



ORIGINAL RESEARCH PAPER

Botany

PHYSICOCHEMICAL PROPERTIES OF DIFFERENT WATER BODIES OF AJODHYA HILLS AND FOREST AREA, BAGHMUNDI BLOCK, PURULIA, WEST BENGAL, INDIA

KEY WORDS: Water quality, Physicochemical Parameters, Dam, Nitrate

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ABSTRACT

Physicochemical properties of different water bodies from five different sites Namely. Site -I (Upper Dam), Site-II (Lower Dam), Site-III (Marbel Lake), Site- IV (Kesto Bazar Lake) and Site- V (Murguma Dam) from Purulia District, India were evaluated during the period from August 2020 to July 2021. The water quality parameters such as temperature, pH, alkalinity, phosphate, nitrate, chloride and dissolved oxygen were analyzed. The temperature ranged from 18–35°C. pH value was neutral to acidic in nature. Diversity of alkalinity was found. The value of alkalinity ranges from 18-192 ppm. Phosphate value ranges from 1.30–2.90 mg/L. Nitrate concentration ranges from 0.150–0.60 ppm. Nitrate value increased due to run off water from different agriculture field Chloride content varies from 12 ppm–27 ppm. Dissolved oxygen range from 3.3–12.0 ppm. All sites shown remarkable for under WHO limitation and there for it may be suitable for drinking and domestic purpose. Different parameters of all sites are favorable for growth of different phytoplanktons.

INTRODUCTION

Water quality parameters and seasonal variation in different water bodies have been investigated by numbers of investigators. Dams have been used since time immemorial as a traditional source of water supply in the world. This resource may be polluted due to discharged water waste, sewage outlets etc. The quality of water depends on its uses and it can be assessed by the analysis of physicochemical parameters of water (Lianthumlaia et al., 2013). Monitoring of the physicochemical water quality parameters plays a pivotal role in assessing the water environment, ecosystem and restoring water quality. (Sarkar et al., 2016)

Ajodhya Hill (23.20808° N, 86.135707° E) is situated under Purulia district of West Bengal. This is the main highland of Purulia. Its acts as a water shed between the Kasai and Subarna Rekha. It has a tropical climate with, average annual rain fall varying between 1100–1500mm. Relative humidity in monsoon season is 75%–80%.

Temperature range from 7°C – 46.8°C. This hill is characterized by different water bodies.

The main objectives of the study were water quality analysis of different water bodies of Ajodhya Hills and forest area by physicochemical parameters and benefit of phytoplankton's for their growth.

MATERIAL AND METHOD

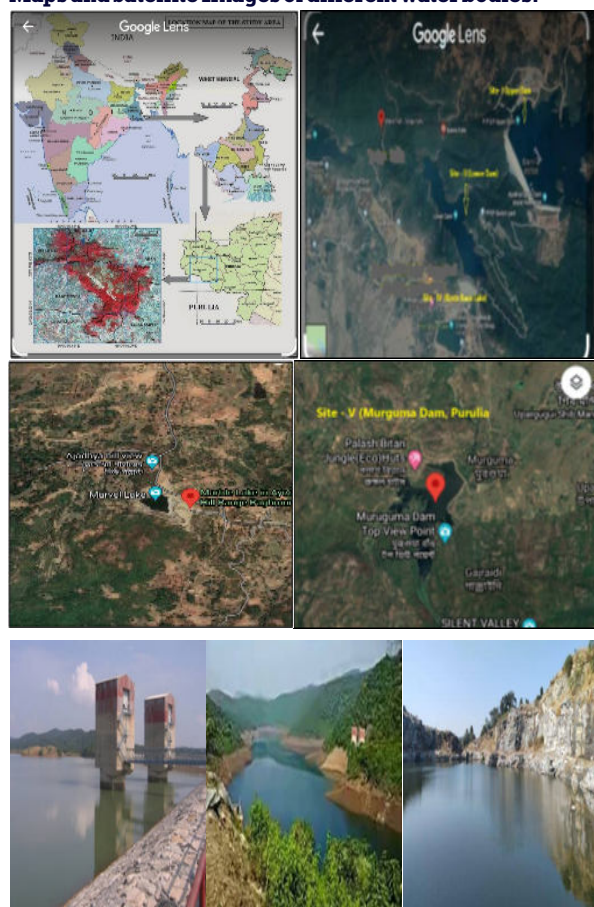
Water samples were collected in plastic bottles for a period of 12 months during the year of August ,2020 to July ,2021 with emphasized during summer and winter for different parameters analysis from five different sites: Site -I (Upper Dam), Site-II (Lower Dam), Site-III (Marbel Lake), Site- IV (Kesto Bazar Lake) and Site- V (Murguma Dam). In below the Table-I their latitude, longitude and altitude were presented. Physicochemical properties like alkalinity, pH, phosphate, nitrate, chloride and dissolved oxygen were analyzed in Sister Nivedita Oldage Home Water Testing Laboratory, under Purulia Division, Public health Engineering Directorate, Govt. of West Bengal. Water temperature (WT) was measured using mercury thermometer. The pH was determined by using Hanna p H meter, other parameters were determined by standard methods (APHA, 1995& Koderkar, 1992)

Given Table -I

Sl No.	Site	Latitude	Longitude	Altitude
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1	Site- I (Upper Dam)	23.201709° N	86.095766° E	467.5mMSL
2	Site- II (Lower Dam)	23.193147° N	86.087350° E	288mMSL
3	Site-III (Marbel Lake)	23.212718° N	86.086895° E	265mMSL
4	Site-IV (Kesto Bazar Lake)	23.186611° N	86.087334° E	350mMSL
5	Site- V (Murguma Dam)	23.315680° N	86.049350° E	329mMSL

Maps and Satellite Images of different water bodies:



Site-I

Site-II

Site-III



Site-IV

site-V

[photograph Of Different Waterbodies]

RESULT AND DISCUSSION

The result of Water quality parameters viz. temperature, pH, alkalinity, phosphate, nitrate, chloride and dissolved oxygen and their variations during the period of August,2020 to July,2021 are represented in table -II, III & IV (Physiochemical

Parameters of different water bodies viz. Site -I (Upper Dam), Site-II (Lower Dam), Site-III (Marble Lake), Site- IV (Kesto Bazar Lake) and Site-V (Murguma Dam).

Table-II. :Summer /winter variations of different parameters

Sl No.	Parameter	Different Sites									
		Site- I		Site- II		Site- III		Site- IV		Site- V	
		Sum mer	Win ter	Sum mer	Win ter	Sum mer	Win ter	Sum mer	Win ter	Sum mer	Win ter
1	Water Temperature (°C)	34	18	38	19	35	18	34	20	35	20
2	pH	8.1	7.3	8.1	7.1	6.8	7.4	7.3	7.1	7.1	7.3
3	Alkalinity (ppm)	160	18	120	20	140	22	192	22	190	40
4	Phosphate (mg/L)	1.9	1.3	1.8	1.4	2.9	1.4	13	2.1	2.5	2.0
5	Nitrate (mg/L)	0.40	0.50	0.15	0.20	0.15	0.60	0.20	0.40	0.15	0.60
6	Chloride (ppm)	25	18	20	13	27	17	26	12	26	20
7	Dissolved Oxygen (ppm)	3.5	10	3.3	9.0	4.1	12	4.2	11	5.0	11

Table-III. : Monthly wise variations of Physico-chemical parameters of different water bodies during the year of August,2020 to July,2021

MONTHS	WATER TEMPERATURE (°C)					pH					ALKALINITY (PPM)					PHOSPHATE (MG/L)				
	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
August	28	27	31	29	34	7.1	7.0	7.1	7.0	7.3	20	19	120	180	50	2.0	1.5	2.0	2.0	2.0
September	27	26	30	28	32	7.3	7.2	7.3	7.1	7.5	19	43	120	150	50	2.0	1.4	2.1	2.0	2.0
October	25	23	28	26	30	7.1	7.1	7.2	7.2	7.4	19	32	125	150	50	2.0	1.4	2.1	2.1	2.0
November	24	23	25	24	23	7.1	7.2	7.1	7.1	7.4	19	30	125	100	50	2.1	1.4	2.1	2.1	2.0
December	18	19	20	20	20	7.0	7.1	7.2	7.1	7.4	20	25	22	22	50	1.3	1.4	2.2	2.2	2.0
January	18	19	20	20	19	7.2	7.2	7.0	7.1	7.4	18	20	22	22	40	1.4	1.4	2.2	2.2	2.1
February	19	20	19	19	20	7.1	7.4	7.1	7.2	7.5	20	114	25	22	40	1.4	1.5	2.2	2.2	2.1
March	21	22	21	20	22	7.0	7.5	6.9	7.2	7.5	140	112	25	25	40	1.4	1.5	2.2	2.2	2.0
April	33	34	35	32	38	8.1	8.1	6.8	6.9	7.0	158	115	30	25	40	1.5	1.8	2.9	1.3	2.5
May	33	32	34	31	38	8.0	8.0	6.8	7.2	7.3	160	120	140	192	190	1.6	1.8	2.9	1.3	2.5
June	33	31	33	31	37	7.9	8.0	6.9	7.1	7.4	162	120	140	190	190	1.8	1.8	2.8	1.3	2.4
July	30	29	32	30	36	7.8	7.9	6.9	7.2	7.3	163	118	140	188	190	1.9	1.7	2.8	1.4	2.4

Table-IV: Monthly wise variations of Physico-chemical parameters of different water bodies during the year of August,2020 to July,2021

MONTHS	NITRATE (MG/L)					CHLORIDE (PPM)					DISSOLVED OXYGEN (PPM)				
	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
August	0.40	0.18	0.20	0.30	0.30	20	14	18	20	22	8.0	4.4	6.0	8.0	8.0
September	0.40	0.18	0.20	0.30	0.30	20	14	17	21	22	9.0	4.5	7.0	8.0	8.5
October	0.50	0.18	0.30	0.40	0.30	20	14	16	18	22	10.0	8.9	12.0	11.0	11.0
November	0.50	0.20	0.60	0.40	0.60	18	13	15	19	20	10.0	9.0	12.1	10.9	11.0
December	0.50	0.20	0.60	0.40	0.60	18	13	12	18	20	10.0	9.0	12.1	10.9	10.4
January	0.50	0.20	0.60	0.30	0.60	18	13	16	18	20	7.0	9.0	12.0	10.8	10.4
February	0.50	0.20	0.50	0.30	0.20	20	14	18	18	19	7.0	9.0	12.1	10.9	10.5
March	0.40	0.20	0.50	0.30	0.15	20	15	20	22	18	8.0	7.1	12.0	10.9	10.6
April	0.40	0.15	0.15	0.20	0.15	25	15	27	22	26	3.5	3.3	4.1	4.2	5.0
May	0.40	0.15	0.15	0.20	0.15	25	20	26	26	26	3.5	3.3	4.2	4.2	5.0
June	0.40	0.15	0.15	0.20	0.15	25	20	25	26	26	3.5	3.4	4.1	4.1	4.5
July	0.40	0.15	0.15	0.20	0.15	25	19	20	26	25	3.6	3.4	4.1	4.2	4.5

Temperature

Temperature is one of the most important factors which control the physical quality of the water. The temperature ranges from 18°C-35°C. The maximum temperatures were found during summer at site-III and site-V. Environmental temperature fluctuates both daily and seasonally which is one important physical parameter directly related to chemical fluctuates in aquatic ecosystems (Goel et.al, 1986)

pH (potential Hydrogen)

pH is the negative logarithm of hydrogen ion concentration (p

$H = \log[H^+]$. pH of water is important for biotic communities. In this study period maximum pH was observed during summer at site-I (upper dam) and site-II (lower dam). pH value was minimum during monsoon time due to dilution of water by addition of rain water (Reddy et.al, 2009)

Alkalinity

Alkalinity is presence of hydroxyl (OH⁻) ions capable of combining with hydrogen ions in solution (Koushik & Shankar, 1999) Alkalinity is a measure of the capacity of water to neutralize a strong acid (Wetzel, 1983). Alkalinity of different

water bodies in the sample ranges from 18-190mg/L. The highest alkalinity is 190 mg/L during summer at site-v (murguma dam). This result occurred due to nutrients the water (Udam, et.al., 2014). At site-I (upper dam) alkalinity is lower due to dilution of water by addition of water (Verma et.al., 2012).

Phosphate

Phosphate concentration varied from 1.3 to 2.9 mg/L. This content derived maximum value of 2.9 at site -III due to agriculture run off from fields. Higher concentration of phosphate in monsoon season was also reported (Shukla et.al., 2003)

Nitrate

Nitrate concentration ranged from 0.15 to 0.60 ppm. Nitrate contributes to fresh water through discharge of sewage and industrial wastes and run off from agricultural fields (Solanki, 2012). The highest amount of nitrate concentration is known to support the formation of bloom (Uduma, 2014). The lowest amount of nitrate in water was recorded during summer by utilization by plankton and aquatic plants (Verma et.al., 2010).

Chloride

In the study areas the chloride concentration varied from 12 to 27 mg/L. Maximum value during summer was at site-III and minimum value of chloride was 12 mg/L during winter at site-IV. The maximum value of chloride is usually during summer and minimum in winter season (Bade et.al., 2009).

Dissolved Oxygen (D.O)

The dissolved oxygen varied from 3.3 to 12 ppm. D.O plays an important role in metabolic process of aquatic organisms. The minimum D.O was found during summer (Masood and Krishnamurthy, 1990). Due to high temperature and addition of sewage and other waste which can be responsible for lowering of dissolved oxygen (Solanki, 2012).

All water bodies of study areas are in permissible limit of WHO. Present investigation clearly shown that studied water bodies are good for human life and different phytoplankton. But still for proper management and handling of these water bodies are required for future.

Conflict Of Interest

There are no competing interest to declare.

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