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**ECOLOGICAL STUDY OF A POND RELATION OF IT'S BIO-PRODUCTIVITY AT BANDA (U.P.) INDIA**

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**ABSTRACT**

Assessment of hydrobiological features viz. colour, turbidity, water temperature, pH, CO<sub>2</sub>, D.O., B.O.D., Chloride, Carbonates, Bicarbonates, total alkalinity, Ammonical nitrogen, Nitrate, Phosphate and plankton (Phyto & Zoo) and fishes of Pragi Talab at Banda were studied during rainy season (July-October). Water samples were taken from four points of the said ponds, having in view to examine entire ecology of the pond. As per the observations following APHA, the productivity of the said pond was not upto the mark, because pond water was used mostly by washerman and vehicle washing. Thus the detergents and petroleum products cause harm to the biota. Apart from this, there was no embankment and trees so the pond requires proper management scientifically for enhancement of bio-productivity. Besides meteorological conditions viz. Photo period, Atmospheric temperature, Rainfall and Relative humidity were also recorded which have direct impact on water bodies. On those guidelines; the other unmanaged lentic water bodies may be properly managed scientifically so that their bio-productivity might be used as an asset for the wellbeing of the society. The parameters results were compared with ISI/WHO standards.

Figure : 00

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KEY WORDS : APHA, Assessment of bio-productivity, Hydrobiology, ISI, Management of lentic water bodies, Role of lentic water bodies in human welfare, WHO.

**Introduction**

'Water is mother of all living world', major part of water available on the earth is saline in nature, only small quantity is fresh water<sup>4</sup>. Aquatic ecosystem is the most diverse ecosystem in the world.

India needs around 7580 billion meter cube (m<sup>3</sup>) water per year for domestic, agricultural, industrial and commercial consumption. But many districts of the country including Banda face severe water shortage problems especially during summer season.

Bio-productivity of aquatic ecosystem

depends on several interrelated physical-chemical factors alongwith meteorological conditions which in turn are function of climatic regions. The size of the watershed, basin, morphology, nature and the food web structure are also considerable. Bundelkhand region of Uttar Pradesh lies in central U.P. and plateau region which is located between 23.8-23°30' N latitudinal 78°11"-81°30' E longitude. Banda district comes under the Chitrakoot Dham Commissionary Banda Uttar Pradesh.

Pragi Talab is under study which is perennial topographically. Pragi Talab is located at Vindhya ranges situated on Ganchha road (which is at south

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outskirt of the city). Its area is approximately 8 hectares.

### Aim

The aim of the study was to evaluate the deficiencies in the pond due to which the proper bio-productivity was not being achieved so the measures for the proper management viz. proper embankment, plantation, regular supply of water through inlet with gauzed gates at inlet and outlet for maintaining required water level, to check the entry of polluted water, drainages to be diverted to other places. Further, for fish culture, proper maintenance by manuring of the pond could be done so that an Ideal pond might be made for enhancing the bio-productivity.

### Materials and Methods

The pond monitored seasonally in the year 2009-2010 during rainy season (July to October) four samples were collected from four sampling

stations in rainy season. Each sample was taken from sub surface of pond between 10 A.M. to 12:00 Noon in PVT canes, D.O. and B.O.D. bottles. D.O. was fixed on the spot and the analysis of the water samples was done as per the standard methods<sup>1</sup>. The physical-chemical factors viz. colour, turbidity, water temperature, pH, CO<sub>2</sub>, D.O., B.O.D., Chloride, Carbonates, Bicarbonates, Ammonical Nitrogen, Nitrate, Phosphate were analysed in lab and for assessment of bio-productivity, plankton and fishes were studied qualitatively and identified with the help of Denny P. & Day Fauna. In addition, climatological conditions i.e. atmospheric temperature, relative humidity, photoperiod and rainfall were also recorded which have direct impact on water quality.

### Result and Discussion

As per the recorded observations of the physical & chemical factors as regards bio-productivity in the pond under study during rainy

**TABLE- 1 : Physico-Chemical parameters of Pragi Talab during rainy season 2009-10**

Parameters	Station a <sub>1</sub> Inlet	Station a <sub>2</sub> Bathing Ghat	Station a <sub>3</sub> Clear Site	Station a <sub>4</sub> Outlet
Water temperature (0°C)	24.2	24.2	24.1	24.2
Turbidity (NTU)	120	122	110	117
Colour	Muddy	Muddy	Muddy	Muddy
pH	8.2	8.1	7.9	8.1
Co <sub>2</sub> (mg/l.)	15.00	16.00	14.00	15.00
D.O. (mg/l.)	7.30	7.2	7.26	7.24
Chloride (mg/l.)	63.00	67.00	62.00	65.00
Carbonates (mg/l.)	42.00	44.00	40.0	42.00
Bicarbonates (mg/l.)	171.00	172.00	168.00	168.00
Ammonical Nitrogen (mg/l.)	0.44	0.46	0.42	0.45
Nitrate (mg/l.)	0.89	1.05	0.87	1.02
Phosphate (mg/l.)	0.58	0.61	0.56	0.59
B.O.D. (mg/l.)	4.60	4.63	4.58	4.61

season (July to October) 2009, the consequences were:-

The pond water temperature varied from 24.1°C to 24.4°C in rainy season. During the case of study highest water temperature at polluted station A<sub>2</sub> which might be due to use of excessive detergents. It was reported that the temperature had the greatest influence on the productivity of Rotifers<sup>2</sup>.

Turbidity varied from 110 NTU to 122 NTU due to contamination of silt and organic matter through surface run-off.

The higher turbidity caused muddy colour of pond's water.

pH varied from 7.9 to 8.1 which depended upon the concentration of carbonates, bicarbonates and carbon-di-oxide. The later is affected by photosynthesis of aquatic vegetation and respiration of animals.

CO<sub>2</sub> was observed from 14.00 mg/l to 16.00mg/l. higher concentration of CO<sub>2</sub> causes pollution because B.O.D. increases.

D.O. varied from 7.20 mg/l to 7.30 mg/l. The concentration of D.O. is adversely affected by the contamination of animal excreta and decomposition of organic matters.

Chloride was in the range of 62 mg/l to 67 mg/l. Human and animal excreta and also drainages have high quantity of chlorides along with nitrogenous compounds.

Carbonates varied from 4.00 mg/l to 44.00 mg/l. In the process of photosynthesis CO<sub>2</sub> is consumed, this increases the carbonates.

The pH is controlled by the photosynthesis and it follows that pH and carbonates would vary directly.

Bicarbonate varied from 168.00 mg/l. to 172.00 mg/l. The contents of bicarbonate were high due to addition of animal excreta and free CO<sub>2</sub> which converts in to H<sub>2</sub>CO<sub>3</sub>.

Ammonical nitrogen varied from 0.42 mg/l to 0.46 mg/l. The most important source of ammonia is the ammonification of organic matter and excretory materials.

Nitrate varied from 0.87 mg/l to 1.05 mg/l. Domestic sewage contains very high amount of nitrogenous compounds. Ammonia of excretory materials converts into nitrate.

Phosphate values ranged between 0.56

mg/l. to 0.61 mg/l. Phosphate is an important and major source for plant growth and also responsible for biological productivity. The main resource of it is from agricultural runoff.

B.O.D. varied from 4.58 mg/l to 4.69 mg/l. As the D.O. is utilized in microbial activities, so the B.O.D. increases.

Meteorological/climatic conditions viz. Atmospheric temperature, Rainfall, Photoperiod and Relative humidity have direct impact on physico-chemical factors of pond's water.

Bio-productivity of the pond depends upon all the said factors. In the present study, micro-flora, micro-fauna & macro-fauna fishes of economic value were studied. During the course of study Chlorophyceae, Bacillariophyceae and Cyanophyceae were also analyzed. Some genera of Chlorophyceae are very valuable as they are used in manufacturing of medicines so they are of medicinal value. Besides it, Cyanophyceae is quite important economically as they are used as organic fertilizers particularly in paddy fields.

Thus it is incurred that the pond's water has very much significance in the field of development. Under micro-fauna pathogenic protozoa's were under consideration Amoeba, Giardia, fishes of food value major carps.

#### **Phytoplankton and Zooplankton in rainy season (July-October), 2009**

Chlorophyceae- Ulothrix, Spirogyra, Zygnema etc.

Bacillariophyceae- Cyclotella, Navicula, Synedra etc.

Canophyceae- Microcystis, Oscillatoria, Nostoc etc.

#### **Zooplankton-**

Protozoans- Amoeba, Entamoeba, Giardia.

Economically important fishes were identified with the help of day fauna and their feeding habits were studied-

<i>Fishes (Major carps)</i>	Feeding habits
<i>Labeo - rohita</i>	Herbivorous
<i>Labeo - calbasis</i>	Herbivorous
<i>Wallago - attu</i>	Carnivorous & predeceous
<i>Catla catla</i>	Surface plankton feeder
<i>Mystus aor</i>	Column feeder & bottom feeder

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