

ABSTRACT

- Mangroves are disappearing world-wide by 1 or 2% per year, a rate greater or equal to coral reefs or tropical forests¹.
- Microbes are essential to nutrient cycling and mangrove health², but the bacterial community structure and response to land use change is poorly understood.
- Here we found distinctive microbial signals of the mangrove microbiome: water, sediment, and root of perturbed and non-perturbed forests, that highlight the sensitivity of mangrove ecosystem health.

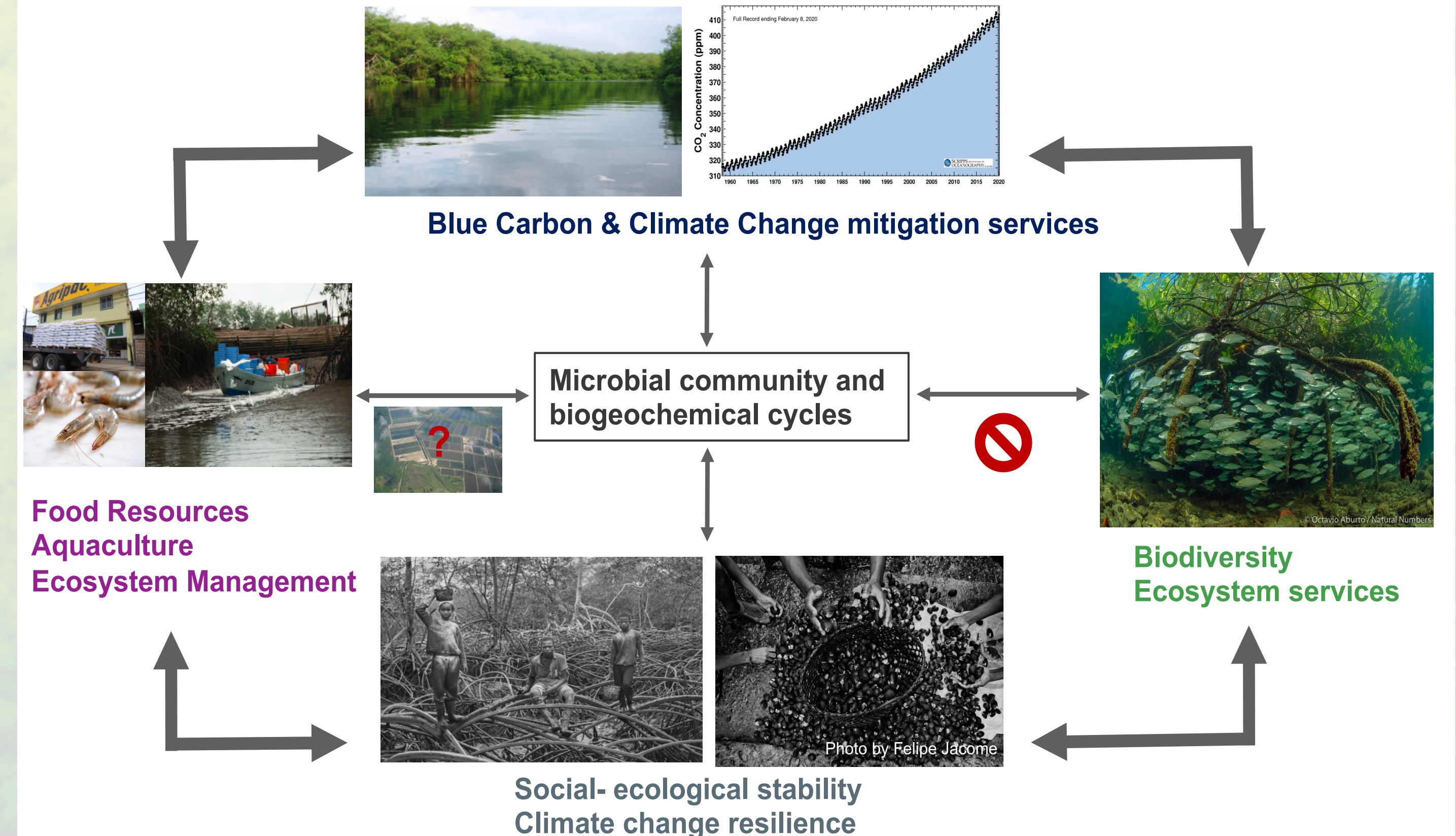


Fig 1. Schematic of mangrove forest ecosystem services and human uses.

STUDY SITE & METHODS

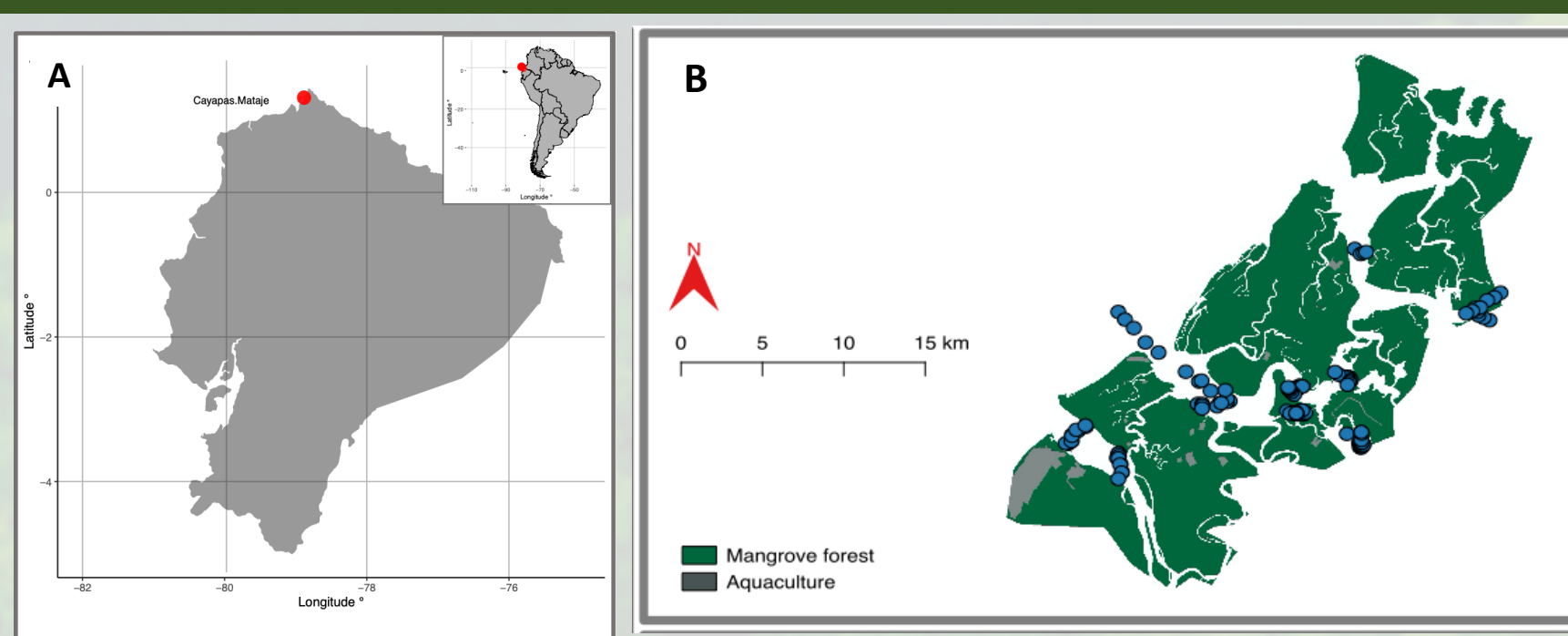


Fig 2. Map of study site in coastal Ecuador (A) and mangrove cover distribution and shrimp aquaculture collection sites (B)

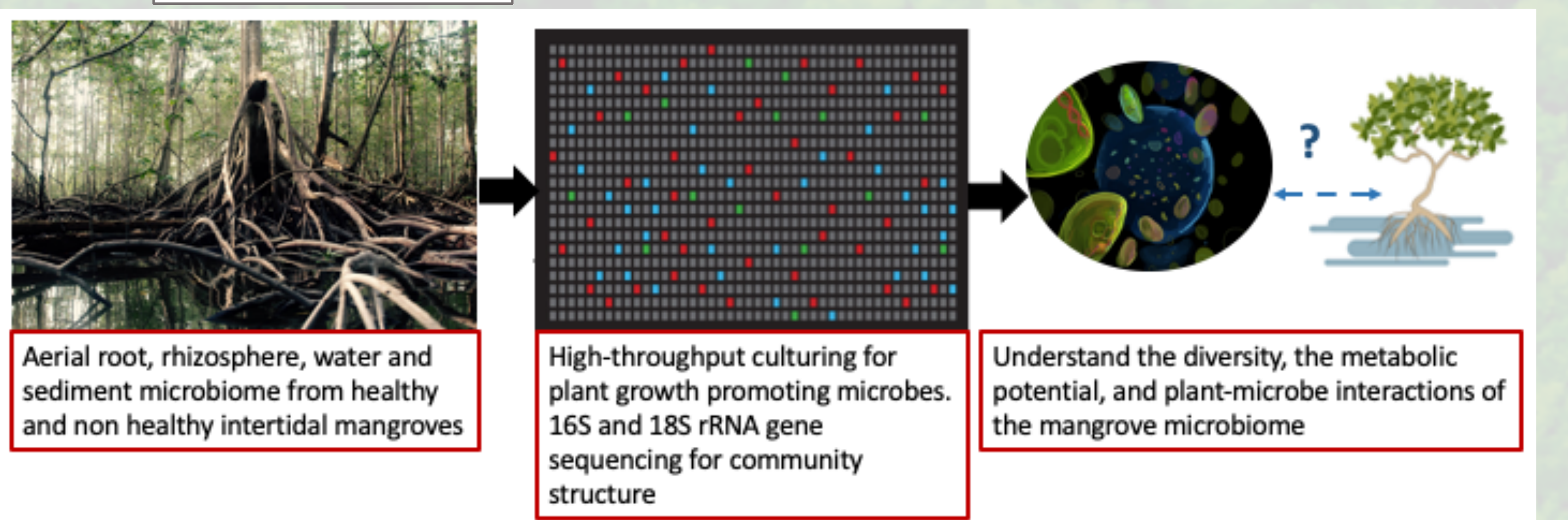
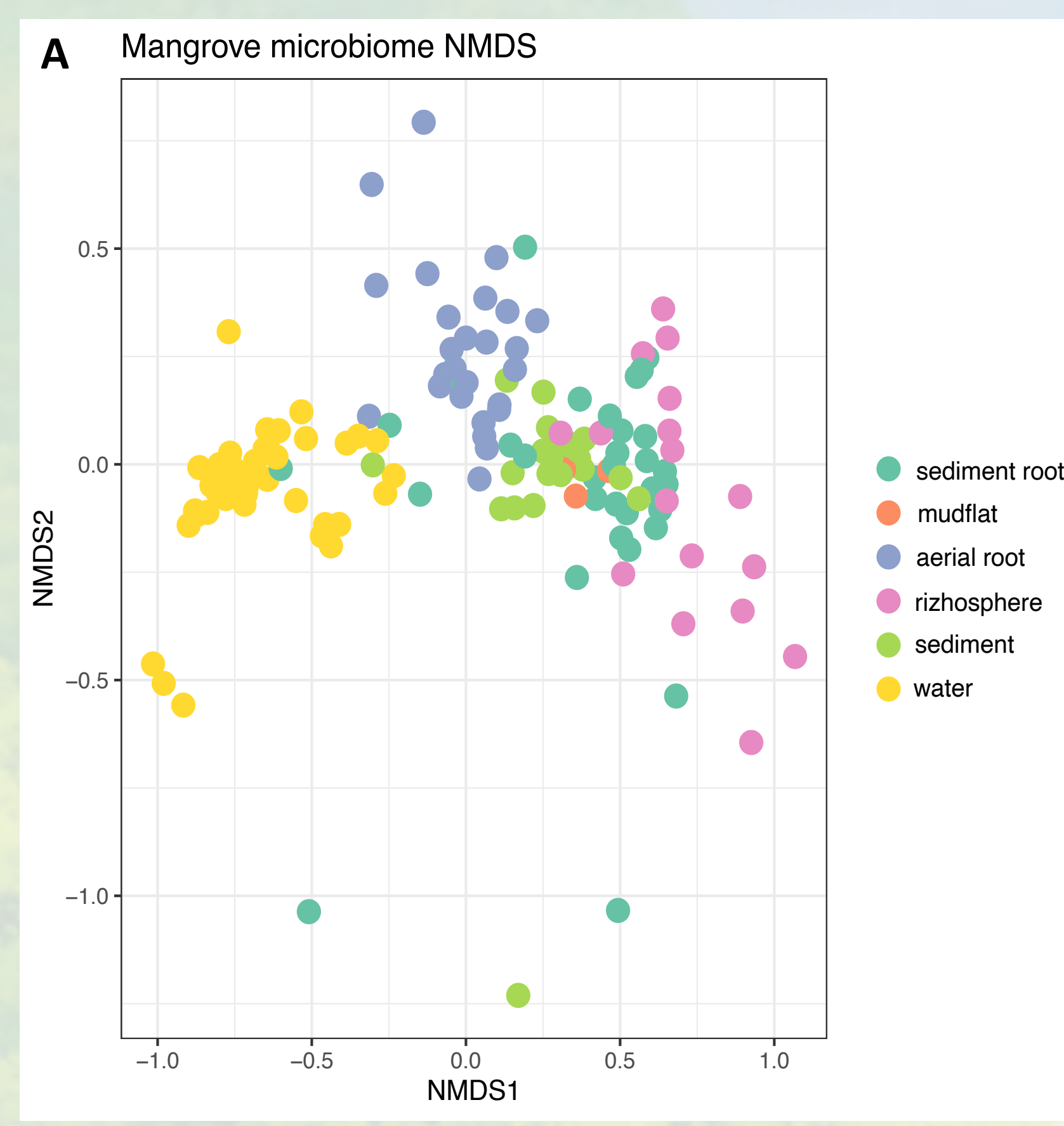


Fig 3. Schematic of sampling and methods
 Total of 149 environmental samples: Measurements of temperature, salinity, turbidity, chlorophyll, nutrients, and isotopes. Amplicon sequencing 16S :Denoise (DADA2) and phylogenetic analysis (Paprica)

REFERENCES

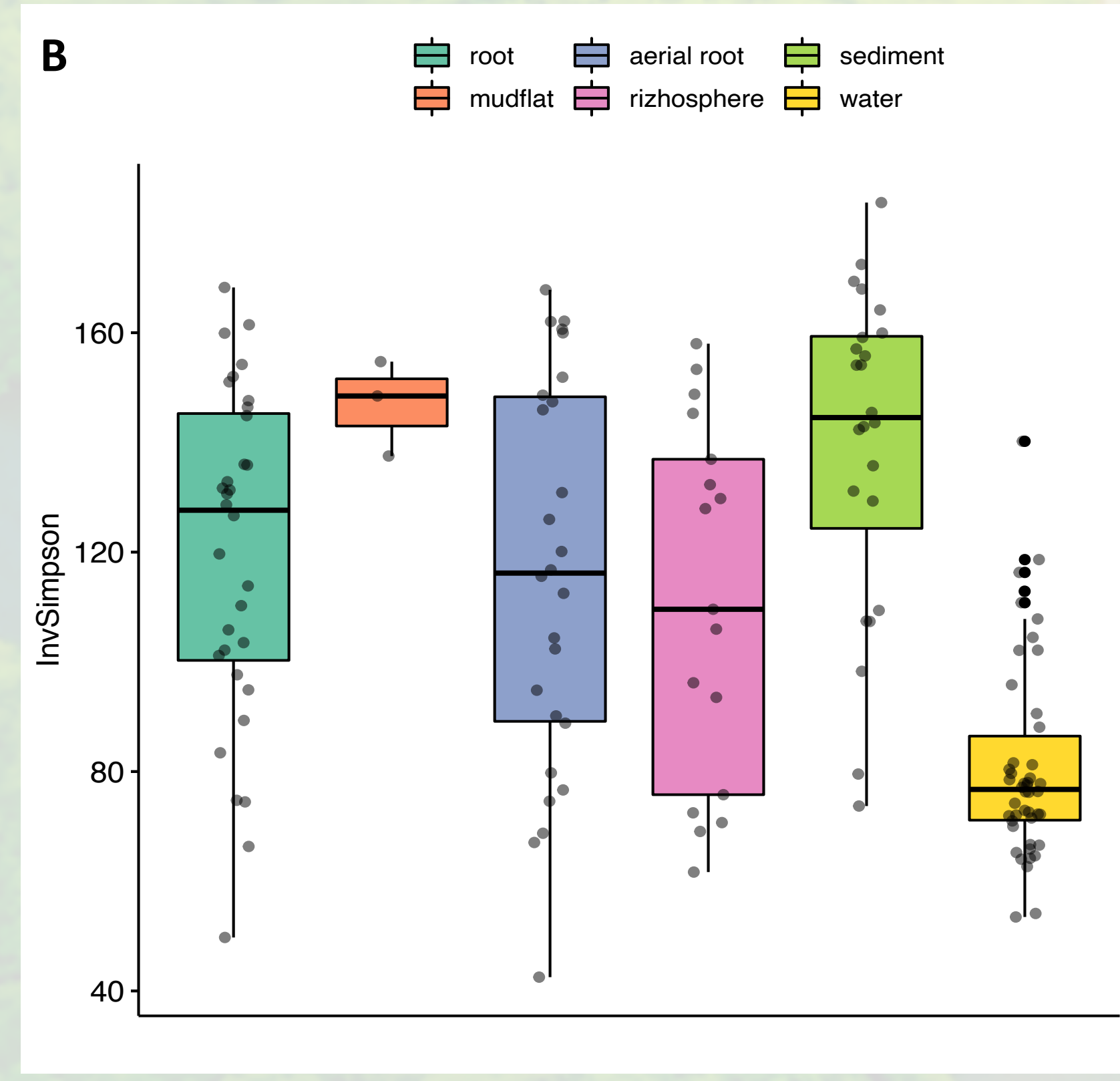
1. Duke, N. C. et al. (2007) 'A World Without Mangroves?', *Science*, 317(5834), p. 41b-42b. doi: 10.1126/science.317.5834.41b.
 2. Alongi, Daniel M. 1994. "The Role of Bacteria in Nutrient Recycling in Tropical Mangrove and Other Coastal Benthic Ecosystems." *Hydrobiologia* 285 (1-3). Kluwer Academic Publishers: 19-32. doi:10.1007/BF00005650.
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MANGROVE MICROBIOME



Q1.) What's the mangrove microbiome community structure and diversity?

Distinctive microbial community for different environments



High diversity in the soil: it has more ecological niches than the water

Lower diversity for the rhizosphere: specialized community

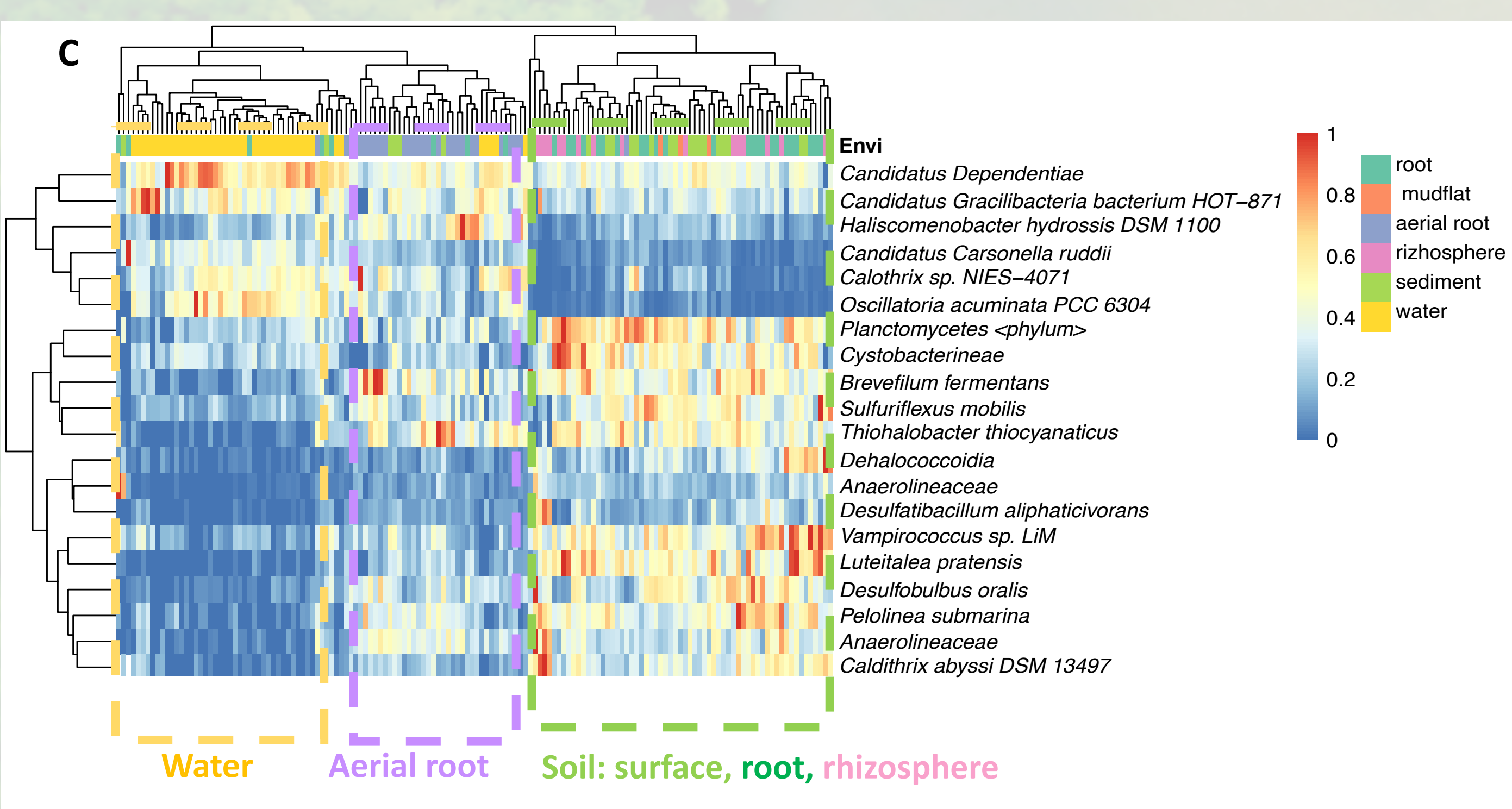


Fig 4.(A) Non-metric multidimensional scaling (NMDS) of microbial community structure (Bray-Curtis). (B) Alpha diversity: inverse Simpson index. (C)Relative abundance of top 20 taxa

RHIZOSPHERE MICROBIOME

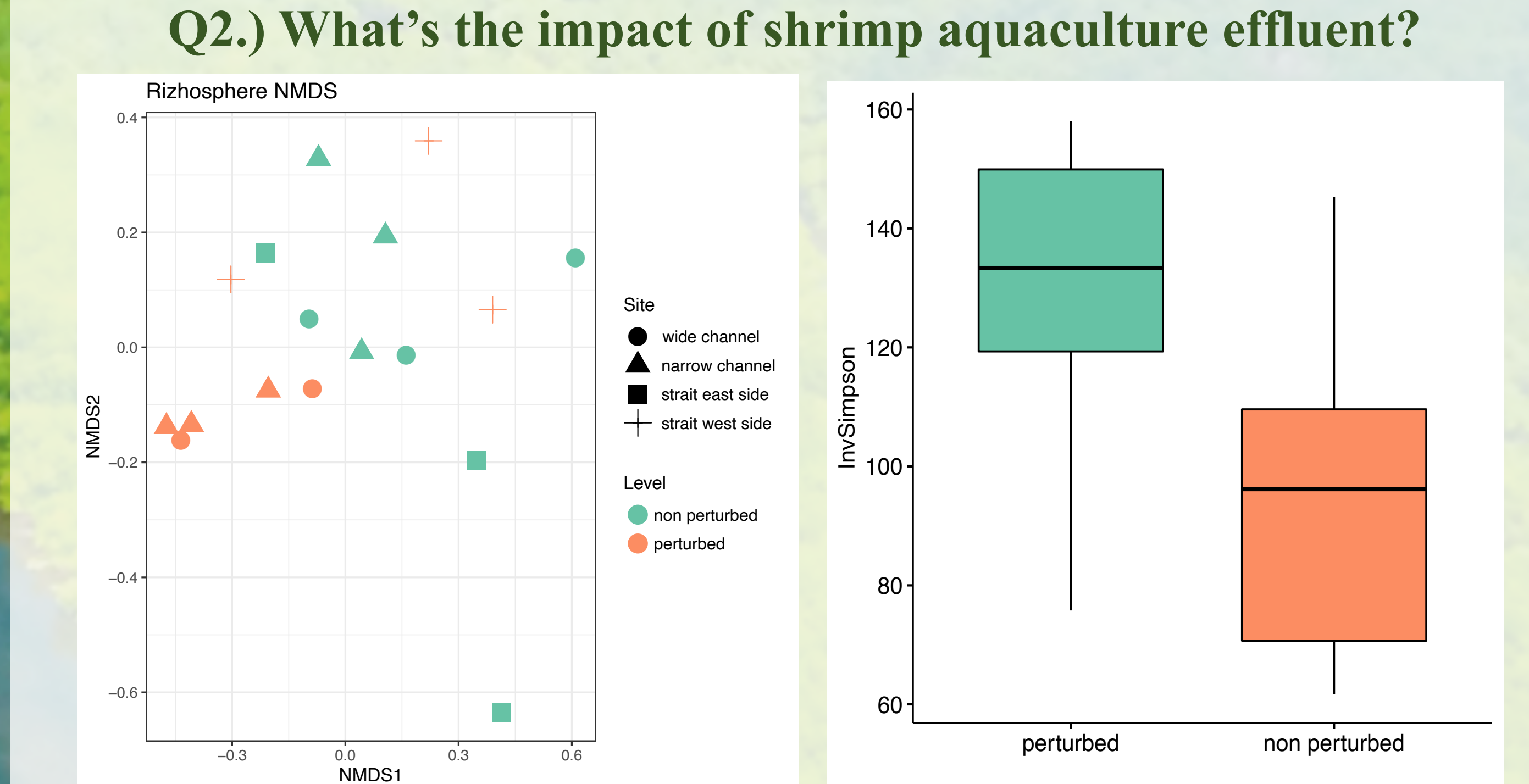
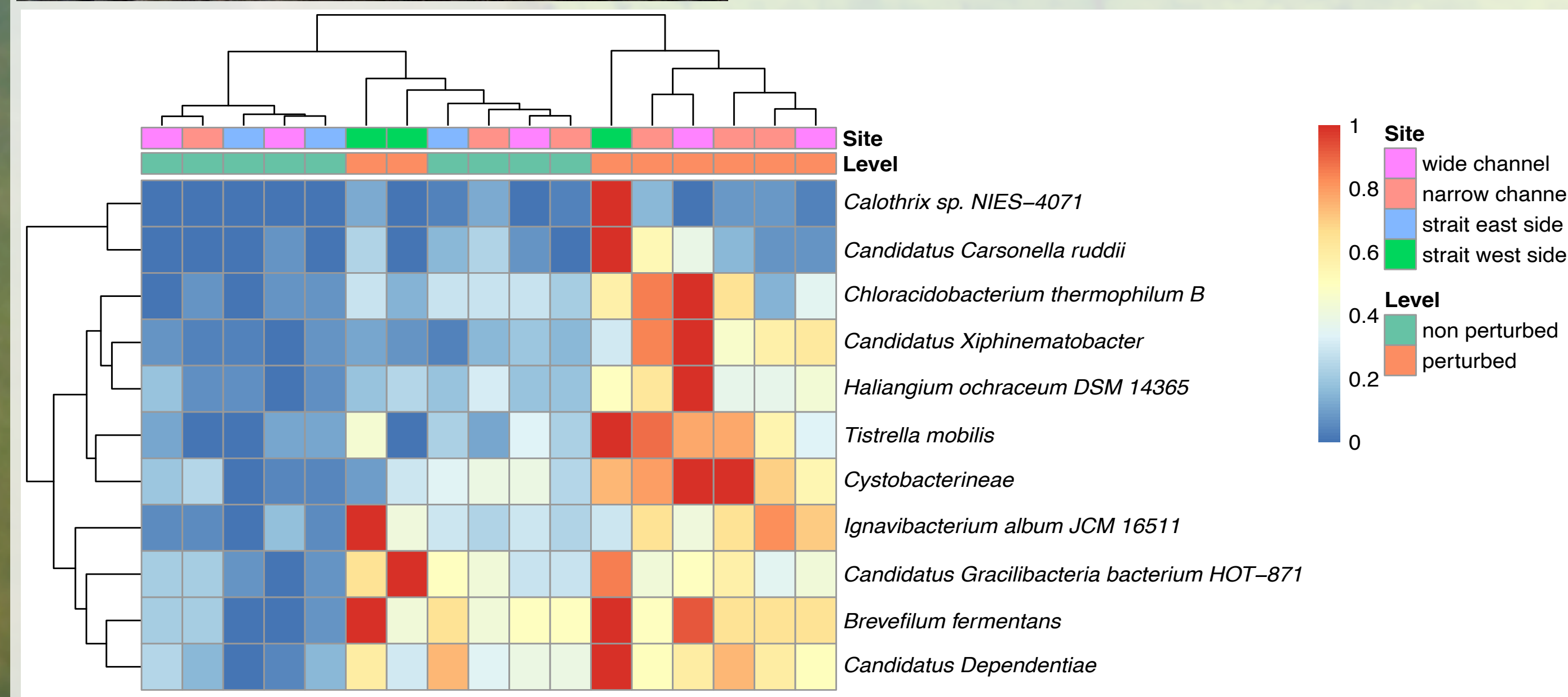


Fig 5. NMDS of rhizosphere microbial community and alpha diversity

RHIZOSPHERE MICROBIAL INDICATORS



Perturbed:
 • *Candidatus Gracilbacteria*: link to necrotic conditions of larvae in bivalves³
 • *Candidatus Carosnella rudii*: symbiont in psyllid plant-pathogen pest

Fig 6. Image of Rhizophora mangle and fisherman collecting bivalves. Differential abundance of bacteria between perturbed vs non perturbed trees. Identified 11 significant taxa p-value <0.05 and potential pathogens.

CONCLUSION

- Distinctive microbiomes in the water, sediment, and root samples.
- Presence of pathogenic microbes in perturbed rhizosphere could be used to monitor changes in the ecosystem health.
- Changes in microbial community could lead to decoupling of biogeochemical cycles with severe implications: eutrophication, hypoxia, and reduction of ecosystem services & health.