

Global Patterns of Functional Convergence in Urban Freshwater Microbiomes

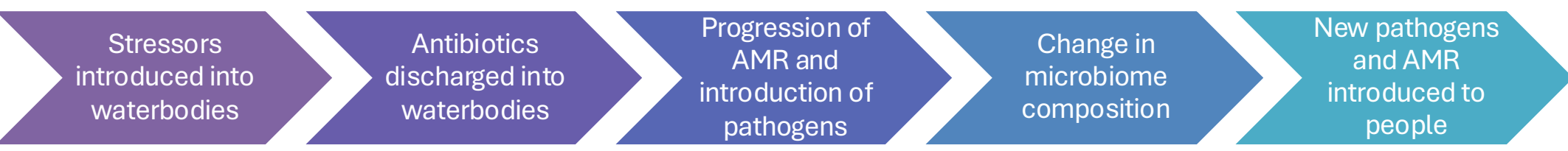
Khushi Thakur, Raashi Jain, Shreejit Panda, Hiya Chakma, Aditi Sudhir and Ananya Mukherjee

School of Arts and Sciences, Azim Premji University, Bhopal, Madhya Pradesh, India

khushi.thakur23 Ug@apu.edu.in and ananya.mukherjee@apu.edu.in

INTRODUCTION & AIM

Aquatic ecosystems are one of the most important ecosystems to help monitor the biosphere and community health.



Aim -
This review aims to study the waterbody microbiome composition and the impact of urbanisation.

Focus -
Studies focused on the microbiome of urban freshwater bodies and the patterns found.

METHOD

The selection criteria for the papers were -

- 1) Studies on lakes, rivers, ponds, catchment (urban aquatic fresh water)
- 2) Year of studies (2000 to 2025)
- 3) Studies on the functional traits such as AMR or nutrient cycling
- 4) Studies in English

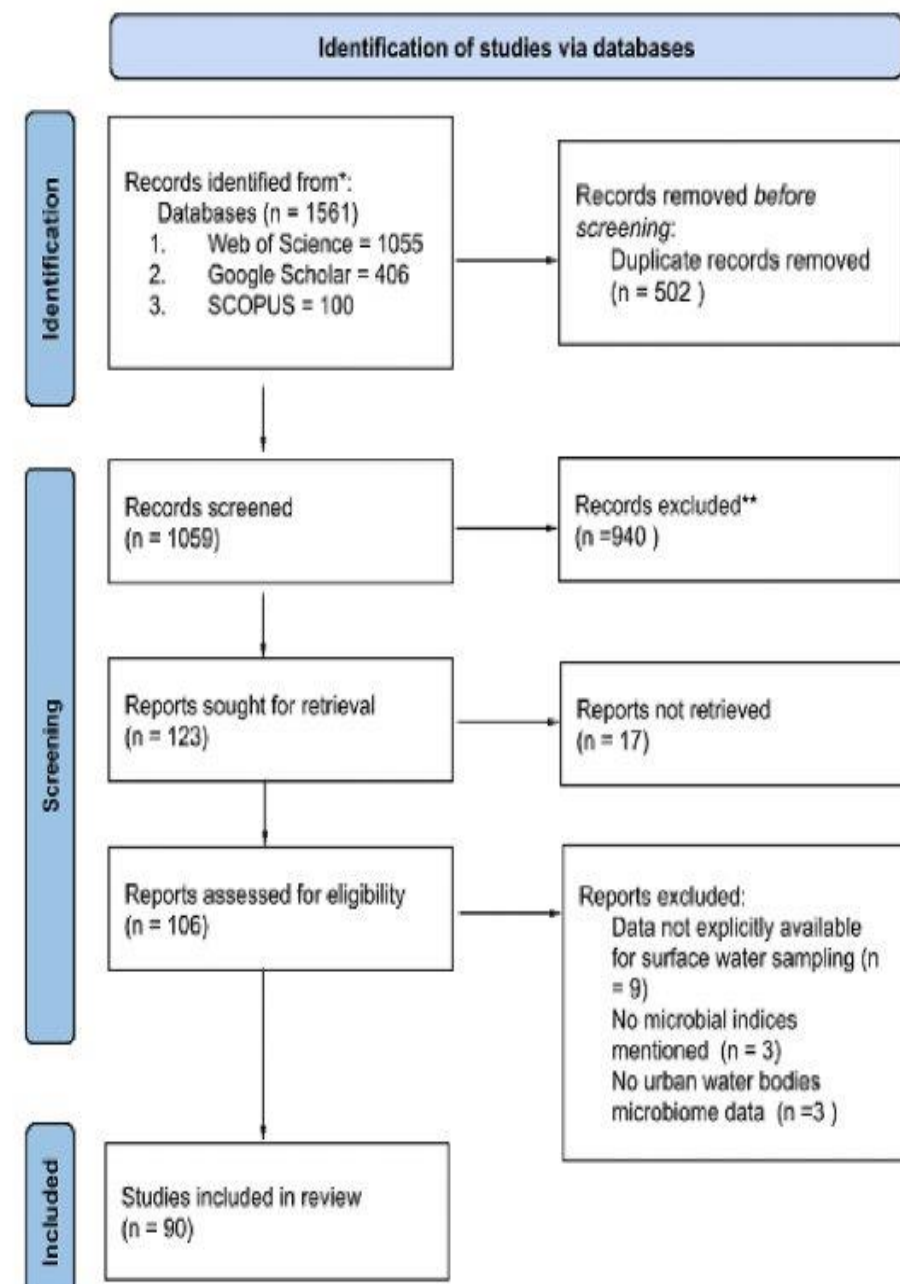


Fig 1 – PRISMA chart for studies included for review.

RESULTS & DISCUSSION

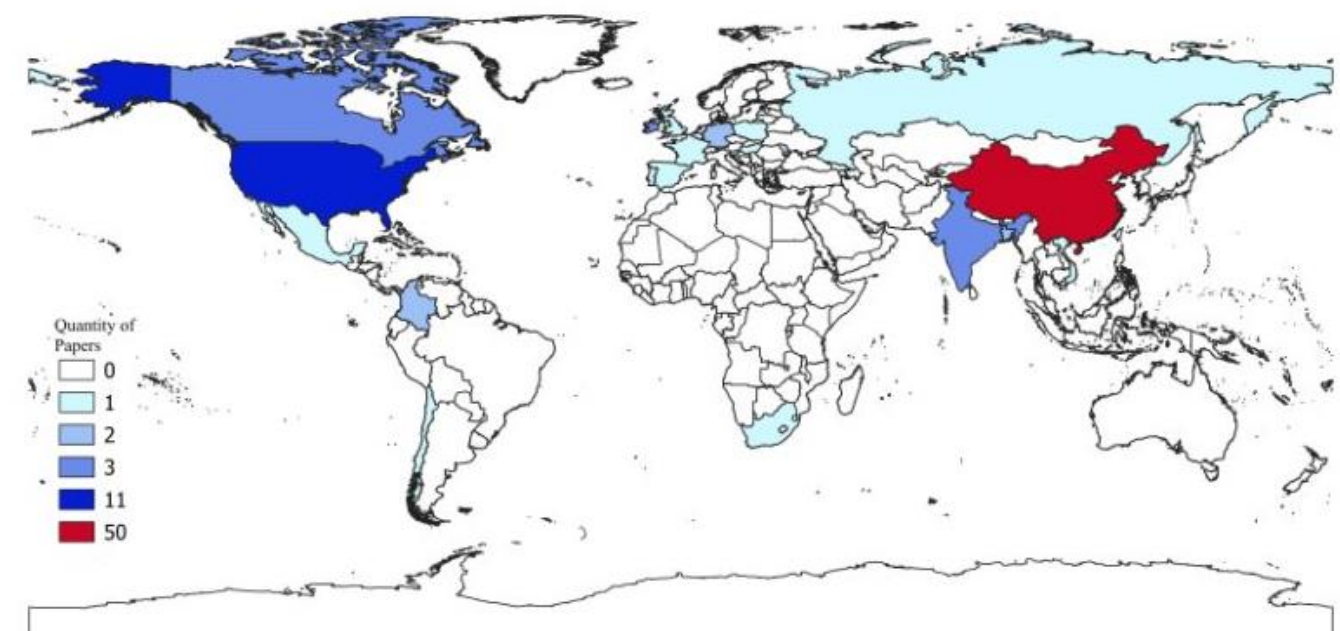


Fig 2 – Geographical distribution of microbiome studies.

1) Study Locations

Most of the studies on water microbiome were from China, 50 papers followed by USA with 11 studies. India had 3 papers, selected for this study.

2) Correlation between Microbes and Anthropogenic Activities

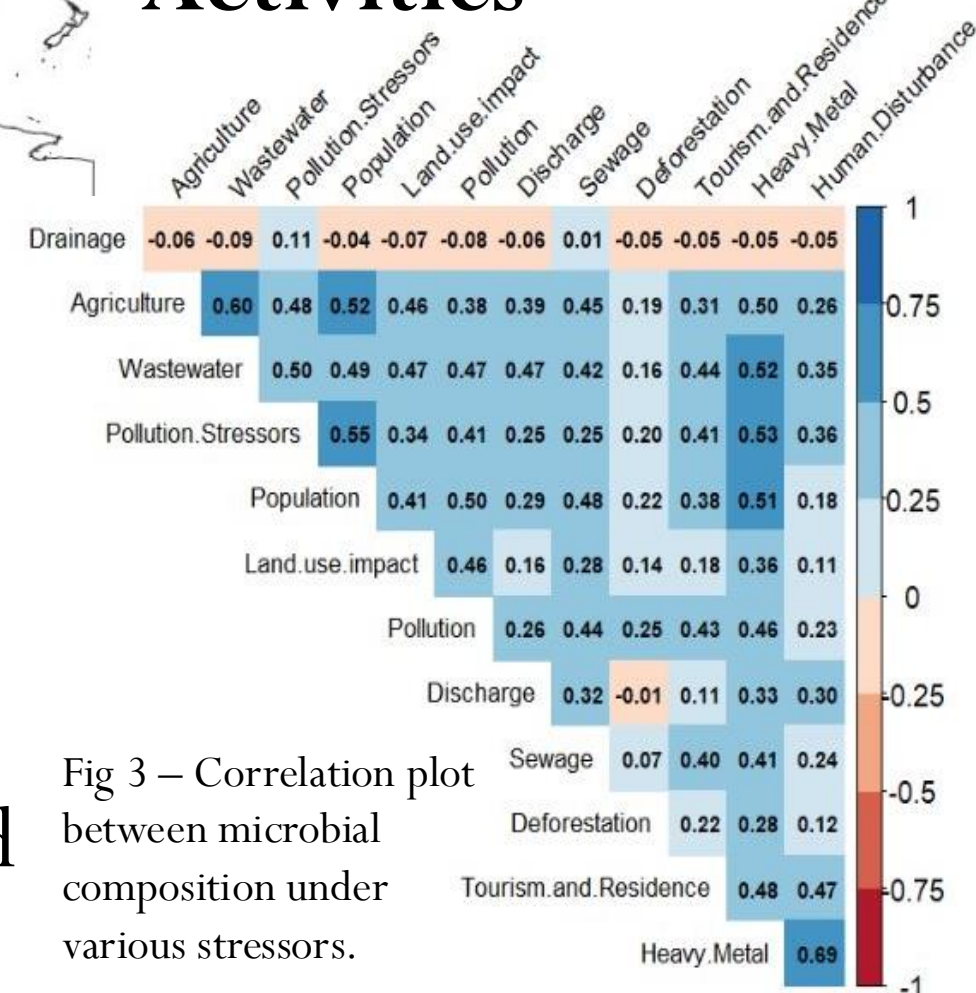


Fig 3 – Correlation plot between microbial composition under various stressors.

RESULTS & DISCUSSION

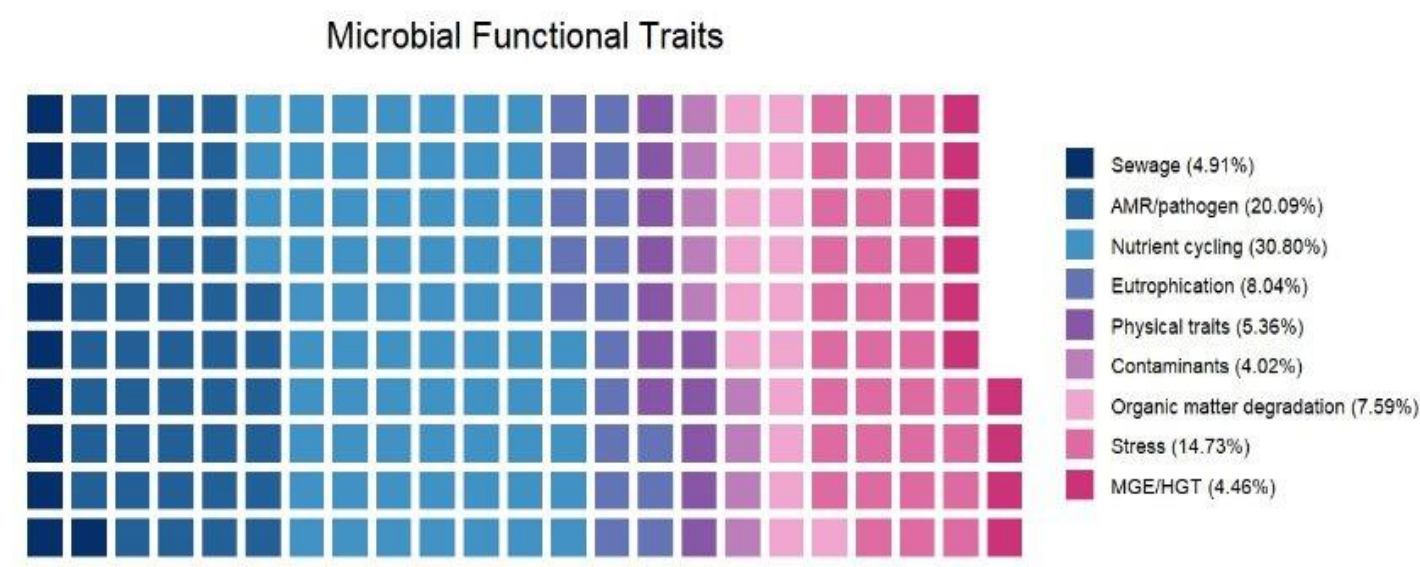


Fig 4 – The functional trait reported across all papers..

Microbe Abundance across Anthropogenic Activities

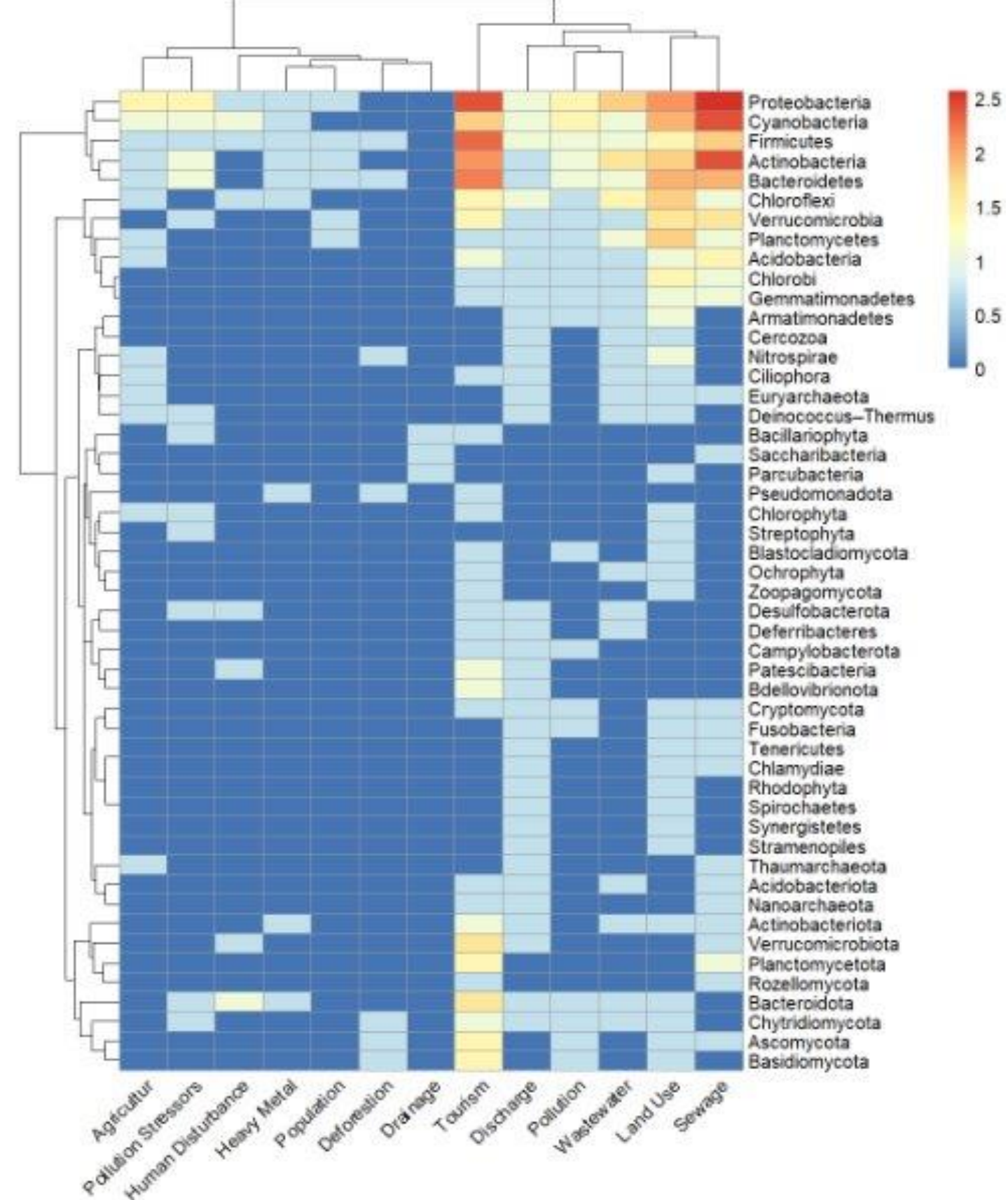


Fig 5 – Top 50 microbes across various reported stressors.

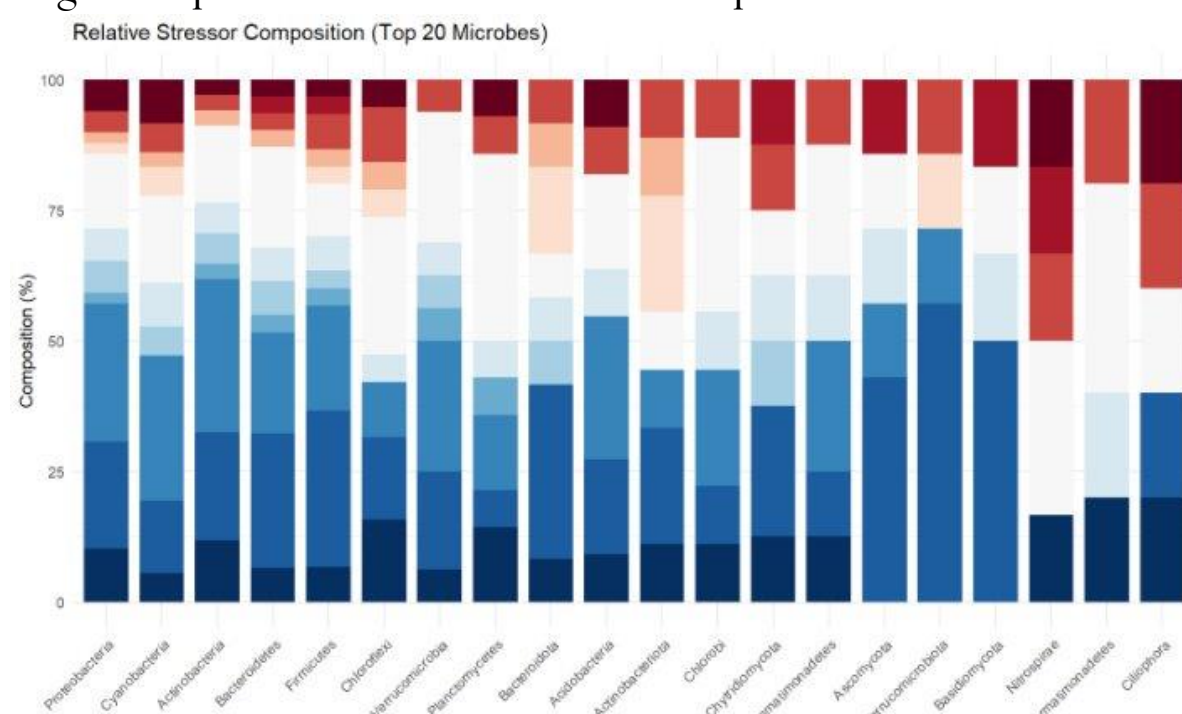


Fig 6 – Relative stressor composition of top 20 microbes.

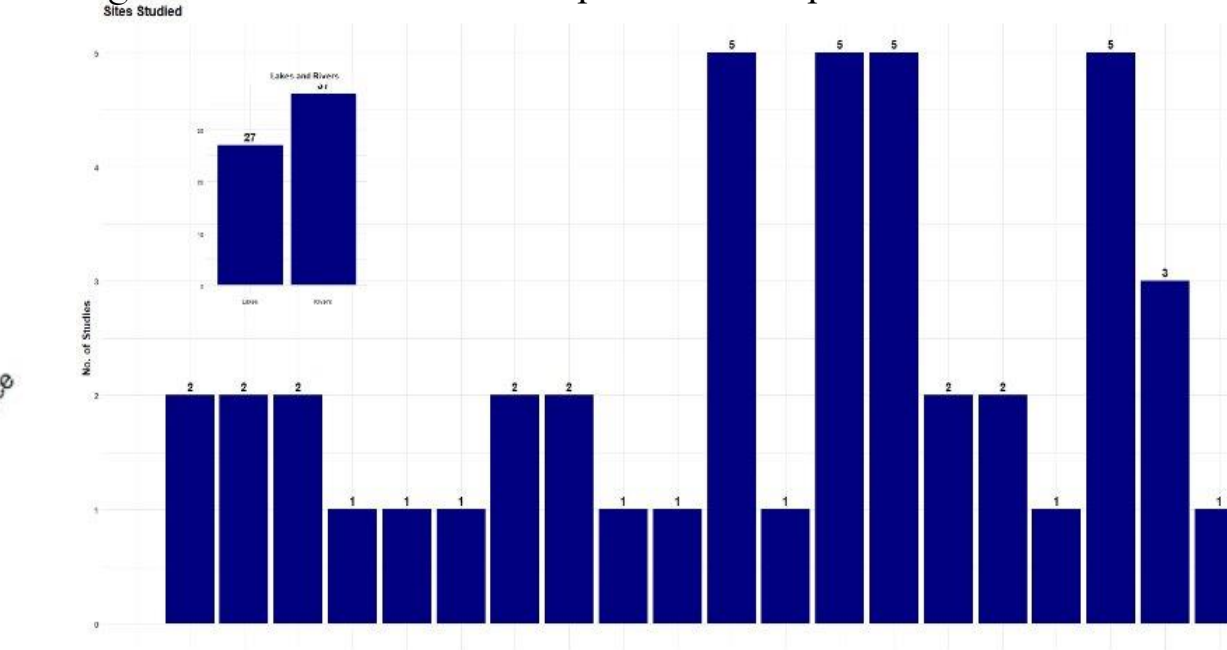


Fig 7 – Sampling sites for all the microbiome studies.

CONCLUSION

Our results indicate a trend towards the homogenization of microbial communities and due to introduction of anthropogenic stressors.



Fig 8 – Flow of water and microbes in urban systems.

3) Functional Trait

The most studies functional traits were nutrient cycling at 30.8% followed by AMR and pathogens at 20.09% and various introduced stressors at 14%.

4) Microbial Diversity

Proteobacteria were the most reported bacterial phylum across all the samples.

5) Relative Stressors

Microbial community in urban waterbodies is composed by the type of environmental stressors present.

6) Study Sites

The most abundant sites that were studied were lakes with 27 studies and rivers with 37 studies