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Urban Expansion and Deforestation in Lahore (2000-2025)

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From 2001 to 2025, Lahore lost over 250 hectares of tree cover as its built-up area nearly doubled, driving up urban heat and flooding risk.

Executive Summary

Urbanization, driven by population growth and economic development, leads to environmental degradation, particularly in Lahore, Pakistan, where rapid urban expansion has heavily impacted deforestation. With a growing population exceeding 15 million, Lahore's urban area increased from 37% in 2010 to 39.7% in 2017, resulting in a significant loss of agricultural and green land. As new housing and infrastructure spread outward, this results in poverty, poor sanitation, and increased pollution. From 2001 to 2025, over 250 hectares of tree cover were lost, equating to a 16% decrease from 2000, while built-up areas expanded from 22.99% to 47.17% over two decades. This urban sprawl contributes to climate change, heightened urban heat, and compromised public health. As vegetation diminishes, carbon storage decreases, exacerbating respiratory issues due to pollution. The Lahore Development Authority must adopt nature-based and sustainable urban planning practices to mitigate these impacts, emphasizing green spaces and efficient drainage systems. Incorporating tree planting and promoting smart city initiatives are essential to preserve ecological balance and improve sustainability. The continued loss of greenery necessitates immediate action for resilient, environmentally friendly urban development to ensure a healthier future for Lahore. Improved land-use policies are crucial to protect biodiversity and manage natural resources efficiently amidst ongoing urbanization.

Introduction

Urbanization occurs when a group of people moves from rural areas to urban areas. Urbanization is a major driver of deforestation and affects biodiversity, water supply, carbon cycling, weather patterns, and local climate. The main factors contributing to urbanization are population growth and economic development. Population growth creates a need for more housing, which not only requires cutting down forests to accommodate these people but also increases poverty by raising purchase and rent prices.

Urbanization is a global issue, especially in developing countries like Pakistan. Pakistan's second-largest city, Lahore, has an area of around 1772 km²[1], with a population of more than

[1]Shah Fahad et al., "Evaluation of Land Use and Land Cover Spatio-Temporal Change during Rapid Urban Sprawl from Lahore, Pakistan," Urban Climate 39 (2021): 100931, https://www.mdpi.com/2413-8851/9/5/162.

15 million.[2] Urbanization has proven to be the primary driver of Lahore's environmental degradation, which has increased the world's average surface temperature.[3]

A previous study of Lahore showed that built-up areas increased while agriculture, grasses, and rare forests sharply declined. To develop effective land-use planning and environmental policies, it is important to understand the relationship between the rapid urban growth in Lahore and deforestation, given Lahore's increasing urban expansion from 37% in 2010 to 39.7% in 2017.[4]

The rapid urban expansion in Lahore increases public health risks due to poor sanitation, air pollution, and local climate effects. Inadequate waste management contributes to congestion and degradation.[5] Deforestation causes a great amount of carbon dioxide to be released into the air, and fewer trees mean less carbon dioxide is removed from the atmosphere as trees absorb carbon dioxide for photosynthesis.

Since Lahore's population is expanding, continued deforestation emphasizes the need for land-use planning to help the Lahore Development Authority (LDA) balance urban growth with environmental sustainability.

Methodology

This policy brief is based on secondary research instead of primary data collection. Information was collected from journal articles, reports, and online databases that examine urban expansion, land use change, and deforestation between 2000 and 2025. Most of the studies used land use/land cover analysis to measure changes in vegetation and built-up areas over time. Global Forest Watch was also used in this policy brief to support findings on tree cover loss in Lahore from 2001-2025. Using these sources helped in the making of this policy brief by investigating the causes of urban expansion, how urban expansion has contributed to deforestation, and the environmental impacts caused by them.

There are a number of limitations to this methodology since this policy brief relies only on existing research and no interviews or surveys were carried out. Different studies were used, which meant certain statistics varied between sources because different research methods and time periods were used. However, comparing multiple reliable sources increases the credibility of the findings used in this policy brief.

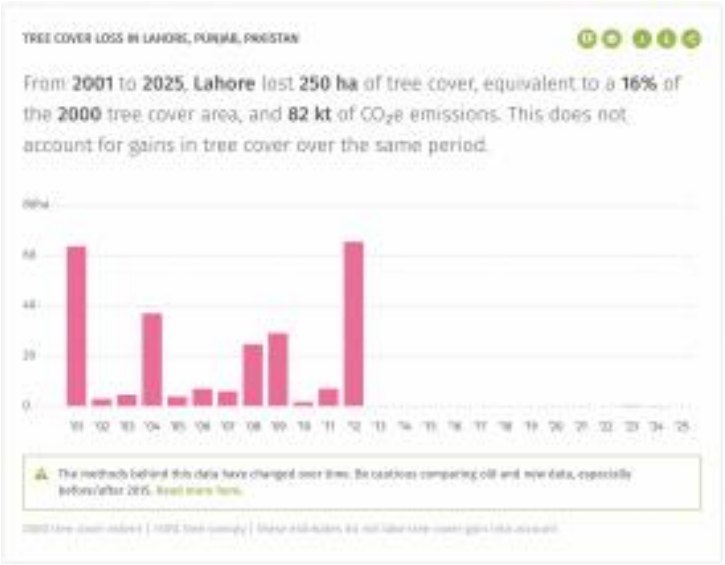
Key Findings

Lahore has expanded beyond its original historic boundaries by encroaching on the walled city. New housing, road expansions, and infrastructure have been built, spreading the development outward into surrounding suburban areas, especially toward the south and southeast. As

[2]Worldometer, "Pakistan Population (LIVE)," accessed July 20, 2026, https://www.worldometers.info/world-population/pakistan-population/.
[3]Muhammad Saeed Hashmi and Muhammad Farhan Asif, "The Impact of Deforestation on Environment in Pakistan," Journal of Social Signs Review 3, no. 2 (2025): 381–407, https://socialsignsreivew.com/index.php/12/article/view/162/140.
[4]Shah Fahad, Wei Li, Akhtar Hussain Lashari, Akhtar Islam, Lubna Hashim Khattak, and Umair Rasool, "Evaluation of Land Use and Land Cover Spatio-Temporal Change during Rapid Urban Sprawl from Lahore, Pakistan," Urban Climate 39 (2021): 100931, https://www.sciencedirect.com/science/article/abs/pii/S2212095521001619.
[5]Muhammad Abdur Rahim Karim, Salman Qureshi, Muhammad Usman, Muhammad Hassan Ali, Muhammad Hassan, and Muhammad Nawaz Chaudhary, "Urban Growth Dynamics in Lahore: Assessing Past Trends, Future Projections, and Sustainable Development Goals through GIS and Remote Sensing," Geojournal 89 (2025): Article 1584, https://www.sciencedirect.com/science/article/pii/S2226585624001584.

Lahore's population grows, it requires more roads, housing, utilities, and public services. It is essential to clear vegetation and convert undeveloped land to meet these demands, which contributes to deforestation. Pakistan lacks urban development policies, which makes it more difficult to control the extent to which urban areas expand and how they expand. In Lahore, this can lead to unnecessary loss of forests and unplanned urbanization. Changes in local government systems have caused mismanagement due to overlapping responsibilities. This makes urban planning less effective and causes environmental issues.[6] In 2023, the population was 11 million, with more than 86% of new migrants choosing to live in urban areas.[7] There was an increased demand for housing, infrastructure, and other services, which increased Lahore's urbanization. Urban expansion in Lahore has been difficult to control, so well-structured institutions require legal, technical, and regulatory support to manage Lahore's rapidly growing population. Lahore's 1,265 km road network, specifically Multan, G.T., and Ferozepur roads, has caused ribbon expansion. This shows how enhanced connectivity has led to urban expansion. Huge transport projects like the Metro Bus and Orange Line Train are expected to accelerate urban sprawl. Another cause of population growth and urbanization is Lahore's role as a trade and commercial center. Not only is urban population density increasing, but it is also straining infrastructure due to economic growth. Economic growth is driven by employment opportunities in business, transportation, and industry.[8] These job opportunities attract people to Lahore, which causes them to migrate from rural areas to urban areas.

From 2001 to 2025, Lahore lost over 250 ha of tree cover, which is equivalent to 16% of the 2000 tree cover area. The urban land has doubled from 22.99% in 2000 to 47.17% in 2020. The urban land has expanded into agricultural land. Agriculture, barren land, and water bodies have continuously decreased while urbanization has been increasing. Agriculture significantly decreased by 35.28% from 2013 to 2023. As Lahore has expanded, farmland has been lost.



Tree cover loss in Lahore, Punjab, Pakistan, 2001–2025 (Global Forest Watch).

[6]Irfan Ahmad Rana and Saad Saleem Bhatti, "Lahore, Pakistan – Urbanization Challenges and Opportunities," Cities 72, pt. B (2018): 348–355, https://www.sciencedirect.com/science/article/abs/pii/S0264275117304833.
[7]Karim et al., "Monitoring the Dynamics of Urban Expansion and Its Implications for Sustainable Urban Planning in Lahore, Pakistan."
[8]Karim et al., "Monitoring the Dynamics of Urban Expansion and Its Implications for Sustainable Urban Planning in Lahore, Pakistan."

By 2023, built-up urban areas dominated at 41.14%, emphasizing urban expansion.[9] Global Forest Watch estimates that Lahore has lost around 250 hectares of tree cover between 2001 and 2025, which is equivalent to one-sixth of the tree cover that existed in 2000. The decline in tree cover decreased carbon storage and is linked to an estimated 82 kilotonnes of carbon dioxide equivalent emissions.[10] Lahore's green spaces such as Jilani Park, Lawrence Gardens, and Gulshan-e-Iqbal Park play an important role in improving air quality, reducing urban heat, and supporting biodiversity.[11] The relationship between Land Surface Temperature (LST) and the Normalized Difference Built-up Index (NDBI) showed a strong positive correlation, indicating that the expansion of impermeable surfaces had significantly contributed to surface heating.[12] The more buildings, the higher the temperatures; the more vegetation, the lower the temperatures. Lahore's dense population, vehicle emissions, and industrial operations worsen air quality and heat stress, causing urban heat island effects in developing urban areas. In June 2024, Lahore experienced a temperature of 46°C and 36% humidity, which resulted in considerable heat stress and also increased hospital admissions for heat-related conditions.[13] This is mainly because of deforestation and the unplanned urban expansion taking place, as deforestation causes climate change through carbon emissions and disturbed water cycles. In August 2025, heavy floods took place in Lahore because of heavy rainfall, which was caused by climate change. Another cause was hydrological shock from upstream dam releases. According to a study, Lakshmi Chowk alone received up to 76 mm of rain on August 27.[14] Removing forests disrupts rainfall patterns and causes a drier regional climate. When tree roots no longer stabilize the soil and canopies no longer shield it from heavy rain, the topsoil becomes eroded. This deteriorates the land and greatly heightens the chance of sudden flooding. Lahore's increased forest loss has caused air pollution. The quick rate of urbanization has led to a significant disappearance of green spaces, fragmentation of the landscape, reduction in biodiversity, and poor environmental conditions in Lahore. Existing vegetation and landscape elements are isolated from each other, which makes it difficult for wildlife and ecosystems to function effectively.[15] Restoring green infrastructure is crucial because it enhances environmental quality and promotes healthier urban lifestyles.

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[9]Mohsin Rafique, Muhammad Atif Majeed, Aamir Shakeel, Tahir Iqbal, and Ziad Raza, "Land Use Land Cover Change Detection of District Lahore Using GIS and Remote Sensing (1993–2023)," Pakistan Journal of Forestry 74, no. 1 (2024): 24–31, https://researcherslinks.com/current-issues/Land-Use-Land-Cover-Change-Detection/41/1/9974/html.

[10]Global Forest Watch, "Lahore, Punjab, Pakistan Dashboard," accessed July 20, 2026, https://www.globalforestwatch.org/dashboards/country/PAK/7/5/.

[11]Karim et al., "Monitoring the Dynamics of Urban Expansion and Its Implications for Sustainable Urban Planning in Lahore, Pakistan."

[12]Fahad Shah, Suiliang Huang, Hui-Gwang Yun, Md. Omar Sarif, and Ayyoob Sharifi, "Exploring Land Use/Land Cover Changes and Their Effect on Land Surface Temperature and Urban Heat Island: A Case Study of Lahore, Pakistan," Frontiers in Environmental Science 14 (2026): 1734724, https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2026.1734724/full.

[13]Shah et al., "Exploring Land Use/Land Cover Changes and Their Effect on Land Surface Temperature and Urban Heat Island: A Case Study of Lahore, Pakistan."

[14]Rizwana Shahid, Muhammad Umar, Farrah Pervaiz, and Rana Muhammad Yasir Bari, "Urban Flooding in Lahore: A Review of the August 2025 Catastrophe," Journal of Health & Climate Change 4, no. 2 (2025), https://www.researchgate.net/publication/398435141_Urban_Flooding_in_Lahore_A_Review_of_the_August_2025_Catastrophe.

[15]Omer Shujat Bhatti, Rabia Shahbaz, Syed Usman Raza Kazmi, Naveed ur Rehman Anwar, and Rashid Ali Khan, "From Transit Corridor to Ecological Corridor: Developing a Green Urban Spine Framework for Biodiversity Conservation and Climate-Responsive Urbanism in Lahore," International Journal of Social Sciences Bulletin 4, no. 6 (2026): 193–213, https://www.researchgate.net/publication/406916082_FROM_TRANSIT_CORRIDOR_TO_ECOLOGICAL_CORRIDOR_DEVELOPING_A_GREEN_URBAN_SPINE_FRAMEWORK_FOR_BIODIVERSITY_CONSERVATION_AND_CLIMATE-RESPONSIVE_URBANISM_IN_LAHORE.

Recommendations

The Lahore Development Authority should incorporate nature-based solutions and urban planning to enhance resilience and manage environmental risks.[16] The LDA should implement sustainable drainage systems and create green spaces to achieve this. This would improve Lahore's adaptability to climate change while reducing environmental risks which are associated with rapid urban expansion. The LDA should promote smart city initiatives and preserve green[17] and blue spaces. Green and blue spaces should not be treated as undeveloped land available for construction; rather, they should be integrated into smart city initiatives.

The LDA and Parks and Horticulture Authority (PHA) should develop green infrastructure to improve biodiversity connectivity, environmental quality, and public health.[18] The LDA and PHA should focus on expanding green infrastructure, including urban forests and roadside tree planting.

The LDA should promote sustainable urban development by preserving vegetation and incorporating more green infrastructure to reduce the urban heat island effect in Lahore.[19] The LDA should incorporate green infrastructure such as tree-lined streets, green roofs, and permeable surfaces. This would support more sustainable urban development.

Conclusion

Between 2000 and 2025, Lahore's landscape changed due to rapid urban growth, which resulted in less greenery and increased environmental stress. According to this policy brief, population growth, housing development, and infrastructure expansion have accelerated deforestation, which has reduced biodiversity, raised urban temperatures, and undermined ecosystem resilience. Urban growth is expected to continue, but it should not come at the expense of the environment. For the Lahore Development Authority and other relevant stakeholders to promote a more sustainable and climate-adaptable future for Lahore, urban planning must be improved to protect green spaces and incorporate nature-based solutions into future developments.

[16]Karim et al., "Monitoring the Dynamics of Urban Expansion and Its Implications for Sustainable Urban Planning in Lahore, Pakistan."
[17]Karim et al., "Monitoring the Dynamics of Urban Expansion and Its Implications for Sustainable Urban Planning in Lahore, Pakistan."
[18]Omer Shujat Bhatti et al., "From Transit Corridor to Ecological Corridor: Developing a Green Urban Spine Framework for Biodiversity Conservation and Climate-Responsive Urbanism in Lahore."
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