONCLUSION:

According to the result of the current study, all physicochemical parameters values apart from the alkalinity and TDS of site 1 are below the recommended levels, making the water quality at this location ideal for aquatic life. Alkalinity and TDS for site 1 are high, which may be due to result of domestic and some industrial operation. If properly managed, this may improve. While the values of site 2 that is kaavi almost all the parameters are above standard range because its seawater and making it unsuitable for human utilization. A good amount of DO represent the phytoplankton abundance and their capacity to carry out the photosynthesis and adding oxygen to water bodies which is important for survival of other aquatic organisms. Diversity of phytoplanktons and zooplanktons are seen from both the sites.

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