

SUMMARY

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A study has been carried out on phytoplankton ecology of two freshwater bodies on Western Ghats in South Western Maharashtra in the districts Satara and Sangli. The lake Kas situated at an altitude in Satara district is a water body not subjected to any human activity or pollution of any kind. On the other hand Khan, a reservoir in the heart of Sangli city is polluted by every kind of human activity.

Monthly observations have been made on the physico-chemical and phytoplankton characteristics of these two water bodies. Heavy metals have also been analysed. Sediments have been tested for various physico-chemical parameters at monthly interval. In phytoplankton density and biomass have been estimated. Density and biomass of each phytoplankton group and species is also estimated. Primary production (Gross and Net) and Community Respiration has been estimated in few months.

The dissolved oxygen value in Khan go upto zero and also to high level on the other hand in Kas they remain near saturation. The Secchi Disc transparency values are high in Kas and low in Khan. The concentration of nitrogen, phosphorus, calcium, magnesium, sodium, potassium, chlorides and heavy metals is several times higher in Khan as compared to Kas. The pH of Khan is also very high apparently due to high phytoplanktonic growth. Free CO₂ is almost always present in Kas suggesting low photosynthesis but was irregularly present in Khan.

A total of 31 species were recorded from the Kas lake and 22 species were found in Khan reservoir. Out of which 16 species were common to both the water bodies. Khan had an abundance of pollution tolerant species like *Microcystis aeruginosa*, *Merismopedia*, *Phormidium*, *Cosmarium*, *Closterium* and *Euglena*. There was a permanent bloom of *Microcystis aeruginosa* in Khan, which did not decline even in the winters suggesting a highly elevated nutrient level.

In Kas about 10 species were always present but in Khan this number was very few as the *Microcystis* bloom seems to have inhibited other phytoplankton. In Kas the total phytoplankton density and biomass ranged from 2295.0 to 39450.0 units/mL and 1.2 to 64.21 mg/L respectively. In Khan this range was 5387.5 to 649200.0 units/mL and 3.1 to 110.0 mg/L.

In Kas the gross primary productivity ranged from 0.03 to 0.52 g O₂/m³/hr. Low values were found during winters. In Khan maximum gross production recorded was 5.3 g O₂/m³/hr. and the values were usually above 1.0 g O₂/m³/hr. The net primary production in Kas was frequently in negative (due to very low gross production but sufficient community respiration) maximum value of net production in Kas was 0.28 g O₂/m³/hr. In Khan the net production was negative on very few occasions. It varied from -0.08 to 2.08 g O₂/m³/hr. In Kas the community respiration ranged from 0.08 to 0.55 mg O₂/m³/hr. In Khan these

values were 0.1 to 1.6 mg O₂/m³/hr. The P/R (GPP/CR) ratio varied from 0.62 to 1.76 in Kas but it was 1.33 to 2.0 in Khan.

The studies on diurnal variation in primary production showed that in Kas usually the maximum gross production was obtained in morning, suggesting a light inhibition. In Khan, however, maximum gross production was noticed during afternoon only following a daily curve of insolation and temperature.

Various physico-chemical (Wetzel, Uttormark and Peterwall, Chemical Score) and biological indices (Diversity indices, Palmer's index, Nygaard's indices) have been applied to ascertain the trophic status of these water bodies. According to these indices Kas is characterized as oligotrophic to mesotrophic and Khan as hypereutrophic to pleistotrophic.

Among the various indices, we found the physico-chemical index Uttermark and Peterwall and diversity index to be suitable in identifying the trophic status. We feel that the values of dissolved oxygen, secchi disc transparency and hourly rates of gross production also indicate eutrophication to an accurate degree.

Kas has been found to be a rarely clean water body (in comparison to vast majority of lakes in India) but the signs of eutrophication are slowly emerging in the lake (which could be due to deforestation in the catchment area, minor tourist influence and run-off) as evidenced by reasonably high nutrient level, moderate algal density and biomass, besides the presence of some pollution tolerant algal species albeit in low quantity. Immediate conservation measures should be started to protect this very precious resource.

On the other hand decades of misuse has put Khan in a position of no return but this certainly brings forth an example as to what level the water bodies can deteriorate due to apparently minor and diffused human activity.