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Research Paper Chemistry

Study of Panam River water by Physico-Chemical Analysis, Taluka Lunawada, Dist: Mahisagar(Gujarat)India.

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ABSTRACT

This Paper deals with the Physico – chemical Parameters of Panam River Water in Lunawada District: Mahisagar, Gujarat monthly Changes in Physical and Chemical Dissolved Solids, pH, Dissolved Oxygen, Free Carbon dioxide and Total Hardness, Chlorides, Alkalinity, Phosphate and Nitrates were analyzed for a periods of one year from 1st January 2014 to 31st December 2014. All Parameters were within the permissible limits. The results indicate that the river is Non-polluted and can be used for Domestic, Irrigation and Fisheries.

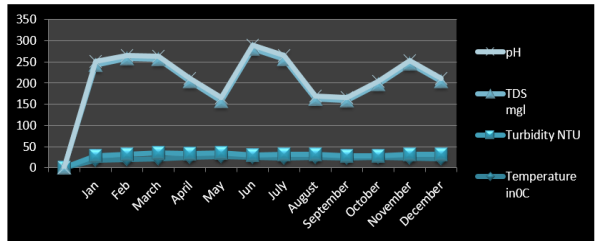
KEYWORDS Panam River; Physico-Chemical Parameters, Monthly variation.

INTRODUCTION

River irrigation is one of the oldest and significant sources of irrigation in India and is particularly in south India (Palanisamy, 1998)[1]. The river occupy vital role in the irrigation as well as local ecosystem in the semi-arid and regions of South India. The river water provides multiple uses like source of drinking water for uncountable rural and urban communities and livestock, fish culture, recharge of ground water, control of floods etc., (Gurunathan, 2006) [2]. As water is one of the most important compounds of the ecosystem, but due to increased human population, industrialization, use of fertilizers in the agriculture and man-made activity. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to pollute water quality and depletion of aquatic biota. It is therefore necessary that the quality of drinking water should be checked at regular time of interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. It is difficult to understand the biological phenomena fully because the chemistry of water revels much about the metabolism of the ecosystem and explain the general hydro - biological relationship.

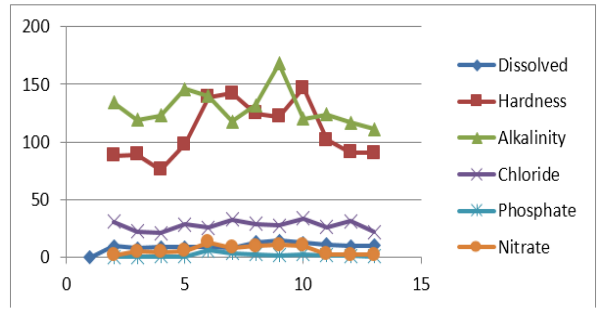
Table: 1 Physical parameters of Panam River, Lunawada, District : Mahisagar

Month	Temperature in^{0}C	Turbidity NTU	TDS mg/l	pH
Jan	18	10.20	215	7.1
Feb	20	12.50	225.1	7.05
March	22	13.15	221.0	7.45
April	24.2	9.05	170.1	7.15
May	26.2	8.50	123.0	7.55
Jun	25.6	5.40	250.5	7.35
July	24	8.10	225.0	7.25
August	25	7.15	130.0	7.20
September	23.6	5.15	130.2	7.10
October	24.2	4.55	168.0	7.01
November	23.9	7.65	213.7	7.18
December	22	9.12	172.3	7.26



Ttable 2 : Chemical parameters of Panam River, Lunawada, Dist : Mahisagar

Month	Free CO^2	Dissolved oxygen	Hard ness	Alkal inity	Chlo ride	Phosp hate	Nitrate
Jan	15.8	9.90	88.0	134.0	31.0	0.70	2.0
Feb	15.8	8.21	89.0	119.0	22.5	0.65	5.3
March	12.7	8.75	76.0	123.0	21.0	0.99	4.5
April	15.7	9.00	98.0	146.0	28.6	0.75	5.42
May	5.4	9.30	139.0	140.0	26.0	5.87	13.1
Jun	9.8	8.30	142.0	118.0	33.0	3.85	8.4
July	9.1	13.25	125.0	132.0	29.0	2.94	9.9
August	6.5	14.5	122.0	168.0	27.5	1.65	10.7
September	5.7	12.75	147.0	120.0	34.0	2.93	10.2
October	1.0	11.20	102.0	124.0	26.2	1.83	2.87
November	0.7	10.00	91.0	117.0	31.5	1.25	2.33
December	0.9	10.25	90.5	111.0	22.1	1.0	2.27



EXPERIMENTAL

The Water Samples from Panam River were collected from two different stations in the morning hours between 09 to 11 am in Polythene bottle regularly for every month. The Water samples were immediately brought in to Laboratory for the Estimation of various Physico -chemical parameters and pH were corded at the time of sample collection by using Thermometer and Pocket Digital pH Meter. While other parameters Such as DO, TDS, Free CO2, Hardness, Alkalinity, Chlorides, Phosphate and Nitrate were estimated in the Laboratory by using Indian Standard Procedures (Titration method, Atomic Absorption Spectrophotometer (AAS) Thermo M5 Model) (Trivedy and Goel,1986, APHA 1985)[3,4]. The Present Study involves the Analysis of water described by its Physical, Water Quality in Terms of Physico-chemical parameters of Panam River, Lunawada Dist.Mahisagar, (Gujarat). This river water is basically for agriculture, fisheries and partially domestic activities.

RESULTS AND DISCUSSION

a) Climate

The area under the project is in semidry zone,there is a rapid increase in temperature after the month of April to June is the hottest month. The climate of the year is divided into four seasons viz hot season from March to May; South-west monsoon from June to September; Post-monsoon from October to November; winter from December to February with an average wind speed of 4.22 km/hr. The maximum and minimum wind velocity in the river area was observed in the months of July and May are 7.60 and 0.1 km/hr respectively.

b) Water Temperature

Generally, the weather in study area is quite cool, however the water temperature plays an important factor which influences the chemical, bio-chemical characteristics of water body. The maximum temperature of 26.2^{0} C was recorded in May and January a minimum of 18^{0} C was recorded in month of December in the year 2014. Water Temperature in summer, was high due to low water level, high temperature and clear atmosphere (Salve and Hiware, 2008).[5]

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c) Turbidity

The turbidity of water fluctuates from 5.40 to 13.15 NTU. The maximum value of 13.15 NTU was recorded in the month of March, it may be due to human activities, decrease in the water level and presence of suspended particulate matter and minimum value of 5.40 NTU in the month of October.

d) Total Dissolved Solids

TDS were observed measured by digital water kit. The total dissolved solids fluctuate from 123 mg/l to 250.00 mg/l. the maximum value (250.00 mg/l) was recorded in the month of June. It is due to heavy rainfall and minimum value (123 m/l) in the month of May.

e) pH

pH was alkaline values ranges from 7.05 to7.55.The maximum pH value (7.55) was recorded in the month of May (summer) and minimum (7.05) in the month of February Most of bio-chemical and chemical reactions are influenced by the pH. The reduced rate of photosynthetic activities reduces the assimilation of carbon dioxide and bicarbonates which are ultimately responsible for increase in pH, the low oxygen values coincided with high temperature during the summer month (Kamble, S. M. et al.,). The factors like temperature bring about changes the pH of water. The higher pH values observed suggests that carbon dioxide, carbonate-bicarbonate equilibrium is affected more due to change in physico-chemical condition.

f) Dissolved Oxygen

The value of DO fluctuates from 8.21 mg/l to 14.5 mg/l. The maximum values (14.5 mg/l) was recorded in the month of February and minimum values (8.21 mg/l). The high DO in summer is due to increase in temperature and duration of bright sunlight has influence on the % of soluble gases (O_2 & CO_2). The long days and intense sunlight during summer seem to accelerate photosynthesis by phytoplankton, utilizing CO_2 and giving of oxygen. This possibly accounts for the greater qualities of O_2 recorded during summer. (Krishnamurthy R., et al, 1990)[6].

g) Free Carbon dioxide

The value of free CO_2 ranges from 0.81 mg/l to 15.8 mg/l. The maximum value (15.8 mg/l) was recorded in the month of January (winter) and minimum value (0.81 mg/l) in the month of November. This may be expends upon alkalinity and hardness of water body. The value of CO_2 was high in December. This could be related to the high rate of decomposition in the warmer months.

h) Hardness (Ca^{2+}/Mg^{2+})

Ca^{2+} , Mg^{2+} were measured EDTA titration methods. The value of hardness fluctuates from 76 mg/l to 147 mg/l. The maximum value (147 mg/l) was recorded in the month of June (summer) and minimum value (76 mg/l) in the month of Janurary. (Hujare, M. S, 2008)[7]: was reported total hardness was high during summer than monsoon and winter. High value of hardness during summer can be attributed to decrease in water volume and increase of rate of oration of water. The amounts of carbonate (Co_3^{2-}) and bicarbonate (HCO_3^{-}) were analyzed using standard method.

Calculation by the usual formula

$$Ca^{2+}/Mg^{2+}\ (mg/l) = \frac{\text{vol. of EDATA used (mL)} \times N \times 1000}{\text{mL of aliquot taken}}$$

CO_3^{2-} in milliequivalent per litre

$$CO_3^{2-}\ (mg/l) = \frac{\text{vol.of } H_2SO_4 \times N \times 1000}{\text{mL of water sample}}$$

Where N = Normality of H_2SO_4

HCO_3^{-} in milliequivalent per litre

$$HCO_3^{-}\ (mg/l) = \frac{\text{Normality of } H_2SO_4 \times \text{Vol. of } H_2SO_4 \times N \times 1000}{\text{mL of aliquot taken}}$$

i) Alkalinity

Total alkalinity ranges from 111 mg/l to 168 mg/l the maximum value (168 mg/l) was recorded in the month of August (summer) and minimum value (111 mg/l) in the month of December (winter). The alkalinity was maximum value in April (summer) due to increase in bicarbonates in the water. Hujare, M. S. 2008) also reported similar results that it was maximum in summer and minimum in winter due to high photosynthetic rate.

j) Chlorides

The values of chlorides range from 22 mg/l to 34.0 mg/l. The maximum value (34.0 mg/l) was recorded in the month of September (summer) and minimum value (22 mg/l) in the month of March. In the present study maximum value of chloride reaches in summer (Swarnalatha and Narsing rao, 1998). [8]

k) Phosphate

The value of phosphate fluctuates from 0.65 mg/l to 5.87 mg/l. the maximum value (5.87mg/l) was recorded in the month of May (summer) and minimum value in the month of February (winter). The high values of phosphate in May (summer) months are mainly due to rain, surface water runoff, agriculture run off; washer man activity could have also contributed to the inorganic phosphate

content.

l) Nitrates

The values of nitrate ranges from 2.0 mg/l to 13.1 mg/l. the maximum value (13.1mg/l) was observed in the month of May and minimum (2.0 mg/l) in the month of January.

CONCLUSION

It is concluded from this study that quality of Panam River Water is useful means not harmful for agricultural purpose and not much suitable for drinking purpose. It is suggested that people around this river require to improvement the water of quality and purity. Also water samples do not match with ICMR standards for drinking purpose.

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