

## **Microbial Diversity and Nitrogen Cycling in Peat and Marine Soils: A Review**

### **ABSTRACT**

Nitrogen is an essential nutrient for living organisms in peat and marine soils, and its transformation within the soil matrix is a complex process mediated by various microbes that inhabit these ecological niches. The metabolism of nitrogen is governed by microbially mediated biogeochemical transformations, such as nitrification, anammox, and denitrification, which contribute to the assimilated pool of nitrogen and fixed nitrogen loss. One of the major challenges facing the field of peat and marine microbiology is the lack of understanding of the correlation between ecosystem-driven nitrogen transformation and microbial diversity. This is crucial because of growing concerns regarding the impacts of human-induced activities and global climate change on microbial nitrogen cycling processes in peat and marine soils. Thus, this review aimed to provide a comprehensive overview of the current understanding of the microbial communities involved in peat and marine nitrification, anammox, and denitrification; the factors influencing the niche differentiation and distribution of the main functional components; the genes involved; and the main effects of human-induced activities and global climate change on the peat and marine nitrogen cycle. The implications of this review will facilitate an understanding of the complex mechanisms associated with ecosystem function in relation to nitrogen cycling, the role of peat and marine soils as carbon sinks, pollution remediation using naturally occurring populations of diverse microbes, and the development of policies to mitigate the effects of anthropogenic influences in peat and marine soils.