Study of Physico-Chemical Properties of Pond Water of Bilaspur , CG. India

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ABSTRACT

The collective mass of water found on underground and over the surface of the planet is called the hydrosphere. Water has been vital to man and nature since the beginning of time. The basic cycle by which water evaporates. Physico chemical parameter are very important for determining the contaminants present in water. Many parameter has been analysed in terms of seasonal variation. The different physico-chemical Properties like chloride, Total Hardness, Ca^{+2} Hardness, Mg^{+2} hardness, Total Alkalinity, Turbidity conductivity, total dissolved solid, microbiological study of water also analyzed , like TBC (Total Bacterial count), SRB (Sulphate Reduce Bacteria). The electrical conductivity of Vyas pond are very high in summer season and turbidity and TBC (Total bacterial count) maximum for siltara sankra pond for raining season were as maximum chloride observed in both pond in summer.

Keywords: Physico-chemical characteristics, Surface water, micro-organism.

1. INTRODUCTION

Water is the main sources of energy and governs the evaluation on the earth. Pond is very important for the ecology and much important for environmental like wildlife, raining water harvesting because water is most wonderful abundant and useful compound. Hydrosphere is study of water on the basis of their distribution and quality, the distribution of water is called Hydrograph . Water contribute its downward journey till it meet a hard work , when it refer upwards and it may even come out in the spring. Pond is a shallow water body and can not store for a long time and it become polluted because discharging

waste water from domestic purpose and anthropogenic activity. (Bojakowska *et al*., 2010 h' Uska *et al*., 2013) pond has been used as traditional source of circulation in India. Physico-chemical and microbiological analysis of underground water in and around Gwalior city MP has been evaluated by Parihar S.S *et al.*, (2012).

2. GOEGRAPHICAL LOCATION

Bilaspur is located at 22.09°N 82.15°E It has an average elevation of 264 metres (866 ft).Bilaspur is situated on the banks of the rain-fed Arpa River, which originates from the Maikal Range of Central India. It's a dolomite rich region surrounded by dense forests in the north and the coal mines of the Hasdeo Valley in the east.Bilaspur District is surrounded by Koria District in the north, Anuppur District of Madhya Pradesh, Mungeli and, Baloda Bazar-Bhata Para District in the south and Korba and Janjgir-Champa District in the east.. Bilaspur city situated in the Arpa river, basin in CG state initially approx 120 ponds were present in Raipur city but now days only 90 ponds remain after become of CG. the selected pond are Vyas and Sankra Siltara pond.

Water qualiy parameter

The water quality analysis of the pond water gives the exact nature including Temperature, Turbidity, Electrical conductivity, TDS, pH, chloride, hardness, alkalinity and SRB , TBC bacteria decide the quality of water.

The method adopted for water quality analysis are listed in table.

Table 1 Methods for Physicochemical and biological analysis

Sr. No	Physical parameter	Method used
1.	Turbidity (NTU)	Turbidity Tube method
2.	Electrical Conductivity EC,ms/cm	Electrometric method
3.	TDS mg/l	Classical method
	Chemical Parameters	
4.	pH	Electrometric Method
5.	Chloride	Argentometric method
6.	Hardness	Complexometric method
7.	Alkalinity	Acid base titration Method
	Biological Method	
8.	SRB	Biotechnological process
9.	TBC	Biotechnological process

3. MATERIALS AND METHODS Study area

Raipur is the capital of CG many industrial area located in city and more than 50 thousand employee coming here for several job Vyas and Sankra siltara pond are selected for study the physicochemical parameters and microbiological analysis. Many people are stay near to industrial area and dependant their daily routine to the nearest water reservoir.

Collection of sample

The sample of water collected in plastic bottls from april 2020 before hot summer season and during raining season over the depth about 10 c.m. Below layer of the pond water because primary fish where observed. All parameters are measured by the standardization method ISO.

4 RESULT

Physico-chemical properties of water

The result obtain by physicohemical analysis of all parameters for two seasons (Summer and Rainy) are given in table-2

Table-2 Physico-chemical properties of different pond water.

Sr. No	Parameters	Sample-1 Vyas pond		Sample-2 Sakra Siltara pond		WHO Standards
		S	R	S	R	
1	pH	8.2	8.3	8.3	8.5	6.5 – 8.5
2	Total Hardness(mg/l)	324	100	350	240	
3	Ca- Hardness (mg/l)	226	72	216	168	
4	Mg- Hardness (mg/l)	98	28	134	72	
5	Turbidity	42.5	50.0	40	62	1-5
6	Conductivity	1250	1058	1164	720	
7	Chloride (mg/l)	291.1	213	310	200	0.2- 250
8	Alkalinity (mg/l)	340	234	320	280	
9	Total Dissolve Solid (mg/l)	837	1110	780	1353	1000- 5000
10	Total Bactria Count (Counts/Ml)	10^3	10^2	10^5	10^4	
11	Sulphate Reduce Bactria Counts/Ml)	10^2	10^2	10^2	10	

1   pH: pH is an indicator of the acid or alkaline condition of water. The pH scale range from 0-14,7 indicates the theoretical natural point and typically is the optimum target . Water with a pH value less than 7 indicates acidity and tends to be corrosive, while water with a value greater than 7 indicates alkaline and tends to affect the taste of water. pH Value of water sample determine by pH meter. pH value of pond water varies between 8.2 to 8.3 and 8.3 to

8.5 during summer and rainy season respectively indicating the alkali nature. The pH of Sankara siltara pond is highest in rainy season.

2   Electrical conductivity: The conductivity of water is directly linked to the concentration of the ions and their mobility. The ionsin water acts as electrolytes and conducts the electricity. The conductivity depends on the value of the pH, on the temperature of measurement which has been dissolved in the water to form ions. The conductivity is also affected by the concentration of ions already present in the water such as chloride, sodium and ammonium. Chemical composition of water determines its conductivity.The value of electrical conductivity varied from 1164 to 1250 microswis/cm and 720 to 1058 microswis/cm in summer and rainy season respectively. It is maximum for in summer season in Vyas Pond.

3   Turbidity: Turbidity is a measure of water of the lack of clearity. Water is high turbidity is cloudy while water with low turbidity is clear. The more particale in the water, the more light

is reflected of the particle and therefore the higher the turbidity cloudiness. Turbidity is measured in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Unit (JTU), The range of Turbidity of analyzed water sample varied between 40 to 42.5 NTU in summer and 50 to 62 NTU in rainy. So it maxiumum for Siltara Sankara Pond.

4   TDS: Total dissolve solid (TDS) of water sample measured by TDS meter and reference electrode which used for measurement of TDS, there times washed by distilled water and display reading set 1000 by calibrated switch , After calibrated directly measured TDS of water sample.The Range of TDS of analyzed water sample varied between 780 to 837 in Summer season and 1110 to 1353 ppm in rainy season, So it highest in Siltara and Sakra pond in rainy season.

5   Chloride: Chloride is generally presence in water sample due to adding salts, animal residues and runoff from industrial , domestic waste and rocks. Chloride determined by agentometric titration method.The chloride ranged from 291.1 to 310 ppm in summer seasion and 200 to 213 ppm in rainy season. The chloride of all sample is permissible unit and it is indicating the maximum chloride observed in Vyas & Siltara pond in summer.

6   Total Hardness: Total Hardness indicate he presence of calcium and Magnesium salt like calcium Bicarbonate, magnesium bicarbonate, calcium chloride, magnesium chloride, calcium sulohate, magnesium sulphate etc. So this the very important parameters for determine of calcium and magnisium salt in water sample. Total Hardness of water sample determine by the complexometric titration method and for determine of total hardness, Used standard solution like standard M/100 EDTA solution used for titration . In present study the total hardness of water in summer season the range between 324 to 350 ppm and 100 to 240 ppm in rainy season so it well permissible unit.

7   Total Alkalinity: Total alkalinity of water sample indicates the presence of

Bicarbonate, Carbonate and hydroxide. Total Alkalinity of water sample determine by Acid Base titration method for determine of total Alkalinity used phenolphthalein and methyl orange as indicators.The total alkalinity ranged from varied between 320 to 340 ppm in summer season and 234 to 280 ppm in rainy season and here hydroxide or caustic alkalinity seldom exist in the samples.

8   Microbiological Study: The bacterial study in water sample play in important role. It is detected by the biotechnological process [total viable count/heterotrophic plate count] The maximum no of TBC bactria founding 10^5 MPN in siltara pond in summer seasion but SRB Bacteria present in well permissible limit in 100 ml water sample.

If high the bacteria in water sample it is fairly indicating of increasing pollution of the pond by organic meanse particularry through of sewage and domestic effluent into the pond. All pond are pollutant but siltara sakra pond are most pollutant area (SRB).
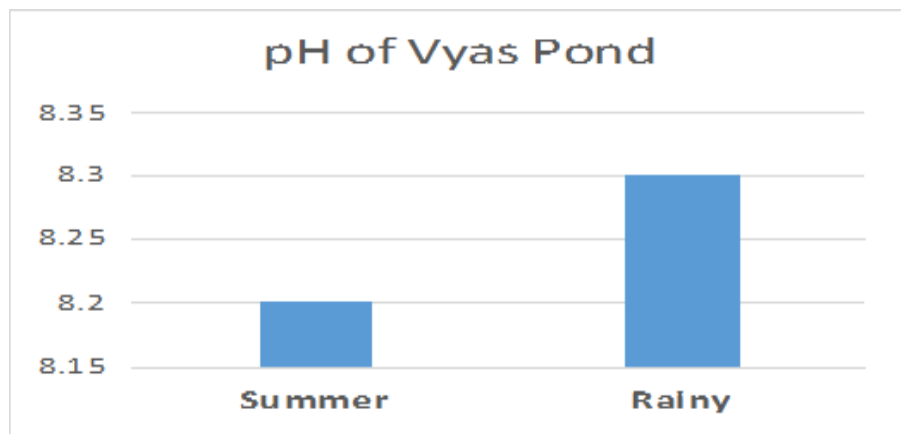
Fig 4.1– Analysis of pH for the Vyas Pond
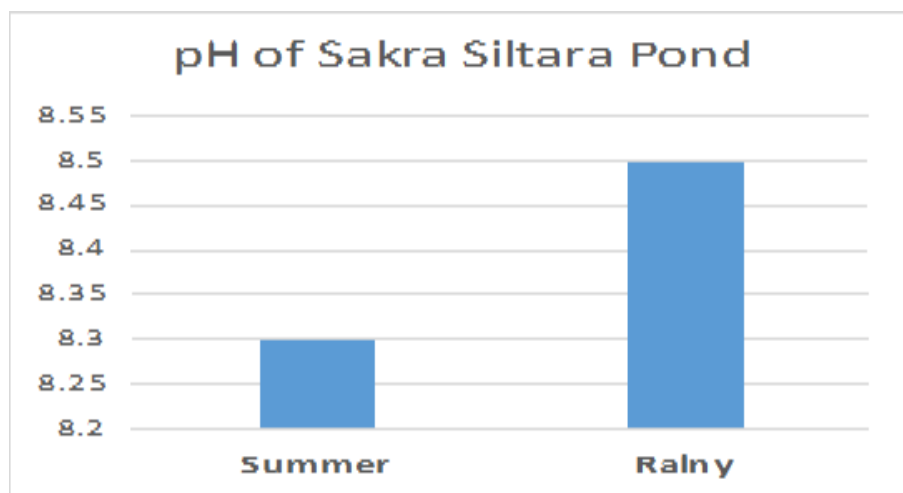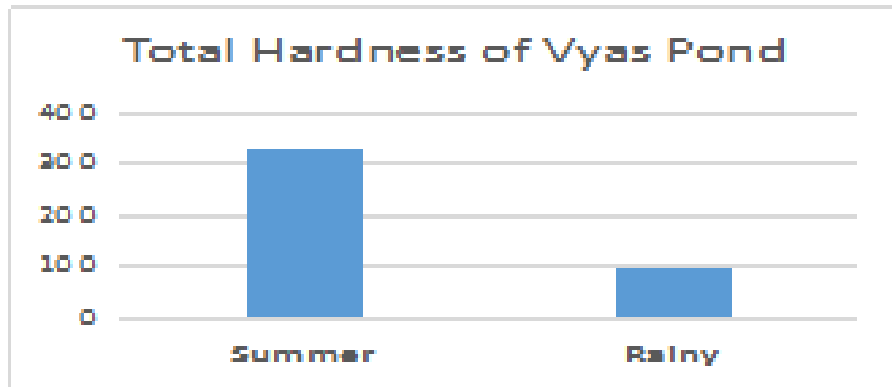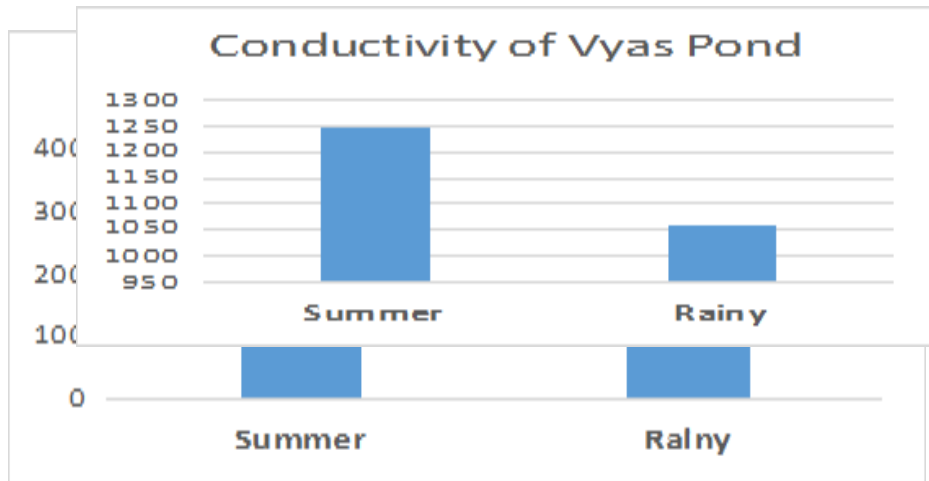
Fig – 4.2 Analysis of pH for the Sakra Siltara Pond.

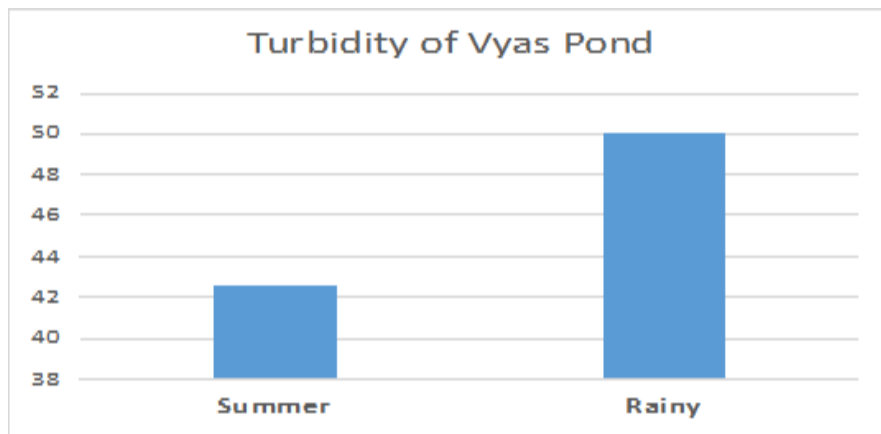**Fig4.4– Analysis of Total hardness for the Sakra Siltara Pond.**

Fig 4.5– Analysis of Turbidity for the Vyas Pond.

Fig4.6– Analysis of Turbidity for the Sakra Siltara Pond
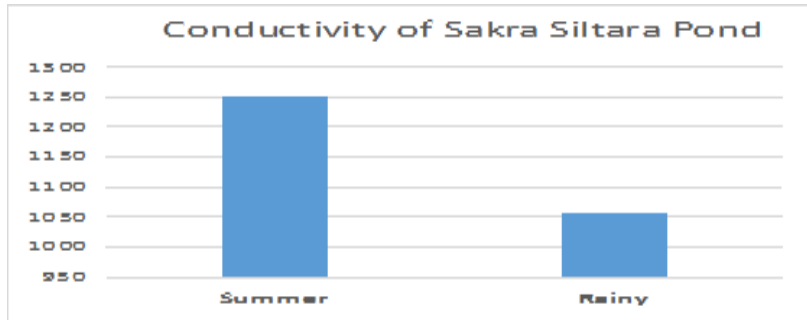**Fig –4.7 Analysis of Conductivity for the Vyas Pond.**
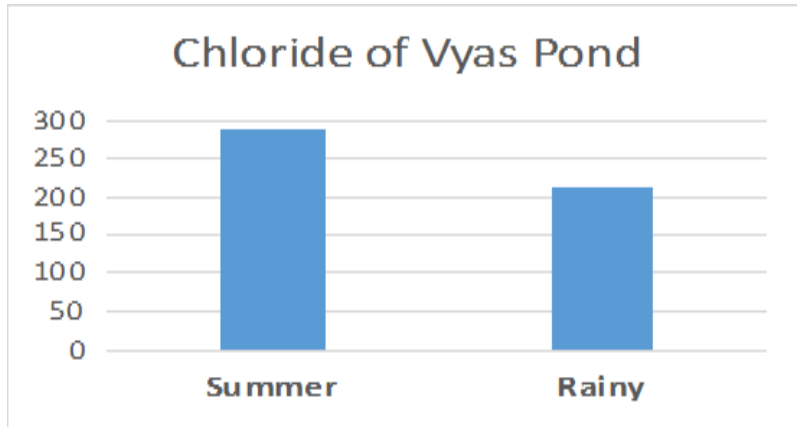
Fig 4.8– Analysis of Conductivity for the Sakra Siltara Pond.
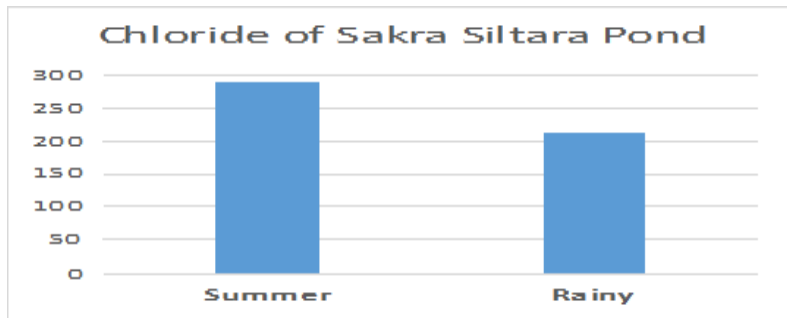

Fig 4.9 Analysis of Chloride for the Vyas Pond.

Fig 4.10– Analysis of Chloride for the Sakra Siltara Pond.
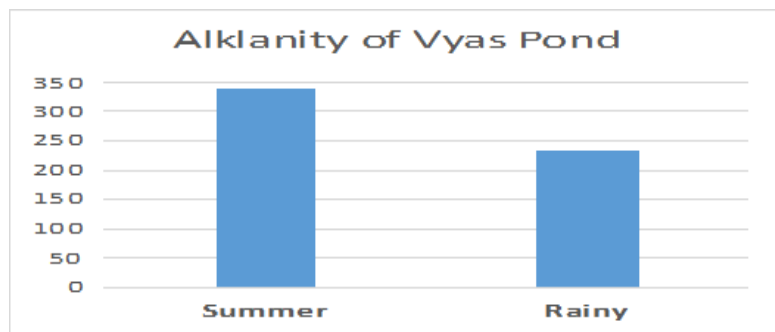**Fig 4.11– Analysis of Alkalinity for the Vyas Pond.**

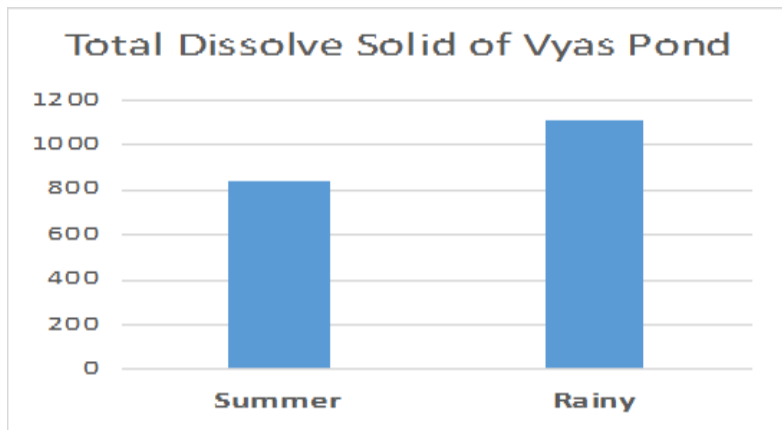**Fig 4.12– Analysis of Alkalinity for the Sakara Siltara pond**

Fig – 4.13Analysis of Total Dissolve Soild for the Vyas Pond.
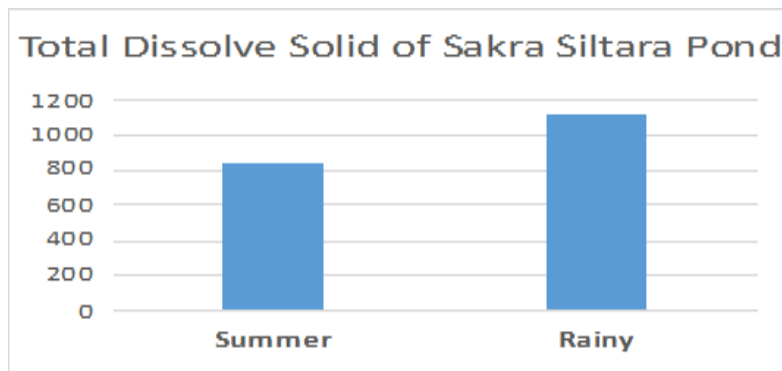

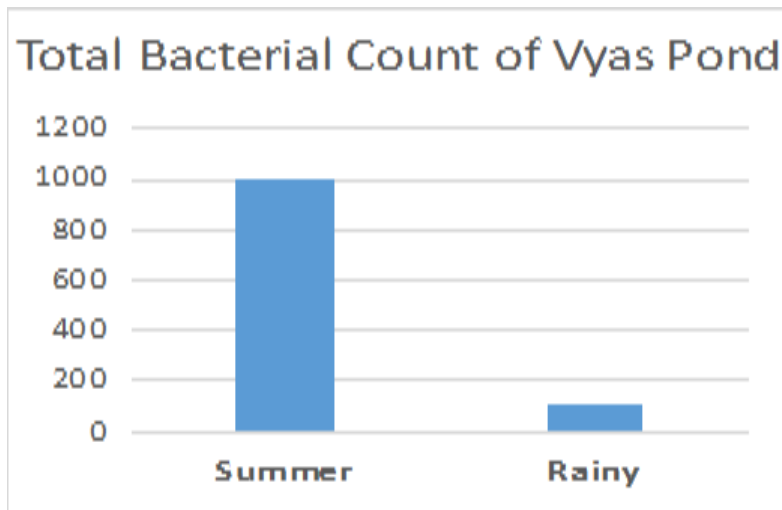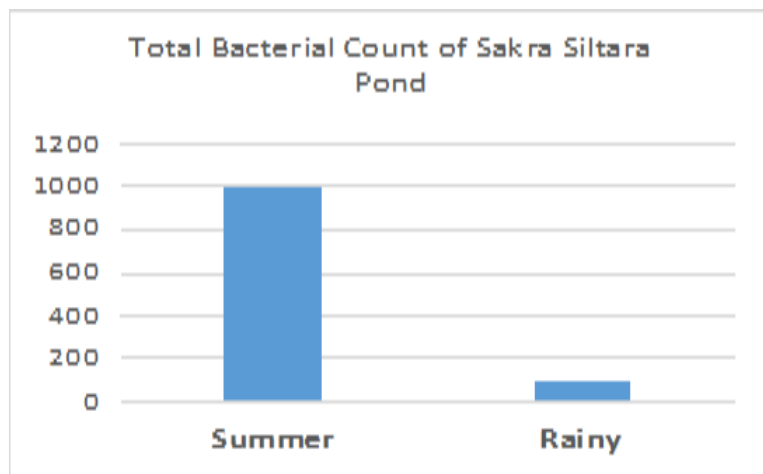**Fig 4.14– Analysis of Total Dissolve Soild for the Sakra Siltara Pon**

Fig 4.15– Analysis of Total Bacterial Count for the Vyas Pond.

Fig –4.16 Analysis of Total Bacterial Count for the Sakra Siltara Pond.

RESULT

With increase in industrial more waste is generated which cause both surface and ground wate pollution. Bacteriological polltion in drinking water cause diffrent types of health.

problem like diarrhea, skin disease etc. More then 70% of the diasease is water born in nature. All ponds are polluted but siltara sakra pond more polluted because of TBC Bactria that indicating the water from this pond are not suitable for drinking, bathing, propagation of wild life, fishries and irrigation purpose.

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