



Centre for Social Change

सामाजिक परिवर्तन केन्द्र

CLIMATE CHANGE AND URBAN FLOODING IN NEPAL: WHY CITIES ARE FLOODING FREQUENTLY?

What is Urban Flooding?

Urban flooding occurs when rainfall exceeds the capacity of a city's drainage system, causing water to accumulate on roads, homes, and public spaces (IPCC, 2022).

WHY ARE CITIES FLOODING FREQUENTLY?

1. Climate Change

Climate change is increasing the frequency and intensity of extreme rainfall events. A warmer atmosphere holds more moisture, leading to heavier downpours over shorter periods. Although annual rainfall may not always increase, rainfall is becoming more irregular and intense, increasing the likelihood of flash floods in urban areas (IPCC, 2022).



Key Facts

7% more water vapor
for every **1°C**
increase in temperature

A warmer atmosphere can hold about 7% more water vapor for every 1°C increase in temperature, increasing the potential for heavier rainfall.



Climate change does not always mean more annual rainfall; it often means more intense rainfall events and greater rainfall variability.

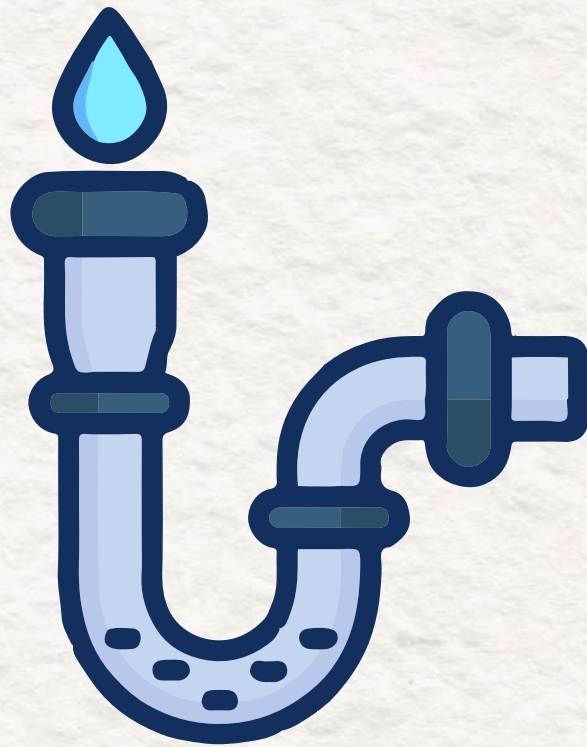


When heavy rainfall occurs in densely built cities with poor drainage, the likelihood of urban flooding increases (IPCC, 2022).



2. **Rapid Urbanization**

Although Nepal is one of the least urbanized countries in the world, it is among the fastest urbanizing countries in South Asia. According to the 2021 National Population and Housing Census, the country's urban population increased from 17.07% in 2011 to 66.08% in 2021. This rapid urban expansion has replaced natural land with roads, buildings, and other impervious surfaces, reducing rainwater infiltration and increasing surface runoff (Central Bureau of Statistics, 2021).



3. **Poor Drainage System**

Many Nepalese cities still depend on traditional drainage systems that were designed decades ago. These systems are unable to cope with today's higher volumes of storm water and increasing solid waste, causing drains to overflow during heavy rainfall. Without significant upgrades, urban flooding is expected to worsen in the future (Danegulu et al., 2024).



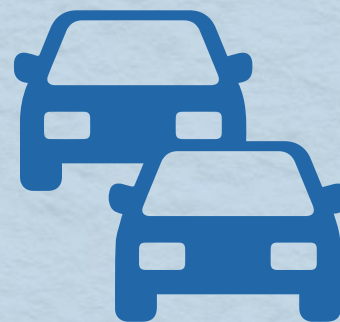
4. **River Encroachment**

Growing urban sprawl, combined with encroachment on riverbanks and floodplains, is an equally critical factor in worsening urban flooding, arguably more significant than land-use change alone (Danegulu et al., 2024).

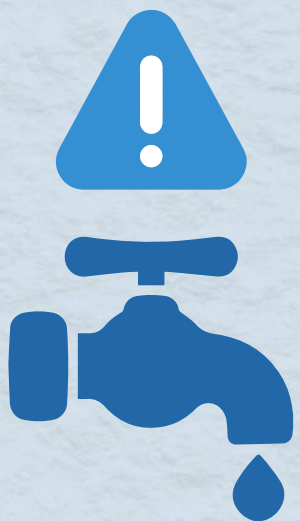
Impacts of Urban Flooding in Nepal



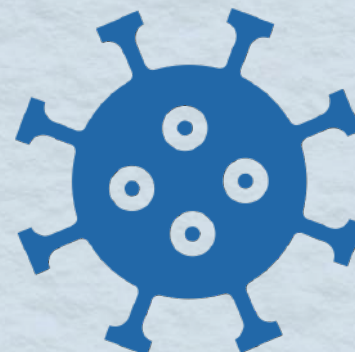
Damage to
homes,
businesses, and
public
infrastructure



Traffic
disruption and
reduced
mobility



Contamination
of
drinking
water supplies



Increased risk
of
water-borne
diseases



Economic
losses and
disruption of
livelihoods



Closure of
schools,
hospitals, and
government
services

Sources

Central Bureau of Statistics. (2021). National population and housing census 2021. Government of Nepal.

Danegulu, A., Karki, S., Bhattarai, P. K., & Pandey, V. P. (2024). Characterizing urban flooding in the Kathmandu Valley, Nepal: The influence of urbanization and river encroachment. *Natural Hazards*, 120(12), 10923–10947.

<https://doi.org/10.1007/s11069-024-06650-w>

Intergovernmental Panel on Climate Change. (2022). Cities, settlements and key infrastructure. In *Climate change 2022: Impacts, adaptation and vulnerability* (Chapter 6). Cambridge University Press.

<https://www.ipcc.ch/report/ar6/wg2/chapter/chapter-6/>

National Disaster Risk Reduction and Management Authority. (2024). A preliminary loss and damage assessment of flood and landslide. Government of Nepal.

<https://reliefweb.int/report/nepal/nepal-national-disaster-risk-reduction-and-management-authority-preliminary-loss-and-damage-assessment-flood-and-landslide-september-2024>