# Research Practices - CCE1 Literature Survey

**Team Code**: TY3-19A

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**Tentative Title**: Biodiversity and Urbanization

**Domain**: Environmental Science & Sustainability

**Sub Domain**:
1. Urban Ecology
2. Environmental Policy & Planning
3. Nature-Based Solutions & Urban Design

**Objective Description**:

The objective of this research is to examine the relationship between urbanization and biodiversity, focusing on the ecological, social, and policy dimensions. It aims to analyze the negative impacts of urban expansion on ecosystems, review global and Indian case studies where biodiversity has been integrated into urban development, evaluate existing conservation policies, and propose sustainable strategies to enable biodiversity to coexist alongside rapid urban growth.

## Team Member1:

**PICO 1:**

Paper Title: Urban Green Infrastructure Planning in Jaipur, India: A GIS‑Based Suitability Model for Semi‑Arid Cities
Authors of Paper: Nathawat R, Gupta SK, Kanga S, Singh SK, et al. (2025)
Paper Description:
Problem: Lack of data-driven methods to guide green infrastructure development in semi-arid urban environments.

Intervention: A GIS-based model to map suitable zones for green infrastructure in Jaipur.

Comparison: Suitable vs. less suitable areas based on environmental parameters.

Outcome: Identification of priority zones for green infrastructure implementation, offering structured guidance for urban planners.

**PICO 2:**

Paper Title: Mainstreaming urban nature-based solutions in India
Authors of Paper: ICF Insights (2025)
Paper Description:
Problem: Conventional grey infrastructure fails to address urban challenges like heat, flooding, and biodiversity loss.

Intervention: Adoption of Nature‑Based Solutions (NbS) like green roofs, urban forests, permeable surfaces.

Comparison: NbS versus grey infrastructure approaches.

Outcome: NbS provides climate regulation, biodiversity enhancement, and reduced flood risk—positioned as holistic, low-cost alternatives.

**PICO 3:**

Paper Title: Promoting Conservation and Sustainable Management of Urban Biodiversity in Noida
Authors of Paper: ICLEI South Asia (2023–2024)
Paper Description:
Problem: Urban planning often neglects biodiversity, leading to degraded ecosystems in growing cities.

Intervention: Development of a Local Biodiversity Strategy & Action Plan, City Biodiversity Index, natural asset mapping in Noida.

Comparison: Standard urban planning versus biodiversity-integrated planning.

Outcome: Framework for mainstreaming biodiversity into urban management, raising stakeholder awareness and embedding conservation into city planning.

**PICO 4:**

Paper Title: Co‑benefits of Urban Biodiversity

Authors of Paper: Dhote M., Mukherjee D. (2018)
Paper Description:
Problem: Urban green spaces are often seen only as recreational assets, undervaluing their ecological roles.

Intervention: Multi-scale biodiversity conservation strategy emphasizing legal and governance tools.

Comparison: Planning with versus without consideration of ecosystem services.

Outcome: Highlighted co-benefits like pollution control, climate regulation, flood management; identified policy mechanisms to integrate biodiversity into cities.

**PICO 5:**

Paper Title: Role of Biodiversity – Opportunities, Threats, and Strategic Interventions for a Resilient Indian City
Authors of Paper: Souporni Paul, Suchandra Bardhan, Sankeerthana Ananthula (2023)
Paper Description:
Problem: High-density Indian cities face escalating biodiversity loss without clear urban resilience strategies.

Intervention: Assessment of biodiversity in Kolkata; formulation of strategic interventions and resilience planning.

Comparison: Business-as-usual development vs. biodiversity-informed urban resilience.

Outcome: Recommendations for habitat restoration, biodiversity profiling, and strategy planning to improve urban resilience in megacities.

## Team Member2:

**PICO 1:**

Paper Title: Biodiversity impacts and conservation implications of urban land expansion
Authors of Paper: Güneralp B., Seto K.C., et al. (2020, PNAS)
Paper Description:
Problem: Global urban land expansion threatens one-third of assessed species.

Intervention: Spatial modeling of biodiversity impacts across projected urban growth zones.

Comparison: Current habitat distribution vs. projected urban expansion zones.

Outcome: Identified hotspots of biodiversity loss; stressed urgent need for integrated land-use policies.

**PICO 2:**

Paper Title: Urbanization driving changes in plant species and communities
Authors of Paper: Aronson M.F.J. et al. (2022, ScienceDirect)
Paper Description:
Problem: Rapid urbanization alters plant communities globally.

Intervention: Analysis of plant biodiversity patterns across urban gradients.

Comparison: Urban vs. peri-urban/rural plant communities.

Outcome: Clear decline in native species; invasive species dominate urban landscapes.

**PICO 3:**

Paper Title: Direct and Indirect Impacts of Urbanization on Biodiversity Across the World's Cities
Authors of Paper: Liu J. et al. (2025, MDPI Remote Sensing)
Paper Description:
Problem: Lack of comprehensive metrics to quantify biodiversity intactness in cities.

Intervention: Use of Biodiversity Intactness Index across 1,523 global cities.

Comparison: Cities with high vs. low levels of intact biodiversity.

Outcome: Found both direct habitat loss and indirect anthropogenic stressors as major biodiversity threats.

**PICO 4:**

Paper Title: Urban Ecosystems and Biodiversity: Climate Change Perspectives
Authors of Paper: Rosenzweig C. et al. (2016, Columbia University ARC3.2 Report)
Paper Description:
Problem: Cities face biodiversity loss while also being climate change hotspots.

Intervention: Review of adaptation/mitigation strategies integrating biodiversity into climate planning.

Comparison: Urban areas with vs. without biodiversity-sensitive climate planning.

Outcome: Biodiversity integration enhances climate resilience, ecosystem services, and human well-being.

**PICO 5:**

Paper Title: Urban bird assemblages in India: the role of traffic, greenspaces, and dietary traits in shaping community composition
Authors of Paper: Karky B., Dutta S., et al. (2022, Springer Urban Ecosystems)
Paper Description:
Problem: Urbanization reduces bird diversity in Indian cities.

Intervention: Study of bird community traits in relation to traffic, parks, and urban design.

Comparison: Bird communities in high-traffic vs. green-rich areas.

Outcome: Richer greenspaces support more species; policy implications for urban biodiversity-sensitive design.

## Team Member3:

**PICO 1:**

Paper Title: The effect of urbanization on bird assemblages in Central India
Authors of Paper: Chace J.F., et al. (2021, Journal of Tropical Ecology)
Paper Description:
Problem: Functional diversity of bird species declines in urban centers.

Intervention: Gradient study of bird richness in Amravati, India.

Comparison: Rural vs. urban core bird diversity.

Outcome: Sharp species decline; dominance of small omnivorous birds in cities.

**PICO 2:**

Paper Title: Urbanisation alters plant-pollinator networks in Bengaluru, India
Authors of Paper: Thakur R., Shanker K., et al. (2021, Ecology Letters)
Paper Description:
Problem: Urban expansion disrupts pollination networks in tropical megacities.

Intervention: Field data on seasonal pollinator turnover in Bengaluru.

Comparison: Rural vs. urban floral networks.

Outcome: Urban sites showed reduced plant diversity and altered pollinator networks, though resilience varied by species.

**PICO 3:**

Paper Title: Basai Wetland facing biodiversity loss due to urban expansion
Authors of Paper: Independent conservation researchers (2022, Reports summarized in Wikipedia)
Paper Description:
Problem: Urban development in Gurugram threatens endangered bird habitats.

Intervention: Calls for wetland protection and policy interventions.

Comparison: Natural wetland ecosystem vs. encroached/developed areas.

Outcome: Documented decline in migratory and resident bird species.

**PICO 4:**

Paper Title: Yamuna Biodiversity Park: Restoration & biodiversity outcomes
Authors of Paper: Delhi Development Authority (DDA), CEMDE Delhi University (2019)
Paper Description:
Problem: Degraded floodplains of Yamuna led to biodiversity collapse.

Intervention: Habitat restoration into wetlands, grasslands, and forests.

Comparison: Pre-restoration degraded floodplains vs. post-restoration outcomes.

Outcome: Restoration brought back 1,500+ species (plants, birds, butterflies).

**PICO 5:**

Paper Title: Nature-based solutions in Bhubaneswar: Urban agriculture as biodiversity strategy
Authors of Paper: Dash A., et al. (2022, Discover Sustainability – Springer)
Paper Description:
Problem: Urbanization threatens peri-urban biodiversity in Odisha.

Intervention: Integrating urban agriculture as a nature-based solution.

Comparison: Conventional urban land-use vs. urban-agriculture-integrated planning.

Outcome: Urban agriculture enhances food security, green cover, and pollinator diversity.

**Github link:**
https://github.com/manali-dhamale/CCE1_Biodiversity_Urbanization_TY03-19A.git