

# Climate change and water security in periurban contexts

the transformation of sociotechnical regimes for adaptation

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# Conceptual issues in defining periurban

- Confusing term with no consensus regarding its meaning
- Used to denote a place
  - Fringe areas around cities
  - Rural areas, but also urban areas away from the core
- Process
  - Transition from rural to urban
- Concept/analytic construct
  - To study rural-urban relationships and flows

# Counterparts of periurban in other languages

- Dutch
  - *halfstedig* (semi-urban)
- East Asia
  - '*desakota*' (city village)
- German
  - *urban landlichen zonen* (urban rural zones)
- Afrikaans
  - *buitestedelik* (outer city or beyond the city)

# Relevance of studying periurban water issues

- Periurban dynamics are key to understanding processes of urban transition
- Give a sense of the ecological foot-print of urbanization
- Raise questions about equity and the politics of urban expansion
- Often overlooked on account of rural urban dichotomy in planning and development

# Why periurban vulnerability ?

- Most studies of vulnerability focus on purely rural or urban contexts
- Studies of vulnerability of pastoralists, agriculturists (SAVI)
- Studies on improving urban/city resilience (ACCRN)
- Periurban locations are subject both to rural and urban stressors, though livelihoods constructed across rural and urban spaces can build resilience
  - Implications both for inequity and vulnerability
  - Differential vulnerability across elite and less fortunate

# The conceptual framing of the problem

- Climate variability and urbanization interact to create patterns of periurban water insecurity
  - Urbanization creates new claimants on water and increases competition for water
  - Climate variability/ change aggravate the impacts of the above:
    - E.g Gurgaon
      - Floods in 1977, decline in rainfall after that, heavy rains in 2010 damaged crops
      - Shorter winters and summers ; shorter period of rains after 1977

# Other conceptual nuances

- Water insecurity is the issue, rather than water scarcity – caused both by urbanization and climate variability
- Vulnerability is seen as a chronic phenomenon, rather than in relation to occasional, extreme events
- The concept of a sociotechnical regime to denote the technologies and institutions through which water users adapt to water scarcity/insecurity

# Methodology

- Ethnographic approach; semi-structured interviews with households to look at changing water use practices with urbanization and adaptation strategies
- Capturing climate variability through PRAs and narratives of a changing climate



# The research context: growth of Gurgaon city

- Projected as a millenium city
- Major outsourcing hub of northwest India
- Drawn a large number of MNCs and corporates that have located their headquarters/manufacturing plants in the city
- Visual landscape
  - tall skyscrapers co-existing with village settlement areas and agricultural fields
- Frontiers of the city still expanding
  - 56 residential sectors exist, another 56 on the anvil
  - enormous implications for water and land resources

# Sadhraana village: Land use change over the last two decades

- Gradual Process of land use change for a national park, SEZs and farm-houses of the urban elite
- Left with about 40% of the net cultivated area recorded in the 1960s
- Land and water appropriated by the urban elite

# Major pressures on groundwater

- Tubewells dug for Sultanpur National Park
- Farm-houses major appropriator of groundwater
  - extract water using submersible pump-sets not affordable by locals
  - acquire the land over the 'fresh' groundwater
  - transport water over 3-4 km to their farm-houses using underground pipes when the farm-houses are located over saline groundwater

# Impacts of growing pressures

- Fall in water table over last decade
  - 60 ft to 100 ft
  - 20 ft to 60 ft
- Farmers accessing saline groundwater
  - unfit for agriculture and livestock
- Small and marginal farmers unable to afford the high costs of extraction
  - a submersible pump-set: Rs 100000 to Rs 125000

# Climatic variability

- 1977 as a year of peak rainfall/ Flood
- Reduced intensity and frequency of rainfall after 1977
- Aggravated stress on groundwater and caused water table level to fall further
- Some farmers depend only on rainfed agriculture; were at a loss

# Adaptation to water scarcity

- Technological adaptation
  - From *lao chedas*, *rainth* to tubewells and submersibles
    - small and marginal farmers left out
  - Use of sprinklers
    - water scarcity
    - clayey soil and undulating terrain
    - less labor-intensive irrigation technologies
- Leave land fallow
- Take only one crop per year
- Switch to rain fed crops
- Buy water based on social relations
  - Social capital eroded in periurban areas

# Land use change in Budheda vilage

- Major source of land to quench urban thirst
- Left with just about a fourth of its net cultivated area
- The Gurgaon Water Supply Channel passes through the vilage
- Tube wells installed to benefit from water table rise
  - Had to be removed when the NCR channel was dug
  - Highlights vulnerability of farmers to uncertain water supply

# Use of urban wastewater

- The Gurgaon Jhajjar canal passes through the village, carrying the city's waste
  - Untreated sewage
    - Rich in nutrients, removes the need for costly application of fertilizers and water pumping
  - Farmers irrigate paddy and wheat
    - Pay irrigation department for its use
  - Results in conflicts on account of over irrigation
  - Long-term adverse health effects
  - Now the only source of irrigation with the removal of tubewells
    - Highlights vulnerability to an uncertain water supply



# Climatic variability

- Similar changes to those of Saadhrana, but being a low lying area, the floods of 2010 damaged the crops , tenants and sharecroppers were the most vulnerable

# To conclude..

- Both climate variability and urbanization interact to create patterns of periurban water insecurity
- A periurban conceptual lens equips us better to look at the flows of rural-urban water than to see rural and urban water supply as distinct entities
- Look at the transformations in technology and institutions through which users adapt to water scarcity