8th International R&D conference on
Global Trends in Water Resources, Power & RE Sectors

Water quality assessment and management of urban lakes

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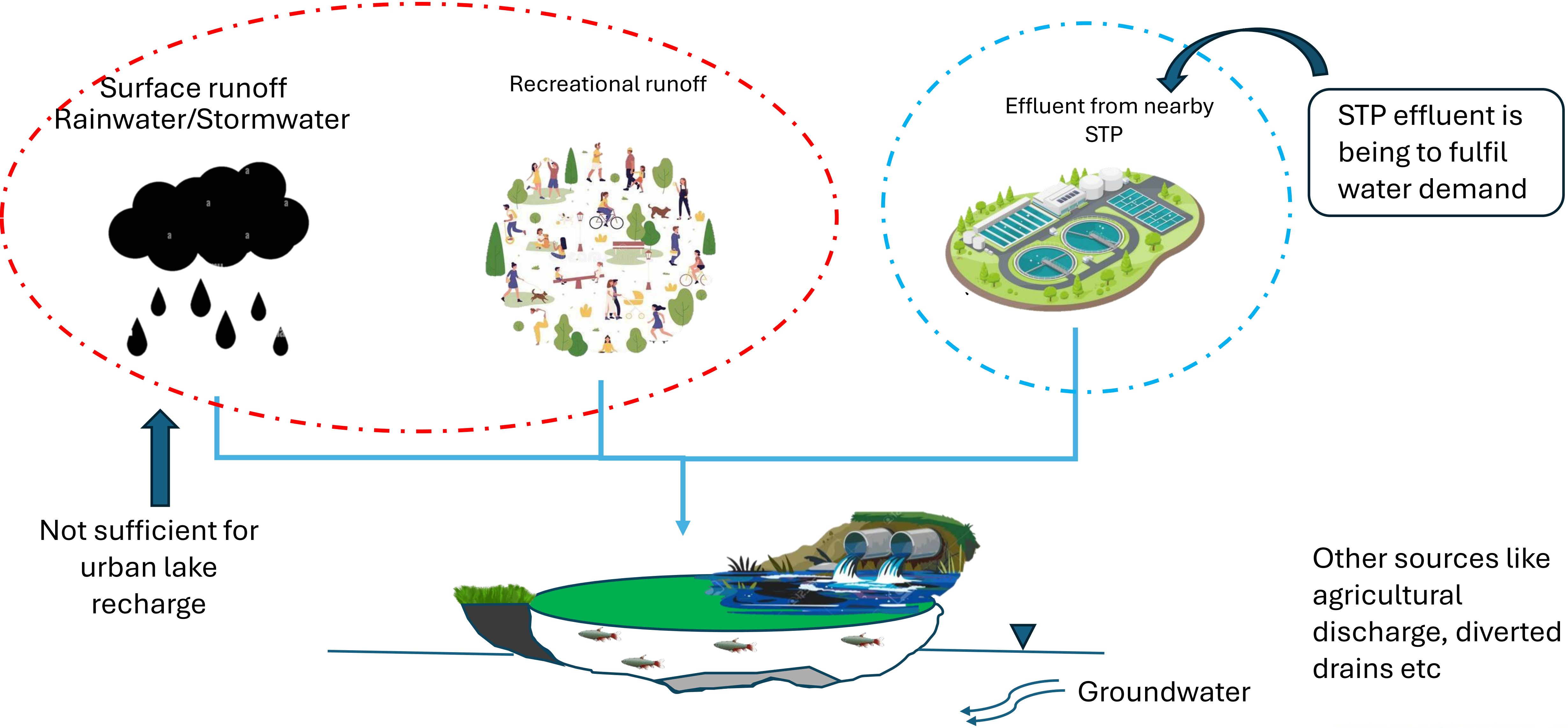


Surface runoff
Rainwater/Stormwater

Recreational runoff

Effluent from nearby STP

STP effluent is being to fulfil water demand

Not sufficient for urban lake recharge

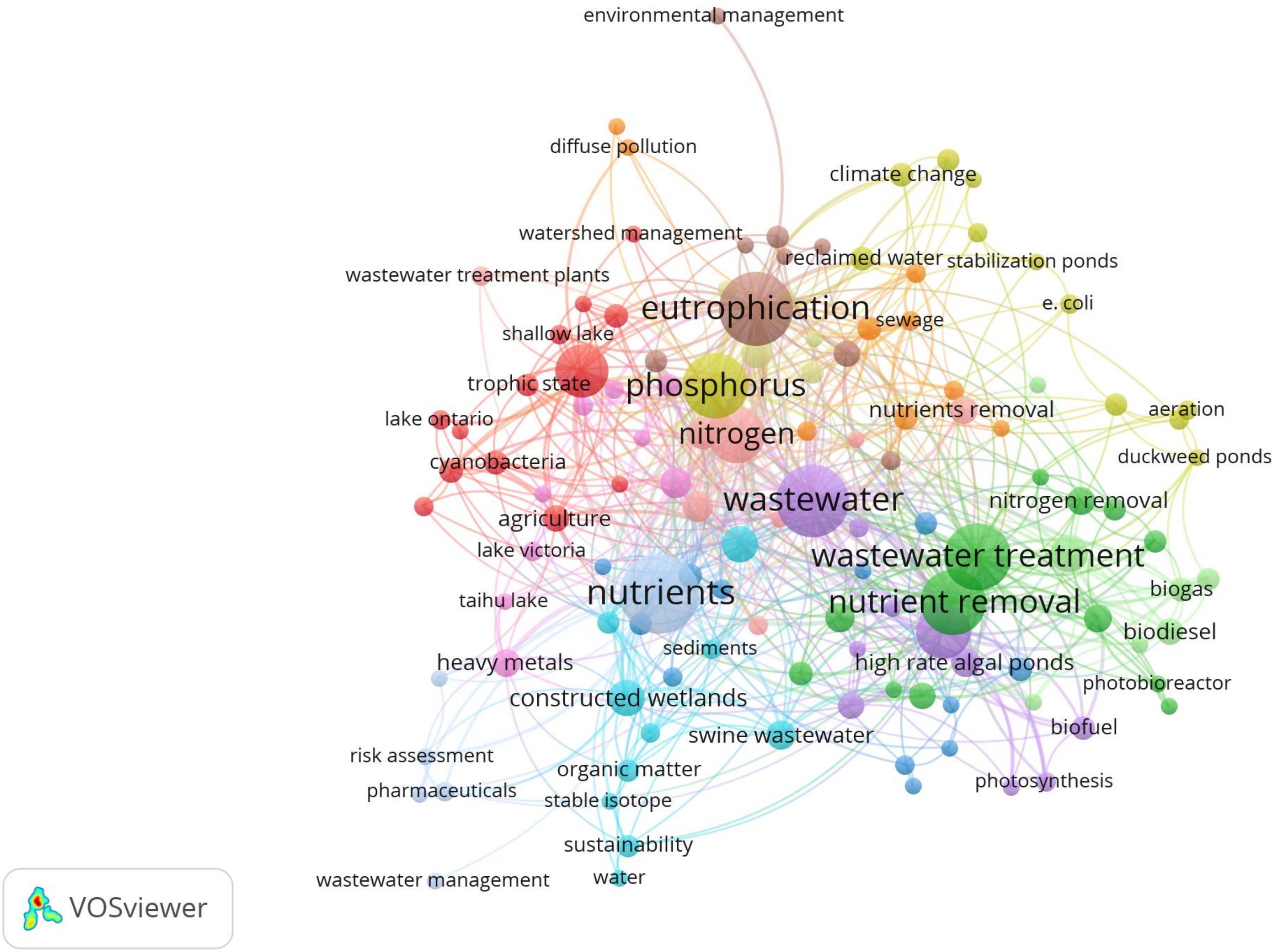
Groundwater

Other sources like agricultural discharge, diverted drains etc

Effects of STP recharged urban lakes

- High nutrient loading like Nitrate and Phosphate
- Water contains heavy metals
- Pathogen and microorganism removal is not 100%
- Chemical compounds like from pharmaceutical waste
- Treated water may still contain dissolved solids, including salts and other inorganic compounds
- May have dissolved gases

keyword co-occurrence analysis (Scopus database)



*Keywords used : *Lakes, wastewater and nutrient*

Total research articles considered: 514

Major water quality parameters

Parameters	Permissible range	Major Effect
Temperature	18 – 22 °C	Affects DO and gas solubility
pH	6.5 – 8.5	Indirect relation with temp., affects aquatic life
DO	> 6.0 mg/L	Affects availability of nutrient and micro organism
BOD	< 4 mg/L	Represents biodegradable waste
Nutrients (P, NO_3, NH4, SO4)		Leads to productivity and algal growth
TDS and TSS	2000 mg/L	Indicates pollutants
Algae	NA	Affects aquatic life and GHG emissions

WQI for lakes

Parameters	Permissible limits (BIS)
Total Nitrogen	45 mg/L
Dissolved lead	0.01 mg/L
Dissolved oxygen	>6.0 mg/L
pH	6.5-8.5
Total particulate	500 mg/L
Dissolved phosphorus	

Chemical water quality Index

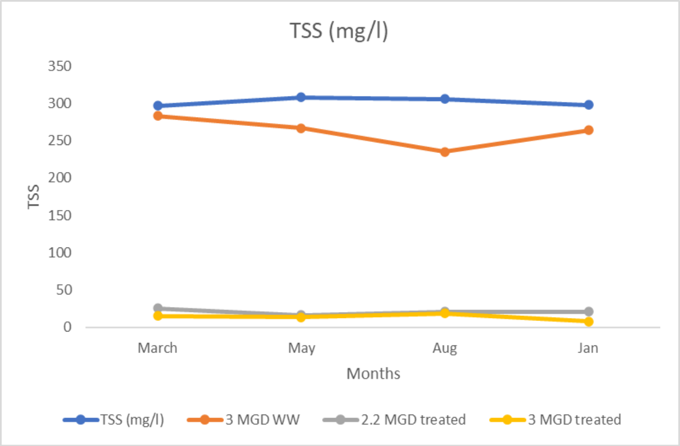
Parameters	Permissible limits (BIS)
Temperature	NA
Chlorophyll a	NA
Dissolved oxygen	>6.0 mg/L
pH	6.5-8.5
PO_3-	NA
Total phosphorus	NA
NO_3-	45 mg/L
NO_2	45 mg/L
NH_3	NA
TDS	500 mg/L
TSS	NA
Turbidity	NA
Fecal coliform	0/100 ml

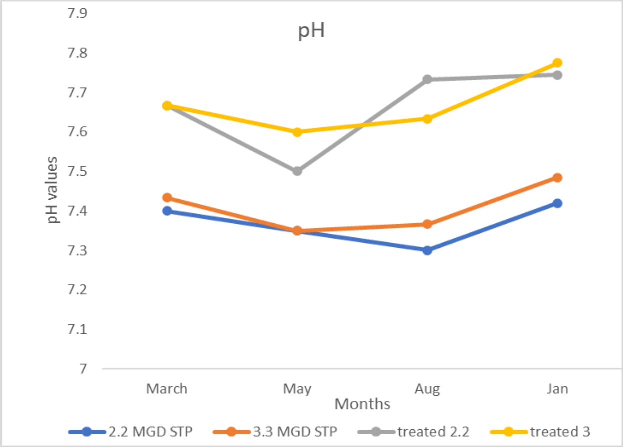
CCME* water quality Index
(Lakes, rivers and reservoirs)

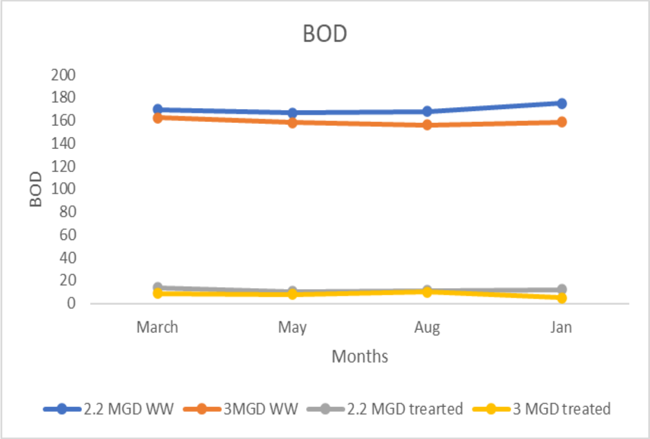
*Canadian Council of Ministers of the Environment

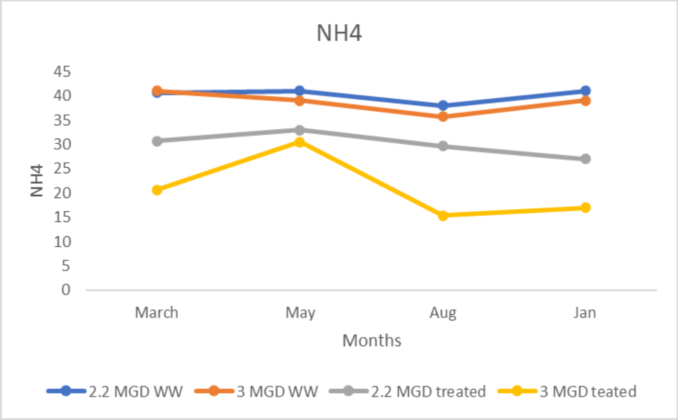
Result and discussion

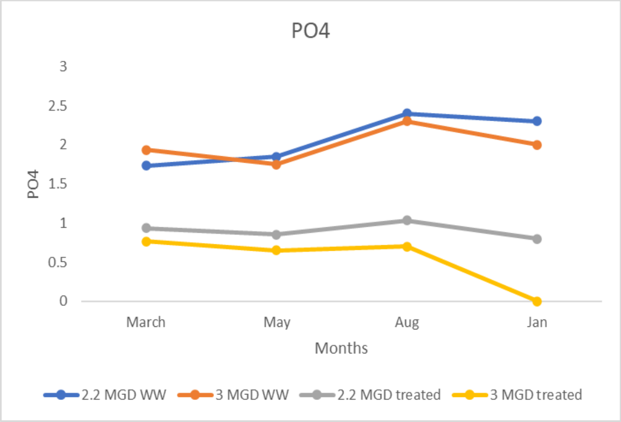
Water quality of vasant kunj Wastewater and treated effluent

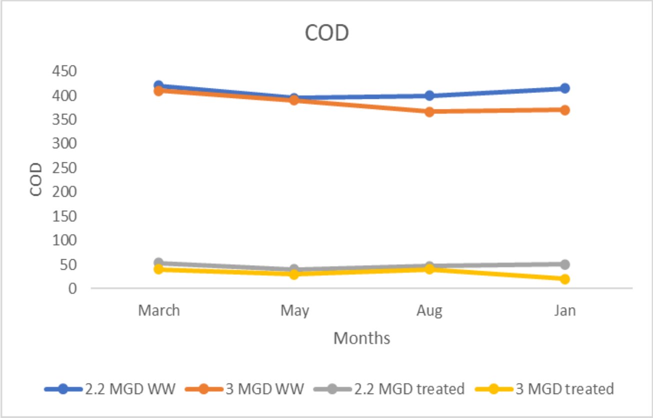












**WW : wastewater*

**MGD : million gallon per day*

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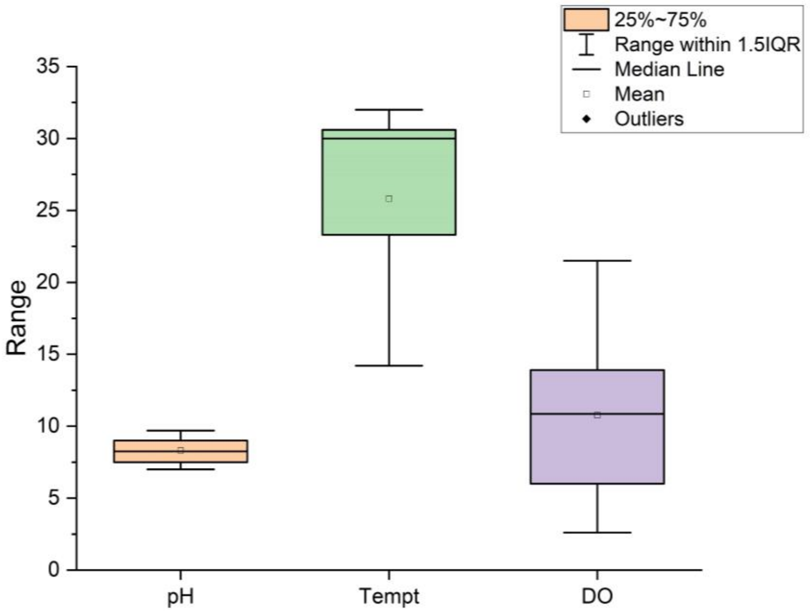
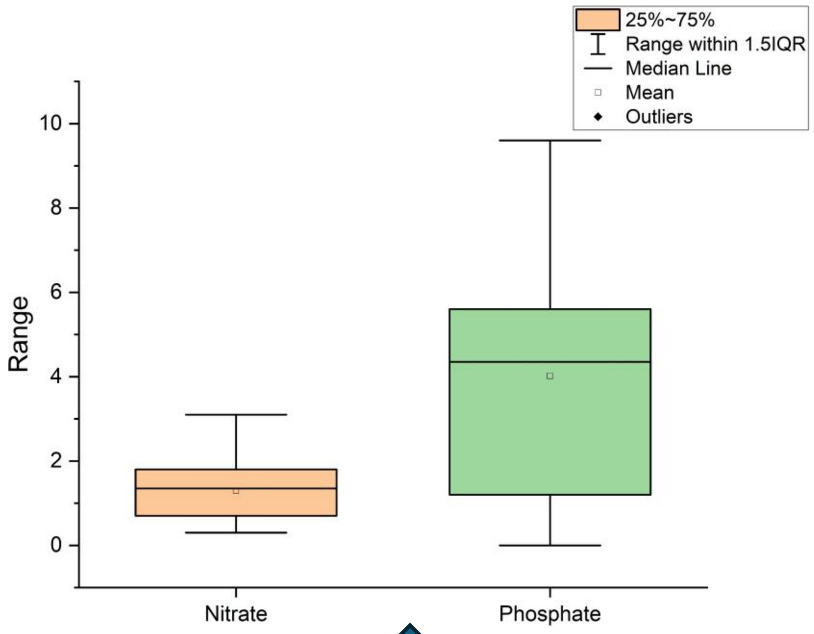
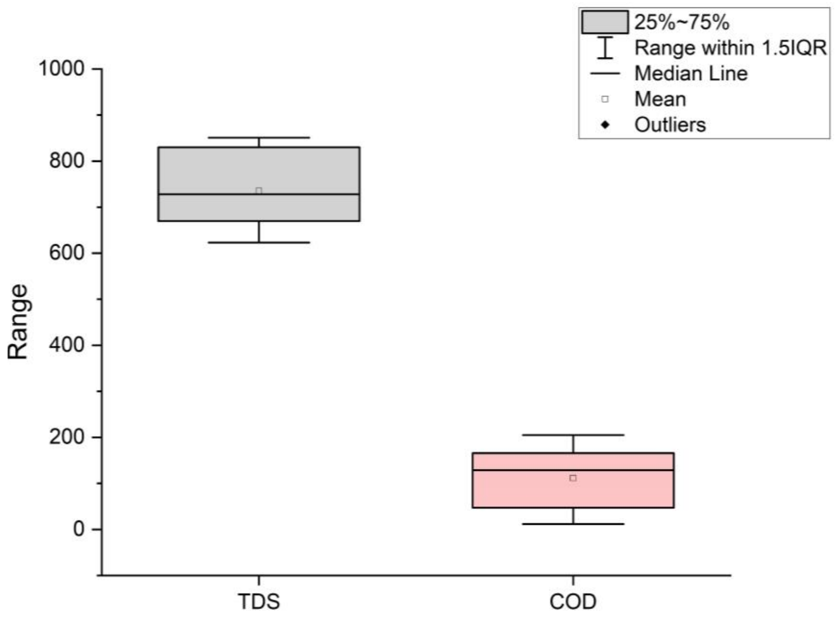
Water quality of lake recharged using STP effluent







Causing Microalgal growth that leads to high GHG emission

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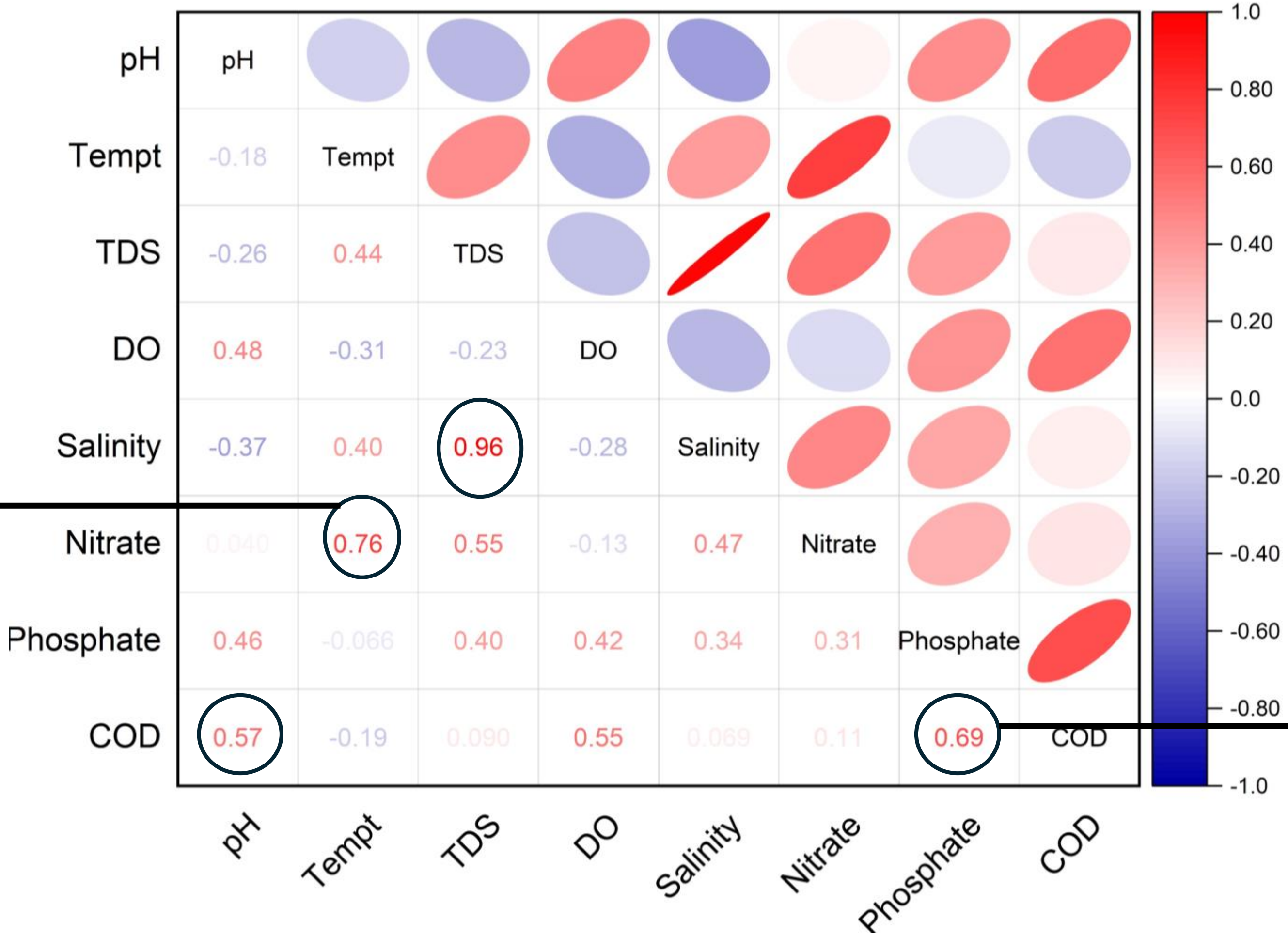
Correlation among parameters using Pearson correlation



	pH	Tempt	TDS	DO	Salinity	Nitrate	Phosphate	COD
pH	pH							
Tempt	-0.18	Tempt						
TDS	-0.26	0.44	TDS					
DO	0.48	-0.31	-0.23	DO				
Salinity	-0.37	0.40	0.96	-0.28	Salinity			
Nitrate	0.040	0.76	0.55	-0.13	0.47	Nitrate		
Phosphate	0.46	-0.066	0.40	0.42	0.34	0.31	Phosphate	
COD	0.57	-0.19	0.090	0.55	0.069	0.11	0.69	COD

Temperature impacts microbial activities which affects nitrate formation through nitrification

In line with high algal growth in lake

Conclusions

- Significant seasonal variation was seen in water quality
- STP are contribute to ample nutrient loading
- Nutrient loading in lakes varies seasonally
- Phosphate and COD is highly correlated
- Phosphate is more in lake which indicate secondary source
- STP effluent increases algal growth
- Algal blooms are more likely to contribute in GHG emissions
- Managing algal blooms can reduce GHG emissions along with energy recovery from biomass
- Over the years water quality is better which implies stable eutrophicated bodies treats water at some level as well

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Thank you