Comparative study on Physico-chemical Parameters of Gwalmangra Pond in Chhatarpur

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ABSTRACT

Aquatic weeds are undesirable plants which give harmful effect on aquatic organisms. Those aquatic plant growing in water and spent their life cycle in water. The presence of low amount of some aquatic weeds in fish culture can be useful several times because they play positive role in the development and maintenance of a balanced community.

The growth of algae and plants keeps them in the category of "weeds" which sometimes beat the weeds. They have various problems such as occupying the available space for fish, providing shelter to weed fishes and harmful insects. It also has some major problems due to the erosion and degeneration of water properties, lack of oxygen, prevention of light, sedimentation of obstructive tract operation, and the destruction of the pond by increasing the rate of eutrophication.

Water assumes an irreplaceable job in very species that get by in this world and is required by all living creature for their reality. In spite of the fact that water is a sustainable source, rash utilization and inappropriate administration of water framework may cause significant issues in accessibility and nature of water. Water might be polluted by different methods artificially and additionally naturally and they become unfit for drinking and different employments. In our nation to foresee of the water is truly contaminated and 75 percent kid mortality is credited to water contamination Debased water is that wrecks normal territory of fish and other new water living things.

The study and assessment of vegetation and plant association with physico-chemical character of water has generally been found highly complicated process. It is very clear that different kinds of micro and macro nutrients are essential for growth of different kinds of vegetation and some of the major elements like nitrogen, phosphorous and dissolved oxygen play very significant role for healthy vegetation growth. Nitrogen and Phosphorous are suitable and important for water hyacinth and alligator weeds.

Key words-Aquatic weeds, Physio-Chemical Parameters, macronutrients, Gwalmangra pond and Chhatarpur

INTRODUCTION

Water quality can have an extraordinary in fluence on the capacity of development of amphibian plants and creatures in a stream, lake or lake (Rao RJ, 2010). The nature of water assets as a rule relies upon its physical, compound and organic attributes. The ordinary scopes of these attributes show water of fine quality. Today because of quick urbanization and industrialization, the crisp water bodies are dirtied by the release of metropolitan and mechanical water. In the oceanic condition, the water quality is estimated as far as physical synthetic and natural parameters, which assume a conclusive job in deciding the sort and assorted variety of biota present in it. At the point when the water quality parameters are at the ideal level, living beings show wide appropriation and rich assorted variety and the other way around. Concentrates under taken on water quality have uncovered that a large portion of the water bodies in India are dirtied, as demonstrated by their physico-synthetic variables. Bringing about social eutrophication.

Water is a characteristic asset, an all-inclusive dissolvable, a unique medium and one of the most valuable product required for the endurance of living structures for their reality and upkeep of biosphere (Singh and Mathur, 2005 and Umavathi et al., 2007) the vast majority of the human exercises like horticulture, ranger service, businesses and different needs are fulfilled for the most part by water (Yogendra and Pattaiah, 2007; Krashnamoorti and Selvakumar, 2010). New water is an inexhaustible asset of humankind. It might be view as mainstay of our progress (Venketeswarlu, 2006). In India, accessibility of unadulterated water is getting diminished step by step because of

populace blast and industrialization (Gupta and Deshpande, 2004). As indicated by national water approach (2002) the request for need for water use is drinking and household, water system, mechanical and age of hydroelectric power.

Lakes happen normally or built and the water quality examination were performed to comprehend the appropriateness for multipurpose use viz; drinking, residential, recreational water system domesticated animals, fisheries and modern (Papastergiadou et al. 2007). The decent variety of sea-going plants are related with water quality and they impact the wellbeing of lakes and financial advancement (Prakash and Somashekar, 2006). Water quality and dependability differs because of its physico-substance attributes, in light of the fact that any adjustment in water quality straightforwardly or in a roundabout way influences the biotic condition. The idea of lake water decides the sort of fish to be chosen for culture and effect on species creation, wealth and profitability of oceanic living beings (Pendse et al., 2000). In this way it turns out to be evident that the idea of the oceanic networks is a declaration of the nature of water. The water bodies are exposed to physical, synthetic and natural changes due to the inflex of disintegrated substances from the catchment region (Wang and Fishcher, 1999 and Mandal et al., 2003). Supplements, for example, nitrate, phosphate and sulfate were in great levels for the substance of amphibian life in the environment. Aimless passage of local sewage, squander water from houses, rural overflow and gushing causes horrendous circumstances and influence the ripeness of lake which thusly may impact the appropriation and bounty of verdure and (Harikrishnan and Azis, 2000; Padmavathy et al., 2003). The wealth of natural mixes, radio nuclides poisonous synthetic compounds and nitrates in water may cause horrible impacts on the human wellbeing particularly causing maladies like malignant growth, other human body breakdown and constant sickness (Duruible et al., 2007). In this manner, a through checking and research on lake framework is basically required for the best possible administration of wetland bodies(Gorsevski, 2008; Beckand Hatch, 2009).

The profitability of a water body can without much of a stretch be recognized from its essential efficiency, which structures the foundation of the oceanic evolved ways of life (Bohra and Kumar, 2002) and the macrophytic sea-going weeds develop sumptuously by the advanced and silt and algal species which were engaged with essential creation. The potential impacts of the earth on water quality were accounted for by Joshi, 2003, Spanas et al.,2003). In 2005, Harikumar and Madhavan considered the water quality in Kerala. A few examinations have been directed so far to comprehend the physico-substance properties of lakes, lakes and supplies in India (Devi and Sharma; 2007). For the upkeep of biological parity physico-concoction parameters are required and distinctive environmental condition featured its status. Kaur et al., (2000) detailed that the natural appraisal is a valuable elective device for evaluating the environmental quality and the hydrophytes of amphibian biological system. Raina and Vobra (1996) proposed that preservation of freshwater environment is required to keep up the physical, concoction and organic nature of water.

MATERIAL AND METHOD

The study was carried out for a period of two years (July 2016 to Nov 2018). Four sampling stations ponds were fixed before regular sampling. The stations were chosen as follows.

The physico-chemical parameters were studied in relation to water quality of pond, suitability of fishes and aquatic weeds. Water samples were collected for physico-chemical analysis in 4 liters acid washed polythene container from a depth of 5-10 cm below surface water at seasonally interval. Separate samples were taken for dissolve oxygen in 250 ml bottle and immediately fixed in the field by adding potassium permanganate, potassium iodide and sulfuric acid. The samples were analysed immediately in the laboratory. The physico-chemical parameters were analyzed in the laboratory as per standard methods for examination of water suggested by APHA (2005).The main physico-chemical parameters of pond water were analyzed as transparency, colour, water temperature, turbidity, pH, dissolved oxygen, BOD, total alkalinity, conductivity, TDS, nitrates, phosphate, COD. (Prakash, 2004; Rao,2001; ReginiBalasingh et al and Shinde 2011)

RESULTS AND DISCUSSION

Study Site

Aquatic weed control by some herbivorous fishes with special reference to water quality at Chhatarpur M.P, India. The investigation was done for a time of two years (July 2016 to Nov 2018). Chhatarpur geologically situated with longitudes and scopes of $24^0$06 and $25^0$20on North $78^0$59 and $80^0$26 on shown in (Figure 1) Normal climatic temperature in winter season (October to January) 10-27^0C, summer season (February to June) 29-48^0C and blustery season (June to September) 19-30^0C. The locale is isolated into eleven tahseel viz. *Badamalahra, Bakswaha, Chandala, Chhatarpur, Gaurihar, Ghuwara, Lovekushnagar (Laundi), Maharajpur, Nowgong, Rajnagar and Vijawar*Many water bodies are situated in Chhatarpur has aquatic weeds and fishes with diverse biodiversity.

Sampling and sample areas

Four sampling stations ponds were fixed before regular sampling. The stations were chosen as follows in (Table 1). **(Gwalmangra pond)** is situated with north east region of Chhatarpur city and has been spread in large area. Four stations were included for this study as follows in (Figure 1)

Physico-chemical Parameters

The collected water samples were taken for physico-chemical analysis from the Ponds with four different stations. The main physico-chemical parameters of pond water were analyzed as transparency, colour, water temperature, turbidity, pH, dissolved oxygen, BOD, total alkalinity, conductivity, TDS, nitrates, phosphate, COD.(Table 2 to7 and Graph 1to 6).

Table 1. Study site of selected ponds year wise

	Gwalmangra pond		Stations
S.No.	Year	Session	Fishes /weeds
1	2016-17	Summer	GA,GB,GC,GD
2	2016-17	Rainy	GA,GB,GC,GD
3	2016-17	Winter	GA,GB,GC,GD
4	2017-18	Summer	GA,GB,GC,GD
5	2017-18	Rainy	GA,GB,GC,GD
6	2017-18	Winter	GA,GB,GC,GD

Figure 1. Geographic location of Chhatarpur district selected area for study Pond Gwalmangra

Table 2. Water quality analysis of gwalmangra pond of Chhatarpur in (summer) 2016-17

S.N.	Parameters	Name of Sampling station			
		GA	GB	GC	GD
1	Transparency cm.	17	17	18	19
2	Colour	Light green	Light green	Light green	Light green
3	Temperature	28	28.6	29	28.5
4	Turbidity NTU	40	40	30	35
5	PH	7.81	7.85	8.1	8.01
6	TDS Mg/l	1780	1736	1684	1816
7	Conductivity µs/cm	770	730	860	910
8	DO mg/l	6.5	6.7	6.4	6
9	BOD Mg/l	3.5	3	3.2	3
10	T. Alkalinity Mg/l	468	452	436	512
11	Nitratrates Mg/l	30.96	17.71	24.67	28.95
12	Phosphates Mg/l	2.88	4.02	3.56	3.43
13	COD Mg/l	65	60	65	58

Table3. Water quality analysis of Gwalmangra pond of Chhatarpur in (Rainy) 2016-2017

S.N.	Parameters	Name of Sampling station			
		GA	GB	GC	GD
1	Transparency cm.	16	16	17	19
2	Colour	Turbid	Turbid	Turbid	Turbid
3	Temperature	27.5	28	27.5	28
4	Turbidity NTU	55	60	55	50
5	PH	8.84	8.87	8.45	8.27
6	TDS Mg/l	792	792	764	796
7	Conductivity µs/cm	300	270	220	110
8	DO mg/l	10.5	10	5.4	10.48
9	BOD Mg/l	6.4	6.3	2.35	1.4
10	T. Alkalinity Mg/l	400	390	396	410
11	Nitratrates Mg/l	17.91	18.95	19.1	18.43
12	Phosphates Mg/l	2.51	3.08	2.58	3.09
13	COD Mg/l	255	250	50	20

Table4.Water quality analysis of Gwalmangra pond of Chhatarpur in (winter) 2016-17

S.N.	Parameters	Name of Sampling station			
		GA	GB	GC	GD
1	Transparency cm.	16	16	17	19
2	Colour	Turbid	Turbid	Turbid	Turbid
3	Temperature	16.5	17	17.5	16
4	Turbidity NTU	40	50	40	40
5	PH	7.6	7.56	7.9	7.86
6	TDS Mg/l	1296	1180	1204	1232
7	Conductivity µs/cm	720	760	770	770
8	DO mg/l	5.5	5	5.5	5.5
9	BOD Mg/l	4.4	4	4.8	4.5
10	T. Alkalinity Mg/l	360	340	344	356
11	Nitratrates Mg/l	32.05	37	31.73	31.77
12	Phosphates Mg/l	1.27	1.36	1.46	1.42
13	COD Mg/l	92	92	60	108

Table5. Water quality analysis of Gwalmangra pond of Chhatarpur in (summer) 2017-18

S.N.	Parameters	Name of Sampling station			
		GA	GB	GC	GD
1	Transparency cm.	19	20	21	19
2	Colour	Light green	Light green	Light green	Light green
3	Temperature	29	29.5	30	29
4	Turbidity NTU	45	46	35	36
5	PH	7.88	7.89	8.16	8.07
6	TDS Mg/l	1810	1780	1699	1899
7	Conductivity µs/cm	790	745	880	950
8	DO mg/l	6.2	6.5	6.3	5.9
9	BOD Mg/l	3.7	3.2	3.5	3.3
10	T. Alkalinity Mg/l	478	465	450	570
11	Nitratrates Mg/l	30.99	17.9	24.9	29
12	Phosphates Mg/l	2.95	4.7	3.6	3.55
13	COD Mg/l	75	70	66	63

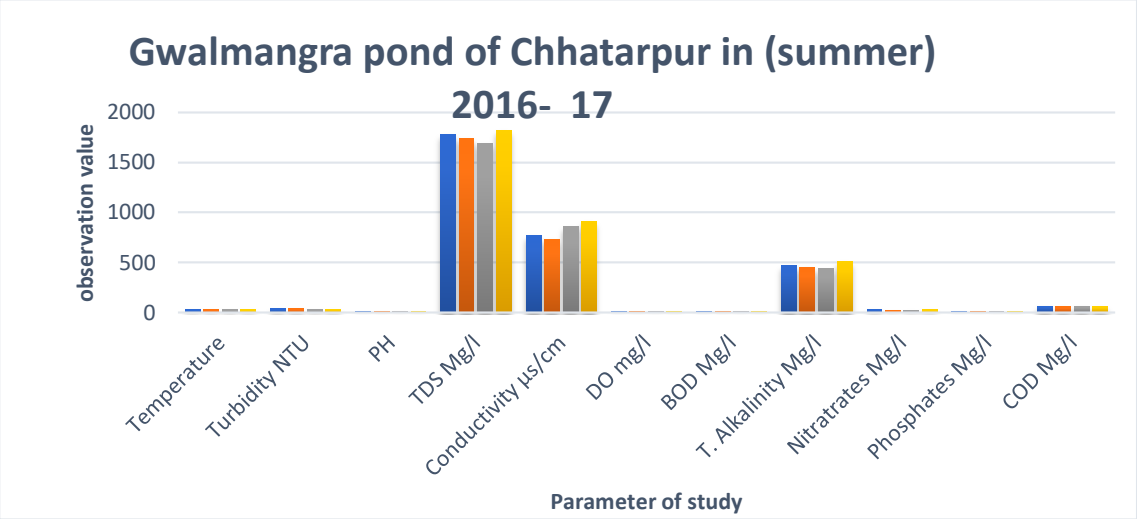
Table 6. Water quality analysis of Gwalmangra pond of Chhatarpur in (rainy season) 2017-18

S.N.	Parameters	Name of Sampling station			
		GA	GB	GC	GD
1	Transparency cm.	18	17	19	20
2	Colour	Turbid	Turbid	Turbid	Turbid
3	Temperature	28.6	29	28.8	29
4	Turbidity NTU	70	69	65	63
5	PH	8.86	8.89	8.5	8.3
6	TDS Mg/l	800	810	790	800
7	Conductivity µs/cm	310	300	250	150
8	DO mg/l	10	9.9	5	10.4
9	BOD Mg/l	6.8	6.1	2.45	1.15
10	T. Alkalinity Mg/l	410	400	420	425
11	Nitratrates Mg/l	17.95	18.99	19.2	18.5
12	Phosphates Mg/l	2.6	3.12	2.65	3.13
13	COD Mg/l	256	253	65	30

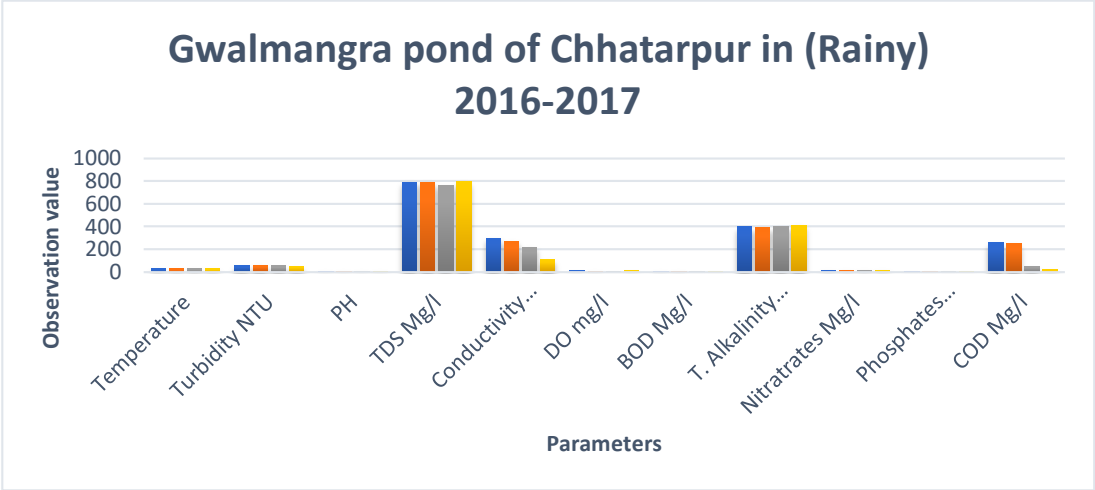
Table7. Water quality analysis of gwalmangra pond of Chhatarpur in (winter season) 2017-18

S.N.	Parameters	Name of Sampling station			
		GA	GB	GC	GE
1	Transparency cm.	20	19	19	21
2	Colour	Greenish	Greenish	Greenish	Greenish
3	Temperature	16.7	17.5	17.9	17
4	Turbidity NTU	50	55	48	47
5	PH	7.65	7.58	7.92	7.88
6	TDS Mg/l	1299	1185	1210	1236
7	Conductivity µs/cm	720	766	774	776
8	DO mg/l	5.2	4.9	5.1	5.3
9	BOD Mg/l	4.9	4.7	4.1	4.8
10	T. Alkalinity Mg/l	362	343	346	362
11	Nitratrates Mg/l	32.1	37.05	31.8	31.85
12	Phosphates Mg/l	1.3	1.4	1.5	1.47
13	COD Mg/l	100	98	70	112

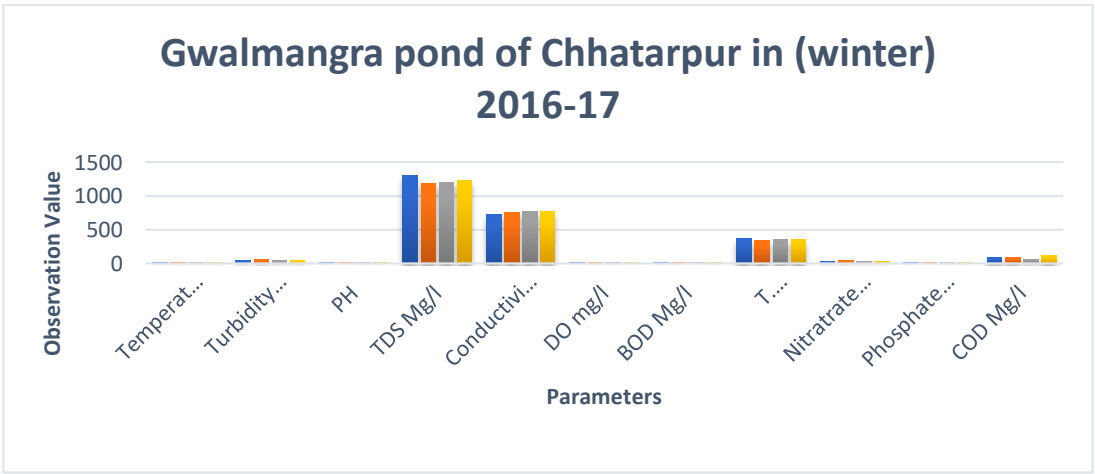
Graph 1. Water quality analysis of gwalmangra pond of Chhatarpur in (summer) 2016-17



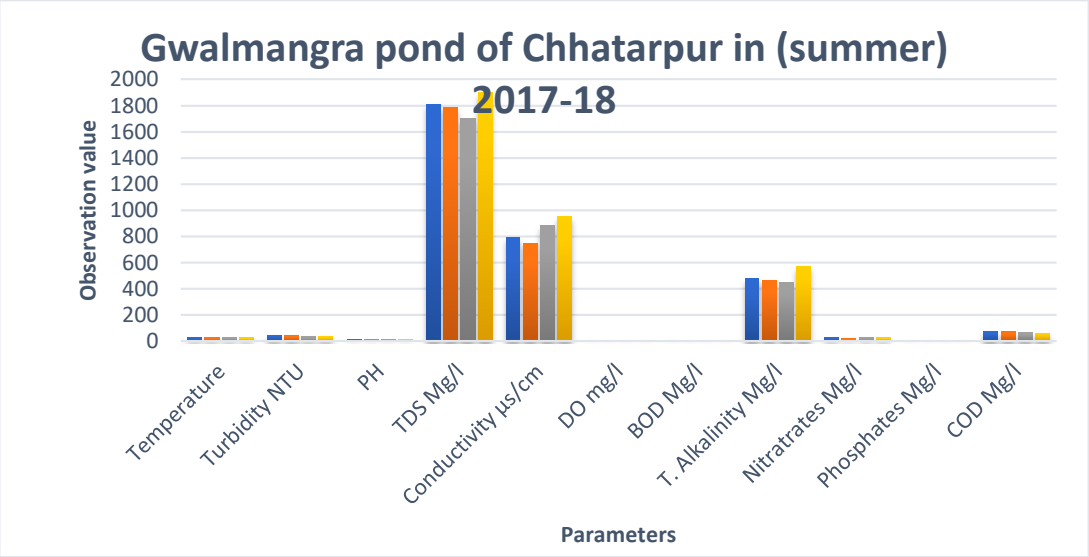
Graph2. Water quality analysis of Gwalmangra pond of Chhatarpur in (Rainy) 2016-2017



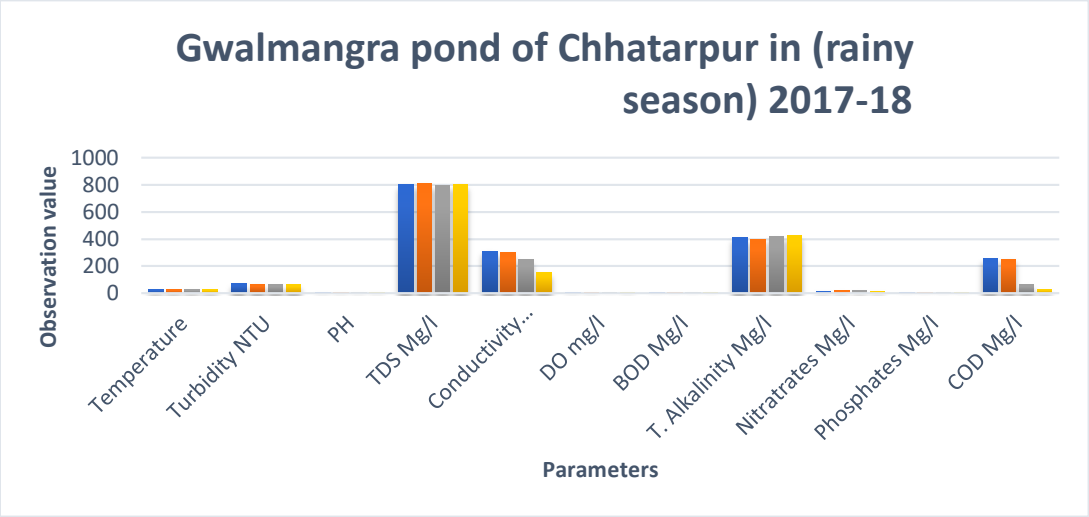
Graph 3.Water quality analysis of Gwalmangra pond of Chhatarpur in (winter) 2016-17



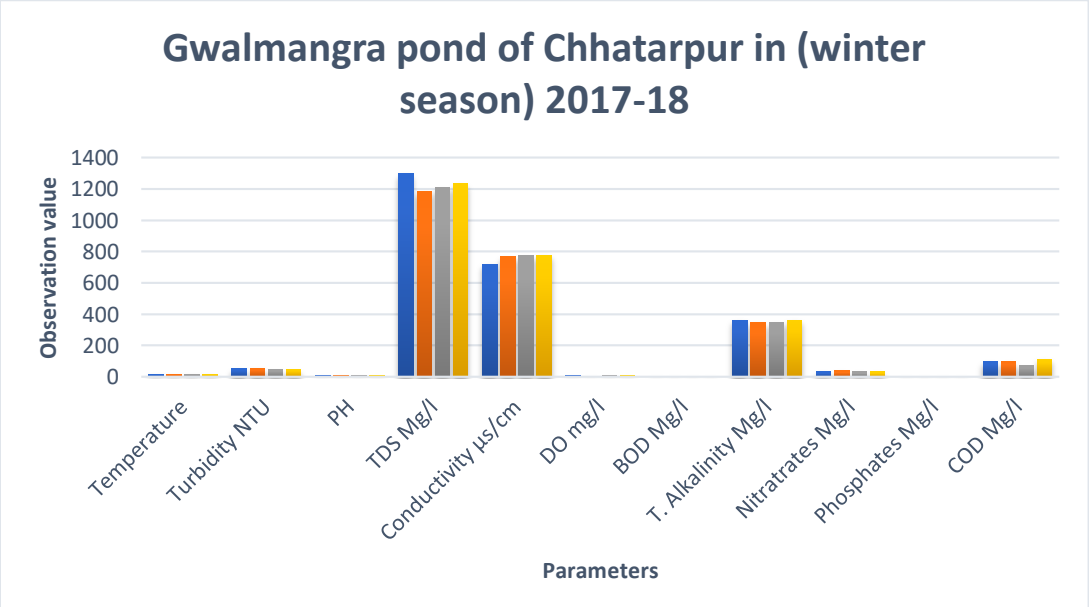
Graph 4. Water quality analysis of Gwalmangra pond of Chhatarpur in (summer) 2017-18



Graph 5. Water quality analysis of Gwalmangra pond of Chhatarpur in (rainy season) 2017-18



Graph 6. Water quality analysis of gwalmangra pond of Chhatarpur in (winter season) 2017-18



Analysis and Interpretation

The physico-chemical analysis is an important parameter to analyze the quality of water. A slight range of variation was seen in different sampling sites in different seasons. Some of the measurement value was under the permissible limit fixed by WHO and Indian Standard showed in (figure 2) The brief description of analysis is mentioned below.

Colour shade of water shifts in each of the three seasons turbid in blustery, Greenish in winter and light green in summer seasons.(table 2 to 13); temperature of different sampling sites ranges from 26.5^{0}C–30^{0}C in rainy season; 15^{0}C –20.5^{0}C in winter season and 36.5^{0}C – 40.5^{0}C in summer season. All the stations have vary in different seasons; Turbidity of water ranges from 30-80 is more colloidalof all seasons and pond; The pH value of pond water ranges from 6.2 to 9.6 which is mostly within the permissible range of limits i.e. 6.5 – 9.5 decided by WHO and Indian Standard of all seasons ; The TDS ranges from 180 to 1299 rainy days low TDS and winter and summer high TDS value recorded; conductivity of pond water are lies between 210 to 950 µs/cm found; D.O. of the pond water vary from ranges 4.9 to 12.9 Dissolve oxygen significance was not found on Aand B in all season shown in (figure 2). Except these two groups all were significant level**;**Mg/l per hour or per total test time. On a per hour basis 0.5 would be considered rich and 0.05 lean in BOD. BOD is usually measured over a 5 day test period. The Biological Oxygen Demand of the ponds were lies between 1.15 to 6.8 in all seasons at Gwalmangra pond rather than the 2.0 to 6.6 the variation; These ponds may benefit from liming to increase the pH and alkalinity as described above. Similarly, alkalinity is very significant in all season in all ponds except A and B for all seasons; Meck (1996) recommended that its concentrations from 0 to 200 ppm are acceptable in a fish pond and is generally low toxic for some species whereas especially the marine species are sensitive to its presence. According to Stone and Thomforde (2004) nitrate is relatively nontoxic to fish and not cause any health hazard except at exceedingly high levels (above 90 mg L-1). According to Santhosh and Singh 2007 described the favourable range of 0.1 mg L-1 to 4.0 mg L1 in fish culture water. However, OATA (2008) recommends that nitrate levels in marine systems never exceed 100 mg L-1. Ammonia had vast variation within a between ponds. The insignificants are as follows the four station of ponds A and B; The availability of Phosphate in sample site lies between 1.3 to 4.7 in Gwalmangra pond of all seasons and lies between 0.23 to 5.39 vaariation showed; Chemical oxygen demand is a speedy and reliable estimate of organic load that is reported in mg/liter. A normal measure would read less than 10. A measure of 60 would be considered rich. The study site of the ponds was lies between 30 to 256 in pond A and initial ranges 20 and goes down upto 130 Variation among the pond in all summer, rainy and winter at Gwalmangra pond. State of a pond can be drawn by measuring the Secchi depth since water transparency is directly related to Total Phosphorous.

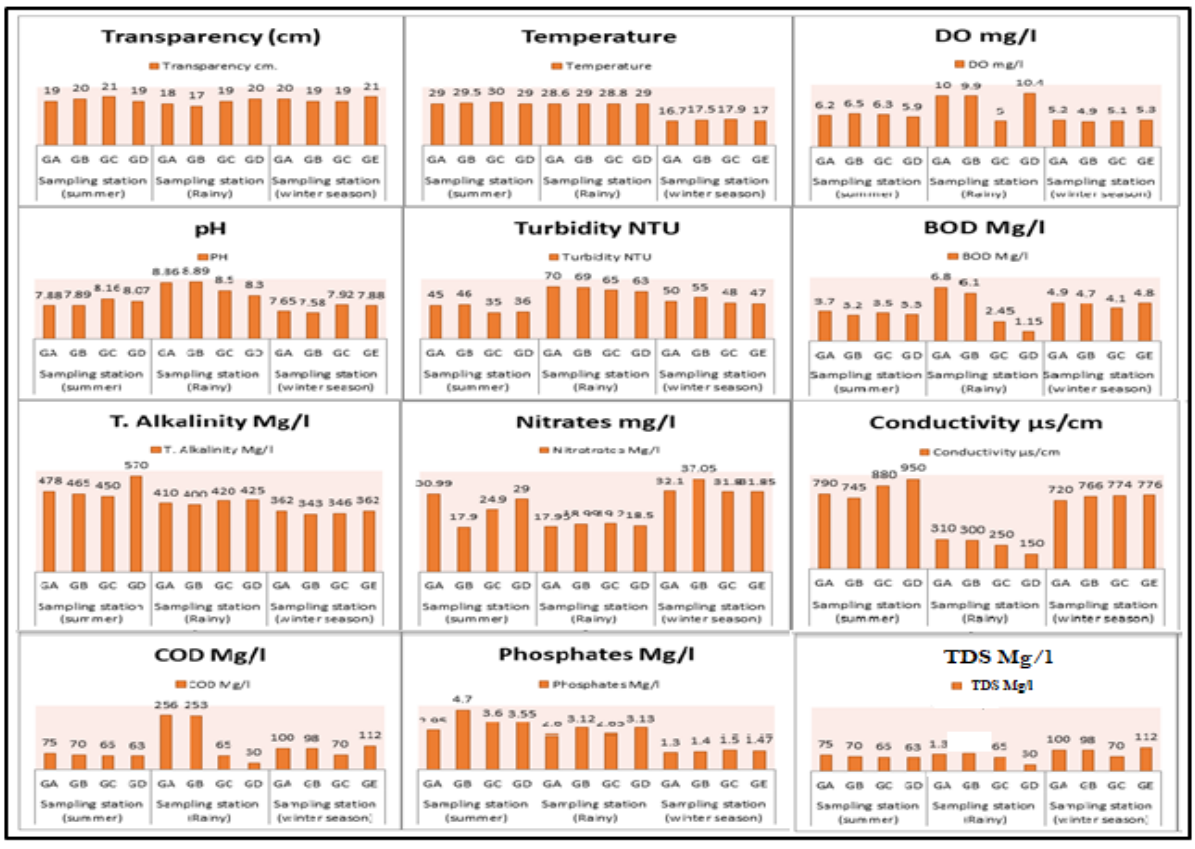


Figure 2. Graph of different parameters

The study and assessment of vegetation and plant association with physico-chemical character of water has generally been found highly complicated process. It is very clear that different kinds of micro and macro nutrients are essential for growth of different kinds of vegetation and some of the major elements like nitrogen, phosphorous and dissolved oxygen play very significant role for healthy vegetation growth. Nitrogen and Phosphorous are suitable and important for water hyacinth and alligator weeds.

CONCLUSION

The role of temperature for the growth of aquatic flora can't be ignored because it influences the primary productivity. It was observed that the temperature between 18^0C - 32^0C seems to be ideal and is considered to be optimal for vegetation growth. The most favourable season for study of aquatic weeds was from February to May and the vegetation growth was observed least during December - January.

The level of D.O. in water is very important for aquatic life. Oxygen content present in water bodies determines the level of purity. The growth of algal blooms in some of the water bodies was gregarious due to more C.O.D. and it indicates organic pollution in water.

Significant variations in values were observed in the various locations. Generally, the parameters analysed fell within the desirable and acceptable limits. Although, there were values higher than the acceptable limit, the situation can be remedied by change of water in the ponds. However, significant pollution of the fish ponds was not indicated from the result of the parameters analyzed. It is shallow and located eastern side of pond near slope area. This site is much influenced by cattle, swine and other animal interference. And rainy water overflows of pond outlet from this site. Other study suggested that the mean estimations of water quality in various medicines. No noteworthy various were found for the mean estimations of all the water quality parameter. This announcement is concurred with the temperature to be gone from 20.5-The deliberate secchi profundity readings between 26 to 50 cm. (Wahab, M.A et ala, 1995) The pH esteems going from 6.5 to 9.0 were watched reasonable for lake fish culture as per (Swingle, H.S. 1967) This announcement is likewise pretty much concurred with pH esteems to be gone found by different scientists (Alim, M.A. 2005; Chakraborty, B.K. also, Mirza, M.J.A. 2009.) This announcement is concurred with the DO level from 2.2 to 7.1 mg/1 in lakes. (Wahab, M.A et ala, 1995) The investigation on lake biology and expressed that the estimations of absolute alkalinity from 71 to 175 mg/l is reasonable for fish culture. The COD level in the water tests ranges from 5.8 mg/l to 9.3 mg/l, the COD is a proportion of oxygen comparable to the natural and non-natural issue substance of water vulnerable to the oxidation by a solid synthetic oxidant and consequently is a file of natural contamination. (Mor, S., Ravindra K., Dahiya R.P., Chandra A. 2006) According to Pandey R.K., Tiwari, R.P. and Kirloskar S.G2013), the significance of the electrical conductivity is its proportion of saltiness, which enormously influences the taste and, in this manner, significantly affects convenience of water. The ground water contamination from shelter in the region of the dumping destinations is discernible through expanded TDS grouping of water. (Pandey R.K. and Tiwari, R.P. 2016).), High centralization of TDS diminishes the attractiveness and may cause gastro-intestinal disturbance in human and may likewise have purgative impact especially upon travels. (World Health Organization (WHO):2020). The convergence of nitrate in water tests ranges from 0.01 mg/l to 5.80 mg/l, the qualities are under the cutoff points of BIS.

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