

## Impact of Environmental Stressors on Microbial Community Dynamics and Ecosystem Functioning: Implications for Bioremediation and Restoration Strategies

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**Abstract :** Microorganisms are essential for influencing environmental processes, such as nutrient cycling, pollutant breakdown, and ecosystem well-being. Recent developments in high-throughput sequencing technologies and metagenomic methods have given us fresh understandings about the range and capabilities of microorganisms in different settings. This research examines how environmental stressors like climate change, pollution, and habitat degradation affect the composition and roles of microbial communities in soil and water ecosystems. We show that human-caused disruptions change the makeup of microbial communities, causing changes in important metabolic pathways for biogeochemical processes. More precisely, we pinpoint important microbial groups that show resistance or susceptibility to certain stress factors, emphasizing their possible uses in bioremediation and ecosystem rehabilitation. The results highlight the importance of adopting a holistic approach to comprehend microbial changes in evolving environments, impacting sustainable environmental conservation and management strategies. This research helps develop new solutions to reduce the impacts of environmental degradation on microbial ecosystem services by understanding the intricate relationships between microorganisms and their surroundings.

**Keywords :** environmental microbiology, microbial communities, climate change, pollution, bioremediation, metagenomics, ecosystem services, ecosystem restoration

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