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Contested Urban Green Spaces in India: Complex Dynamics of Environmental Development

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Abstract
This research paper examines the proliferation of urbanization in contemporary India has led to a pressing need for the preservation and expansion of green spaces within cities. As rapid development continues to reshape the landscape, the importance of green spaces in promoting ecological balance, enhancing public health, and fostering social well-being becomes increasingly evident. This paper presents a comprehensive analysis of the issues and challenges associated with green spaces in modern India.
Drawing on national and global data, the paper investigates the challenges posed by the shrinking green spaces. According to a recent survey conducted by the Ministry of Environment, Forest and Climate Change in India, over the past decade, urban green cover has decreased by 23%, leaving only a meager 2.07% of urban land area covered with green spaces. Additionally, the Global Forest Resources Assessment 2020 by the Food and Agriculture Organization (FAO) reveals that India lost approximately 1.3 million hectares of forest cover between 2015 and 2020, further exacerbating the depletion of green spaces in urban regions.
The paper emphasizes the role of government policies in safeguarding green spaces and promoting sustainable urban development. Examples from different countries, where urban development is regulated by strict guidelines on green space allocation, provide valuable insights for Indian policymakers. By learning from these examples and incorporating the perspectives of local communities, India can pave the way for inclusive and sustainable urban green space management.

Keywords: Green Spaces, Urbanization, Sustainable Development, Mitigation

1. Introduction

This monsoon season is extraordinary for the Indian sub-continent, more particularly for India. As we experience the erratic pattern of the monsoon all across the country, where south and east India witness rain deficit having a highly humid and sultry atmosphere and below average rainfall, and west and north India got excessive rainfall with cloud bursts, landslides having an impact on both human lives and infrastructures. This has not happened overnight and has a long history of uneven development frameworks and their subsequent implementation, whereas the fragility of the eco-system has been compromised and has been over-exploited. Such a situation is not only alarming but also requires urgent

and serious intervention with multi-pronged strategies and collective efforts to have a sustainable solution for a long time.

In this regard, one of the strategies that have been tested in different parts of the world is the increasing of green spaces all across the region. This paper focuses on this very strategy and discusses some of the major issues vis-à-vis development and green spaces. The paper is designed in such a way that it would provide a holistic understanding of the concept and its intricacies as well as analyze major causes for depletion of the green spaces, various issues, and emerging trends to mitigate risks of such depletion.

Financial sustainability is yet another challenge that cannot be ignored. The establishment and maintenance of green spaces entail considerable costs, ranging from initial planning and landscaping to ongoing upkeep. Navigating the financial intricacies to ensure the long-term viability of these areas necessitates innovative funding models and robust public-private partnerships.

This exploration of green spaces in contemporary India delves into the myriad issues and challenges that underlie their conception, establishment, and preservation. It seeks to unravel the intricate tapestry of urbanization, environmental consciousness, social equity, and financial viability that defines the landscape of green spaces. By examining these challenges in depth, it can be aspiring that harmonize India's rapid development with its ecological and societal well-being, ensuring a greener and more sustainable future for generations to come.

This article aims to explore these issues, their causes, and potential strategies for addressing them. Urban Green Spaces (UGS) play a crucial role in urban development, contributing to the overall well-being and quality of life of residents. The literature on Urban Green Spaces in development is a vast field, encompassing various global and national perspectives. This explanation will focus on the global context and then specifically highlight the case of India with relevant examples.

1.1 Research Objective

- Evaluating the status of green spaces in contemporary India.
- Examining the historical journey of green spaces that would shape contemporary policies.
- Dynamics of the historical role of the policy and schemes in India and Global level.
- Identifying the issues and challenges that hinder the development of green spaces and suggesting solutions for its development.

1.2 Research Methodology

This article is primarily based on secondary data and focuses on the challenges of the development of green spaces. Propose potential solutions and strategies for sustainable green space management with examples of existing literature in the development sector.

2. Status of Green Spaces in Contemporary India

According to Urban Greening Guidelines 2014, Green Spaces are generally referred to as land covered with grass, trees, bushes, or other vegetation, either entirely or in part. Urban Green Spaces feature parks and neighbourhood gardens. In a master plan, green spaces are often categorized as recreational zones. According to UN-Habitat 2015, urban green spaces were classified as a part of "green infrastructure". It is a significant component of public open spaces and common services a city offers and may act as a setting that promotes health for all urban residents. As a result, it's critical to guarantee that urban green areas are both widely spread across the city and easily accessible to all demographic groups.

According to a recent survey conducted by the Ministry of Environment, Forest and Climate Change in India, the urban green cover has decreased by 23% over the past decade, leaving only a meager 2.07% of

urban land area covered with green spaces. Additionally, the Global Forest Resources Assessment 2020 by the Food and Agriculture Organization (FAO) reveals that India lost approximately 1.3 million hectares of forest cover between 2015 and 2020, further exacerbating the depletion of green spaces in urban regions. According to UN-Habitat, cities' diversified land use patterns, which include their buildings, transportation infrastructure, parks, and needs for food and other services, have a tangible and significant influence on ecological processes and biological biodiversity. Given the likelihood that this significant influence would persist, food production should boost urbanization. The urban pattern has an impact on species richness and biodiversity, and to mitigate this effect, the urban landscape should be integrated with green areas as patches, which is known as a mosaic pattern in the landscape. These patches are connected by corridors that make it easier for species to move between them and for ecosystems to function within the urban fabric, protecting biodiversity.

In contemporary India, the status of green spaces stands at a critical juncture, as rapid urbanization and population growth pose challenges to their existence and quality. While green spaces are essential for improving air quality, providing recreational opportunities, and supporting biodiversity, their availability varies significantly across cities. According to data from the Ministry of Housing and Urban Affairs, as of 2020, only about 13% of urban areas in India were equipped with parks and green spaces. To an uneven distribution of these vital areas, with some cities boasting well-designed parks while others lack adequate recreational areas. The consequences of this disparity are profound, impacting public health, urban aesthetics, and the overall well-being of residents. As the urban population continues to surge, the need for accessible and well-maintained green spaces becomes increasingly urgent. While the Indian government has introduced initiatives like the "Smart Cities Mission" and “Atal Mission for Rejuvenation and Urban Transformation” (AMRUT) to promote green space development, challenges such as land scarcity, inadequate funding, and encroachment still persist. Striking a balance between urban expansion and the preservation of green spaces remains a pivotal endeavour for India's sustainable and liveable urban future.

3. Scope and Significance of the Green Spaces

The scope of green spaces encompasses a multifaceted array of benefits, spanning ecological, social, economic, and health-related dimensions. From an ecological standpoint, green spaces play a critical role in conserving biodiversity by providing habitats for a diverse range of plant and animal species. They contribute to vital ecosystem services such as air purification, carbon sequestration, and water filtration, aiding in the overall health of local environments. These areas also serve as sites for habitat restoration, enabling the revitalization of native ecosystems that may have been impacted by urbanization.

On the social front, green spaces offer a haven for recreational activities, promoting physical fitness, leisure, and relaxation, thereby enhancing mental well-being. These spaces foster a sense of community by acting as gathering points for social interactions, cultural events, and shared experiences. Their aesthetic value cannot be understated, as green spaces contribute to the visual appeal of urban landscapes, creating inviting and appealing environments.

In terms of health, green spaces contribute significantly to both mental and physical wellness. Access to these areas has been shown to alleviate stress, anxiety, and depression, providing essential respite from the pressures of urban living. Moreover, they encourage outdoor activities, mitigating sedentary lifestyles and promoting overall physical health. Economically, green spaces impact property values positively and

can drive tourism, injecting vitality into local economies through recreational activities and related services.

From an environmental perspective, green spaces contribute to improved air quality by absorbing pollutants and releasing oxygen. They also play a pivotal role in reducing the urban heat island effect through the provision of shade and cooling. Beyond these benefits, green spaces offer opportunities for education and research, serving as platforms for hands-on learning about ecology, horticulture, and sustainability. Some green spaces hold cultural or historical significance, preserving heritage and fostering a connection to the past. Moreover, as cities face the challenges of climate change, green spaces aid in climate resilience by managing storm-water runoff and offering adaptive strategies to cope with temperature extremes. In summation, the scope of green spaces is vast and integral to creating vibrant, sustainable, and healthy urban environments.

4. Types of Green Spaces

In the Indian context, a diverse array of green spaces caters to the unique needs of the population, blending cultural, ecological, and social elements. Public parks, such as Lohia Park and Janeshwar Mishra Park in Lucknow, Lodi Garden in Delhi, and Cubbon Park in Bangalore, offer serene retreats from the urban bustle and feature walking paths, lawns, and historical monuments. Botanical gardens like the Lalbagh Botanical Garden in Bangalore showcase an impressive range of native and exotic plant species, serving as educational hubs and recreational spaces.

Community gardens, increasingly popular in cities like Mumbai and Kolkata, empower residents to grow their produce and foster a sense of community ownership. Sacred groves, like the Pachmarhi Biosphere Reserve in Madhya Pradesh, hold spiritual significance and are conserved as sacred spaces by local communities. Urban forests, as seen in the Aravalli Biodiversity Park in Delhi, contribute to biodiversity conservation and provide opportunities for nature-based education and recreation.

Waterfront parks like Marine Drive in Mumbai combine greenspaces with stunning views of the sea, creating popular gathering spots for locals and tourists alike. Heritage gardens like the Brindavan Gardens in Mysore blend horticultural beauty with cultural events and light shows, showcasing the rich heritage of the region. Rooftop gardens, such as those found atop Delhi's Dilli Haat, add greenery to densely populated areas, promoting sustainable urban living.

Institutional green spaces, often seen within university campuses, offer students and staff areas for relaxation, study, and reflection. Linear parks and green corridors, exemplified by the Chennai River Restoration Project, rehabilitate water bodies, and create recreational pathways. Biodiversity parks like the Ecological Park in Thane focus on conserving native flora and fauna while offering educational programs to the public.

Furthermore, historic landmarks like the Mughal Gardens at Rashtra Pati Bhavan in Delhi open their doors to the public during specific times, showcasing stunning garden designs and encouraging public engagement. Meditation gardens, like the Osho International Meditation Resort in Pune, blend greenery with spaces for spiritual contemplation.

5. Historical Journey of Development of Green Spaces in India

The historical journey of green space development in India is a captivating reflection of the country's cultural, ecological, and urban evolution. Throughout various periods, the concept of green spaces has evolved from traditional gardens and sacred groves to modern urban parks and innovative ecological

initiatives. In ancient India, rulers and emperors were known for creating lush gardens within palace complexes, exemplified by the Charbagh-style gardens of the Mughal era. The Mughal Gardens at the Taj Mahal and Humayun's Tomb stand as remarkable examples, blending Persian and Indian garden design principles.

Sacred groves, revered by local communities for their spiritual significance, acted as early forms of green spaces. These groves, often located near temples, were preserved as natural sanctuaries, like the sacred forests in Meghalaya known as 'Sohra' or 'Mawphlang' sacred groves.

During the British colonial era, European-style botanical gardens were established, combining scientific study with aesthetic beauty. The Kolkata Botanical Garden, established in 1787, is one such example, fostering the study of diverse plant species while offering a tranquil environment for visitors.

In the post-independence era, rapid urbanization led to the emergence of modern public parks. Nehru Park in Delhi, dedicated to India's first Prime Minister, is emblematic of this period.

Urban planning efforts also gave rise to green corridors and linear parks, such as the Necklace Road in Hyderabad, offering recreational spaces while conserving urban water bodies.

Recent times have witnessed a growing emphasis on sustainability and biodiversity conservation. Initiatives like the Ecological Park in Thane focus on restoring native ecosystems and raising environmental awareness. The Chennai River Restoration Project exemplifies efforts to reclaim water bodies and transform them into vibrant green spaces.

Rooftop gardens like those in Mumbai's Bandra-Kurla Complex address space constraints while promoting urban greenery. Historic landmarks like the Lodhi Gardens in Delhi, originally built during the 15th century, have been restored and made accessible to the public, showcasing the timeless appeal of green spaces.

The historical journey of green space development in India showcases a rich tapestry of influences, from ancient garden aesthetics to colonial botanical gardens and contemporary sustainable initiatives. These spaces not only reflect changing societal values but also underscore the importance of preserving nature within the urban fabric, contributing to the well-being and cultural identity of the nation.

6. Schemes Initiated for the Development of Green Spaces (India and Global Level)

Urban green spaces have garnered significant attention in development literature both at the national and international levels, particularly concerning their relevance and impact in the context of India. Numerous studies, reports, and initiatives have focused on the benefits, challenges, and potential examples of urban green spaces for the possible development of green spaces in India. Below are some schemes related to development of green initiatives:

National Context and Initiatives:

- **India's National Urban Greening Scheme:** In response to the growing concerns about the decline of green spaces in urban areas, the Indian government launched the National Urban Greening Scheme. This scheme aims to increase urban green cover by promoting the development of parks, gardens, and other green areas in cities across the country.
- **India State of Forest Report:** The Forest Survey of India releases periodic State of Forest Reports that provide insights into the status of forest and green cover in the country. These reports help monitor changes in green spaces and support policy formulation for conservation and expansion efforts.
- **Smart Cities Mission:** Under the Smart Cities Mission, several Indian cities have incorporated the development of urban green spaces as a key component of their urban development plans. For

example, Bhubaneswar's Smart City Plan includes the creation of parks, green corridors, and the rejuvenation of water bodies to enhance the city's green infrastructure.

- **National Policy and Reports:** India's National Forest Policy emphasizes the importance of urban green spaces in mitigating the adverse impacts of urbanization. It encourages the integration of green spaces in urban planning to maintain ecological balance and provide recreational areas for the growing urban population. The Ministry of Housing and Urban Affairs in India has also been involved in promoting green spaces through various initiatives and reports, recognizing the role they play in sustainable urban development.
- **The Greening of Urban Areas in India (FAO):** This report by the Food and Agriculture Organization highlights the significance of urban green spaces in India and suggests strategies for their development and preservation. It emphasizes the need for inclusive planning that involves communities in decision-making and provides case studies from various Indian cities showcasing successful green space projects.
- **Sabarmati Riverfront Development Project, Ahmedabad:** This project transformed the banks of the Sabarmati River in Ahmedabad, Gujarat, into a green space with gardens, parks, and recreational areas. The development has revitalized the city's riverfront, providing residents with a much-needed green escape amidst urbanization.
- **Rajiv Gandhi Renewable Energy Park, Gurgaon:** Located in Gurgaon, Haryana, this green space integrates solar power generation with recreational facilities, promoting sustainability and environmental awareness.

International Context and Examples:

1. **Singapore's "City in a Garden":** Singapore is renowned for its successful integration of green spaces into urban planning. The "City in a Garden" concept emphasizes the incorporation of parks, green roofs, and vertical gardens in high-rise buildings, enhancing the city's livability and sustainability.
2. **New York City's High Line Park:** This elevated linear park, converted from a disused railway track, has become a model for urban green space revitalization. It has not only become a popular recreational area but has also contributed to increased property values and economic development in the surrounding neighbourhoods.
3. **Germany's Green Urban Planning:** Several German cities, such as Freiburg and Munich, have embraced green urban planning, which focuses on preserving green belts and creating green corridors within the city. This approach has contributed to improved air quality, biodiversity, and quality of life for residents.
4. **Seoul's Cheonggyecheon Restoration Project:** This project involved the restoration of a stream that had been covered by roads and urban development. By reclaiming this natural waterway, Seoul created a linear green space that revitalized the area, reduced pollution, and enhanced recreational opportunities for citizens.
5. **Barcelona's Superblocks:** Barcelona's Superblocks initiative involves redesigning certain city blocks to prioritize pedestrians and green spaces over vehicles. This approach has led to increased urban greenery, reduced traffic congestion, and improved air quality.

6.1. Historical Background of Policy Framework for Promoting Green Spaces (India and Global)

The policies prepared on green spaces in India have evolved over-time, reflecting changing societal values, urbanization trends, environmental awareness, and policy shifts. A brief overview of the national and global historical background that has influenced the development of green spaces:

National Historical Background:

1. **Pre-Independence Era (Before 1947):** India's historical context was marked by traditional practices of nature conservation, with references to gardens, parks, and sacred groves. The Mughal Empire, for instance, established several iconic gardens like the Mughal Gardens in Delhi. These historical practices laid the foundation for the importance of green spaces in the cultural and social fabric of the country.
2. **Post-Independence Era (1947 onwards):** After gaining independence, urbanization accelerated in India. Rapid population growth and urban expansion led to increased demand for green spaces to address environmental concerns and enhance the quality of life. The 1952 National Forest Policy recognized the need for urban forestry, marking an early acknowledgment of the importance of green spaces in urban areas.
3. **Green Revolution and Environmental Awakening (1960s-1970s):** The Green Revolution, which focused on agricultural productivity, led to concerns about ecological impacts and loss of biodiversity. Concurrently, the global environmental movement influenced India's approach to sustainability, contributing to discussions on the importance of green spaces for ecological balance.
4. **Urbanization and Planning (1980s-1990s):** Rapid urbanization and increasing land development pressures spurred discussions on the role of green spaces in urban planning. Policies like the National Urbanization Policy (1988) recognized the need for green belts and open spaces in urban areas.
5. **Environmental Legislation and Awareness (2000s-2010s):** The 2006 Forest Rights Act and the 2009 National Green Tribunal Act aimed at protecting forests and the environment. The rise of environmental awareness, advocacy, and the impacts of climate change brought further attention to the importance of green spaces for mitigating environmental challenges.

Global Historical Background:

1. **Modern Urbanization and Garden Cities (19th-early 20th centuries):** The global phenomenon of urbanization led to the emergence of "garden city" movements, advocating for planned urban development that incorporated green spaces and recreational areas. The works of Ebenezer Howard and Frederick Law Olmsted laid the foundation for the integration of green spaces in urban planning.
2. **Environmental Movement (1960s-1970s):** The global environmental movement, prompted by events like Earth Day (1970), drew attention to ecological degradation, pollution, and urban sprawl. The movement highlighted the need for green spaces to mitigate environmental impacts and improve the quality of urban life.
3. **Sustainable Development and Biodiversity (1980s-1990s**): The Brundtland Report (1987) popularized the concept of sustainable development, emphasizing the importance of balancing environmental, social, and economic aspects. International discussions around biodiversity conservation and the Rio Earth Summit (1992) further underscored the significance of green spaces.
4. **Health and Well-being Focus (2000s-present):** Research on the health and well-being benefits of green spaces gained prominence in the 21st century. Studies highlighting the positive impacts of green spaces on mental health, physical activity, and overall well-being contributed to the broader narrative of their significance.
5. **Urban Resilience and Climate Adaptation (2010s-present):** The increasing awareness of climate change impacts and urban vulnerabilities led to discussions on urban resilience. Green spaces gained attention for their role in climate adaptation, as they help manage stormwater, reduce heat island effects, and promote sustainable urban development.

The evolution of the early literature on green cover focused on historical gardens, aesthetics, and urban planning. The environmental movement led to research on the ecological importance of green spaces in addressing environmental degradation. As urbanization accelerated, literature shifted towards the role of green spaces in improving urban quality of life and social well-being. The focus expanded to include participatory planning, cultural significance, and ecosystem services provided by green spaces, and the recent literature integrates concepts like sustainable urban development, biodiversity conservation, health and wellbeing, and equitable access to green spaces.

7. Urban Expansion Absorbing Green Spaces

According to polls, India's urban population is expected to grow by more than 40 crore people. According to the 2011 census, urban regions saw a greater absolute population growth than rural areas for the first time since India's Independence. With an absolute rise of 9.1 crores during the course of the ten years, the urban population rose from 27.81% in 2001 to 31.16% in 2011. A sizable portion of valuable agricultural land will be converted to urban development as a result of the urbanization process, especially in the surrounding areas of large cities. According to MoUD, there is now 17.43 square meters of open space per person in cities with listed master plans as of 2014, with 14% of green areas having been altered as a result of development activities.

According to UN-Habitat studies, more than half of the world's population resides in cities, and projected that the urban population will grow to two-thirds by 2050. The growing, large-scale concentration of human settlement in the world's cities poses significant difficulties for innovation, as well as countless potential to improve human habitats. The majority of this population expansion will occur in developing countries, which are predicted to add 1.3 billion people by 2030, compared to 100 million in developed world cities over the same period (UNDESA, 2018).

Table 1: Major cities of India with per capita green spaces

City	Population in Millions	Population Density per km^2	Geographical area (km^2)	Green Cover % (in km^2 2017)	Per Capita Green Space (m^2 2018)
Delhi	28.5	12,591	1484	20.00 (296.80)	**10.41**
Mumbai	23.5	20,482	603	36.48 (220.00)	**9.36**
Kolkata	15.2	24,400	1380	7.30 (100.74)	6.61
Bangalore	13.9	4381	2196	2.09 (46.03)	3.31
Hyderabad	11.57	18,480	650	1.66 (10.79)	0.93
Chennai	9.88	14,350	1189	15.00 (178.35)	**18.05**
Ahmedabad	8.41	9900	464	17.00 (78.88)	**9.38**
Surat	6.55	1376	326.5	11.84 (38.66)	5.9
Gandhinagar	6.33	660	649	54.00 (188.46)	**29.77**

Jaipur	3.71	598	467	5.43 (24.75)	6.67
Nagpur	2.94	11,000	285.9	18.00 (51.42)	**17.49**
Mysore	1.7	6911	128.4	20.19 (25.92)	**15.25**
Chandigarh	1.05	9252	114	35.00 (39.90)	**38**

Source: Ramaiah and Avtar, 2019

Table 1 shows the population in the 13 most crowded cities as of the 2018 Estimated Census which was obtained from Ramaiah and Avtar, 2019 (India Environment and Population Portal). This table also gives information about the geographical area, forest & tree cover, and per capita space in these cities. Figures in bold above indicate the optimal of 9 m^2 per capita green cover.

Metropolitan areas may offer more opportunities and better living circumstances, yet urbanization has a variety of negative effects. Necessities are put under pressure by encroachment and resource shortages. Due to the numerous urgent issues affecting urban green spaces, the unplanned urbanization problem is environmentally unsustainable, and more land is needed for infrastructure and housing to accommodate new immigrants to cities. But frequently, the current vegetation suffers as a result of construction in those places. Reduced capacity to absorb toxic gases and other pollutants due to fragmented vegetation also invites other negative effects of climate change, such as flash floods.

8. Issues and Challenges with Green Spaces

Existing Challenges to Green Spaces

The qualitative analysis revealed several challenges faced by green spaces in contemporary India:

Major Challenges: These can be categorized as social, spatial, governance, economic, and environmental

Social

1. **Lack of Awareness:** Public awareness about the importance of green spaces and their benefits is lacking in many areas, leading to reduced support for conservation efforts.

Spatial

1. **Land Scarcity and Encroachment:** India's total land area is approximately 3.28 million square kilometers, accommodating a population of over 1.3 billion people. The limited availability of land becomes evident when comparing the per capita land availability in India to global averages. According to data from the World Bank, India's arable land per capita is only around 0.11 hectares, significantly below the global average of 0.20 hectares. This stark contrast underscores the severity of land scarcity in the country.
2. **Inequitable Distribution:** Green spaces are often not evenly distributed, with affluent areas having better access to parks and recreational areas than marginalized neighborhoods.
3. **Gentrification:** Green space development can sometimes lead to gentrification, where increased property values displace local communities, making it difficult for them to enjoy the benefits of improved green spaces.

Governance

1. **Weak Policy Implementation:** While policies may exist to promote green spaces, their effective implementation can be hindered by bureaucratic hurdles, lack of coordination, and insufficient enforcement.

2. **Balancing Development:** The need for green spaces with the demand for urban development is a constant challenge, requiring thoughtful urban planning and sustainable development strategies.

Economic

1. **Maintenance and Management:** Adequate maintenance and management of green spaces remain challenging due to limited funds, lack of skilled personnel, and waste disposal and sanitation issues.
2. **Limited Funding:** Empirical data from government budgets reinforces the notion of limited funding for green areas. A comprehensive analysis of municipal budgets across several Indian cities consistently reveals that the allocation for parks and gardens is disproportionately low, and often constitutes merely **1-2% of the total budget**. Such meager funding underscores green space projects' challenges in securing adequate resources to thrive.

Environmental

1. **Climate Change and Urban Heat:** Rising temperatures due to climate change are affecting urban areas, creating heat islands. Green spaces play a critical role in mitigating this heat effect, but their effectiveness can be hampered by a lack of planning.
2. **Biodiversity Loss:** Empirical studies conducted across various green spaces in India underscore the alarming decline in biodiversity. A comprehensive survey conducted by the **Zoological Survey of India** (ZSI) reveals that urbanization has led to the loss of habitat for numerous species. The study documents a significant decrease in the population of various birds, insects, and small mammals in urban green areas over the past decades. This data-driven research serves as a clarion call, indicating the dire consequences of unchecked biodiversity loss. Urbanization can lead to habitat fragmentation and loss of biodiversity.

Preserving native flora and fauna in urban green spaces is essential to maintain a healthy ecosystem.

Major causes for the depletion of green spaces:

The challenges identified stem from various underlying causes:

1. **Urbanization Pressure:** Rapid urban growth and population influx contribute to the conversion of green spaces into built environments.
2. **Competing Land Uses:** Economic development and infrastructure projects prioritize land for commercial and housing purposes.
3. **Lack of Awareness:** Limited public awareness about the importance of green spaces contributes to their neglect.
4. **Policy Gaps:** Inadequate integration of green space planning into urban development policies hinders their protection.

9. Potential Solutions and Strategies for Sustainable Green Space Management in India

Sustainable green space management in India requires a combination of policy measures, community engagement, innovative practices, and effective implementation. Here are some potential solutions and strategies:

1. Comprehensive Urban Planning:

- Integrate green space planning into urban development plans to ensure that adequate green areas are reserved and well-distributed across the city.
- Implement green infrastructure strategies, such as green roofs, permeable pavements, and rain gardens, to manage stormwater and reduce flooding.

2. Multi-Stakeholder Collaboration:

- Foster collaboration between government agencies, NGOs, community groups, and private organizations to jointly plan, develop, and maintain green spaces.
- Develop public-private partnerships to secure funding and resources for green space projects.
- Explore innovative financing models, such as impact investments and green bonds, to secure funding for green space development and maintenance.
- Encourage corporate social responsibility initiatives to support green space projects.

3. Biodiversity Conservation:

- Promote native plant species and create habitats that support local wildlife, enhancing biodiversity within urban green spaces.
- Incorporate ecological corridors and wildlife-friendly design elements to ensure connectivity between green spaces.

4. Inclusive Design and Accessibility:

- Design green spaces to be inclusive and accessible to people of all ages, abilities, and backgrounds.
- Focus on creating universally accessible paths, seating areas, and recreational facilities.

5. Community Engagement:

- Involve local communities in the planning, design, and maintenance of green spaces to ensure that their needs and preferences are met.
- Establish community gardens and green space stewardship programs to foster a sense of ownership and responsibility.

6. Sustainable Maintenance Practices:

- Implement sustainable maintenance practices, such as water-efficient irrigation systems and organic landscaping techniques, to minimize resource consumption.
- Train local staff or volunteers to properly maintain green spaces and ensure their long-term health.

7. Green Education and Awareness:

- Conduct awareness campaigns to educate the public about the importance of green spaces for environmental, social, and health benefits.
- Organize workshops, seminars, and educational programs to promote sustainable behaviours and practices.

8. Adaptive Management and Monitoring:

- Regularly monitor the health and usage patterns of green spaces to identify issues and make informed decisions for improvement.
- Use data-driven insights to adapt management strategies and respond to changing needs.

9. Policy and Regulation Strengthening:

- Review and update existing policies to reflect changing urban dynamics and the importance of green spaces.
- Incorporate green space requirements and guidelines into urban planning codes and zoning regulations.

10. Research and Innovation:

- Support research on the benefits of green spaces, innovative design solutions, and sustainable management practices.
- Encourage the development of technology-driven solutions like smart irrigation systems and data-driven decision-making tools.

11. Cultural and Historical Preservation:

- Integrate cultural heritage and historical significance into green space design, ensuring that traditional practices and values are respected and preserved.

12. Adaptive Reuse of Spaces:

- Transform underutilized or abandoned areas into green spaces, promoting sustainable land use and revitalizing urban areas.

Sustainable green space management requires a holistic approach that balances ecological, social, and economic considerations. These strategies, tailored to the Indian context, can help create vibrant, accessible, and resilient green spaces that contribute to the well-being of communities and the environment.

10. The Way Ahead

Contemporary India's urbanization challenges pose significant threats to green spaces, impacting public health and environmental sustainability. Addressing these challenges requires a holistic approach involving urban planning reforms, policy enhancement, community participation, and public awareness. By prioritizing preserving and creating green spaces, India can pave the way for a more sustainable and liveable urban future.

Climate change is remarkably challenging, and green spaces will play a role in climate change adaptation and mitigation. Parks can help reduce air pollution and temperature regulation (creating micro-climatic conditions) to some extent, generally for larger parks. There is a need for reconfiguration of existing infrastructures to provide green spaces and other amenities to reduce heat. Parks can play crucial functions concerning health and climate regulations thus providing a way better future for the coming generation in an urban setup.

Urbanization also raises questions regarding food security as most of the urbanization took over agricultural land, which cannot be compromised for the sake of urbanization. If there is no land for agriculture then how the government could process & manage the food distribution system for India’s growing population?

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