# Biogeography of bacteria in surface sediments of a shallow lake

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Microorganisms, very small and almost invisible to human eyes, are the most abundant organisms on the earth. They play important roles in day to day human life through different functions like carbon cycling, nitrogen cycling, providing food and medicine, and helping in decomposition of waste materials. Bacteria, a type of single-celled microorganism, and its biogeography, the community compositions change over space and time in water bodies are still in less priority for scientific research. However they play important roles in maintenance of ecosystems interacting between living beings and non living components like sunlight, air, water etc. Higher animals' biogeography has been well studied since the 19$^{th}$ century (from the time of Darwin) but the bacterial community composition in water bodies is still scarcely studied and there is little knowledge about the factors influencing their distribution. Therefore the distribution pattern of bacterial community compositions and their related factors in lake sediments is very important to know their specific roles in lake ecosystems.

In freshwater lakes, more bacterial communities are present in surface sediments than in the water column. The bacterial diversity and community composition in sediments can vary greatly even within few centimeters or a meter difference in geographic distance and also with small change in sediment environment. My study identified that bacterial community compositions were only influenced by sediment environment in late spring (June), only influenced by geographic distance in winter (January) and not influenced by any of these factors in summer (August). I also found that the variation in bacterial community change over seasons was greatly affected by the geographic distances.

The findings of my study can be important for formulation of new theoretical concepts in the biogeography of bacteria and also help in sustainability of ecosystems with identification and good knowledge of seasonal factors that influence the community composition. The findings are also useful as basis for future biogeographic studies of sediment bacteria.

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