

# Water quality in urban wetlands: What do fluctuations in physio-chemical parameters mean for wetland management?

## Emerging Pollutants in aquatic ecosystems

### Introduction

- The city of Colombo (Sri Lanka) is built around wetlands. It is the first capital city in the world to receive a Ramsar Convention's accreditation
- These aesthetically pleasing and biodiverse wetlands provide numerous services to a city harbouring a human population of 3417 persons/Km<sup>2</sup> (Figure 1)
- The objective was to study the water quality changes over time to explore realistic wetland management options within the city of Colombo

### Method

- In a pilot study, water quality was measured in the Heen Ela marsh, which is part of the Colombo Wetland complex. With an area of 46 hectares the marsh is impacted by the rapid suburban development where interconnecting effluent canals bring in heavy loads of pollutants



Figure 1 – Colombo wetland complex @www

- Fourteen Sampling locations were selected using the following equation (Figure 2)

$$L = \sqrt{\frac{A}{n}}$$

( L = Length of a grid cell /A = Approximate area of the study site /n = No of sampling sites )

- Nine water quality parameters were measured over a period of 5 weeks in 2022

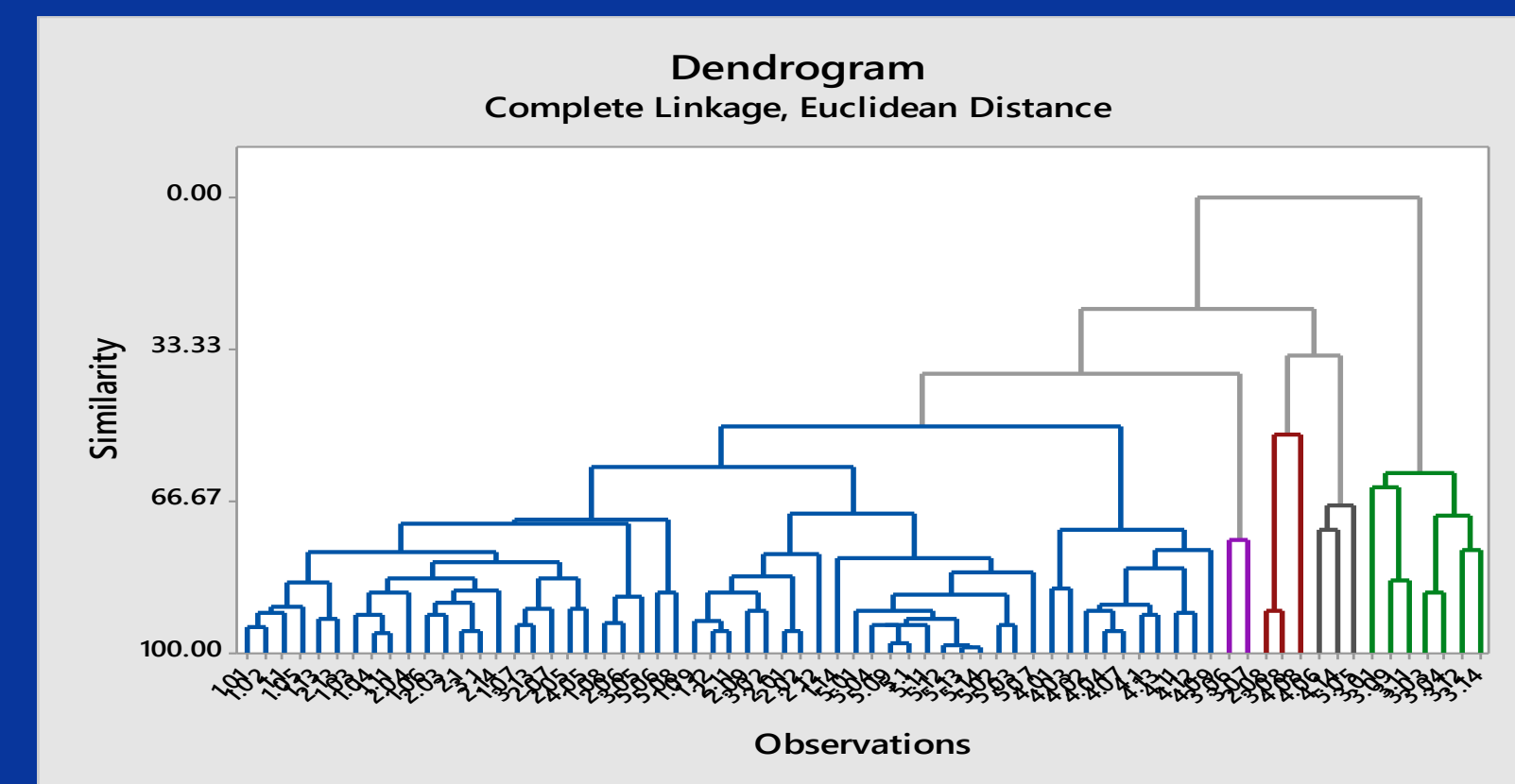
Variable	Mean value (SE)
pH	6.49 ± 0.75
Dissolved Oxygen	1.78 ± 0.954 ppm
Nitrates	2.32 ± 2.82 ppm
Phosphates	0.36 ± 0.32 ppm
Conductivity	712 ± 231 μS/cm
Salinity	0.32 ± 0.10 ppt
Total dissolved solids	448.9 ± 145.6 ppm
Turbidity	78.83 ± 57.86 NTU
Biological Oxygen Demand	9.03 ± 3.14 ppm
Temperature	30.59 ± 1.24 °C

- Hierarchical and factorial analysis were used in interpretation of data



### Results and Discussion

- The variation within the water quality parameters was marked during the period of observation. This may indicate the level of disturbances due to natural and anthropogenic phenomena



Cluster Number & Colour	No. of Observations	Observations	
		Sampling Day	Sampling point
01, Blue	55	1	1,2,10,5,13,3,4,11,6,7,8,9,12,14
		2	13,4,3,10,14,7,5,6,11,9,1,2,12
		3	10,13,5,2
		4	5,1,3,2,4,7,10,13,11,12,09
		5	6,8, 1,4,9,10,11,12,13,14,2,3,7
02, Purple	02	3	6,7
03, Brown	03	2,3,4	8
		4	6,14
04, Grey	03	5	5
		3	1,9,11,3,4,12,14
05, Green	07	3	

- According to the dendrogram, at 50% similarity level the majority of the observations are included in one cluster indicating that the overall water quality in wetland is similar
- Sampling location 8 on days 2,3 and 4 include a special cluster where several drains and sewage outlets are located and to the naked eye it was generally black to grey in colour
- However the observations on days 1 and 5 of location 8 fall with the bigger cluster. This could be a result of the dilution that occurred due to rain on days 1 and 5
- An activity of removal of water hyacinth (*Eichhornia crassipes*) was noticed in the area using a dredging machine on day 03 resulting in a decreased overall pH of the entire area

### Conclusion

- Periodic water quality monitoring at strategic points is essential to better understand how urban wetlands are affected by polluted inflows and the role they play in enhancing water quality

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