Enhancing Kathmandu's Urban Design Through Implementation of Green Infrastructures

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HS5.10: Green infrastructure for sustainable urban hazard management (26th May 2022)

Urban settlement of Kathmandu valley, Nepal

Tangible heritage

01

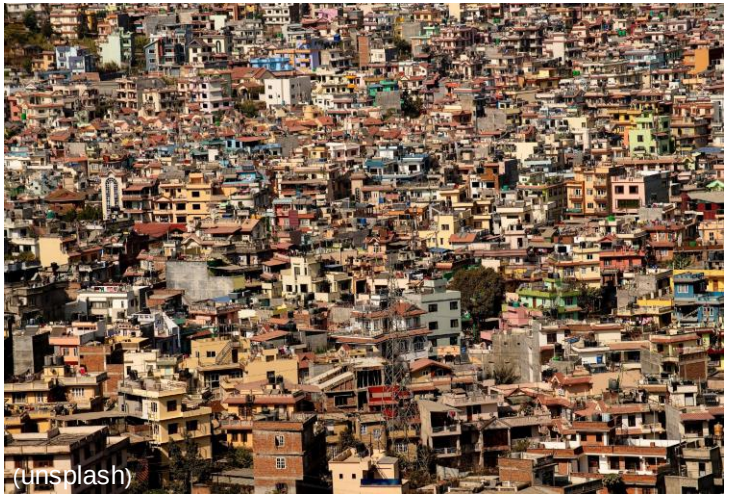
Raimond Klavins (unsplash)

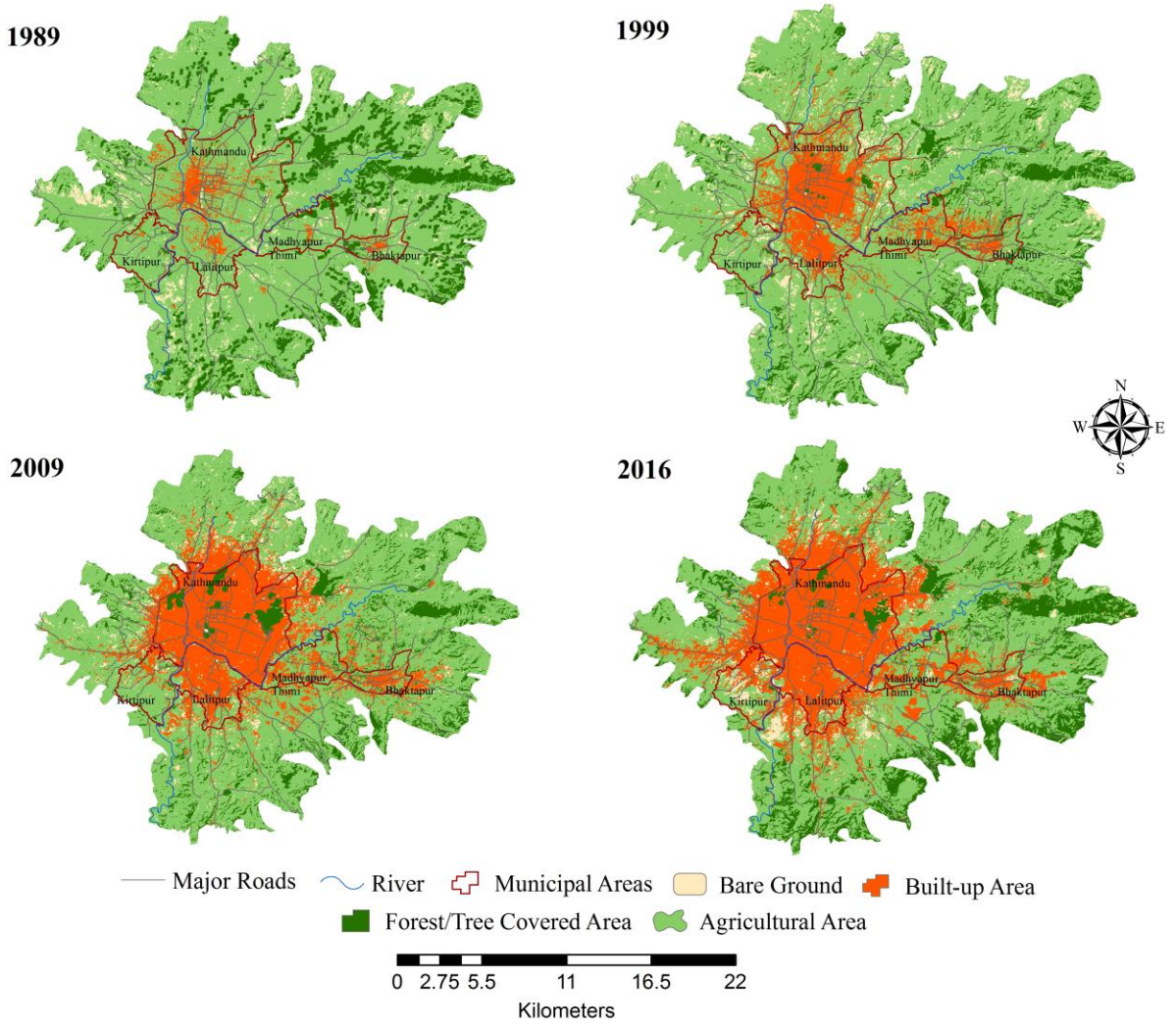
Intangible heritage

02

Introduction

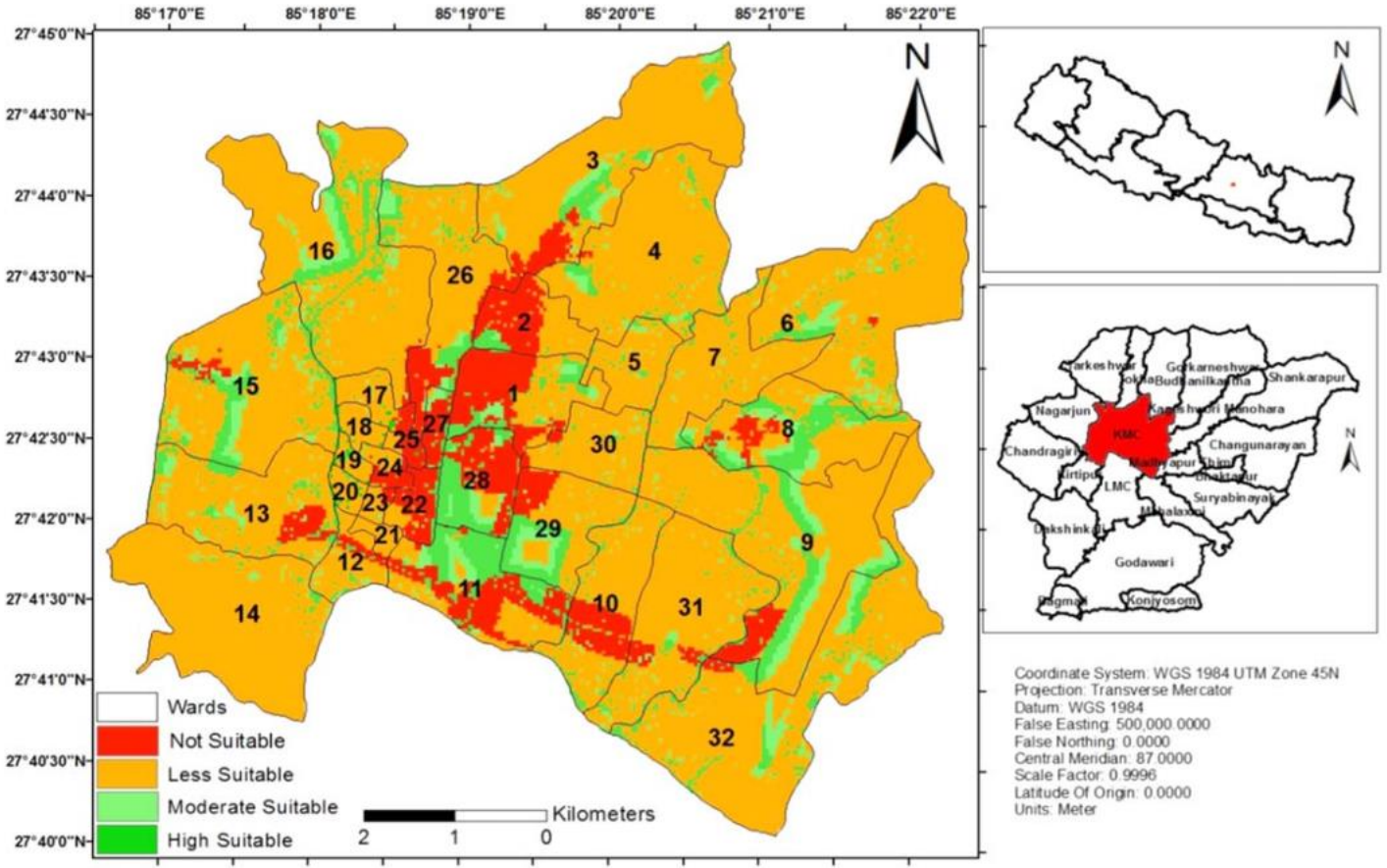
- Unplanned urbanization; demographic and environmental change
- Loss of green space
- 450% urban growth between 1978 and 2000
- Low rate of urban green space in Kathmandu city (3% of total area)
- Earthquake, floods, & environmental problems
- Loss of human life/health & habitats
- Urban expansion dominating natural networks that provide multi-functions for both human and ecology





Land use land cover change in Kathmandu Valley from 1989 to 2016 (Source Ishtiaque et al 2017).

Green space suitability map of Kathmandu city



Parameters used:

- Accessibility
  - Emergency road
  - Physical site condition
  - Slope; facilities; location: LULC
- Socio-economic status
  - Population; density; historical & cultural sites
- Environmental criteria
  - Existing park; water bodies

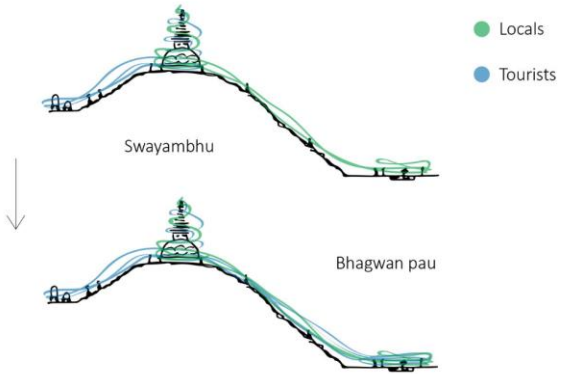
Source: Pokhrel, Shiva. "Green Space Suitability Evaluation for Urban Resilience: An Analysis of Kathmandu Metropolitan City, Nepal." *Environmental Research Communications* 1, no. 10 (November 1, 2019): 105003. https://doi.org/10.1088/2515-7620/ab4565.

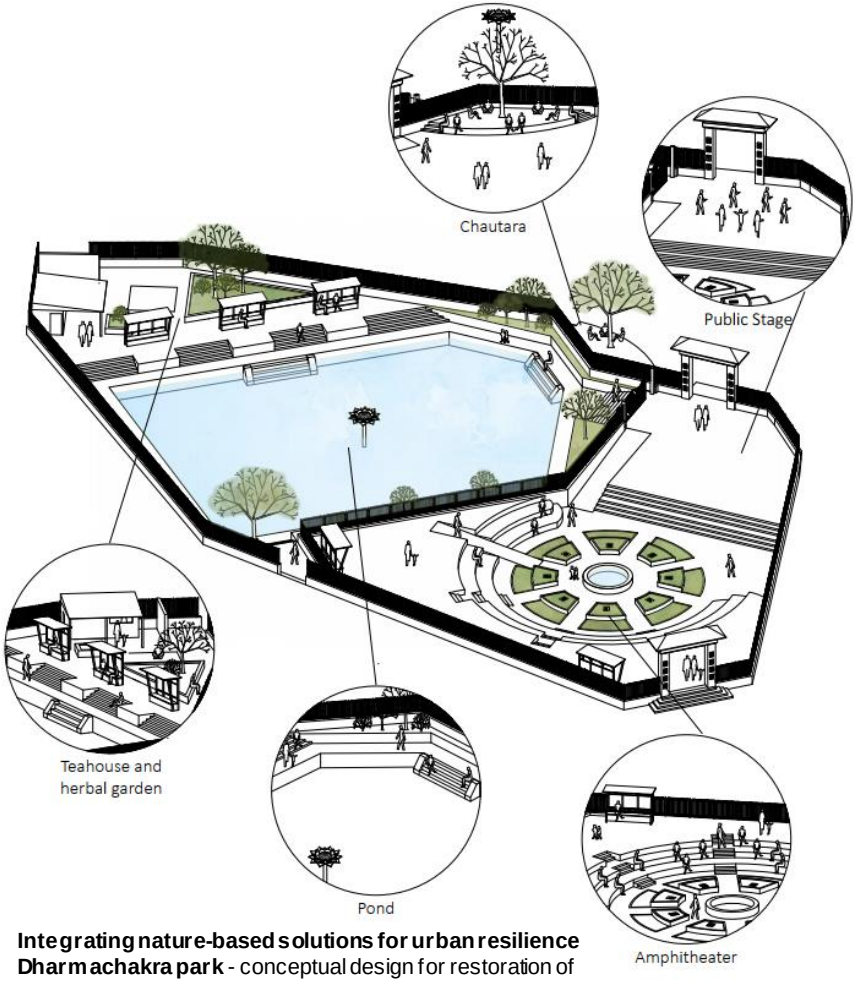
Land scarcity in Kathmandu's highly dense areas means limited space for blue-green infrastructures, implies that **higher efficiency** and **adaptability** in **urban blue-green infrastructure development** is needed.

Approximately 5.7 sq. km. of public area is suitable as open green space inside Kathmandu city.

Shrestha, Jüpner & Thaler, *Enhancing Kathmandu's Urban Design Through Implementation of Green Infrastructures*, Vienna, Austria, EGU 2022.

Practical example: Dharmachakra park, Bhagwan pau, Kathmandu





Integrating nature-based solutions for urban resilience
Dharmachakra park - conceptual design for restoration of garden & pond
Source:- ASF Nepal & Kathmandu Metropolitan City

Optimizing green infrastructures:
Individual Nature-based solutions

Bioswales

Aspern Seestadt, Vienna

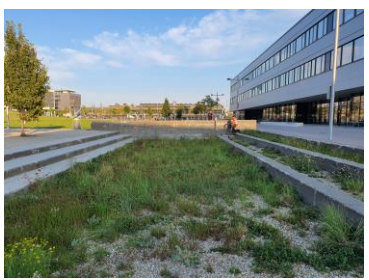
Bio retention basins

Wulzendorferstraße, 1220 Vienna

Water retention ponds

Nordmanngasse, 1210 Vienna

Infiltration trenches



Aspern Seestadt, Vienna

Permeable paving

Stempelingeranger, 81737 München

- Iwaszuk et. al. *Addressing Climate Change in Cities: Catalogue of Urban Nature-Based Solutions*. Krakow; Berlin: Sendzimir Foundation : Ecologic Institute, 2019.
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Issues in implementation

Issues	Sub-issues
Varying Hydroclimatic & geographical conditions	• Lack of data & analysis capabilities • Uncertainties due to climate change
Land use competition	• Scarcity of space for infrastructure • Territorial inequalities
Technical & human resource constraints	• Modelling capabilities • Design & construction challenges • Lack of skilled manpower
Awareness on importance of blue green infrastructure	• Lack of knowledge on BGI & conceptual unclarity • Institutional experiences
Financial incentives	• Lack of funding • Estimating cost of inaction
Cultural & Social process	• Consensus building
Governance & Institutions	• Managerial, political and legislative realms • Missing strategic vision & integrated planning • Lack of leadership; Competing priorities
Maintenance after project completion	• Monitoring & maintenance protocols • Added financial burden for maintenance of infrastructure

Shrestha, Jüpner & Thaler, *Enhancing Kathmandu's Urban Design Through Implementation of Green Infrastructures*, Vienna, Austria, EGU 2022.

Recommendations

Detailed technical guidelines & capacity building

Policy frameworks for urban blue-green infrastructures

Bottom up initiatives (community groups, private sector)

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Thank you !

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