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Awareness on water quality parameter for better management of pond at Patna, Bihar, India.

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The present study is focused on purity of water is essential for survival of human possibility of good quality is an integral aspect for preventing diseases and improving the quality of life. In this investigation Physico-chemical analysis of water is studied from two different ponds such as Mangal pond located in Patna city, where as Manikchand Pond located in Anishabad, Phulwarisharif, in Patna. The water quality parameter like, pH, TDS ,hardness, chloride, iron and calcium magnesium, sulphur, turbidity ,Fluoride, nitrate, conductivity, were studied by various analytical techniques. It was noticed that most of the parameter were in the acceptable limit according to the BIS standard. The present study can help to criticise the pollution by simple management practises and by degrading the amount of wastage created. Overall, this study recommends that there is substantial scope for enhancement in knowledge knowledge and awareness, and outlines a sequence of commendations to improve precedence for water quality protection among Local Authority staff and common people.

Keywords: Pond, water, quality, physico-chemical, parameters, management

Introduction

Water is the precious gift to us by nature. Due to urbanization, the water demand is also increasing day by day. Increased in water demand is leading to the decreased quality of water. It is well recognized that the water value is very important for the persistence of human race. The water in ponds contains germs and dirt which is treated by the PMC. The treatment of water makes it safe and usable. The treatment mainly involves straining, chlorination, filtration and flocculation. The study area, Patna, is bestowed by two rivers which are Manikchand pond and Mangal pond. Determining of the water quality of the study area is utmost important because Water quality is extremely significant as it is present in all ecosystem in influencing the entire ecosystem, health and balance as well as species diversity. Due to diffuse nature of nonpoint source pollution that interacts with land use, soil, management, and climate across the landscape; it is very difficult to control (Jabbar and Grote, 2019; Ouyang et al., 2019; Giri et al., 2016a,b). Clear water is vital for drinking and irrigation purpose as well as survival of aquatic fauna.

Ponds have an essential role in the surrounding of urban area. There is a religious and historical significance of pond from the beginning, but due to the lack of maintenance and the polluted environment, the historical nature of the pond is on the verge of disappearing. People have started throwing garbage in the pond in which the garbage and dirt appears around.
Since the growing industrial and domestic usage increased the demand of water which leads to the severe problem of the water pollution and the sources of water pollution are nearly increasing every day. On the other hand, population growth increases urbanization concomitant with increased food demand owing to application of more fertilizer and pesticides to increase crop yield (Shukla et al., 2018). With the increasing pollution the water related diseases are also increasing. Hence the assessment of the degree of water pollution is the need of the hour for survival of humans as well as other living beings.

For any water body to function satisfyingly it must have the degree of purity. Hence for the increasing demand for water the concept of management of the quality of the water is becoming very important. Several previous review manuscripts have addressed other issues of water quality such as watershed scale water quality models (Fu et al., 2019; Obropta and Kardos, 2007), effectiveness of best management practices (Liu et al., 2017; Eckart et al., 2017; Ahiablame et al., 2012), addressing re-eutrophication of Lake Erie (Scavia et al., 2014), and guidance on water quality model evaluation, interpretation, and communication of model results (Scavia et al., 2017; Harmel et al., 2014).
By seeing this entire scenario the main aim of this study is to explore the influence of pollution, its impact on water quality and massive increase in pond pollution. Most of the ponds are getting worse gradually, and thus the quality of pond water will be severe problems in the coming years.

Study Area

The present investigation was undertaken from two sites, Manikchand pond and Mangal pond as site-I and site-II respectively. The first site of study area that is Manikchand pond located at Anishabad, Phulwarisharif, Patna, and the second site Mangal pond is located in Patna city itself. Both the ponds receive rainwater and are used for fishing and cloth washing purpose.

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Patna is the rapid developing largest city and capital of Bihar state in India. Since the growing industrial and domestic usage increased the demand of water which leads to the severe problem of the water pollution and the sources of water pollution are nearly increasing every day in this area. Hence, the assessment of the degree of water pollution is the need of the hour for survival of humans as well as other living beings.

Research Methodology

Water samples were collected in a plastic bottle of 2 L capacity from ManikChand pond and Mangle pond randomly from June–December in the year of 2023 in morning hours. After collection, the sample bottle were labelled properly and brought to the laboratory for analysis under various physico-chemical parameters**.** Samples of water were estimated for various parameters, such as pH, turbidity, TDs, alkalinity, sulphate, nitrate, conductivity, hardness, calcium, magnesium, fluoride, arsenic, chloride, iron and are performed by the standard method, outline by Alpha and Bureau of Indian standard (BIS). PH of water was done on the spot, in the laboratory. It was estimated again using buffer solution. Other parameters were performed in the laboratory under different standard methods.

Result and Discussion

Due to diffuse nature of nonpoint source pollution that interacts with land use, soil, management, and climate across the landscape; it is very difficult to control (Jabbar and Grote, 2019; Ouyang et al., 2019; Giri et al., 2016a,b).
The result, often by physiological analysis of all parameters for two different ponds are given below.

Table1:-Physico-chemical analysis of Manikchand Pond June–December 2023.

SR NO.	TEST PARAMETER	ACCEPTABLE LIMIT AS PER IS10500:2012	PERMISSIBLE	RESULT
1.	Turbidity(NTU)	1	5	0
2.	TDS(mg/l)	500	2000	225
3.	PH	6.5 to 8.5	NR	8
4.	Iron (mg/l)	0.3	NR	0.18
5.	Chloride(mg/l)	250	1000	20.34
6.	Sulphate(mg/l)	200	400	23.48
7.	Alkalinity as CaCo3 (mg/l)	200	600	57.42
8.	Hardness(ppm)	200	600	106.92
9.	Calcium as Ca (mg/l)	75	200	15.04
10.	Magnesium(mg/l)	30	100	22.32
11.	Conductivity(mhos/cm)	770	2500	358
12.	Fluorides F (ppm)	1	1.5	0.17
13.	Nitrate(mg/l)	45	NR	12.53

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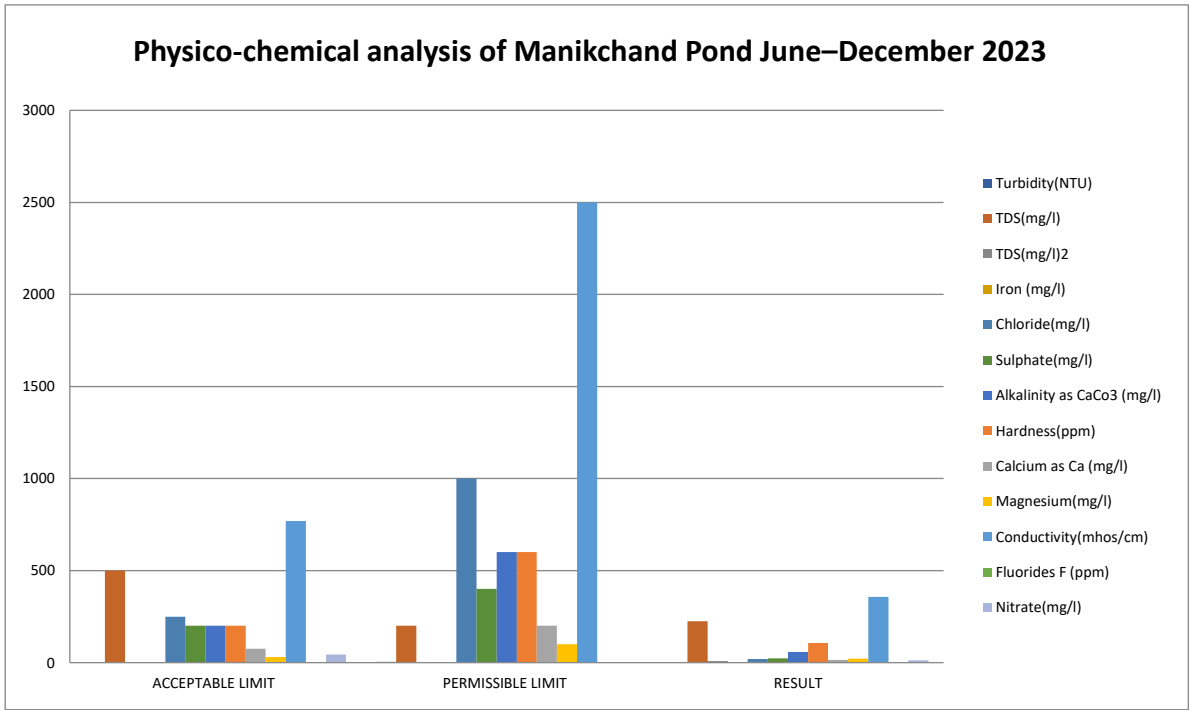


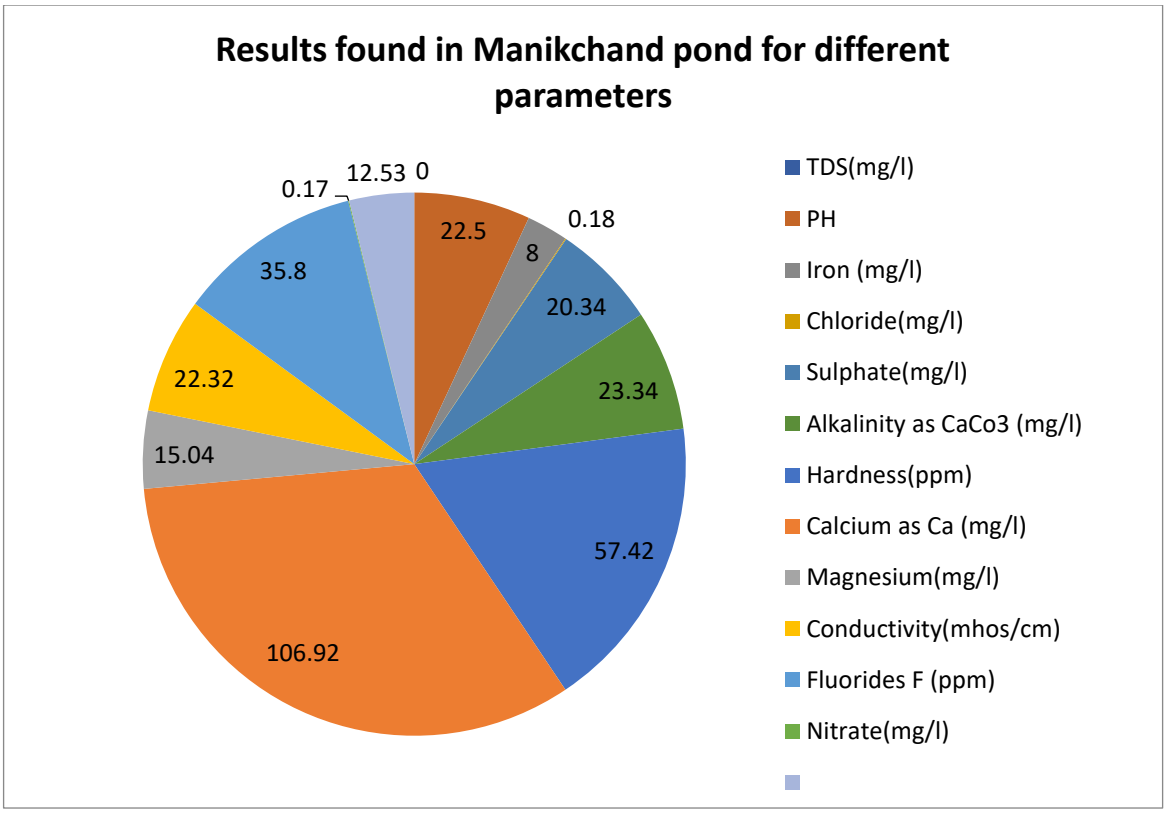
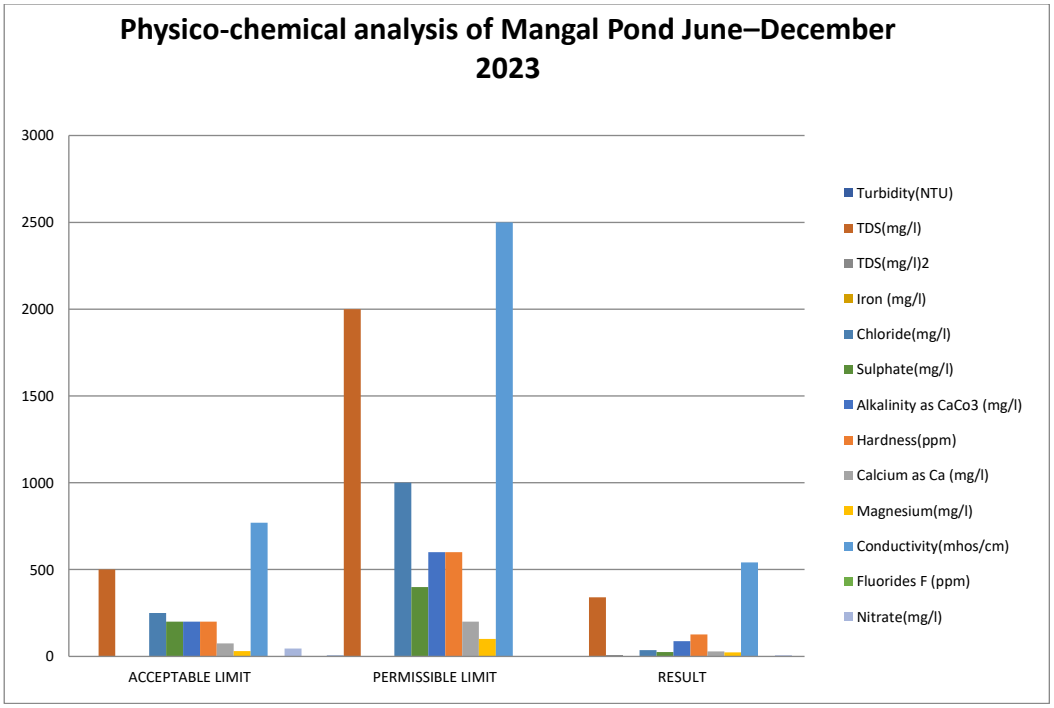
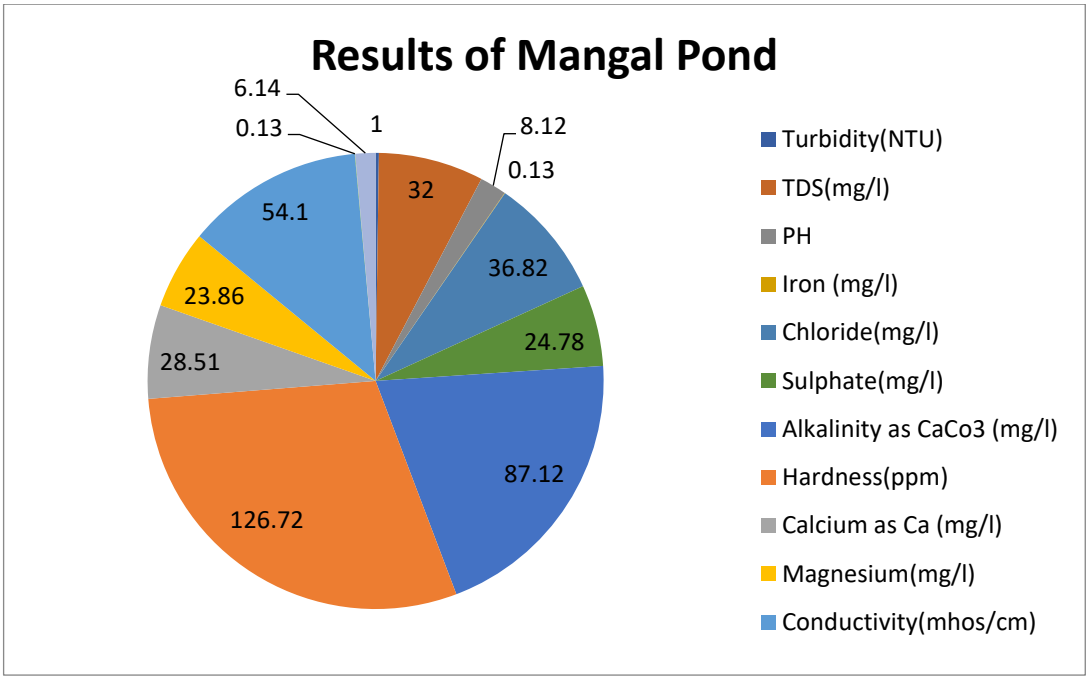


Table:-2 Physico-chemical analysis of Mangal Pond June–December 2023.

SR No.	TEST PARAMETER	ACCEPTABLE LIMIT AS PER IS10500:2012	PERMISSIBLE	RESULT
1.	Turbidity(NTU)	1	5	0
2.	TDS(mg/l)	500	2000	340
3.	PH	6.5 to 8.5	NR	8.12
4.	Iron	0.3	NR	0.14

	(mg/l)			
5.	Chloride(mg/l)	250	1000	36.82
6.	Sulphate(mg/l)	200	400	24.78
7.	Alkalinity as CaCo3 (mg/l)	200	600	87.12
8.	Hardness(ppm)	200	600	126.72
9.	Calcium as Ca (mg/l)	75	200	28.51
10.	Magnesium(mg/l)	30	100	23.86
11.	Conductivity(mhos/cm)	770	2500	541
12.	Fluorides F (ppm)	1	1.5	0.13
13.	Nitrate(mg/l)	45	NR	6.14





PH
It is used to mention the potential potency of acidic or alkaline condition of the solution. The acceptable limit of pH, in drinking water ranges between 6.5 to 8.5 accordingly to bureau of Indian standard (BIS). The value of pH in Manikchand Pond recorded as eight which is within desirable limit, but the pH of Mangal Pond was recorded as 8.13, which is slightly alkaline. When pH data sets are transformed to $[H^+]$ to estimate average pH, extreme pH values will misrepresent the average pH. Values of pH conform more closely to a normal distribution than do values of $[H^+]$, making the pH values which is more acceptable for use in numerical analysis **(Boyd, C. A., & Chainark 2010).**

Turbidity
Turbidity of water is due to suspension of particles. According to the turbidity of drinking water should not be more than 5 NTU and should ideally below 1 NTU turbidity recorded in both pond is within the limit prescribed by WHO.

TDS
Total dissolved solids denote mainly the various kinds of minerals present in water. The permissible value recommended for TDS is 500 mg/l prescribed by Bureau of Indian standard (BIS). TDS in both the pond recorded as 225/l of Manikchand pond, and 350/l of Mangal pond, which is in limit prescribed by BIS.

Conductivity
Electrical conductivity consider water capacity to conduct the electric current.it signifies the total number of dissolved acid. The values of electrical conductivity of both the ponds were within the WHO limits.

Alkalinity
Alkalinity is the buffering capacity of water, the range of alkalinity is set by BIS is 200mg/l. Both the pond result showed permissible value of alkalinity as recommended by the Indian standard **(Boyd, C. A., & Chainark 2010).** The acidity and alkalinity of water quality are capacity factors which are defined as water's capacity to neutralize them as strong bases or acids. **(Barth, E. F.1975).**

Hardness
Hardness of water mainly depends upon the amount of calcium or magnesium or salt of both. The hardness value of both ponds found within the limit prescribed by BIS.
Chloride, magnesium, and calcium
In our investigation, it was recorded that magnesium, calcium and chloride value have similar range of both the pond found to be quite below according to the acceptable limit given by Indian standard.

Nitrate
The highest amount of nitrate concentration was known to support the formation of blooms. The highest amount of nitrate in Manikchand Pond was 12.53, whereas the lowest amount of nitrate as recorded 6.14 in Mangle pond.

Iron
The recommended or healthy level of iron in water is less than 0.3mg/litre. The iron concentration is highest in both of the Pond, but under the tolerance limit.

Conclusion
An exploration was directed to access water quality parameters of Mangal Pond and Manikchand Pond. The result of the present study indicated that the physico-chemical parameters of both the pond were below the acceptable limit. The highest value of pH and iron was noted in both of the pond water overall detailed analysis of pond water so slightly fair. The review was taken up mainly to convey about and precise awareness among the people regarding the quality of water. It can help to criticise the pollution by simple management practises and by degrading the amount of wastage created. Overall, this study recommends that there is substantial scope for enhancement in knowledge and awareness, and outlines a sequence of commendations to improve precedence for water quality protection among Local Authority staff and common people.

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