

# Water security in periurban South Asia

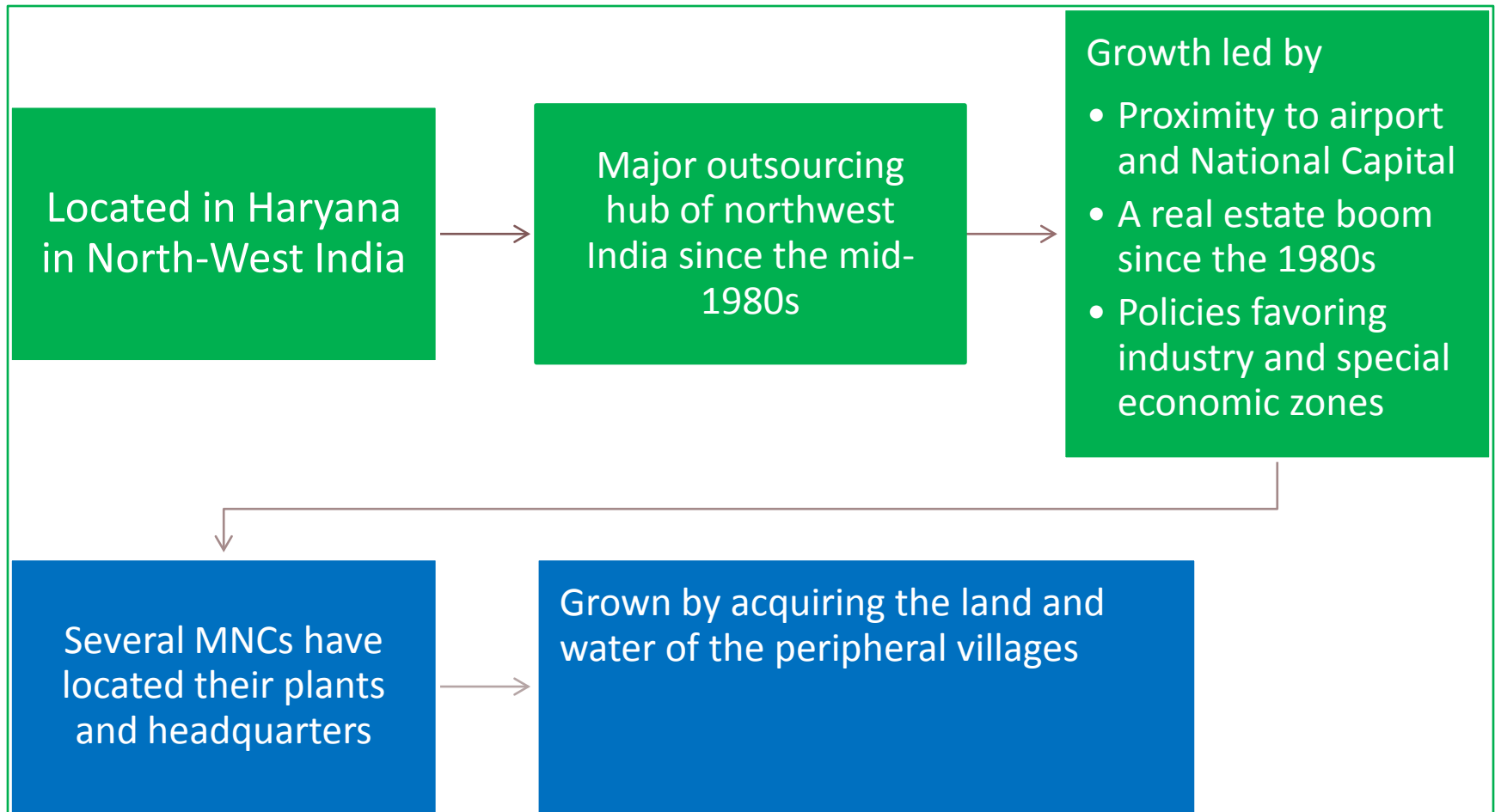
**Adapting to climate change and  
urbanization: the case of Gurgaon**

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# The growth of Gurgaon city



# The study sites

Villages Budheda, Sadhraana, Sultanpur and Jhanjhrola Khera -  
15 kms from the city



- ▲ Medium sized villages (population of 3600- 5200)
- ▲ Socially heterogeneous and diversity of castes and land ownership patterns
- ▲ Major land use changes
  - The Sultanpur National Park (1972)
  - Farm-houses of the urban elite (since the 1980s)
  - A water treatment plant to supply water to the city
  - Land acquired for the KMP expressway
  - SEZ for Reliance, a corporate giant

# Assessing the lived experience of climate change

Communicating climate change in the field

The Hindi word for climate and weather is the same *mausam*

People perceive climate change in relation to festivals, the biodiversity around them and their cropping seasons

Differ in what they attribute it to

Fatalists (*kudrat ke khel*)

Theists (*Ram ji ki Marzi, Indra devta ki naraazgi*)

Anthropogenists (as a result of human activity; a global phenomenon)

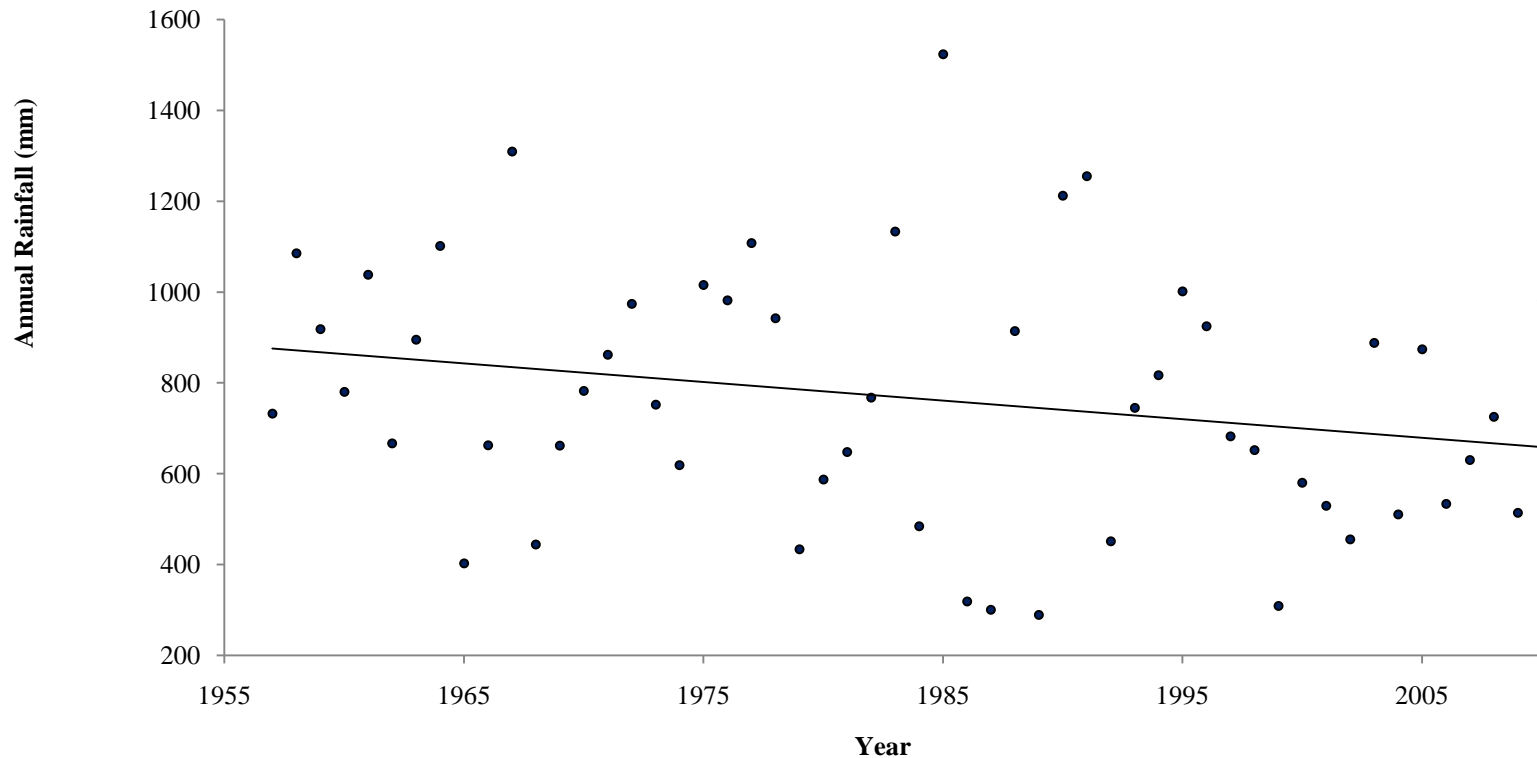
# How people perceive a changing climate

1980s stand out as a watershed in people's experience of a changing climate

- Shorter winters, setting in later
  - 1-2 months now as against 3-4 months earlier
- Longer, hotter summers
- Rainfall more erratic and delayed
- Notice less *nami* (moisture) in the soils
- Warmer climate reduces opportunities for social interaction
- Say that they experience changing climate more than their urban counterparts
- Recall rainfall flooding in 1977 followed by decline in rainfall over the years

Corroborated by analysis of  
hydro-meteorological data

## Annual Rainfall 1957-2010



## Key results from analysis of hydro-meteorological data

### Over the period 1957-2010

- There is a generally decreasing trend in annual rainfall of 3.9 mm per year
- The natural seasonal distribution of rainfall is gradually changing
- The inter-year variability in rainfall has increased in the latter half of the period at both seasonal and monthly scales; rainfall has become more erratic
- The means of both the minimum and maximum temperatures have increased

# Over the last decade...

Average annual  
evaporation rate is  
increasing

Increasing evaporation rate  
is consistent with  
decreasing rainfall and  
humidity and increasing  
temperature

Corroborates with people's  
narrative of increasing  
*khushki* (aridity) in the soil  
and less *nami* (moisture)



# The experience of water insecurity

## Sadhrana Village

Gradual loss of land for  
the Sultanpur National  
Park, farm-houses and  
reliance SEZ

Farm-houses major  
appropriator of  
groundwater

Extract water using high  
powered submersible pump-  
sets

Purchased the best land  
over fresh water

Transport water over 3-4 km  
using underground pipes  
when the farm-houses are  
located over saline  
groundwater

# Impacts of growing pressures

People caught in a trap of declining rainfall and increasing pressures on groundwater

Fall in water table over last decade

60 ft to 100 ft

20 ft to 60 ft

Farmers accessing saline groundwater

Small and marginal farmers unable to afford the high costs of extraction

a submersible pump-set: Rs 100000 to Rs 125000

## Budheda: The Land and water nexus in the periurban

- Land was acquired to build a water treatment plant and canals to carry water to it
- Two rounds of land acquisition affecting the same people
- Loss of tubewells located on those lands
- Acquisition of private and grazing land for the WTP
  - Switch from grazing to stall feeding
  - Increasing fodder collection tasks for women



# Responses/Adaptation strategies

- **Technological**

- Change in technologies for extracting water
- Switch to sprinkler irrigation sets: the context of adaptation



- **Institutional**

- Access water markets /tankers
- Mobilizing social capital: collective tubewells among the Pundit community
- Take water from friends/relatives: eroding social capital in a periurban context increases vulnerability

# Responses...

## Changes in agriculture practices

Leave land fallow

Take only one irrigated crop per year

Lesser  
flowers, vegetables, pulses, groundnut, musk  
melon; confined to mustard and wheat in the  
*rabi* (winter) season and pearl-millet in *kharif*  
(monsoon)

Wastewater the only recourse for  
many; produce sold to the city

# Relationship between identity and vulnerability

Most vulnerable are those who lack  
endowment/ entitlement and the means of  
mediation E.g. Balmeeks

Rural-urban  
transformations  
influence  
gender  
relations  
around water

Women in  
upper caste  
families now  
also collect  
water against  
traditional  
norms



Lower caste  
women face  
tacit  
discrimination  
in accessing  
water

## But water insecurity is also about excess water...

- 2010 a year of high rainfall: rainfall flooding in the fields
- Farmers lost monsoon crop and sowing season for wheat
- Most vulnerable
  - Low lying fields, geographically concentrated, clayey soils with no alternative lands or assets in the city to serve as cushion
  - Tenants more vulnerable than landlords; pay cash before seeing the harvest
  - Some clans more vulnerable
  - Psychological stress of crop failure often borne by women



# Capacity Building for water security and resilience

- Organized a series of dialogues between water users and the PHED (water providing agency) in Sultanpur and Jhanjhrola Khera villages
  - Steered away from social engineering
  - Built community capacity to improve responsiveness of PHED
    - replace cement pipes by DI pipes
    - secure water connection for school and attend to faults (in record time)
    - building capacity to negotiate with service providers can build community resilience in the face of climate change : changing the “hydro-culture”





# Giving voice and building livelihood skills

Filmed a series of 3  
videos involving  
stakeholders to articulate  
their concerns on  
periurban water security

A participatory video  
scripted, directed and  
filmed by the women of  
Jhanjhrola Khera as a  
means to mobilize them  
and spread awareness

Facilitated vocational  
training of village youth  
to impart livelihood skills

Occupational  
Diversification in the face  
of urbanization and  
climate change