

Study of Planktonic diatoms in Veerbhadra barrage, Rishikesh

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Abstract

The study of Planktonic diatoms was studied in veerbhadra barrage, Rishikesh. Samples were collected with the help of Plankton net. Diatoms also known as "stick plants", are a major group of algae. They belong to the Kingdom Protista, the very wild recognised. Maximum diatoms are unicellular, while they can occur as colonies in the shape of filaments or ribbons (eg. Fragilaria), fans (eg. Meridian), zig-zag (eg. Tabellaria) or stellate colonies (eg. Asterionella). They are basically pinnate or centric. Diatoms are producers within the food chain. An important feature of the diatom cell is that they are enclosed within a unique cell wall made of silica called a frustule. These frustule shows a wide assortment in form, but usually it made up of two asymmetrical sides with split between them, so the group name. The two tests fit together like two parts of a Petri plate and the assembly is called a valve. Diatom communities are popular tool for monitoring environmental conditions, past or present and are commonly used in studies of water quality. Diatom is a common group and can be found in the fresh water, in soil and on damp surfaces. Most live pelagically in open water while some live a surface field at the water, while some live as surface films at the water sediment interface (benthic) or even under damp atmospheric conditions. Planktonic diatoms in freshwater environments typically exhibit a blooms and bus life style, when conditions in the upper mixed layer are encouraging their competitive edges allow them to quickly dominate phytoplankton communities. Living diatoms are habitually found in great numbers as related to filamentous algae or forming gelatinous masses on various sab-merged plants. Diatoms are eukaryotes, meaning that they have true cells with a well-defined nucleus surrounded in a nuclear membrane. Since they are algae, which are plants, they carry out photosynthesis in cellular "organelles " called chloroplast. Diatoms variety abundant in size, the largest species being about 2 mm and the smallest being only a few micrometres long. The pennate diatom show below is a little over 200 micrometres long. Diatoms are equally common in gold or yellow colour. This is because they have a large amount of yellow carotenoids pigment and xanthophyll pigment that mask the green colour of their chlorophyll. Diatoms are often difficult to identify since their body plan is quite simple and they are usually of the same colour.

Key words: phytoplankton, diatoms, algae, benthic, food chain, organelles.

Objective of study:

The objective of study-

Identification of diatoms in Veerbhadra barrage, Rishikesh.

Introduction

Diatoms are one of the most specific groups of unicellular algae. It is found all over the world in marine, brackish and fresh water, in soil and, damp surfaces. Their most characteristic is the possession of elegant, siliceous cell walls, features of which are used to define and classify species because silica resists degradation, diatoms are habitually preserved in both fresh water and marine sediments and in conjunction with knowledge of their biological specificity such records have been used to infer lake or Ocean histories. In certain diatoms in lake sediments have been used to deduce changes in pH and nutrients status, as well as climate change. They are also used wide-ranging to infer water quality in current aquatic system.

Investigated Area

Veerbhadrha barrage, is located near the Veerbhadrha Mahadav Temple in Rishikesh. It is also known as the gateway to the Himalaya and is located around 25km.away from the holy city Haridwar.

Review of literature

Since the beginning of the 20th century there have been numerous publications to study the plankton diversity.

1.Studies on fouling diatoms from the Zuari estuary, Goa (West coast of India) January 2000.

P.D. Redekar and A.B.Wagh, during the studies on fouling diatoms in Zuary estuary the overlying surface diatoms were also studied for comparison in all 66 species of planktonic diatoms have been recorded, belonging to 29 genera out of these, 36 species were Pennales and 30 Centrals. The common diatoms observed were *Chaetoceros borealis*, *C.subtilis*, *C.grani*, *Navicula inflexa*, *N.oblonga*, *Amphora turgida*, *A.ovalis*, *Nitzschia sigma var.regidula*, *N.longissima var. Closterium*, *Thalassiosira nitzscheoides*, *Rhizosolenia solterforthii* and *R. Shrubsolei*.

2.Archana Sharma, Ramesh C. Sharma, Ashish Anthwal have studied phytoplankton diversity and abundance of hill stream chandrabhaga from October 2000 to September 2001. A total of 31 genera of phytoplankton belonging to the families Bacillariophyceae, Chlorophyceae and Cyanophyceae were identified. These comprised of the Diatoms 95%, green algae 2.8%, blue green algae 1.6% and miscellaneous 0.8%. The diversity of phytoplankton was found to be maximum during winter and minimum in monsoon. The study revealed that water current, water temperature and turbidity influenced the diversity of phytoplankton.

3.Y.A. Hicks, D.Marshall, P.L.Rosin, R.R. Martin, D.G. Mann,S.J.M.Droop.2006.

a model of diatom shape and texture for analysis, synthesis and identification.

4. D.R.Khanna, Rakesh Bhutiani, Gagan Matta, Vikash singh and Gaurav Bhadauriya. 2011.

study of planktonic diversity of river Ganga from Devprayag to Roorkee Uttarakhand India.

5. Rajveer Singh Chauhan, Bharti singh, Deepmala katiyar and P.K. Misra.2014.

Seasonal variation investigation on diversity of some freshwater items on Kumaon Region, Uttarakhand state in India.

6. A.R.Singh and P. Verma.2019

A systematic review on various diatoms species associated with drowning.

Material and methods

Collection and preservation of Biological water sample for Biological analysis. To collect and preserve the water sample for Biological studies. The methods for the collection of samples for Biological studies vary greatly due to diversity of life form (Planktonic diatoms).

Procedure

Sample is collected by drawing the plankton net through the water. The plankton net has a small bottle attached to the end, when it is dragged through the water the organisms were collected and filter straight into the bottle.

4% formalin is added to it, for the fixation of biological specimens in water sample and studied with the help of microscope.

Result and discussion

Qualitative composition of planktonic diatom to observe and identify various planktonic diatoms in different water samples. Planktonic diatoms which identify in the area of Veerbhadra barrage, Rishikesh. In all species of planktonic diatoms listed below were recorded-

Navicula

A diatoms of the genus *Navicula* is seen against a background of flocculent organic matter. The two longitudinal brown plastids characteristics of many pinnate diatom species are clearly seen. Under the microscope, *Navicula* can be seen gliding slowly and erratically in contact with the slider or cover glass.

Cymatopleura solea

Cymatopleura solea is the name traditionally given to a complex of several *cymatopleura* species, all of which are characterized by the presence of a central constriction. The earliest name in this complex appears to be *Navicula librile* of Ehrenberg: However, because revision of the species complex is inevitable, perhaps requiring the use of several of the old names. We have retained the old name *solea* as have Krammer and Lange Bertalot(1988).

Asterionella

It is a characteristic member of the phytoplankton of nutrient rich temperate water body, where it is a major component of the diatom spring bloom. It is a cosmopolitan pennate fresh water diatom; average cell size is 60 to 80 micrometer wide. It forms colonies that often consist of eight cells, but can vary up to 20 cells.

Pinnularia

Cells solitary, live cells usually with two plate like chloroplast lying along the sides of the girdle without obvious pyrenoids.

The chloroplast margins may be entire or variously lobed and then extending under the valve face. Some species have a single H- shaped chloroplast with the narrow isthmus under the epvalve and then with one or two pyrenoids.

Tabellaria

It is a common freshwater diatom, which forms zig-zag chain colonies by joining corner to corner with pads of mucilage.

Gyrosigma

Cells solitary, sigmoid in valve view, narrowly rectangular in girdle view. Live cells with two plate-like chloroplasts lying along each side of the girdle, sometimes lobed with several rod shaped pyrenoids along their length, valves sigmoid, raphe sigmoid, more or less central apical.

Fragilaria

Cells joined at valve face to form ribbon like colonies. Those taxa (example: Fragilaria) that are swollen at the centre are linked only there; otherwise, linkage occur along the entire length of the cell. Two plate-like plastids. Valves liner to liner lanceolate (occasionally elliptical) with rounded, rostrate or capitals ends, sometimes with a slight swelling at the centre of the valve. Almost parallel striae separated by a narrow liner sternum. Valve face bordered by row of short spines. Central area variable, but often riches to edge of valve on one or both sides.

Cymbella

The lid of Cymbella is a bit too strongly or asymmetrical to the apical axis. The terminal ridge cleft is diverted to the dorsal side, an important characteristic feature. Pointed pore fields are present at both sides. One or more blot may be present, they are located on the anterior side of the central area. Internally, the blot are complex internal occlusions. Also, internally, the proximal ridge may be constant across central area. Cymbella cells grow mostly in benthic habitats, and frequently produce mucilaginous stalks that are secreted through the pointed pore field.

Syndera

Cells are found singly, in filaments, knob at one end larger than at the other.

Table – 1.1 : Number of Planktonic Diatoms

Diversity	No.
Bacillariophyceae	9

Table – 1.2 :

Taxon	Navicula	Cymatopleura solea	Asterionella	Pinnularia	Tabellaria	Gyrosigma	Fragilaria	Cymbella	Synedra
Abundance	+++	+	+++	++	++	++	+++	+	+

+++ : Dominant species.

++ : Common.

+ : Rare.

Conclusion

In Veerbhadra barrage, the dominant species were Navicula and Fragilaria. Planktonic diatom is an important component of aquatic food chain. They serve as most important food item of aquatic ecosystem. Most of the energy is transferred through plankton.

They can form nuisance blooms -

- (a) Pollutant production.
- (b) Pollutant production can sometimes be a problem even when a bloom is not present.

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