

# 2<sup>ND</sup> NIGERIAN SOCIETY FOR NIGERIAN ECOLOGY (NSME-2024) (<https://www.nsme.com.ng>)



**Main Theme: Microbial Dynamics at the Nexus of  
Environment: Exploring Interdisciplinary Approaches  
for Sustainable Environment**



## **Introduction**

In today's rapidly evolving world, the intricate relationship between microbial dynamics and the environment has garnered increasing attention due to its profound implications for global sustainability (Wright *et al.*, 2019; Marin *et al.*, 2021). Microbial communities are highly dynamic; they go through distinct and rapid stages of community succession with consequent effects on biotic and abiotic environments.

Microorganisms have played critical roles in shaping the dynamics of our planet's ecosystems, from nutrient cycling, bioremediation, and climate regulation to disease control. However, the ongoing environmental challenges such as climate change, habitat degradation, and pollution (Jun *et al.*, 2020) require an urgent need to unravel the complexities of microbial dynamics, and leverage this knowledge to devise effective strategies for environmental conservation and restoration. Scientific innovations and advancement in technology have reshaped our environment, and these have contributed to changes in microbial communities of our environment over time. Creation of policies that target real environmental problems is more than environmental factors, but economic, social, and political ones as well (United Nations, 2021). Hence the interdisciplinary dialogue and collaboration will shed light on the complex interactions between microorganisms and their surrounding environment, and create the development that meets the needs of the present, without compromising the ability of future sustainability.

Exploring microbial dynamics at the nexus of the environment through interdisciplinary approaches is essential for promoting environmental sustainability, mitigating environmental degradation, and ensuring the well-being of both ecosystems and human populations.

**Importance of this study:** This study is crucial for:

- maintaining ecosystem stability and resilience.
- innovative solutions for addressing environmental contamination and improving air and water quality.
- developing sustainable agricultural practices that minimize reliance on synthetic inputs and promote soil health.
- managing risks associated with pathogens and harnessing beneficial microbes for human well-being.
- mitigating climate change through carbon sequestration and reducing emissions.
- fostering interdisciplinary collaboration and innovation, leading to holistic solutions for environmental challenges.

### **Goals of the Conference**

This conference will bring together experts from diverse fields, including microbial ecology, environmental science, biogeochemistry, microbial biotechnology, and other related disciplines to elucidate how microbial communities interact with diverse environmental factors such as climate change, pollution, and habitat degradation, to devise innovative strategies for environmental conservation and management. Through this interdisciplinary exchange, synergistic collaboration with a multifaceted approach will bring solutions that will harness the power of microbial ecosystems, paving the way for a healthier planet and a more sustainable future.

## **Sub-Themes**

1. **Microbial Community Resilience:** Investigating the resilience of microbial communities in the face of environmental disturbances, such as pollution, habitat destruction, and climate change. This sub-theme explores how microbial populations adapt and evolve to maintain ecosystem function and stability, offering insights into strategies for mitigating environmental degradation.

2. **Biotechnological Applications:** Exploring the potential of microbial communities as sources of biotechnological solutions for environmental challenges. This sub-theme focuses on harnessing the diverse metabolic capabilities of microorganisms for purposes such as bioremediation, bioenergy production, and sustainable agriculture, offering innovative approaches to environmental sustainability.

3. **Ecological Interactions and Ecosystem Services:** Examining the intricate ecological interactions between microorganisms and their environment, and elucidating the ecosystem services provided by microbial communities. This sub-theme explores how microbial dynamics influence nutrient cycling, soil health, and biodiversity, and how understanding these interactions can inform conservation and restoration efforts for sustainable ecosystem management.

## **Relevant Topics**

1. Microbial Diversity and Function:

- Microbial community structure and composition
- Functional diversity of microorganisms in various environments
- Role of keystone species in microbial communities

2. Environmental Stressors and Microbial Response:

- Impact of pollution on microbial communities

- Response of microorganisms to climate change
- Effects of habitat destruction on microbial diversity

### 3. Biogeochemical Cycling:

- Microbial contributions to carbon, nitrogen, and phosphorus cycles
- Influence of microbial processes on greenhouse gas emissions
- Microbial mediation of nutrient availability

### 4. Bioremediation and Bioaugmentation:

- Applications of microorganisms in bioremediation of pollutants
- Bioaugmentation strategies for environmental restoration
- Engineering microbial communities for targeted remediation

### 5. Microbial Ecology and Ecosystem Services:

- Microbial interactions with plants and animals
- Role of microorganisms in soil fertility and health
- Microbial contributions to ecosystem resilience and stability

### 6. Technological Advances:

- Omics approaches in microbial ecology
- Molecular tools for studying microbial communities
- Emerging technologies for monitoring microbial dynamics

## 7. Sustainable Agriculture:

- Microbial-based approaches to enhance crop productivity
- Role of soil microbiome in sustainable agriculture
- Biofertilizers and biostimulants for eco-friendly farming

## 8. Public Health and Microbial Ecology:

- Zoonotic diseases and microbial transmission
- Microbial dynamics in urban environments
- Impacts of antimicrobial resistance on environmental microbiota

## 9. Policy and Management Implications:

- Incorporating microbial ecology into environmental policy
- Management strategies for conserving microbial diversity
- Integrating interdisciplinary approaches for sustainable environmental management

## 10. Education and Outreach:

- Communicating the importance of microbial ecology to the public
- Educational initiatives to promote understanding of microbial dynamics
- Citizen science projects involving microbial research.