# Report
## on
# Monthly Seminar
## conducted
## by
# ICFRE-RFRI
# Jorhat (Assam)

## INSTITUTE LEVEL

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|---|---|
| Venue | ICFRE - Rain Forest Research Institute |
| Theme and Title | Biodiversity Conservation and<br>Challenges and opportunities of urban soil management |
| Presentation Team | **Mr. Anshuman Patel**, Scientist-B, Forest Ecology and Climate Change Division of the Institute |
| Broad structure | 1. Opening session: Welcome and overview<br>2. Introductory remarks by the Director of the institute<br>3. Presentations by the speaker<br>4. Discussion on the presentations<br>5. Closing Remarks by the Director of the institute<br>6. Vote of thanks |
| Periodicity | Once in a month |
| Duration | Half day |
| Expected outcomes of the seminar | Current strategic knowledge on urban soil management and the research gap |
| Coordination team | 1. Sh. R K Kalita, Head, Extension Division<br>2. Dr. Druba Jyoti Das, Head FECC Division<br>3. Ms. Tara Kumari, Nodal Officer (Monthly Seminars)<br>4. Supporting staff of Extension Division |
| Proceedings | **(Attached, Page number 2)** |

# Proceedings of the Monthly Seminar

**Date: 3rd September 2025 at 03:30 PM onward**
**Venue: Brahmaputra Hall, ICFRE-RFRI, Jorhat**
**Theme: Biodiversity Conservation**

ICFRE-Rain Forest Research Institute, Jorhat (Assam) conducted the monthly seminar on 3rd September, 2025 for the month of August at Brahmaputra Hall of ICFRE-RFRI, Jorhat campus. The seminar was attended in physical and virtual mode by the scientists, officers, technical, subordinate staffs, researchers and students along with the members of its centers i.e. BRC, Mizoram and LEC, Tripura. The Coordinator of the seminar Ms. Tara Kumari, Scientist, conducted the program. The program was chaired by Dr. Nitin Kulkarni, Director, ICFRE-RFRI.

**Mr. Anshuman Patel**, Scientist-B, Forest Ecology and Climate Change Division, ICFRE-RFRI, Jorhat presented on the topic '**Challenges and opportunities of urban soil management**' in the monthly seminar of ICFRE-RFRI, Jorhat, on 3rd September, 2025 at Brahmaputra Hall, ICFRE-RFRI, Jorhat campus.

Mr. Patel highlighted that the current world population is approximately 8 billion, and it is projected to reach 9 billion by 2050. Currently, 5.5 out of 10 people live in urban areas, and this is expected to increase to 7 out of 10 by 2050. Currently 35 percent of Indian lives in cities which is expected to reach 52% by the year 2050 (World population prospects, 2022). Therefore, urban management is essential for building livable, sustainable, and resilient cities that can meet the needs of their residents and thrive in a rapidly changing world. Urban soil management is an important aspect of urban management, as it involves the management of soil in cities and other urban areas that have been significantly altered by human activities, resulting in a soil composition that differs from the natural landscape (Morel et al., 2017). However, urban soil management presents numerous challenges and opportunities in the context of urbanization and sustainability. The challenges include contamination of soil by different inorganic/organic pollutants primarily from industrial activities, atmospheric deposition of dust and aerosol and vehicle emissions (Chabukdhara and Nema, 2013). Another important challenges is degradation of soil health due to surface sealing and compaction that resulted in decreased microbial activity,

depletion of carbon and nitrogen storage (Lu et al., 2020), lower infiltration rate and other negative effects. Urban runoff exacerbates environmental risks by transporting nutrient-rich and suspended loads into water bodies, leading to eutrophication. Accumulation of contaminates in urban soil also promotes antibiotic resistance genes (ARGs) and mobile genetic elements (MGEs), making urban soils reservoirs of antimicrobial resistance. Along with that increasing plastic accumulation in urban soil is going to be a challenge to manage the soil (Hoseini and Bond, 2022).

Despite these issues, Mr. Patel highlighted several opportunities for sustainable soil management. Engineered interventions such as porous pavements, green roofs, and constructed technosols, alongside biological strategies like phyto-remediation and bioremediation, offer promising solutions. Urban afforestation, in particular, emerges as a cost-effective approach to neutralize soil pH, enhance infiltration, sequester significant amounts of carbon and mitigate resistome risks by stabilizing soil microbial communities. However, in the Indian context, comprehensive data on soil sealing, contamination, biodiversity loss, and carbon dynamics remain scarce, and soil health has yet to be fully integrated into urban planning missions. Addressing these gaps through innovative, collaborative, and policy-driven frameworks will be essential to ensure urban soils contribute effectively to sustainable city futures.

The presentation was followed by an insightful discussion in which valuable suggestions were shared by the participants. Dr. Dhruba Jyoti Das, Head of the FE&CC Division, commended Mr. Patel for his excellent presentation. In his remarks, Dr. Nitin Kulkarni, Director, appreciated the quality and relevance of the talk, and encouraged the scientific community of the institute to develop a research proposal on this important theme. The session concluded with a formal vote of thanks delivered by Ms. Tara Kumari, the coordinator of the program, marking its successful completion.

## Expected outcomes of the seminar

***Future Research Aspects***

- ✓ **Lack of Urban Soil Data -** There is currently no comprehensive mapping of soil sealing, contamination, or fertility across Indian cities. Developing systematic databases is essential for informed planning and management.
- ✓ **Soil Contamination Risks -** Research on the impacts of heavy metals, plastics, and industrial wastes on urban soils remains limited. More studies are needed to understand their implications for soil quality, food safety, and human health.
- ✓ **Carbon and Climate Role -** Urban soils play an important role in carbon sequestration and climate regulation, yet this aspect is poorly understood. Future studies should focus on quantifying their contribution to climate resilience and mitigation.
- ✓ **Urban Agriculture Potential -** Community gardens, rooftop farming, and peri-urban agriculture depend on soil quality and safety. Research on soil suitability, safe cultivation practices, and productivity is crucial for promoting urban food security.
- ✓ **Soil Biodiversity Loss -** Very few studies address how urbanization affects soil microbial communities, fauna, and their ecosystem services. Understanding this loss is vital for sustaining soil health and ecological functions.
- ✓ **Policy Integration -** Soil health has not yet been fully integrated into urban planning frameworks such as the Smart Cities Mission or AMRUT. Evidence-based research can support stronger policy inclusion and practical interventions.

***Future Strategies for Urban Soil Management***

- ✓ **Data-driven monitoring** – Establishing reliable databases and using modern tools such as GIS, remote sensing, and sensors to track soil sealing, fertility, contamination, and overall health in real time.
- ✓ **Policy integration** – Incorporating soil health explicitly into urban planning missions (e.g., Smart Cities Mission, AMRUT) and developing regulatory frameworks for soil conservation.
- ✓ **Pollution control** – Preventing and mitigating soil contamination from industrial effluents, heavy metals, plastics, and organic pollutants through stricter standards and remediation technologies.

- ✓ **Green infrastructure** – Promoting permeable pavements, green roofs, roadside plantations, urban forestry, and constructed Technosols to restore soil functions and manage stormwater.
- ✓ **Urban agriculture** – Supporting safe and sustainable rooftop gardens, community farms, and peri-urban cultivation to enhance food security while improving soil productivity.
- ✓ **Biodiversity conservation** – Protecting and restoring soil organisms, microbial diversity, and fauna to sustain nutrient cycling, carbon storage, and other ecosystem services.
- ✓ **Community involvement** – Engaging citizens in awareness campaigns, soil health drives, and local restoration projects to ensure long-term sustainability.

***Networking Research Options and Opportunities***

Collaborative research and institutional networking are essential for advancing urban soil studies and addressing the growing challenges of soil degradation in cities. At the **national level**, several organizations can play a pivotal role:

- ✓ **ICFRE (Indian Council of Forestry Research and Education)** – With expertise in urban forestry, soil–vegetation interactions, and green infrastructure, ICFRE can lead research linking soil health to urban ecosystem restoration and sustainability.
- ✓ **ICAR Institutes** (e.g., NBSS&LUP, IISS Bhopal, CRIDA Hyderabad) – These institutes are well positioned to contribute through soil mapping, fertility evaluation, and climate–soil interaction studies, providing critical data for urban agriculture and land-use planning.
- ✓ **NEERI (CSIR)** – NEERI brings valuable expertise in studying soil pollution and designing remediation strategies for urban and industrial environments, which are often hotspots of contamination.
- ✓ **IITs, NITs, and Central Universities** – These institutions can offer technological and interdisciplinary support by advancing research in urban hydrology, soil sealing, and sensor-based monitoring. Their involvement ensures integration of engineering, environmental sciences, and digital tools for soil management.


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Ministry of Environment, Forest & Climate Change, Government of India
Director, RFRI


Sectors of urban management
Urban infrastructure
Urban management
Social services
Urban economic development


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