

# Study On Plankton and Micro-vegetation Diversity Of River Ravi at Jammu Division and Madhopur Punjab

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**Abstract-** River Ravi has significant value for Kathua District of Jammu and Kashmir and Punjab. In the present study we observed planktonic diversity at three sites where two are in Kathua district and one is in Punjab state on a monthly basis. In the result Ravi water was found very poor in planktonic concentration the phytoplankton as Diatom, Green algae, and Blue Green algae found during all over the year. In other hand the zooplankton as Protozoa, Rotifers, Cladocera, Copepod and Ostracods were observed, where group Rotifera was dominant on others.

**Key words:** Phytoplankton, Zooplankton, Diatom, Protozoa, Rotifers, Cladocera, Copepod and Ostracods

## Introduction

The Ravi River is one of the important river of trans boundary river system of India and Pakistan and also smallest river between five rivers of Indus riverine system. The all river passage is 720 km where 341 km in India and rest in Pakistan. Out of 341 km 168 km lies in Himanchal Pradesh 110 km in Punjab and only a covers 63 Km in Jammu and Kashmir Union Territory (U.T). The phytoplankton are the bio indicator of water quality and also producer and play very important role in aquatic ecosystem. In other hand some species are harmful and make water toxic for living being Ariyadej *et al.*, (2004). The Increase number of phytoplankton provide a picture of a healthy environment of water body, by measuring their abundance we can find the level of effectiveness of management or restoration program or regulatory actions. Zooplanktons are considered as secondary producer in aquatic eco system and also play a key role in energy transformation of energy synthesized by phytoplankton, along zooplankton phytoplankton support to population of fishes and other aquatic creatures which are the major support in economy of human and existence of life. The abundance planktons are very sensitive against physical chemical nature of water which use to change with season, environmental factors and anthropogenic activities Panpatil Pawan *et al.*, (2021). The fresh water system is the life line of most of the living being including human David Foster Wallace's (2005). Very few work has done on assessment of the health Ravi river so we step ahead to enhance focus on this important river. The all sample collection has done during year 2022.

## **Materials and Methods-**

### 1. Site description

The all study concentrated mostly at Kathua district of J&K which is situated between 32°17' to 32°55' N latitude and 75°70' to 76°16' E longitude beside one site in Punjab. Here we collected samples from three following sites –

Site 1- The village Hutt selected as upstream site of study it is located between 32°37' to 29°5'N latitude and 75°53' to 51°9'E longitude.

**Site 2-** The second site was Basoli which is a small town and Tehsil headqater . It is 45 Km away from site 1 and also considered the mid stream of targeted starch. The coordinates of Basoli are 32<sup>0</sup>50'N and 75.82<sup>0</sup> E.

**Site 3-** The site 3 is Madhopur on it is a town of Punjab state near to city pathankot. It is 65 km away from site No 2. The coordinates of this ie are 32.3614<sup>0</sup> N Latitude and 75.59.43 E Latitude.

2. **Collection of Water sample** –During the course of study the samples were collected in glass bottles of one liter capacity and plastic container.
3. **Timing of collection** - Samples were collected between 6:00 am to 8:00 am morning in each month of year during 2022.
4. **Fixation and Preservation** – 2 ml formalin was added when we collected the samples for fixation and Preservation of planktons.
5. **Concentration of Planktons** - The planktons in water sample was concentrated with the help of sedimentation unit, with which the sample let settle down for a time period.
6. **Staining** - The staining is specific for particular species of plankton but here we use Natural Red and Evans Blue for staining and flurochromes are used to enhance flurochromes are used to enhance fluorescence quantum yield.
7. **Estimation of Phytoplankton-** Biomass was calculated by direct count method. For this sedwick rafter cell were used. Identification of plankton was done with help of Edmondson (1992), APHA (1998), Khanna and Bhutani(2004)

## **Result and Discussion-**

The study reviled the poor concentration of plankton at targeted sits similar findings were published in report of I.C.A.R (2014) the table -1 showed the abundance of phytoplanktons on monthly bases here we found highest abundance of phytoplankton at the site -3 during January month and minimum during January Month Vats Deepika et al., (2018), Khanna D.R (2011) Kirti Raje (2020) reported the similar findings.

During all over year phytoplanktonic which are belong to chlorophyceae, Bacillariophyceae and Cyanophyceae observed in water of river Ravi at selected sites. At all sits Diatoms were in dominant position in flora. The similar spectrum were observed by many workers at different water bodies as Bhatnagar .M *et al.*, (2013), Mahadik *et al.*, (2013) ,Waghmare B.D. *et al.*, (2015), Guiry M.D *et al.*, (2010)

The result of observation of different type of phytoplanktons and Zooplankton at different site are following-

**Site1** – The table -1shows the abundance of phytoplankton on monthly basis. According to

Which at site -1 the abundance of phytoplankton was maximum during (88) during January month and minimum during August (24). The Diatoms was found dominant over other phytoplankton on all over the sites all over the year. Diatoms was maximum (72) in January month where Green algae and Blue Green algae

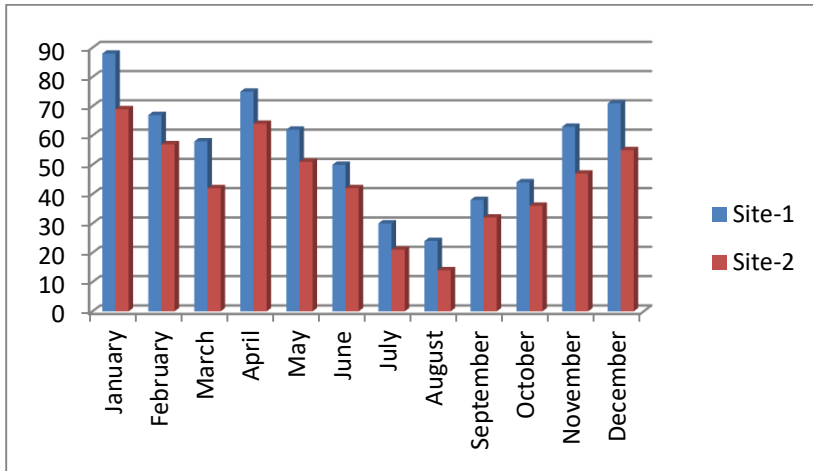
followed the same pattern. The number of Green algae were (12) and Blue green Algae were (4) . Blue Green algae were found nil during the july and August month .month.

The table -2 show the result of zooplanktonic abundance over the year, the Zooplanktons are first level consumers and has significant value in aquatic system. The Zooplanktons are considered as second producer their abundance is completely depend on phytoplankton they are the food of mostly fishes are other creatures so it has direct relation with richness of aquatic system which play very important role in economy of that region. At the site -1 we observed Protozoa, Rotifera, Cladocera, copepod and ostracods the Rotifera were found dominant all over the year on the site- 1 . In the month of December and February the abundance of Rotifera was recorded maximum (5) and nil during month of August. Protozoans were also found maximum during winter season and minimum during rainy season. The abundance of Cladocera was found nil during June, July, August and September.

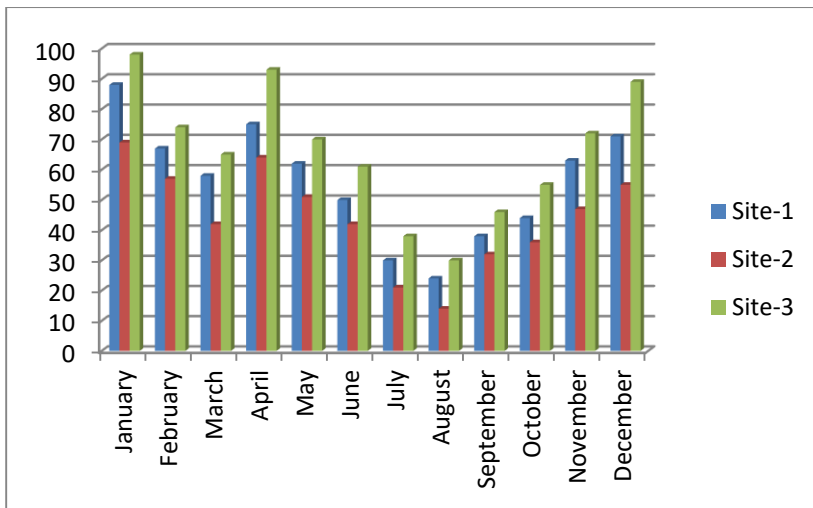
Table-1

Monthly variation of phytoplanktonic abundance in unit/l at all sampling sites

Month	Site-1	Site-2	Site-3	Average
January	88	69	98	85±14.7
February	67	57	74	66±8.5
March	58	42	65	55±11.7
April	75	64	93	77.3±14.6
May	62	51	70	61±9.5
June	50	42	61	51±9.5
July	30	21	38	29.6±8.5
August	24	14	30	22.6±8.0
September	38	32	46	38.6±7.0
October	44	36	55	45±9.5
November	63	47	72	60.6±12.6
December	71	55	89	71.6±17.0

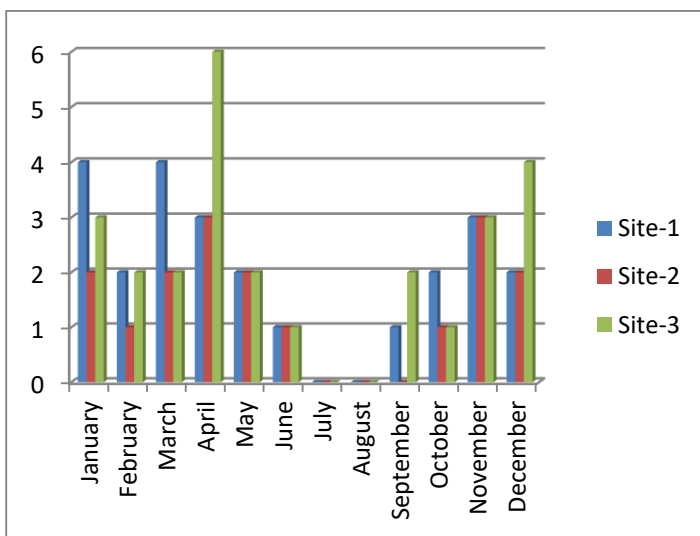


Graph-1

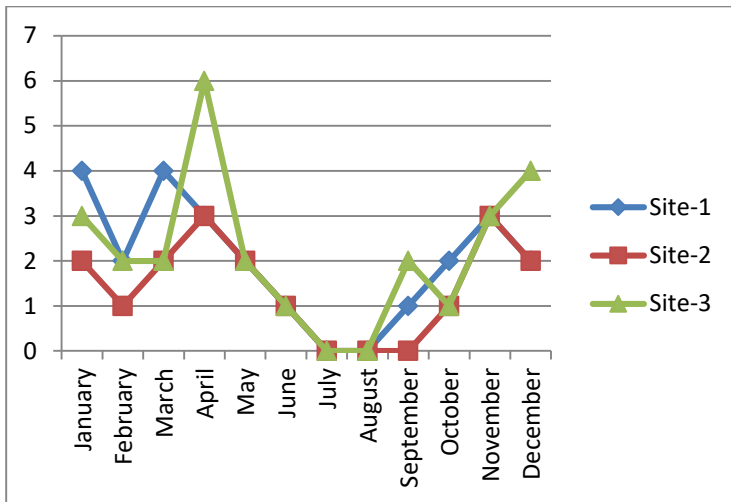


Graph-2

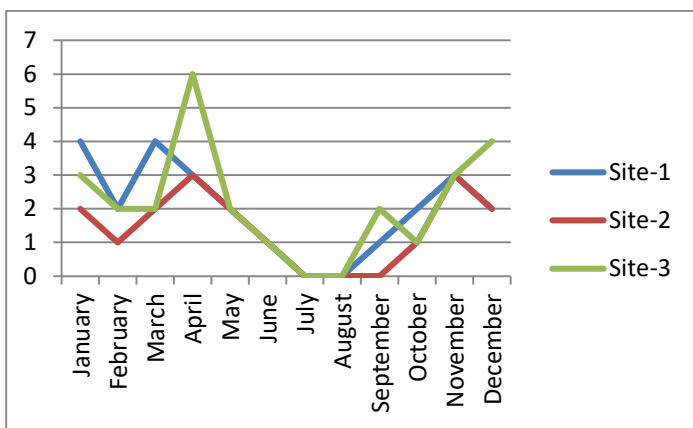
The Graph- 1 an 2 shows comparison between the phytoplanktonic concentration of site-1 , 2 and 3



The Graph -3 Show comparison of abundance of Diatoms every month of year at all site



The Graph-4 Show comparison of Green algae concentration



Graph -4 fluctuation of Blue Green algae at all site over the year

Copepod were found nil during the month May, July, August and October and only one unit in a liter over the year. Ostracods found in minimum concentration than other group of zooplanktons during all over the year. Similar studies done by Dabhade D.S, Chhaba S.G. (2019), Benarjee G.K et al., (2008) and Altaff K.A.etal.,(2004)

**Site -2** - On the site 2 the concentration of phytoplankton was found higher in the month

April and January as during these month the pollution level is much lower than other month of year. Similar to the site -1 we found the present of Diatom, Green algae and Blue Green algae over the year where Diatoms were found dominant over other groups. The site 2 has least abundance of phytoplankton than other sits. Here the maximum number of planktonic unit was 60 unit/ liter and minimum 12 unit/liter. The result in table -3 reviled that the concentration of zooplankton is very poor and rotifera was found dominant on other group. The site 3 has least concentration of zooplankton in comparison to other sits that mean the low quantity of fish and aquatic creatures at this site.

Table -3

Month	Zooplanktonic abundance in unit/liter														
	Site-1					Site-2					Site-3				
Group	Protozoa	Rotifera	Cladocera	Copepod	Ostracods	Protozoa	Rotifera	Cladocera	Copepod	Ostracods	Protozoa	Rotifera	Cladocera	Copepod	Ostracods
Jan	3	4	1	1	0	1	4	1	0	0	5	3	1	1	1
Feb	4	5	1	1	1	1	3	1	1	1	3	2	1	0	0
Mar	3	4	0	0	0	1	3	1	0	0	5	1	1	1	1
April	2	2	0	1	0	1	3	0	0	0	4	2	1	1	1
May	1	1	0	0	0	2	2	0	0	1	3	3	2	0	0
June	3	3	0	1	1	1	2	1	1	0	4	2	1	0	1
July	0	2	1	0	1	3	2	1	1	1	3	3	1	1	1
Aug	0	0	1	0	0	2	0	0	0	0	2	0	0	0	0
Sep	1	2	1	1	0	1	1	0	0	0	3	1	1	1	1
Oct	1	3	1	0	0	0	1	0	0	0	4	2	0	1	1
Nov	2	4	1	1	0	1	2	0	0	0	5	1	0	0	1
Dec	2	5	1	1	1	2	3	1	1	1	4	1	1	1	1

**Site 3-** The Madhopur only site of Punjab here the river become slow in comparison to

other site. But the concentration of Phytoplanktons was found higher than other sites as physic chemical nature of water and anthropogenic activity direct affect the abundance of planktons. The water flow is also a factor which has direct propotion with abundance of planktons high water flow reduce the concentration of planktons in a river. So the concentration of plankton on the site -3 was found maximum. The maximum number of units were 98 which were observed during January month. But in the month of July August and September the it was low. Diatoms were found dominant on green algae and Blue Green algae but also found maximum than other sits. The zooplankton has direct proportion with planktonic abundance so the zooplanktons group also found higher than other sites. Between the groups of zooplankton Ostracods were found minimum in number where Rotifers showed highest concentration.

**Conclusion-**

Water is best of all things for us with in a centaury we have disturb all the aquatic ecosystem anthropogenic activities changing the physic chemical nature of water in the result reducing concentration of producer and first level consumers. The study shows the water quality of Ravi river is not suitable of a healthy

ecosystem at all sites. For the improvement of this some efforts should done on government level and locals living adjacent to the river Ravi. The annual data show that many group of planktons were found nil during many months of year. So it need more work and effort to improve this great river.

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