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The Impact of Urban Sprawl on the Wetlands: The Case of Surat, Gujarat

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Abstract - This research paper examines the impact of urban sprawl on wetlands in Surat, Gujarat. Using a literature synthesis, recent satellite-based land-use studies, municipal reports, and local news accounts, the paper documents wetland loss, drainage obstruction, and changes to creek and estuarine systems driven by rapid urbanization and industrial expansion. Recommendations include strengthened wetland protection, restoration of creek corridors, integration of nature-based solutions into urban planning, and a monitoring framework using satellite remote sensing and community-based reporting. Limitations and a path for follow-up fieldwork and plagiarism verification are discussed.

Key Words urban sprawl, wetlands, Surat, Gujarat, land-use change, creek encroachment

1.INTRODUCTION

Wetlands provide vital ecosystem services — flood attenuation, groundwater recharge, biodiversity habitat, and nutrient cycling — yet they are highly vulnerable to urban expansion. Surat, a fast-growing commercial and industrial city in southern Gujarat, India, has experienced rapid built-up expansion in recent decades. This paper investigates how urban sprawl around Surat has affected local wetlands, creeks, and estuarine systems, drawing on peer-reviewed studies, government reports, and investigative journalism. Key research questions: 1) What measurable changes in wetland extent and surface water bodies have accompanied Surat's urban growth? 2) What are the primary direct (encroachment, filling) and indirect (pollution, altered hydrology) drivers? 3) What policy and technical solutions can reduce further loss and restore wetland function?

2. STUDY AREA: SURAT, GUJARAT

Surat is located on the banks of the Tapti River in southern Gujarat and has a coastal zone with tidal creeks and estuarine wetlands. The city's economy (textiles, diamonds, manufacturing) has driven population growth and infrastructure development. Surat's low-lying creeks, intertidal flats, and freshwater lakes historically formed an integrated wetland network that regulated floods and supported fisheries and local biodiversity (Forests Department, Gujarat, 2016

3. METHODOLOGY

This study synthesizes existing remote-sensing LULC analyses, municipal technical reports, government wetlands surveys, and recent media reports to construct an evidence-based account of wetland change in Surat. Key sources include multi-temporal Landsat-based built-up assessments and surface water inventories (1990s–2010s), state-level wetlands inventories, and local studies on creek encroachment and waste dumping. Where possible, numerical change statements are drawn from published studies; qualitative corroboration comes from municipal documents and investigative reporting.
3 Load Combinations:
Load combinations were generated as per IS 456, IS 1893, and IS 875, ensuring worst-case load representation.

4. RESULTS

1. Built-up Expansion and Surface Water Loss — Multiple Landsat-based LULC studies report substantial built-up growth in Surat between the 1990s and 2010s, with reported increases in urban built-up area exceeding 100% in some multi-decade studies. Researchers have documented a concurrent decline in the area and number of small surface water bodies and wetland patches within the urban and peri-urban landscape (Mohammad et al., 2020; ResearchGate study, 2020).

2. Creek Encroachment and Obstruction — Local investigative reports and municipal actions have highlighted widespread dumping and illegal construction in creek corridors, causing choking of natural drainage channels and increasing flood risk during the monsoon (Times of India, 2025). Recent enforcement drives to clear encroachments indicate the severity of obstruction in key creek stretches (Times of India, 2025).

3. Wetland Degradation Drivers — Primary drivers are direct landfilling/encroachment for housing and industry, conversion to infrastructure, solid waste dumping, and pollution from urban runoff and untreated effluents. Secondary drivers include altered hydrology from impermeable surfaces and loss of natural sediment processes (IRade, Surat adaptation study; Gujarat Forests wetlands inventory).

5. CONCLUSION

The evidence shows a consistent pattern: rapid urban expansion in Surat has reduced wetland area and impaired wetland function. Loss of wetlands exacerbates flood risk in low-lying neighborhoods by reducing detention capacity and blocking drainage routes. Restoration is possible but requires coordinated policy instruments — strict protection for remaining wetland cores, legal action against encroachment, community-based creek monitoring, and investment in nature-based solutions (mangrove planting in brackish zones, constructed wetlands for wastewater treatment).

6. RECOMMENDATIONS

1. Legal and Planning Measures — Strengthen enforcement of wetland protection (state wetlands rules, municipal development controls), map and legally designate remaining wetlands and creek corridors, and prevent further conversion.

2. Nature-based Interventions — Restore mangroves and tidal marshes in brackish zones, construct wetlands for sewage polishing, and create buffer zones along creeks with community stewardship.

3. Monitoring and Data — Implement a monitoring framework using freely available satellite imagery (Landsat, Sentinel) with periodic LULC change detection, and integrate citizen reporting and municipal inspections to identify encroachments early.

4. Further Research — Field-based ecological surveys of remaining wetlands, water quality sampling, and socio-economic studies of communities dependent on wetlands

REFERENCES

1. Mohammad, S. M. M. B. K., et al. (2020). Indices-based assessment of built-up density and urban expansion of fast-growing Surat city using multi-temporal Landsat data sets. (Available at ResearchGate).
2. ResearchGate. (2020). Urban Sprawl Analysis Using Remote Sensing Data and Its Impact On Surface Water Bodies: Case Study Of Surat, India.
3. Forests Department, Government of Gujarat. (2016). Wetlands of Gujarat. Retrieved from Gujarat Forests website.
4. IRADE. (n.d.). Vulnerability of Coastal Cities to Climate Change: Case Study of Surat to Develop Adaptation Framework. (IRade report).
5. Times of India. (2025). Rampant waste dumping choking creeks: Report. Retrieved from Times of India.
6. Emerald. (2024). Surat's sustainable future: analyzing compact urban growth and implications. (Journal article).