



ECOLOGY SIGNIFICANCE OF RIVER MAHANADI IN ODISHA

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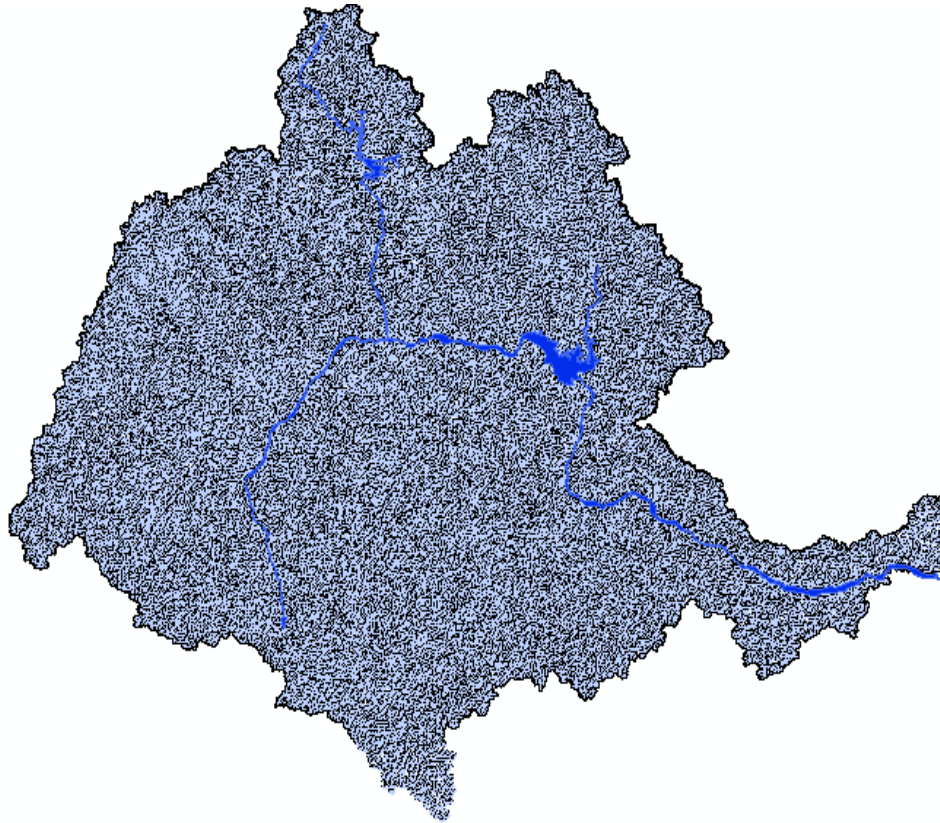


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Mahanadi Basin



Mahanadi river: Basin
area of 1,41,589 km²,
nearly 4.3% of the total
geographical area of the
country
Length: 845 km

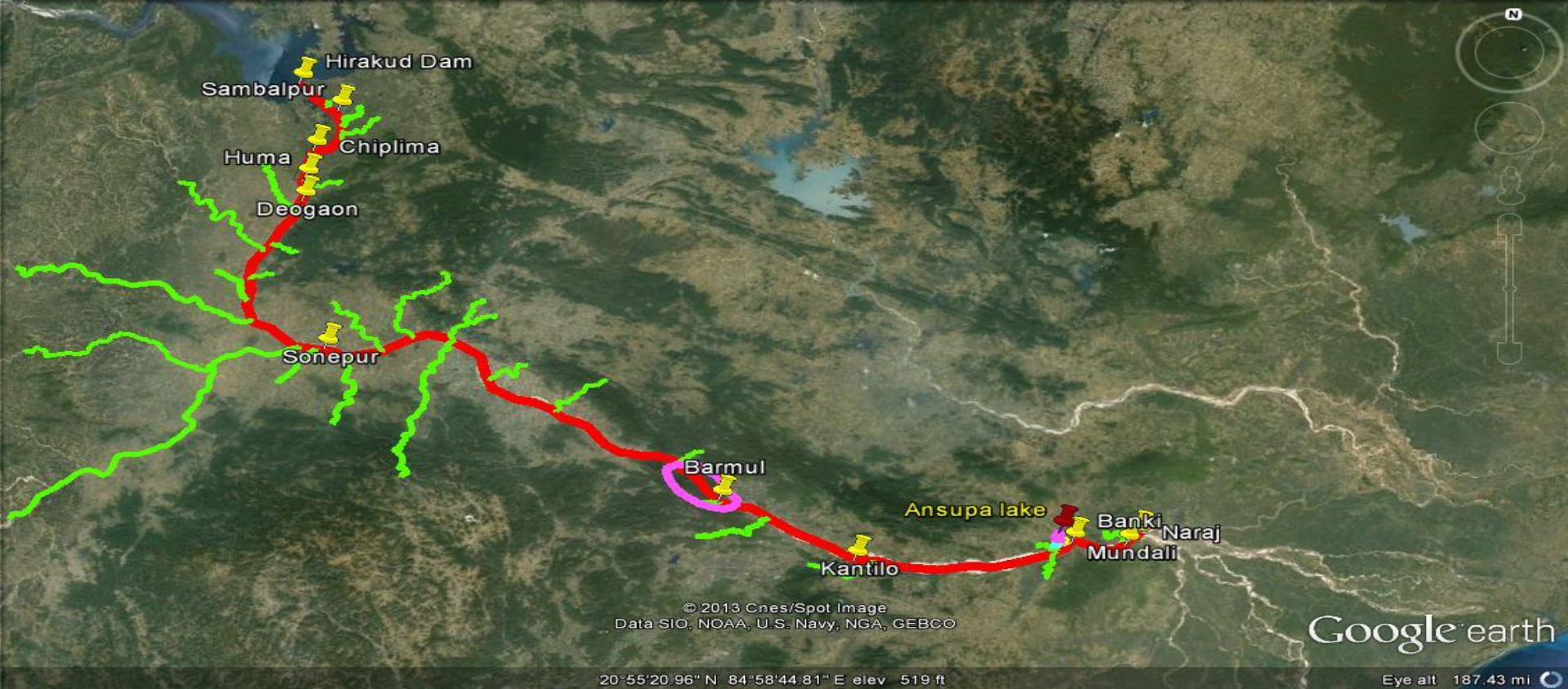


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2015-2016 (98km)





Study Site: Mahanadi River From Hirakud to Naraj (350 Km)

Sampling Stations: 10 no. [Upper (4); Middle (3), Lower (3)]

Sampling Period: Nov, Feb., May., Aug.

Sampling Parameters: Hydrology, Biotic, Abiotic





Significant Records:

- Ecological asset were identified (**Ansupa floodplain wetland and Satkosia wild life sanctuary** and 38 deep pools serving are shelter sites for fish during lean season).
- Livelihood mapping showed **fisheries is the top income** source for the people. Hence, underlines the importance of river water connectivity with river for fish catch.



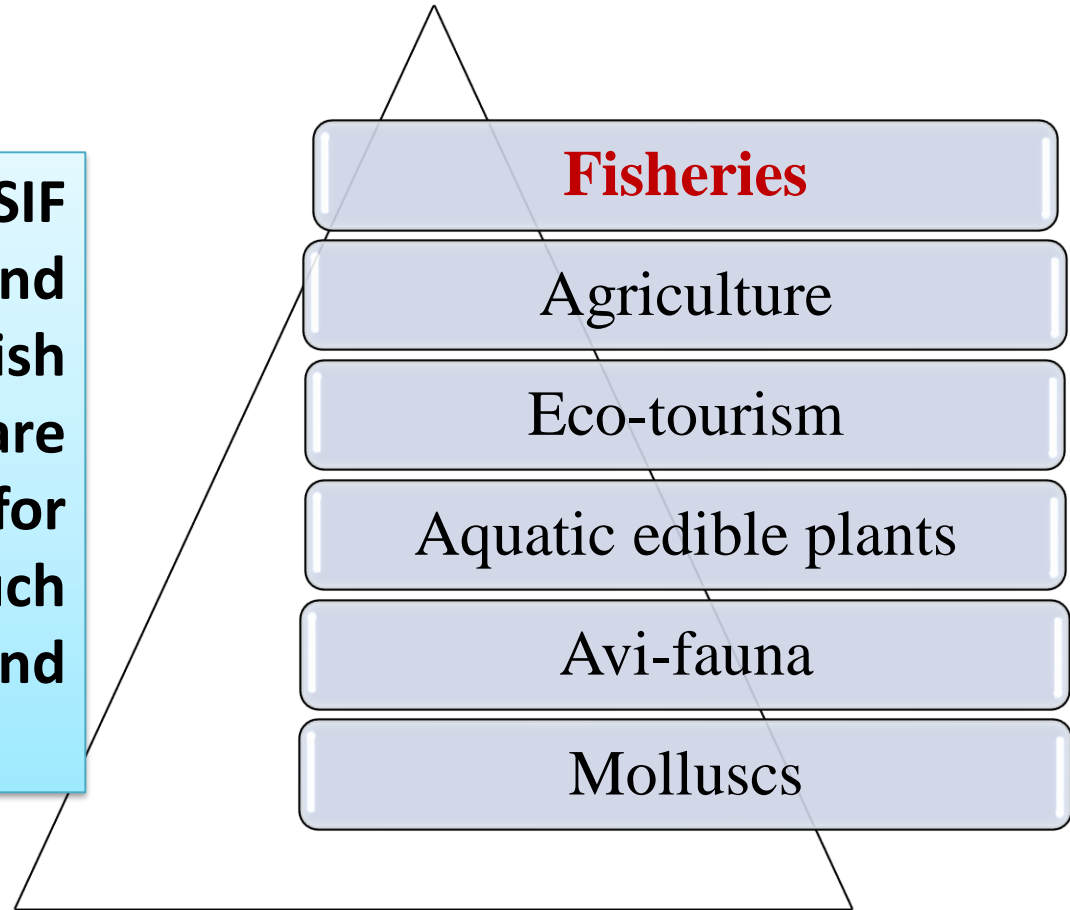


ANSUPA WETLAND





Fish species of SIF (Nutrient rich) and ornamental fish importance are major focus for future studies such as conservation and exploitation.



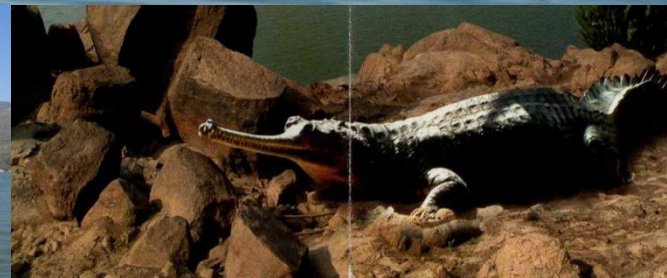
Direct livelihood opportunities provided by Ansupa





SATKOSIA GORGE (wild life sanctuary and home for large bodied carps and catfishes)





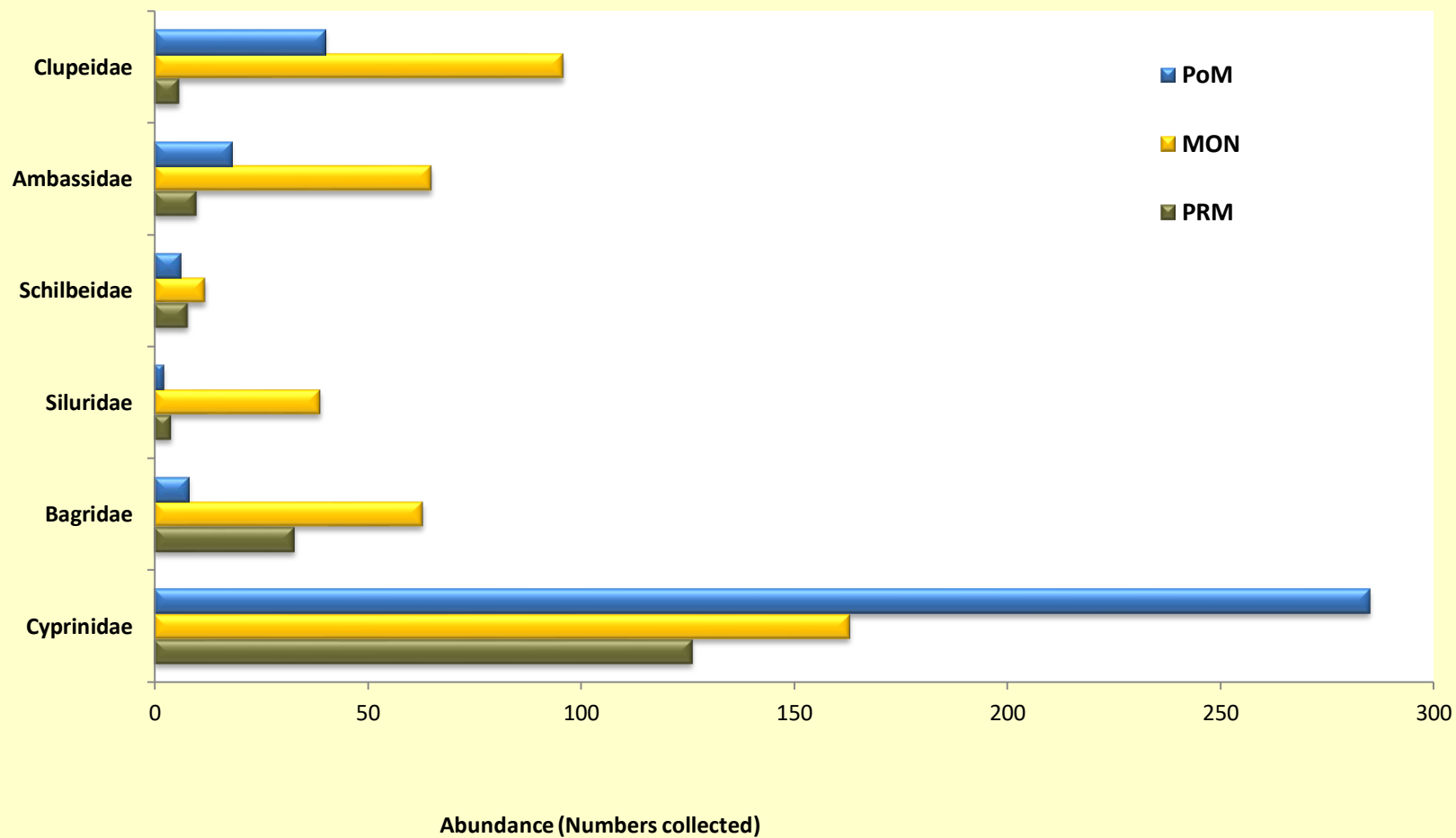


Fishes of river Mahanadi

A total of **113 (76+37) species belonging to 44 (20+24) families** was reported in the Mahanadi river. While **Day (1869) has recorded 146** species of which several were collected from the Cuttack region. **Job (1955)** work covering a stretch of 104 km of the main Mahanadi presents a record of **86 species**.

*First record of the Burmese river gizzard shad, **Gonialosa modesta** (Day, 1870)*





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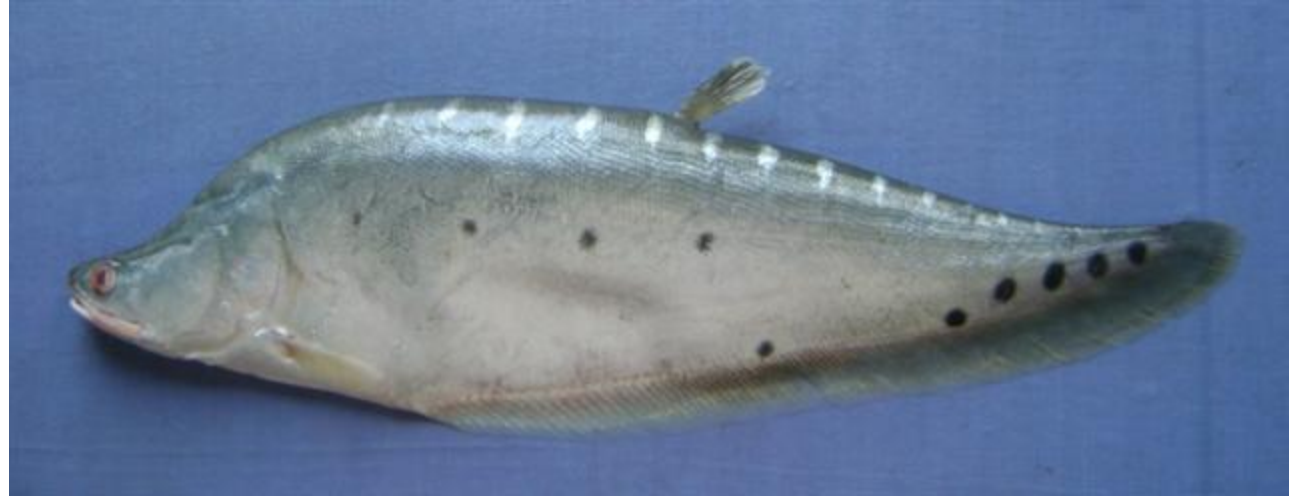
Endangered Fish (IUCN Red List 2012.2)

State fish of ODISHA



Tor mahanadicus





Generalized linear model (GLM) analysis observed **that depth ($P < 0.01$)** and **water temperature ($P < 0.05$)** are significantly correlated with ***C. chitala*** and ***Tor mahanadicus*** distribution. Study underlined that a depth of 18 to 30 feet should be maintained in the river course as deep pools as habitat preference of ***Chitala chitala*** during lean season.



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Breeding stage water requirement

Tor mahanadicus breeds during post monsoon season with a river discharge more than 60000 cusec with water temperature 24.0 ± 0.5 °C, pH 7.5 and DO 7.4 ppm

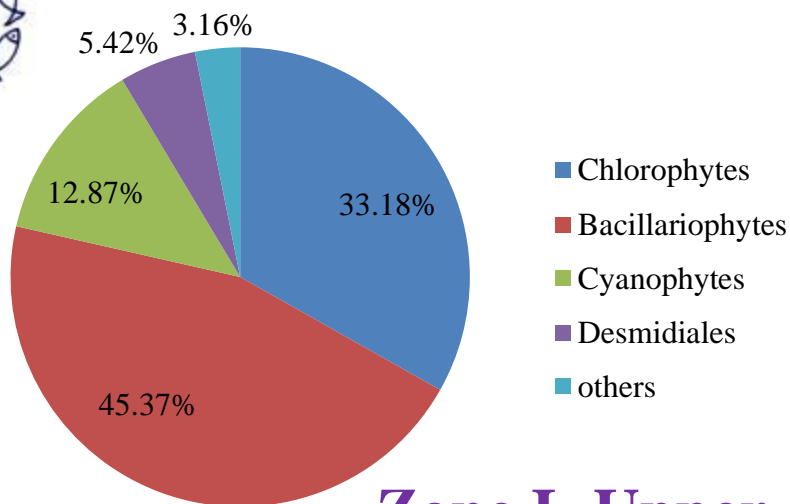
Sahoo A.K. and Sahoo B., (2015) Environmental flow estimation under climate change. Current Science.109 (9): 1522

Sahoo A.K. Sharma A.P. and Suresh V.R., (2016) Managing rivers: Ecohydrology an effective tool under climate change. National Academy Science Letters. DOI 10.1007/s40009-016-0454-0

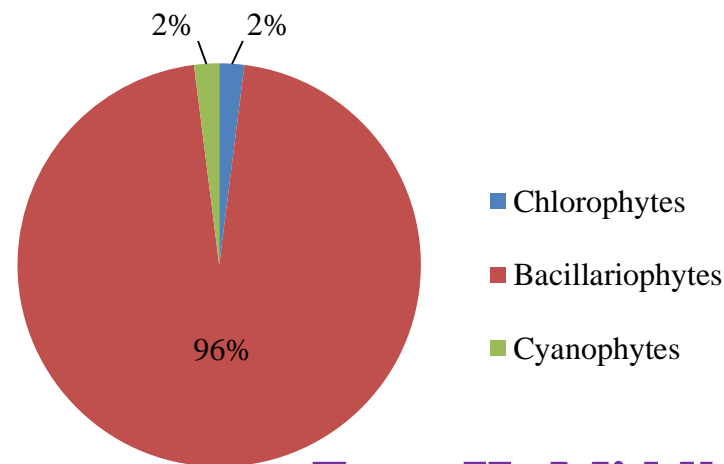




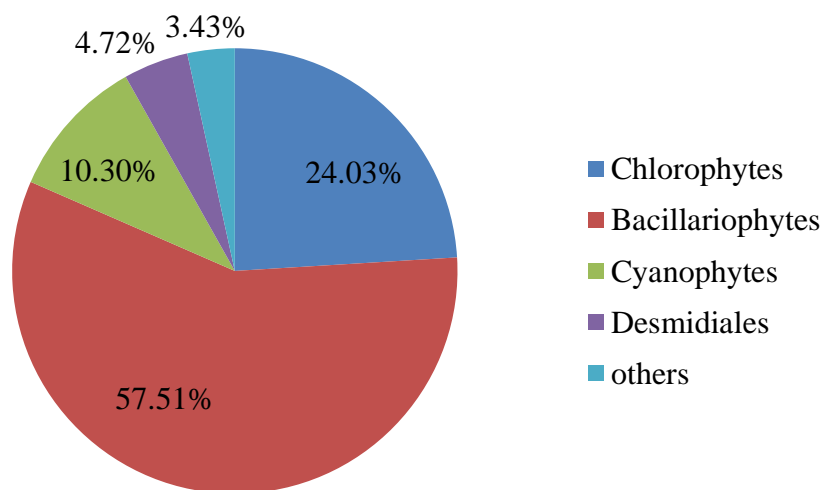
Percentage of Phytoplankton composition in different stretches of river Mahanadi



Zone I- Upper



Zone II- Middle



Zone III- Lower





Plankton species suitability water requirement

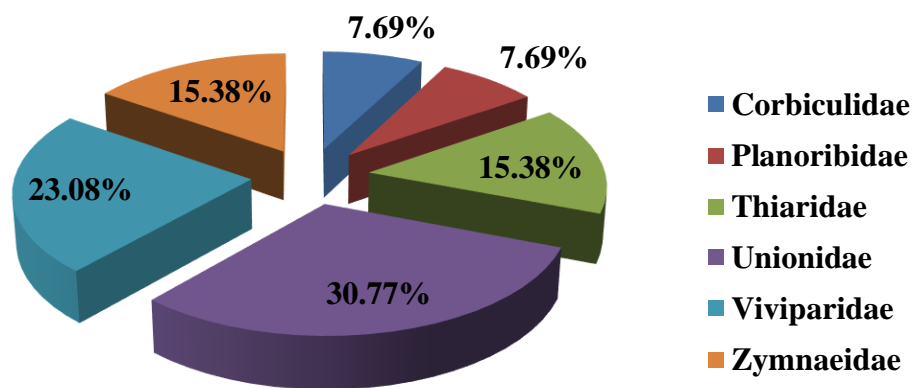


- Association between habitat variables (Flow, Dissolve oxygen, BOD, transparency, specific conductivity, nitrate, phosphate and magnesium) with phytoplankton abundance showed that **Fragilariophytes and Cyanophytes are more influenced by Phosphate and Specific conductivity during Low flow (8000 to 15,000 cusec) than high flow (>90,000 cusec).**

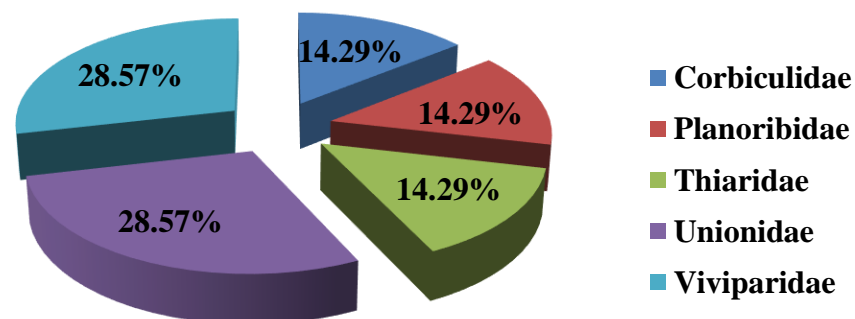




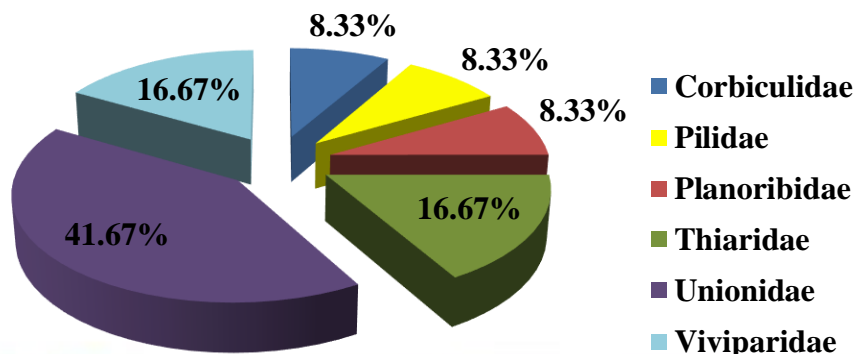
Macrobenthos composition in different stretches of river Mahanadi



Zone I- Upper



Zone II- Middle

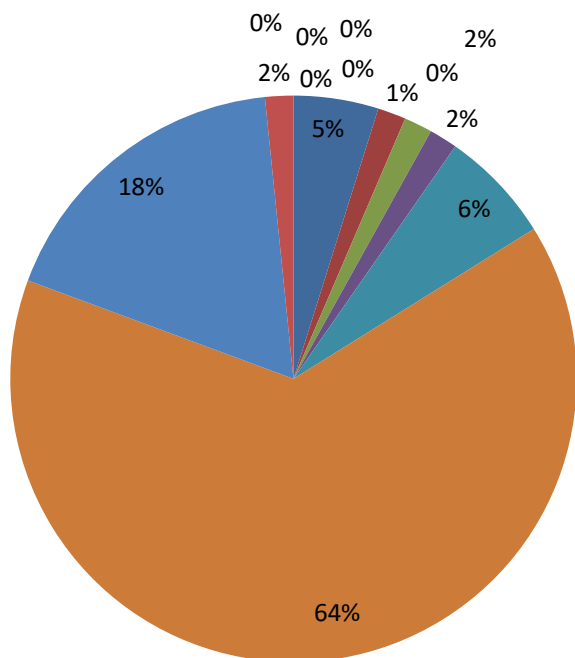


Zone III- Lower





Fresh water zone



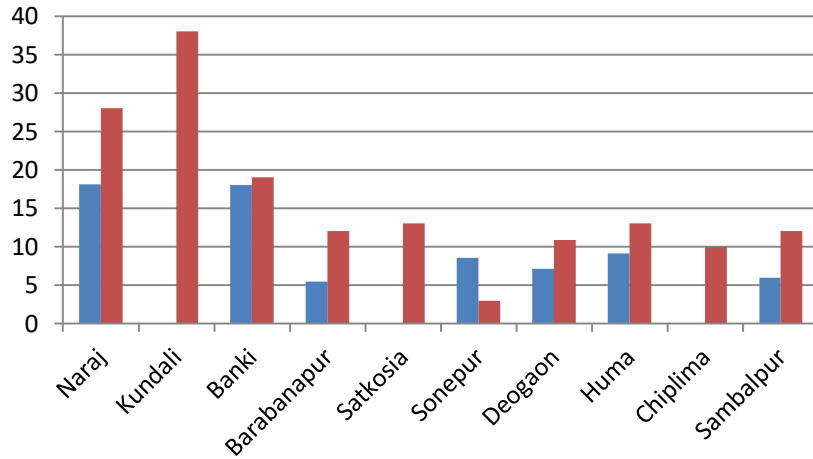
- *Bellamya bengalensis*
- *Corbicula striatella*
- *Parreysia (R) lima*
- *Parreysia occata*
- *Thiara* sp.
- *Thiara*(T) *lineata*
- *Thiara* (m) *tuberculata*
- *Thiara* *scabra*
- *Tellina opalina*
- *Mactra turgida*
- *Mactra mera*
- *Nerita articulata*
- *Polychaeta*
- *Nematoda*



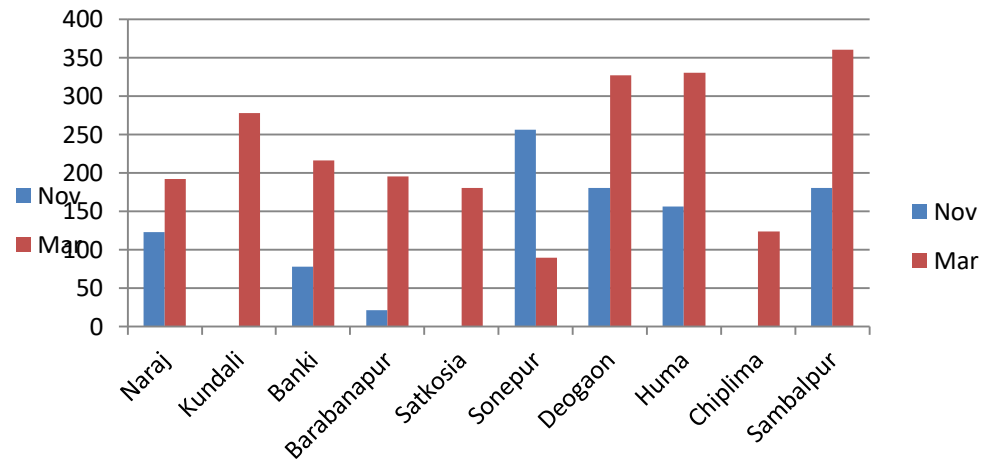


Physico-chemical parameters:

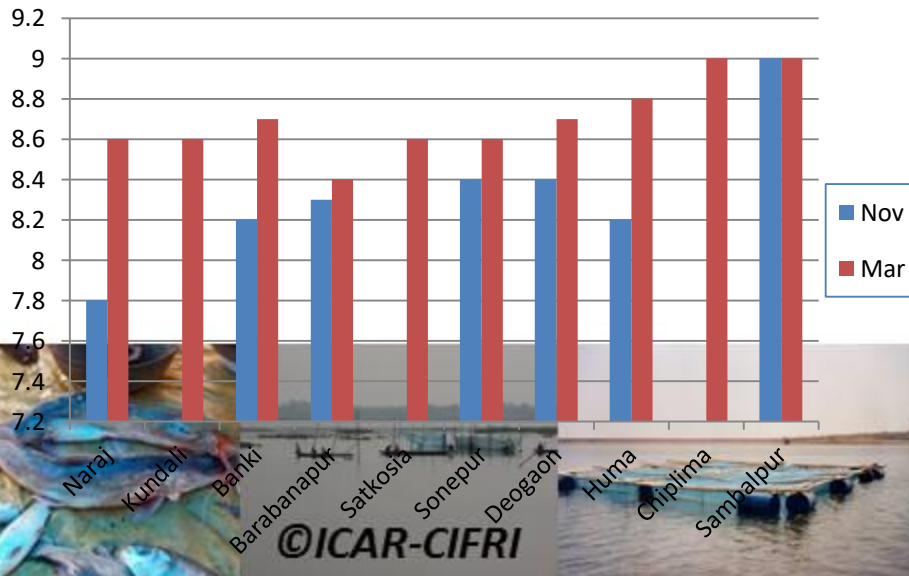
Water depth (ft)



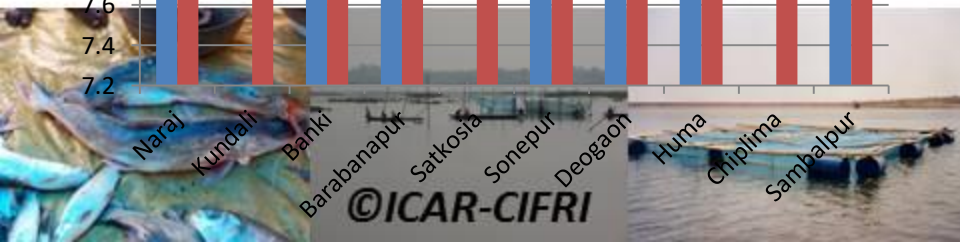
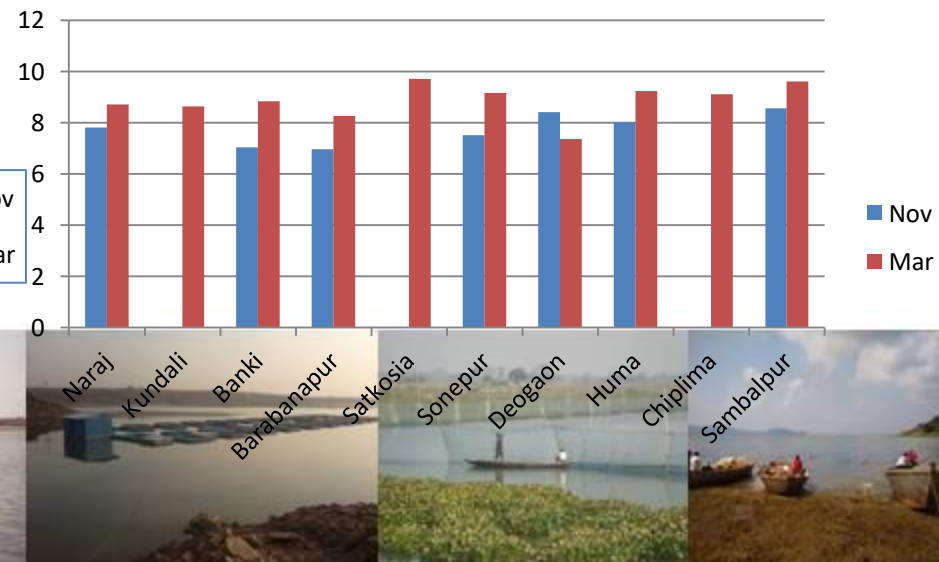
Transparency (cm)



Water pH



Dis. oxygen (mg/l)





- Redundancy analysis (RDA) was preferred over canonical correspondence analysis (CCA) because of unimodal response of biotic community to the gradient of water quality. **Biotic parameters such as fish, benthos and plankton diversity were associated with the water quality parameters such as velocity, dissolve oxygen, silicate and TDS and observed that fish community is inclined more towards TDS and periphyton is more inclined to higher Silicate value and benthic community is more inclined towards the water velocity. It was noticed that higher the velocity ($>0.8\text{m/s}$) the lesser diversity of *Thiara lineate***





Ecological significances

- Ansupa wetland and Satkosia gorge with 34 deep pools providing shelter for large bodied fish species during low flows
- Flood pulses are required to inundate Ansupa wetland for the fish species recruitment and maintaining livelihood of fishermen
- Plankton and benthic communities are the indicator of water qualities and required for river health maintenance





THANK YOU



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