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Impact of Urbanization on Green Spaces in Islamabad: A case study of sector D-12 Islamabad, Pakistan.

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INTRODUCTION & AIM

Background

Urbanization is one of the most transformative global trends of the 21st century. More than 56% of the world's population currently lives in urban areas, a figure projected to rise to 68% by 2050 (United Nations, 2022). Islamabad was originally conceived as a "garden city" by planner Constantinos Doxiadis, with nearly 30% of its land dedicated to forests, green belts, and open spaces (Capital Development Authority, 2020). However, rapid urban expansion has eroded many of these natural assets. Sector D-12, located adjacent to Margalla Hills National Park, exemplifies this transformation: once a forested zone, it has undergone large-scale construction, vegetation loss, and ecological degradation since the 2010s (Tariq & Waheed, 2016).

Problem Statement

While CDA's master plan mandates green space conservation, weak enforcement, commercial pressures, and institutional) which stresses balancing development with long-term environmental preservation gapss have allowed rampant land conversion in D-12. Shrinking green belts have led to rising temperatures, soil erosion, biodiversity loss, and diminished quality of life for residents (Ali & Malik, 2010; CDA Environmental Directorate, 2022).

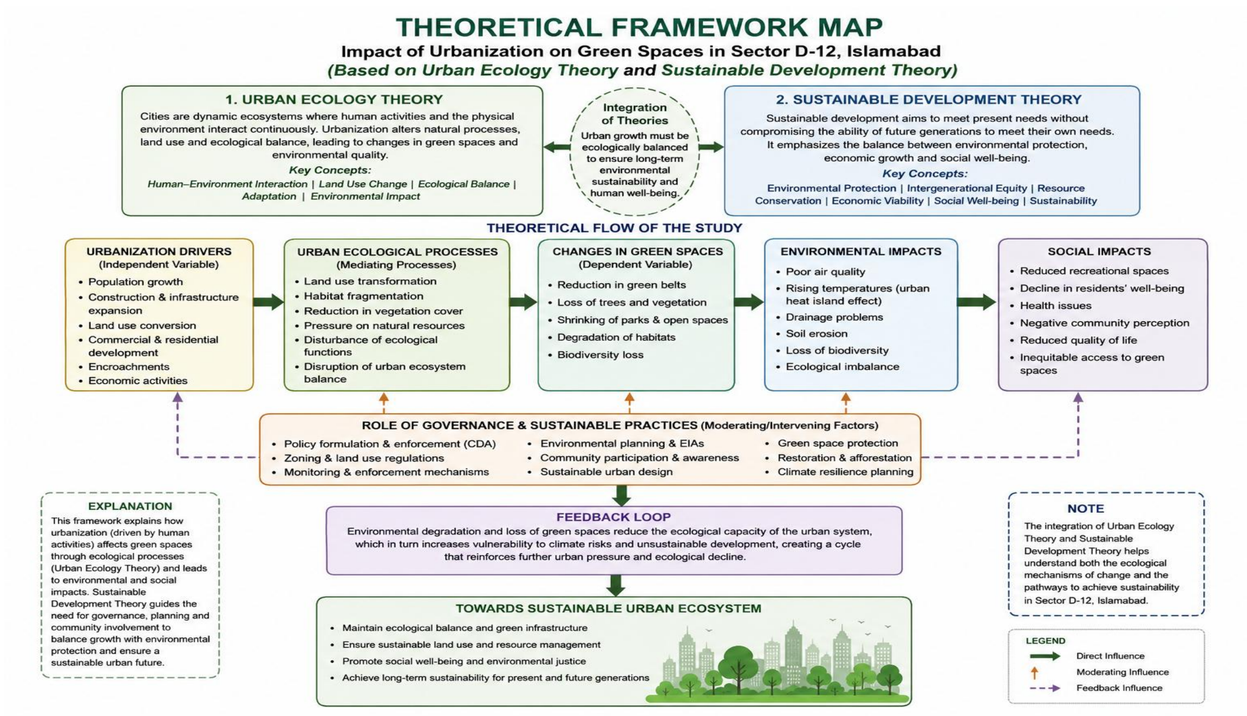
Research Objectives

■To examine how urbanization has altered the availability, quality, and ecological function of green spaces in Sector D-12, Islamabad.

■To analyze residents' perceptions of green space loss and examine CDA's urban environmental policies related to green space management in D-12.

Theoretical Framework

Guided by **Urban Ecology Theory** (Grimm et al., 2008) which views cities as ecosystems where human and natural processes interact and **Sustainable Development Theory** (WCED, 1987) which stresses balancing development with long-term environmental preservation.



METHOD

Research Design

Qualitative case study approach, selected for its ability to explore lived experiences, perceptions, and contextual dynamics within Sector D-12, Islamabad.

Data Collection Methods

In-depth semi-structured interviews (15–30 min) with long-term D-12 residents and a key informant (long-term resident with insider knowledge of sector development).Participant observation through multiple field visits; field notes and photographic documentation of environmental changes.

Secondary data: Analysis of CDA policy documents (Islamabad Master Plan, zoning regulations, Islamabad Environmental Improvement Act 1995).Audio-visual documentation (photographs and video clips across green belts, parks, and construction sites).

Sampling & Analysis

Purposive sampling was used to select participants with direct experience of D-12's environmental changes. Data were analyzed using thematic analysis: interview transcripts were coded to identify recurring patterns related to green space loss, governance gaps, and community perceptions.

Study Site

Sector D-12, northwestern Islamabad, bordering the Margalla Hills National Park. Topography of slopes and plains once covered in thick vegetation; large-scale development began post-2010, making it an ecologically sensitive and rapidly urbanizing case.

RESULTS & DISCUSSION

1. Changes in Green Spaces

Residents confirmed a dramatic reduction in green belts and open land. D-12 was originally described as a "forest or jungle" with large, centuries-old trees. Today, the remaining greenery is largely attributable to the proximity of Margalla Hills, not to the sector itself. Construction has replaced almost all of D-12's indigenous vegetation.

2. Environmental Changes

Tree felling has led to noticeably hotter summers. New winter fog and soil erosion (causing mud flows onto roads during rainfall) were identified as direct consequences of deforestation. These changes corroborate urban heat-island effects documented in broader Islamabad studies.

3. Role of CDA

CDA's Enforcement Directorate conducts anti-encroachment drives and collaborates with district administration and police. Minimum green area requirements stand at 15–20% per project (Islamabad Environmental Improvement Act, 1995). However, residents noted that enforcement is inconsistent, and community participation is essential for sustaining newly planted vegetation.

4. Biodiversity Loss

Residents reported the disappearance of wild birds and small animals that were common 10–15 years ago. Habitat destruction has led to local extinction of wildlife species that previously inhabited the sector's natural slopes and tree canopy.

5. Community Perception & Social Spaces

Residents acknowledged CDA's recent park development efforts, noting several new family parks have improved social interaction. However, there is a consensus that large-scale prevention of construction is no longer feasible; the priority now is protecting remaining trees and newly planted vegetation from damage.

6. Policy Standards & Governance

■CDA gazette criteria: minimum 15% open/green space per development; Environmental Improvement Act (1995) mandates 20%

■Boundary fencing near Margalla Hills protects ecological buffer zones; reclaimed land handed to Environment Wing for afforestation

■Enforcement gaps persist developers and private builders frequently bypass NOC requirements; monitoring capacity remains limited

CONCLUSION AND RECOMMENDATIONS

Rapid urbanization in Sector D-12 has significantly degraded the ecological character of a once-forested zone, resulting in loss of green belts, rising temperatures, soil erosion, biodiversity decline, and reduced ecosystem services. A clear gap exists between CDA's green-space conservation policies and their on-ground implementation, driven by weak enforcement, institutional constraints, and commercial pressures. Without stronger governance, effective monitoring, and active community engagement, Islamabad risks further erosion of its green identity and long-term ecological resilience.

Recommendations

■Strengthen CDA zoning enforcement and mandate EIAs for all construction in ecologically sensitive sectors

■Introduce transparent monitoring and GIS-based tracking of green space loss at the sector level

■Expand native-species reforestation programs; clearly demarcate buffer zones near Margalla Hills

■Foster community participation through awareness campaigns and resident stewardship committees

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