

Evaluating the Costs and Benefits of Disaster Risk Reduction under Changing Climatic Conditions:

The Case of the Rohini River Basin, India

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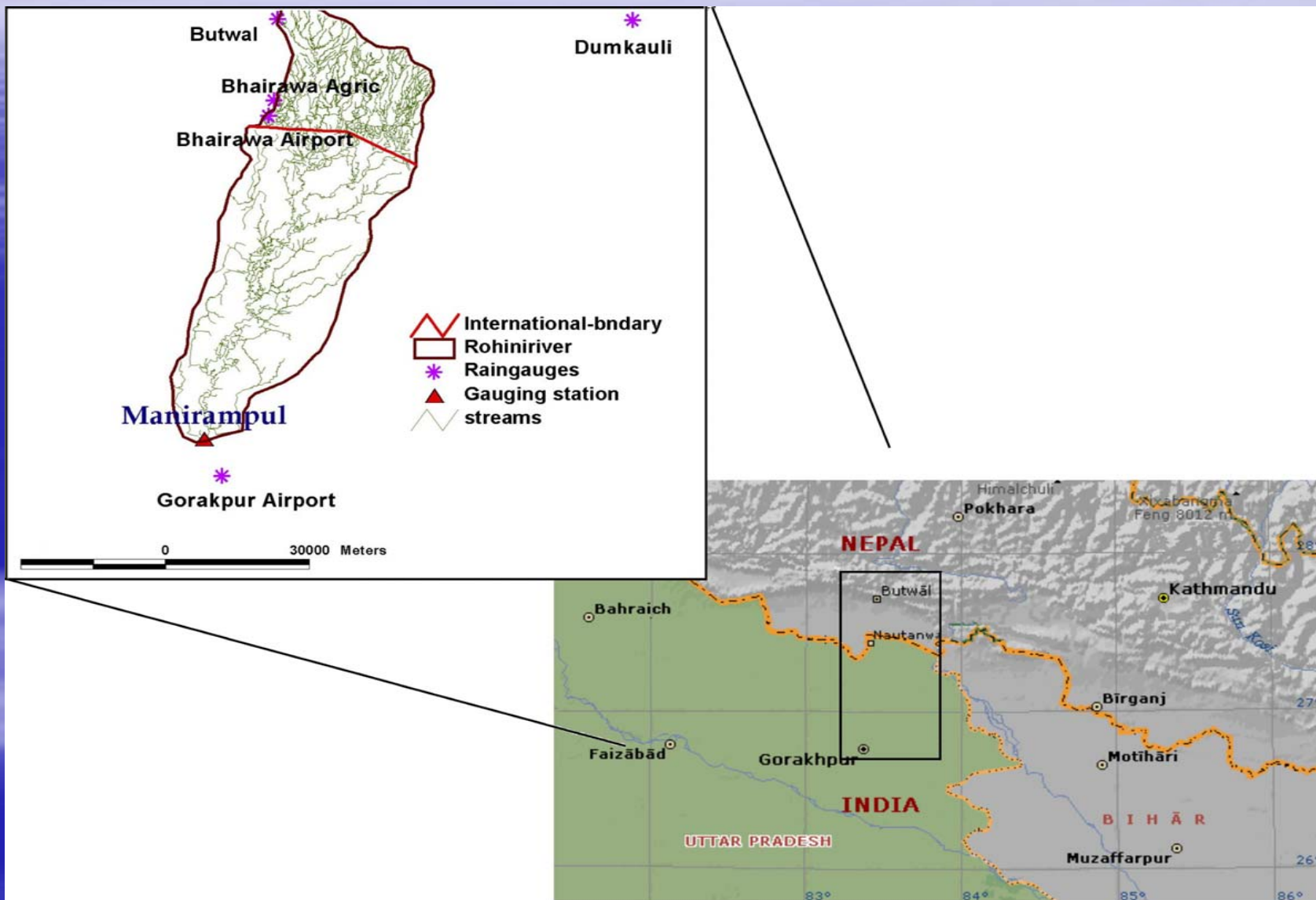
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- Context
- Flood Hazard and Risk
- Flood Risk Management Strategies
- Methodology

- *Results of Quantitative Assessment (Daniel Kull, IIASA)*

Location of case study



The Region:

Geography, Demography, Economy and Development

- The Rohini River part of Gangetic Basin located in Gorakhpur and Maharaganj Districts (*terai* region) of Uttar Pradesh, India
- International river starts in Nepal (30% catchment in Nepal; cloudbursts cause intense rainfalls)
- Large number of small water bodies—encroached; role in flood management
- Paddy, Wheat, vegetables
- High population density (about 1000 persons per km²)

The Region:

Geography, Demography, Economy and Development..

- Lags on various human development indicators, compared to both national and state averages (Uttar Pradesh itself being lower than most of India) (30% BPL, UP: 25.5% India: 21.8%)
- 50% of households < 0.4 ha of land
- Occupation: farming (65%), agricultural labor (14%), non-farm wages (14%), business (4%), service (2%), and animal husbandry (1%)
- 60% household earn income from local opportunities; 22% migrate for compensating household income

Flood hazard

- Every year some flooding
- Major floods: 1954, 1961, 1974, 1993; in past decade intensity and frequency of floods increased (1998, 2001 and 2007)
- Embankments cause
 - Waterlogging and drainage congestion
 - Earlier floods were considered beneficial but now they cause immense damage
- ***Overall, major problems bank cutting, waterlogging and sand-casting***

Flood Risk

- Poor WSS and other infrastructure, health impacts
- Dependant on distance from river/embankment
 - Trapped between embankments and river—refuge to shelters on embankment (land degradation)
 - Just behind the embankment—long duration waterlogging, land degradation

Flood Risk Reduction Strategies

- Primarily embankment (construction since 1970s)—“Centralised” [maintenance, breaches, increase river bed, reduced carrying capacity of river)
- “People centered” decentralised strategies
 - At households level (individualistic);
 - Requiring community organizations (community level interventions);
 - Societal level interventions (interventions requiring support through regional as well as local action)

“People Centered” Strategies

- **Household level (individualistic) interventions**
 - Raising plinth
 - Raised fodder storage unit
 - Drinking water and sanitation package
- **Community level interventions**
 - Early warning
 - Raised Handpumps and Temporary Elevated Toilets
 - Flood shelters (strengthening and raising schools and panchayat buildings)
 - Community grain bank
 - Community seed bank
 - Maintenance of key drainage points
 - Self Help Groups (SHGs)
 - Community boat

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“People Centered” Strategies

- **Societal level interventions**
 - Flood adapted agriculture
 - Strengthening overall healthcare system

Methodology

1. Quantitative framework

- Series of three interdependent modeling—climate downscale modeling, preliminary hydrologic and flood inundation, and stochastic cost-benefit analysis.
- Secondary data (hazard, demography, spending and investments, impacts)
- Primary survey
 - 17 villages from different zones;
 - Ten percent of the households selected in each village capturing landholding size, caste, women headed households;
 - Total households surveyed 208
 - Household questionnaire

Methodology

- Qualitative framework involved FGDs with various community groups and interviews of key informants
 - Complements the quantitative framework-- helped capture non-tangible and non-monetary aspects of costs and benefits of DRR strategies.