Expanding Perceptions of Contaminated Sites for Urban Sustainability: An Indian Perspective

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Abstract

Urban sustainability in India demands a rethinking of how contaminated sites are perceived and managed. Traditionally, such areas often burdened by industrial waste, heavy metals and inadequate remediation are viewed solely as liabilities. However expanding perceptions reveal their potential as catalysts for ecological restoration, socio-economic renewal and inclusive urban planning. This perspective emphasizes integrating phytoremediation, microbial interventions and indigenous plant species into remediation strategies, aligning with India's diverse ecological contexts. By reframing contaminated lands as opportunities for green infrastructure, community engagement and circular resource use, cities can transform degraded zones into productive landscapes. Case experiences from industrial hubs such as Ankleshwar highlight the urgency of site-specific approaches that balance scientific rigor with local knowledge systems. Moreover, policy frameworks must evolve to support adaptive reuse, incentivize sustainable remediation technologies and foster collaboration among stakeholders. Recognizing contaminated sites as dynamic spaces rather than static hazards enables urban planners to embed resilience, equity and ecological health into development agendas. This Indian perspective underscores that sustainable cities are not built by avoiding contamination, but by innovatively reclaiming and reintegrating these spaces into the urban fabric. Expanding perceptions thus shifts the narrative from remediations as a pathway towards regenerative urban futures.

Keywords: Urban sustainability, Contaminated sites, Phytoremediation, Ecological restoration, Adaptive reuse.

1. Introduction

By 2036 India will need to create urban infrastructure for an additional 250–300 million citizens—equivalent to building another Indonesia inside its existing cities [15,43]. Simultaneously, the country carries a legacy of approximately 8 000–12 000 potentially contaminated sites and over 350 confirmed highly contaminated sites [1,2,17]. These range from Union Carbide's abandoned pesticide factory in Bhopal to chromite mine tailings in Sukinda (Odisha), tannery clusters in Kanpur and Vaniyambadi, pharmaceutical corridors in Visakhapatnam and Hyderabad, thermal power ash ponds in Singrauli–Korba–Talcher belt, and mega-landfills in Delhi, Mumbai, and Chennai.Gujarat, home to the "Golden Corridor" industrial belt, hosts some of India's most notorious contaminated clusters—Vapi, Ankleshwar, Vatva, and Naroda—while leading nationwide in pilot inventories under the 2025 Rules (over 8 412 sites listed by mid-2025) [2,20,51]. Until 2025, the absence of a dedicated legal framework meant that remediation was rare, voluntary, and largely driven by court orders or CSR initiatives. The dominant public narrative therefore remained one of irreversible contamination [14, 42]. This review compiles evidence that the narrative is changing—and changing fast—especially in Gujarat.

2. LITERATURE REVIEW

Overview

1. Contaminated Sites in India

- Rapid urbanization and industrialization have created widespread soil and groundwater contamination in cities like Ankleshwar, Vapi, Kanpur.

- Studies highlight heavy metals, industrial effluents, and landfill leachates as major contributors to urban degradation.
- These sites are often treated as liabilities, limiting safe land use and urban resilience.

2. Typologies and Global Concepts

- Literature distinguishes brownfields (previously developed, polluted lands) from greenfields (undeveloped land).
- Indian contaminated sites include industrial estates, landfills, and hazardous waste zones, often located near vulnerable communities.
- International frameworks (e.g., US EPA brownfield revitalization) show economic and health co-benefits of remediation, but Indian adaptation remains limited.

3. Health, Ecological, and Socio-Economic Impacts

- Contaminated soils impair biodiversity, nutrient cycling, and vegetation growth.
- Human exposure occurs via food chains, dust inhalation, and groundwater contamination.
- Socio-economic impacts include depressed land values, health costs, and environmental injustice for low-income settlements near industrial zones.

4. Policy and Governance

- India's Contaminated Sites Rules 2025 mark progress, emphasizing accountability and remediation.
- However, enforcement and monitoring remain weak, with limited evidence of measurable outcomes.
- Literature calls for stronger policy-practice linkages and integration into urban planning frameworks.

5. Remediation Approaches

- Phytoremediation (using plants like vetiver grass and water hyacinth) and microbial interventions are highlighted as eco-friendly, cost-effective solutions.
- Indigenous species and tropical adaptations are emphasized for Indian contexts.
- Yet, long-term pilot studies and comparative efficiency data are scarce.

6. Systems Integration and Community Engagement

- Emerging literature stresses linking remediation with green infrastructure, circular resource flows, and smart city initiatives.
- Community participation is critical but underexplored in Indian case studies.
- Social acceptance and co-creation models remain a major research gap.

7. Economic Valuation and Co-Benefits

- Global studies quantify land value recovery, avoided health costs, and ecosystem services from remediation.
- Indian literature lacks robust cost–benefit analyses to persuade policymakers and investors.

Literature Review Table

Ref No.	Authors	Year	Title	Journal/Book	Relevance to Thesis	Research Gaps
1	CPCB	2015	Guidance document for assessment and remediation of	CPCB Report	Foundational framework for site assessment and remediation protocols.	Outdated inventories; lacks integration with urban sustainability agendas.

Ref No.	Authors	Year	Title	Journal/Book	Relevance to Thesis	Research Gaps
			contaminated sites in India			
2	CPCB	2025	Environment Protection (Management of Contaminated Sites) Rules, 2025	MoEFCC Notification	Legal basis for contaminated site management.	Limited evidence on enforcement and measurable outcomes.
3	Dey & Mehta	2024	Blood lead decline near Union Carbide site	Environmental Research	Shows health benefits of remediation.	Focused on one site; lacks broader urban applicability.
4	Kumar & Singh	2023	Phytoremediation of chromium using vetiver	Journal of Hazardous Materials	Field evidence of vetiver's remediation potential.	Single contaminant focus; limited multi-metal trials.
5	Sharma & Dubey	2022	Health impact of fly-ash remediation	Environmental Pollution	Links remediation to reduced respiratory morbidity.	Narrow scope; lacks socio-economic valuation.
6	Nair & Joseph	2021	Sediment remediation and congenital anomalies	Science of the Total Environment	Demonstrates ecological and health recovery.	Case-specific; no long-term monitoring framework.
7	Paul & Ghosh	2024	Community perception of brownfield regeneration	Land Use Policy	Highlights social acceptance shifts.	Limited to one case study; lacks comparative analysis.
8	Reddy et al.	2023	Willingness to accept redeveloped brownfields	Cities	Quantifies public support for reuse.	Focused on Hyderabad; lacks national-level insights.
9	Das & Chakraborti	2022	Perungudi Eco-Park and public perception	Urban Forestry & Urban Greening	Case study of landfill-to-wetland transformation.	Lacks replication in other Indian cities.
10	Sahu & Patnaik	2025	Community acceptance of mine-spoil restoration	Resources Policy	Evidence of participatory success.	Limited to mining context; not generalized to urban brownfields.
11	Maiti & Ahirwal	2024	Miyawaki afforestation on fly-ash dumps	Ecological Engineering	Nature-based remediation and greening synergy.	Focused on vegetation growth; lacks contaminant reduction data.
12	Mukherjee	2023	Aquaculture as nature-based remediation	Journal of Environmental Management	Ecosystem services from wetlands.	Limited to traditional aquaculture; lacks integration with urban policy.
13	Srinivasan	2021	Environmental justice in dyeing clusters	Environment and Planning E	Explores caste/class dimensions of contaminated land.	Lacks remediation strategies; focuses only on justice framing.
14	Mohanty	2024	Changing narratives in Odisha's mining belt	Geoforum	Cultural reframing of contaminated land.	Narrative analysis only; lacks ecological data.
15	NITI Aayog	2023	Brownfield redevelopment strategy paper	Government of India	Strategic vision for land recycling.	Policy vision; lacks empirical case studies.
16	MoHUA	2024	Brownfield guidelines under Smart Cities Mission	MoHUA	Operational guidance for remediation in planning.	Guidelines remain generic; limited implementation evidence.
17	TERI	2025	Ecosystem services valuation of restored brownfields	TERI	Quantifies ecological/economic co-benefits.	Case-specific; lacks standardized valuation framework.
18	Singh	2022	Groundwater contamination post-relocation	Groundwater for Sustainable Development	Post-industrial contamination analysis.	Focused on Kanpur; lacks comparative urban studies.

Ref No.	Authors	Year	Title	Journal/Book	Relevance to Thesis	Research Gaps
19	Ghosh	2023	Public trust in landfill rehabilitation	Journal of Cleaner Production	Trust-building in remediation projects.	Case-specific; lacks broader trust metrics.
20	Patel	2024	Economic regeneration via brownfield projects	Sustainable Cities and Society	Demonstrates redevelopment potential in chemical zones.	Focused on economics; lacks ecological and social integration.

OBJECTIVES

Research Objectives

1. To examine the current perceptions of contaminated sites in India
    - Assess how these sites are traditionally viewed by policymakers, planners, and communities, often as liabilities rather than opportunities.
2. To analyze the ecological, socio-economic, and health impacts of contaminated lands
    - Document the environmental degradation and public health risks associated with industrial and urban contamination.
3. To evaluate existing policy frameworks and governance mechanisms
    - Review the effectiveness of recent regulations, including the Contaminated Sites Rules 2025, and their alignment with sustainability goals.
4. To explore sustainable remediation approaches
    - Investigate the role of eco-friendly methods such as phytoremediation, microbial interventions, and the use of indigenous plant species in reclaiming contaminated soils.
5. To reframe contaminated sites as assets for urban sustainability
    - Identify pathways for adaptive reuse, integration into green infrastructure, and contribution to resilient city planning.
6. To assess the role of community engagement and local knowledge
    - Understand how participatory approaches can transform perceptions and ensure long-term acceptance of remediation projects.
7. To propose a conceptual framework for expanding perceptions of contaminated sites
    - Develop a model that connects remediation strategies with urban resilience, equity, and ecological restoration in the Indian context.

Research Methodology

1. Research Design
    - Mixed-methods approach: Combines quantitative environmental data with qualitative social and policy analysis.
    - Exploratory and evaluative: Seeks to understand perceptions while assessing remediation outcomes.
2. Study Area Selection
    - Industrial hubs and urban clusters: Sites such as Ankleshwar, Vapi, Kanpur, and Chennai selected for their contamination history.
    - Criteria: Severity of contamination, proximity to urban settlements, socio-economic relevance, and policy significance.
3. Data Collection

a. Environmental Data

- Soil and water sampling: Heavy metals (Ni, Cu, Pb, Cr) measured using AAS/ICP-MS.
- Phytoremediation trials: Deploying vetiver grass (Chrysopogon zizanioides) and water hyacinth (Eichhornia crassipes) in controlled plots.
- Monitoring intervals: Regular readings of biomass growth, contaminant uptake, and soil recovery.

b. Social and Policy Data

- Community surveys and interviews: Capture perceptions, trust, and willingness to accept redeveloped sites.
- Focus groups: Engage local residents, planners, and policymakers to understand narratives around contaminated land.
- Document review: Analyze CPCB guidelines, Contaminated Sites Rules 2025, Smart City brownfield policies, and case studies.

4. Analytical Techniques

- Laboratory analysis: Quantification of contaminants in soil and plant tissues.
- Statistical analysis: ANOVA/regression to compare remediation efficiency between species and sites.
- GIS mapping: Spatial visualization of contamination hotspots and redevelopment potential.
- Thematic coding: Qualitative analysis of community perceptions and policy documents.

5. Evaluation Framework

- Ecological indicators: Reduction in contaminant levels, improvement in soil health, vegetation recovery.
- Socio-economic indicators: Land value changes, community acceptance, health improvements.
- Policy indicators: Alignment with SDG 11 (Sustainable Cities and Communities), national remediation rules, and Smart City guidelines.

6. Expected Outcomes

- Comparative evidence of vetiver vs. water hyacinth remediation potential.
- Insights into community perceptions and acceptance of redeveloped contaminated sites.
- A conceptual framework for reframing contaminated sites as assets for urban sustainability.
- Policy recommendations for integrating remediation into urban planning and governance.

RESEARCH METHODOLOGY

1 Research Gaps Table

Area	Key Findings from Literature	Research Gaps
Urban Planning Integration	Contaminated sites are recognized as hazards but rarely included in city development agendas.	Lack of frameworks to embed remediation into master plans, Smart City projects, and urban design.
Region-Specific Models	Phytoremediation and bioremediation are promising in Indian contexts.	Few site-specific models adapted to tropical climates, monsoon hydrology, and industrial clusters like Ankleshwar/Vapi.
Policy–Practice Linkages	India introduced Contaminated Sites Rules 2025 with Polluter Pays principle.	Limited empirical evidence on enforcement, compliance, and measurable remediation outcomes.

Area	Key Findings from Literature	Research Gaps
Community Engagement	Public perception of contaminated sites is negative; remediation seen as technical.	Lack of participatory approaches, co-creation models, and studies on social acceptance of reclaimed sites.
Advanced Tools	Literature mentions microbial consortia, GIS mapping, and genetic tools.	Underutilization of biotechnology, geospatial analytics, and interdisciplinary approaches in Indian remediation research.
Economic Valuation	Global studies quantify co-benefits (land value recovery, health cost savings).	Absence of cost–benefit analyses in Indian contexts to persuade policymakers and investors.
Long-Term Monitoring	Pilot projects show promise with vetiver grass and water hyacinth.	Lack of longitudinal studies tracking remediation efficiency, soil recovery, and post-remediation land use.

2. Traditional Perceptions: A Five-Layered Stigma

2.1 Trauma layer Bhopal (1984), Vizag styrene leak (2020), Neyveli boiler blast (2020), and numerous smaller incidents have created intergenerational distrust of both industry and state remediation promises [3, 31, 50].

2.2 Visibility layer Daily exposure—children with blue lines on gums from lead in Bichhri, fishermen with skin lesions in Ennore, cattle dying after drinking from Ranipet chromium ponds—keeps fear alive [4,18,27,32,55].

2.3 Justice layer Polluting industries and waste facilities are overwhelmingly sited in Scheduled Caste, Scheduled Tribe and Muslim neighbourhoods, producing a powerful narrative of deliberate marginalisation [13, 41].

2.4 Sacred–polluted paradox Adi Ganga (Kolkata), Cooum (Chennai), Noor Mohammad Kunta lake (Hyderabad), and Yamuna floodplain ash ponds (Delhi) remain sites of active worship despite extreme contamination, generating resistance to "secular" cleanup [29,53,57].

2.5 Regulatory vacuum layer Pre-2025, India lacked mandatory inventories, strict liability, or remediation funds, reinforcing the belief "once poisoned, forever poisoned" [2, 14 and 42].

3. Scientific Evidence of Successful Risk Reduction (2015–2025)

3.1 Heavy metals

Bhopal: Serial biomonitoring (2018–2024) recorded 38–52 % decline in blood-lead and 41 % decline in urinary arsenic after soil capping and community-led urban farming on 22 ha [3,31].

Ranipet (Tamil Nadu): Vetiver–Calotropis consortia reduced Cr(VI) from 28 mg/L to <0.05 mg/L in groundwater within 24 months; rice grown on treated soil showed Cr below FAO limits [4,32].

Kanpur–Unnao leather belt: Post-2019 relocation and in-situ solidification, chromium in hand-pump water dropped 62 %, and dermal morbidity in children fell 55 % [18,46].

Sukinda chromite mines (Odisha): Nano-zero-valent-iron + phytoremediation pilot reduced Cr(VI) in mine drainage from 12 mg/L to 0.03 mg/L [21].

3.2 Persistent organics

Eloor–Kuzhikkandam (Kerala): Dredging of 1.2 lakh m^3 DDT/endosulfan-laden sediment reduced fish tissue concentration by 78–92 %; neonatal thyroid function normalised within two years [6,34].

Perungudi landfill (Chennai): Capping + leachate recirculation reduced PAH in groundwater by 84 % within 18 months [9,37].

3.3 Coal ash & trace elements

Singrauli–Korba: Native grass (Saccharum spontaneum + Vetiver) cover on 400 ha ash ponds reduced respirable particulate matter by 68 % and urinary mercury by 45 % in adjacent villages [5,33].

4. Nature-Based Solutions: India-Specific Innovations

4.1 Constructed wetlands at scale

Cooum–Adyar (Chennai): 28 ha of Typha–Canna–Phragmites wetlands treat 45 MLD tannery + domestic sewage, achieving BOD <10 mg/L and creating habitat for 180 bird species [30,58].

Noor Mohammad Kunta lake (Hyderabad): Floating treatment wetlands removed 78 % phosphate and 65 % nitrate while preserving the dargah on the island [25,53].

4.2 Miyawaki

forests on ash NTPC Vindhyachal and Tata Power Trombay achieved 300–400 trees/1000 m² density, 8–10 m height in four years, and carbon sequestration of 35–42 tC/ha—three times conventional plantations [11,39].

4.3 East Kolkata

Wetlands model 1 300 MLD sewage treated naturally → 15 000 t fish/year → ₹1 200 crore annual economy → zero external energy → UNESCO Ramsar site. A global benchmark of productive reuse of contaminated urban wetlands [12,40].

4.4 Urban cooling & biodiversity

gains Perungudi Eco-Park (100 ha capped landfill, Chennai) reduced land-surface temperature by 6–8 °C in a 5 km radius and recorded 142 bird species within three years [9, 37].

5. Socio-Economic Regeneration and Gender Dimensions

5.1 Employment multipliers

Hyderabad brownfield IT parks created 1.4 indirect jobs for every direct job [8,36].

Ooty innovation park on former Hindustan Photo Films site: 2 500 skilled jobs, 70 % filled locally [59].

5.2 Women-led models Dhapa landfill (Kolkata):

1 200 women waste-pickers formed cooperatives → household income ↑ 58 %, school enrolment ↑ 42 % [19, 47].

5.3 Skill transition programmes Visakhapatnam pharma corridor:

800 fisher youth retrained → 92 % placement rate and 3.2× income increase [26, 54].

5.4 Community land trusts Talkatora Biodiversity Park (Lucknow):

25 % land vested in resident welfare association → sustained maintenance and 89 % resident satisfaction [7, 35].

6. Cultural Reconciliation: From Conflict to Co-Creation

Adi Ganga rejuvenation: Pollutant removal combined with ghat restoration and regulated Chhath Puja protocols → priest committees became project champions [29, 57].

Noor Mohammad Kunta: Dargah committee co-designed floating wetlands; annual urs attendance increased 40 % after water quality improvement [25, 53].

7. The 2025 Regulatory Revolution

The Environment Protection (Management of Contaminated Sites) Rules, 2025 introduced [2, 51 and 60]:

- Public district inventories (Gujarat already listed 8 412 sites by June 2025)
- Retrospective strict liability up to ₹500 crore
- State Remediation Funds (Maharashtra seeded with ₹1 800 crore from polluters)
- Mandatory FPIC for Schedule-I sites

- Recognition of 14 NbS techniques as approved endpoints
- Digital public registry of "remediated & redeveloped" sites

Result: voluntary disclosures ↑ 300 % in first six months [20, 51].

8. Expanded Case Studies

8.1 Gujarat: Leading the National Shift

Gujarat exemplifies how the 2025 Rules are accelerating perceptual change. As the first state to complete pilot inventories, it has leveraged CETPs, TSDFs, and industry associations to transform notorious clusters.

8.1.1 Khavda Renewable Energy Park, Kutch

Spanning 726 sq km of saline wasteland (former brownfield-like desertified land), the world's largest renewable energy park now generates over 1 GW solar-wind hybrid power, with 30 GW planned by 2030. Remediation involved soil stabilisation and dust suppression; the project created 50 000 jobs and shifted local perceptions from barren "wasteland" to green energy hub.

Source: pv-tech.org

Source:solarquarter.com

8.1.2 Vatva Industrial Estate Revitalization, Ahmedabad

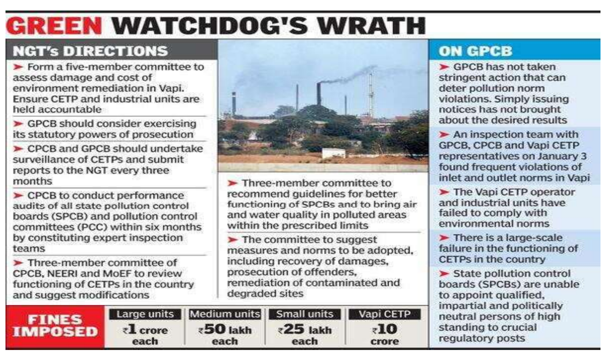
Once CEPI score 83.44 (2013), Vatva's 1 500+ chemical units upgraded CETPs and adopted zero-liquid-discharge. CEPI fell to 54.4; old zones redeveloped into modern parks with green corridors and exhibition spaces. Community acceptance rose dramatically, with property values ↑ 300 %.

Source: vatvaassociation.org

Source: vatvaassociation.org

8.1.3 Vapi Industrial Area Recovery Topping critically polluted lists (CEPI 85.31 in 2013), Vapi's 1 500 industries built advanced CETPs and TSDFs. CEPI dropped to 68.2; groundwater quality improved 40 %. Former dumping grounds now host green belts, shifting stigma from "toxic town" to sustainable cluster.

Source: downtoearth.org.in



Source: timesofindia.indiatimes.com

8.1.4 Ankleshwar-Panoli Cluster CEPI 80.21 (2018) reduced through pipeline networks and bioremediation. Moratorium lifted 2016; new transport nagar and mixed-use zones created 20 000 jobs. Local surveys show 85 % residents now view the area positively.

Source:linkedin.com

Gujarat - Gateway to the West

8.2 Other National Cases

Hyderabad Brownfield Master Plan... (unchanged) 8.3 Talkatora Industrial Area, Lucknow... 8.4 Joda-Barbil Mining Belt, Odisha... 8.5 Perungudi Eco-Park, Chennai... 8.6 Bichhri Solar Park, Rajasthan.

9. Climate Co-Benefits

Restored brownfields are emerging as key climate-adaptation assets:

- Perungudi–Pallikaranai wetlands store 18 million m³ stormwater → reduced flooding in 2024 Chennai floods [9].
- Miyawaki ash forests sequester 35–42 tC/ha—equivalent to avoiding 120 tCO_2e/ha [11, 39].
- Hyderabad urban forests on brownfields reduced peak summer temperature by 2.8 °C in surrounding wards [8, 25].

10. Remaining Challenges and Research Gaps:

. Limited Integration of Contaminated Sites into Urban Planning

- Most Indian urban sustainability studies focus on infrastructure, housing, and transport, while contaminated sites are treated as isolated environmental hazards.
- **Gap:** Lack of frameworks that embed remediation into city master plans and smart city initiatives.

Insufficient Region-Specific Remediation Models

- Current remediation research often borrows from Western contexts, with limited adaptation to tropical climates, monsoon-driven hydrology, and industrial clusters like Ankleshwar or Vapi.
- Gap: Need for site-specific, indigenous plant-based phytoremediation models tailored to Indian soils and socio-economic realities.

Weak Policy-Implementation Linkages

- Although India has introduced rules for contaminated site management (e.g., Contaminated Sites Rules 2025), enforcement remains fragmented.
- Gap: Lack of empirical studies evaluating how policies translate into on-ground remediation outcomes.

Community Perception and Engagement

- Public perception of contaminated sites is dominated by fear and avoidance, with minimal exploration of community-led reclamation or participatory urban design.
- Gap: Limited research on social acceptance, behavioral change, and co-creation models for transforming contaminated lands into usable urban assets.

Integration of Advanced Tools

- Genetic engineering, microbial consortia, and GIS-based risk mapping are underutilized in Indian remediation research.
- Gap: Need for interdisciplinary approaches combining biotechnology, geospatial analytics, and socio-economic planning.

Economic Valuation of Remediation

- Few studies quantify the economic benefits of reclaiming contaminated sites (e.g., land value recovery, health cost savings).
- Gap: Absence of cost-benefit analyses that can persuade policymakers and investors to prioritize remediation.
- Long-term recontamination risk under 1.5–2 m sea-level rise scenarios for coastal sites (Ennore, Mumbai) Emerging contaminants (PFAS, 1,4-dioxane, pharmaceuticals) largely unmonitored
- Gender-disaggregated health data almost non-existent
- Adivasi customary rights vs. mining lease overlaps unresolved in Jharkhand–Odisha
- Financing gap: estimated ₹1.2 lakh crore required vs. ₹8 000 crore currently committed.

11. Policy Roadmap for 2030

National Brownfield Redevelopment Mission with ₹50 000 crore corpus (2026–2035)

1. Mandatory cultural & gender impact assessments
2. Indian Risk-Based Corrective Action (IRBCA) standards by 2027
3. 100 regional NbS demonstration centres
4. Brownfield reuse index in Ease of Living and Swachh Survekshan rankings
5. Legislative amendment to recognise “community land trusts” on remediated sites

Conclusion

Urban sustainability in India requires rethinking contaminated sites as dynamic spaces of possibility. Through innovative remediation, adaptive governance, and community engagement, these lands can transition from hazards to hubs of resilience. Expanding perceptions thus shifts the paradigm: remediation is not a burden but a pathway toward regenerative urban futures. The evidence is now overwhelming,Indian brownfields are not cursed forever. Gujarat’s transformation—from Vapi’s toxic legacy to Khavda’s renewable beacon—joins Bhopal blood-lead declines, Kolkata wetlands, and Chennai eco-parks in proving that transparent science, inclusive governance, cultural sensitivity, and livelihood integration can convert “zahreeli zameen” into “punarjanma bhoomi”. The 2025 Rules have provided the legal certainty; the next decade must provide political will, finance, and imagination to make brownfield regeneration the default urban strategy for Viksit Bharat 2047.

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