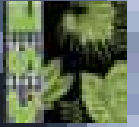


Catch water where it falls

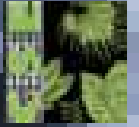


Sanitation beyond toilets: the challenge of 'new' thinking and 'innovative' technologies for water and sanitation

Sunita Narain

**Centre for Science and
Environment, New Delhi**

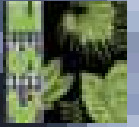
Catch water where it falls



Challenge: access to 'functional' sanitation facilities for all

- 1. Ownership and management; cost of system to pay for maintenance**
- 2. Water facilities to use toilet**
- 3. Ensure sanitation facility -- toilet or sewerage -- does not pollute water and add to health burden**

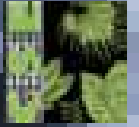
Catch water where it falls



Lessons: way ahead

- **Reduce costs of sanitation to ensure facility is provided to all**
- **Ensure water facility is provided and is sustainable**
- **Ensure 'waste' of sanitation facility becomes a resource -- loop is closed -- so that costs can be reduced and pollution checked**

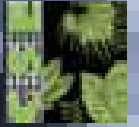
Catch water where it falls



Need change in ways we do things

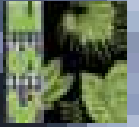
- **Current system is built on bringing water from long distances – and taking back waste long distances;**
- **It is capital intensive and resource intensive;**
- **The longer the transmission pipeline or canal, the higher the inefficiencies and losses**
- **All this adds to costs of delivery. Poor clients and even relatively rich cannot pay.**
- **Have to be subsidised. State cannot subsidise all. Subsidises, rich, not poor.**

Catch water where it falls



- **Cities and industries growing. Will need water. Increasing stress on rural water**
- **Cities use clean water and discharge polluted water. Add to water stress**
- **Need to reinvent the water paradigm for urban South**
- **Need answers to *minimise* water use; to generate *less waste* and to *treat, reuse* and *recycle* every drop of water. Need prudent use**

Catch water where it falls

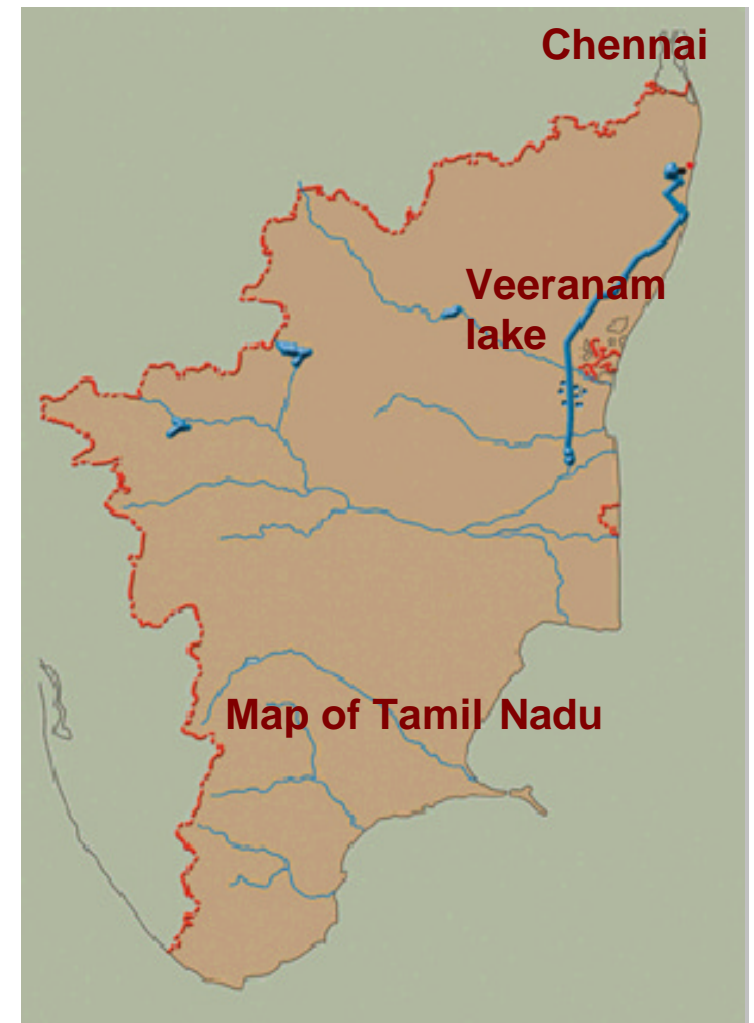


Cities in search for water

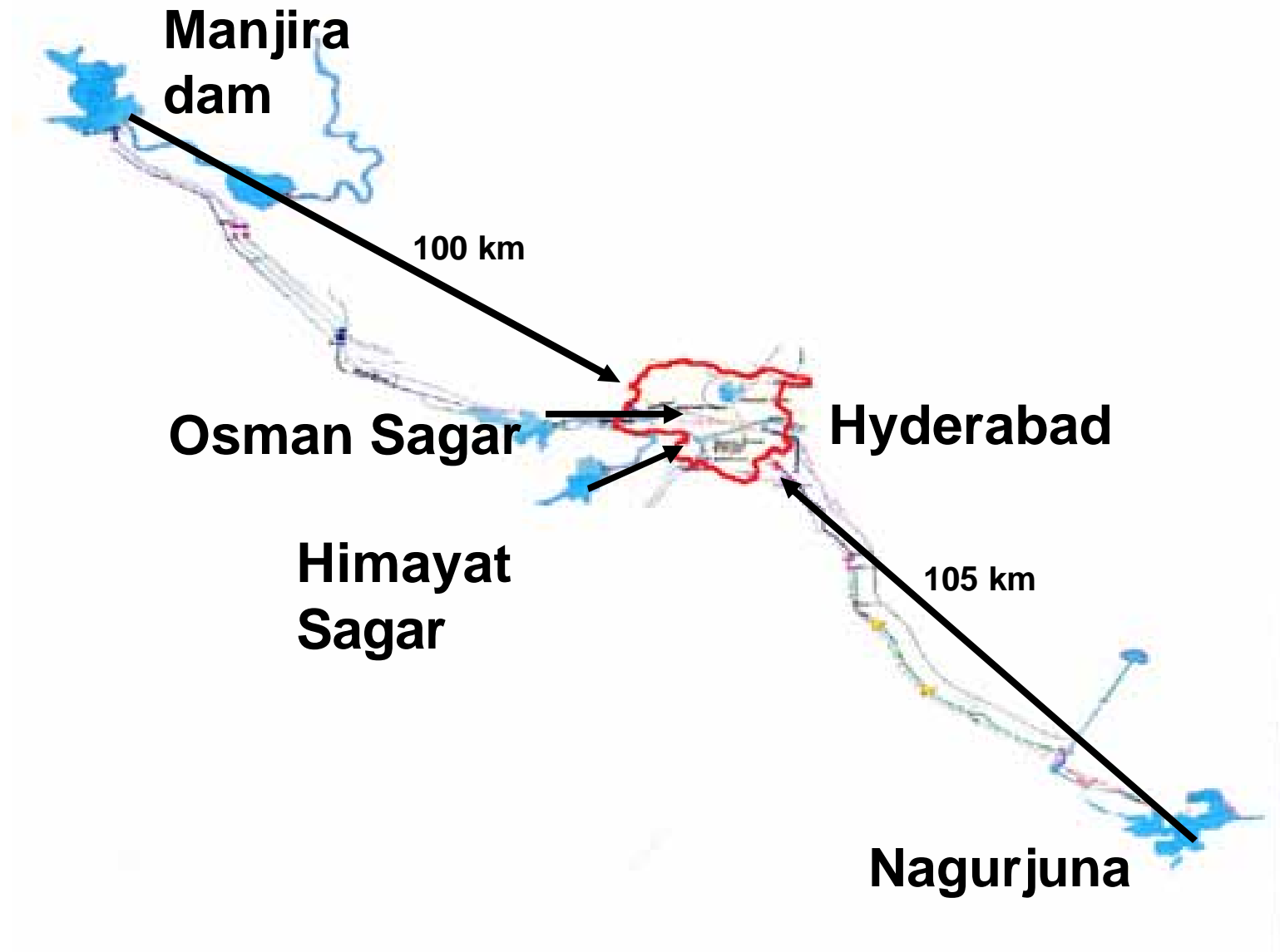
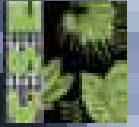
Chennai: **235 km**
(Veeranam lake) and now
planning to go farther 300 Km
(Veeranam extension project).

Bangalore: **95 km**
(Cauvery) pumping 1000 m
elevation.

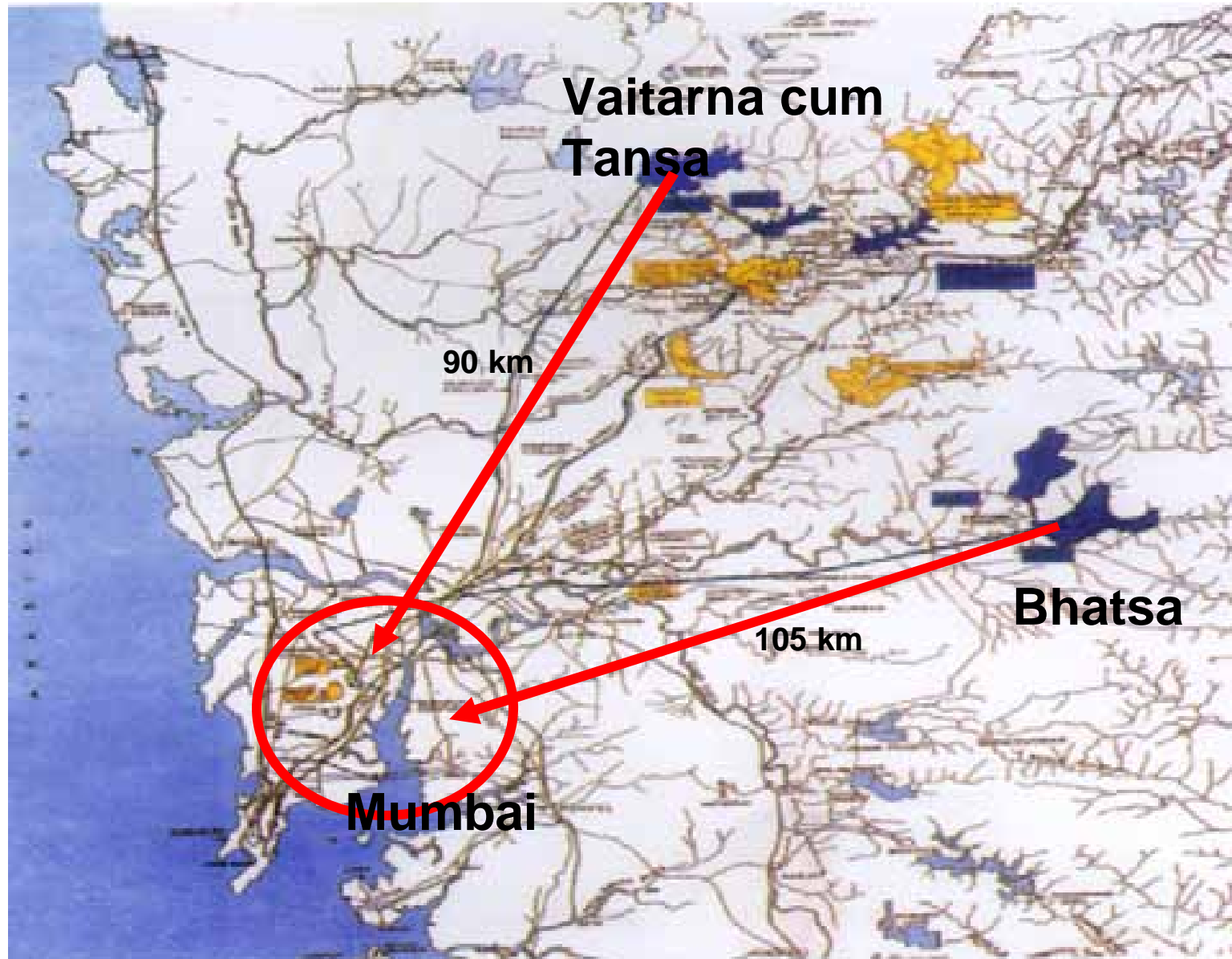
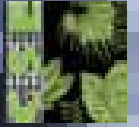
Delhi: **450 to 500 km**
(from Tehri dam)



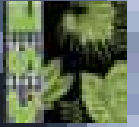
Catch water where it falls



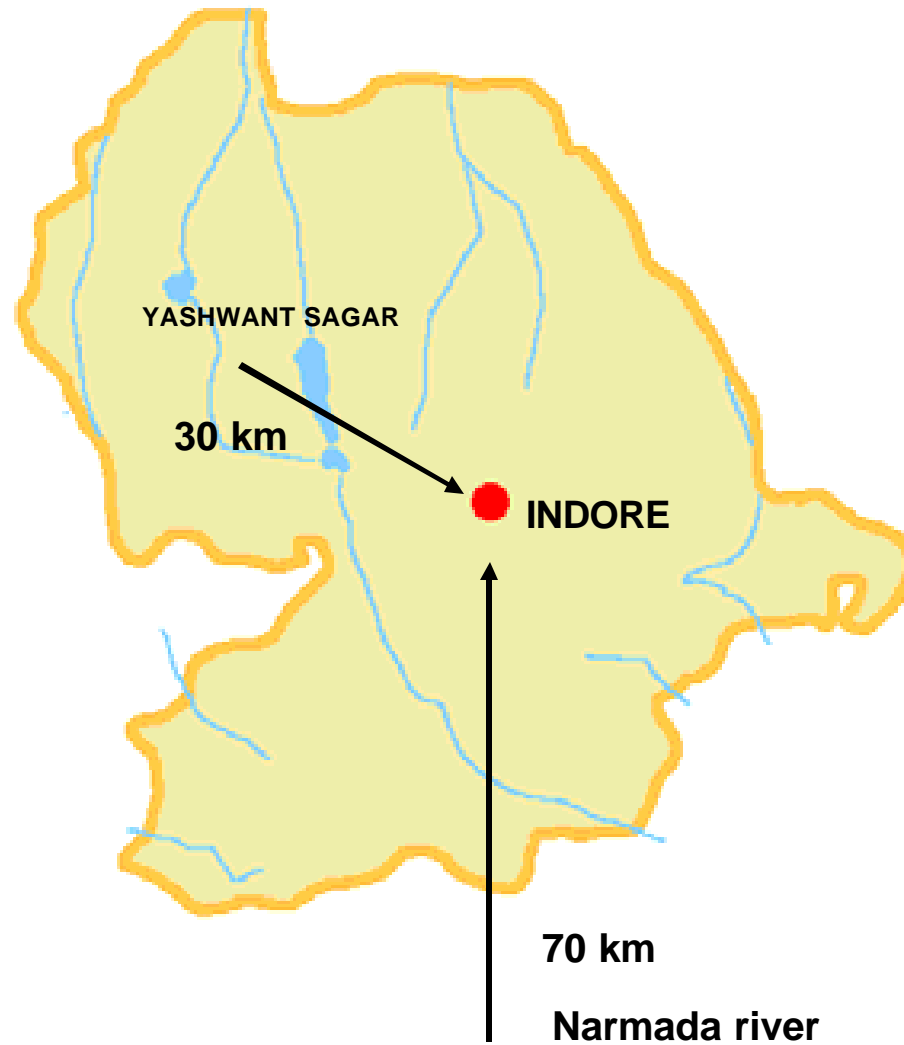
Catch water where it falls



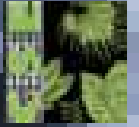
Catch water where it falls



INDORE



Catch water where it falls




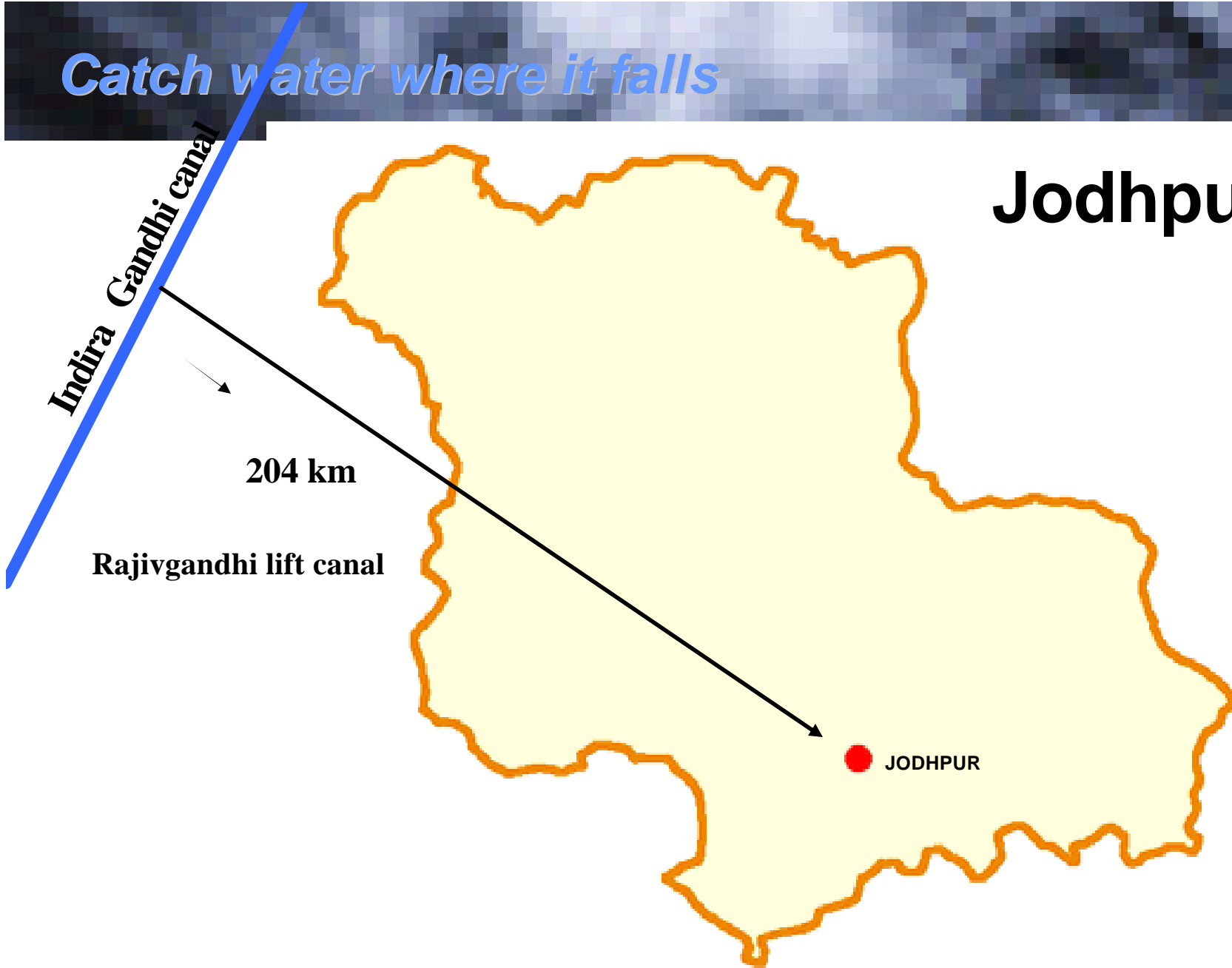
Jodhpur

Indira Gandhi canal

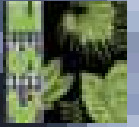
204 km

Rajivgandhi lift canal

 JODHPUR



Catch water where it falls



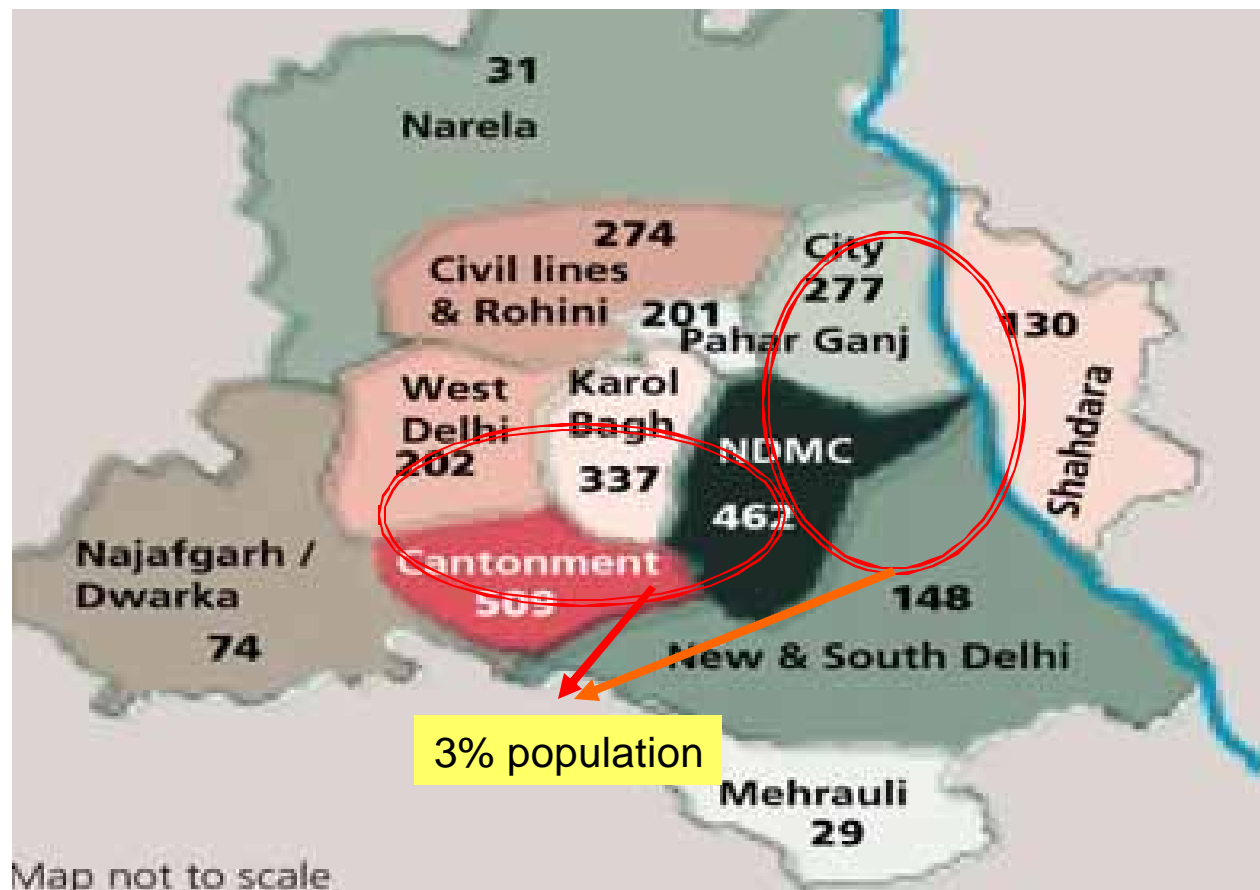
Inefficiencies are high

- **Huge distribution losses in water supply – between 20-50 per cent**
- **Cost recovery is difficult: higher inefficiencies add to cost**
- **Cannot invest in efficiencies and clean water for all**

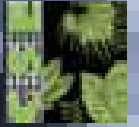
Catch water where it falls



Transportation costs are high. Distribution costs high. Cannot be recovered. Subsidy to some. Water inequity in Delhi.

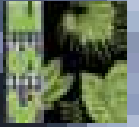


Catch water where it falls



Add: waste to these sums

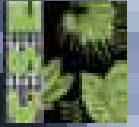
- The **more water** we use = the **more waste** we generate.
- The **more waste** we generate = **more money** to collect, to convey, to treat and to dispose
- The more waste we **do not treat** = **polluted water** and increased burden of health costs.
- **Simple sums: but we can't add up**



Maths of national excreta

- 2006 CPCB estimated sewage from class I and II cities =
- Total sewage = 33,200 mld
- Capacity to treat: 6,109 mld (18% of sewage)
- Sewage actually treated: 4,400 mld (72% of capacity created)
- Gap: 28,800 mld of sewage
- = 13.5% of sewage generated actually treated

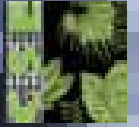
Catch water where it falls



Treatment plant: not the simple answer

- **India has installed capacity to treat roughly 20 per cent of excreta generated.**
- **Delhi has 40% of India's installed sewage capacity.**
- **But 70% of sewage capacity installed in the city remains under-utilised.**
- **The political economy of excreta is not simple.**

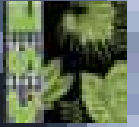
Catch water where it falls



Drainage exists; but does not work. Drainage does not exist; does not work

- Drains cost money to build, to repair. Cannot transport waste to the sewage plant.
- **Then:**
- Large parts of the city does not have official-underground drainage system
- Large parts of the city lives in unauthorised-illegal colonies. Their waste mixes with treated waste. **Result pollution**

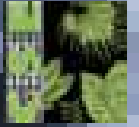
Catch water where it falls



Can we pay full cost? Can we design system for all?

- It costs **Rs 5-6** per 1000 litres to supply treated water to us. **Bangalore** costs more
- We pay **Rs 2.20** per 1000 litres. **Bangalore** pays more
- Will cost **Rs 30-40** per 1000 litres to take back our sewage; treat it; dispose it. (Nobody pays)
- Cost will increase as river gets more polluted. No assimilative capacity

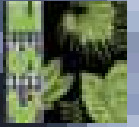
Catch water where it falls



Cost of system is high. Cannot pay. Cannot subsidise all.

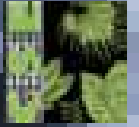
- **This is the political economy of defecation.**
- **The rich use water. Are connected to sewage system. Waste is collected. Even treated.**
- **But they cannot pay for full costs..**

Catch water where it falls



Subsidy to the rich to excrete in convenience.

- **River action programmes. All sewage treatment plants built in river cleaning programmes as grants/loans/public investment.**
- **Even when capital cost paid. No money to run. Governments subsidises again.**
- **Massive subsidy to sewerred populations.**
Polluters never pay



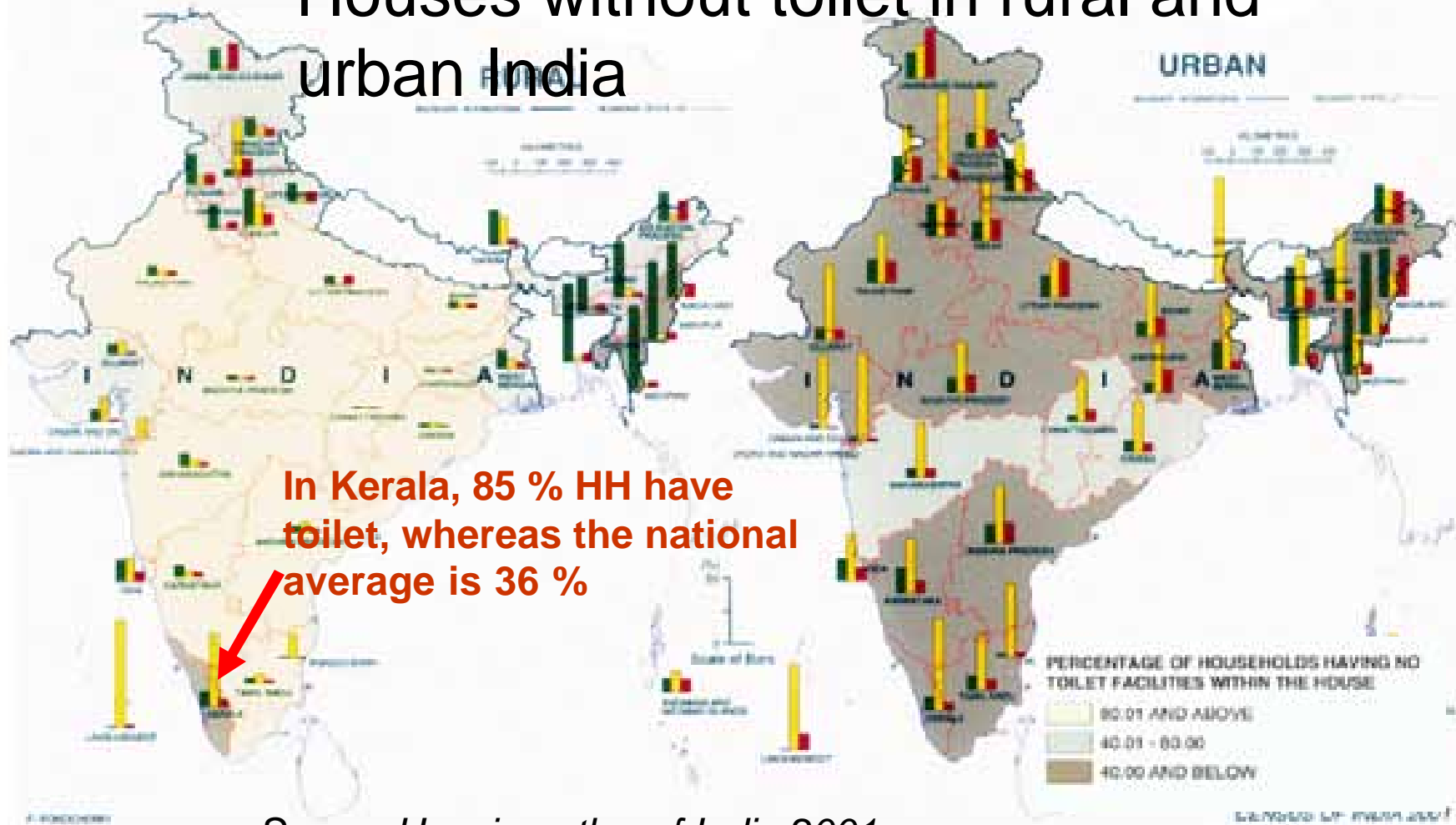
Rich and urban **subsidised**...

- Urban rich do not pay for water; or for sewerage; system cannot provide for poor
- Poor pay with cost to health -- waterborne diseases key cause of mortality
- Rural communities have to pay for sanitation -- government subsidises toilets **nominal**ly and only for **some, not all**

Catch water where it falls

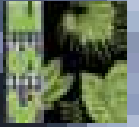


Houses without toilet in rural and urban India



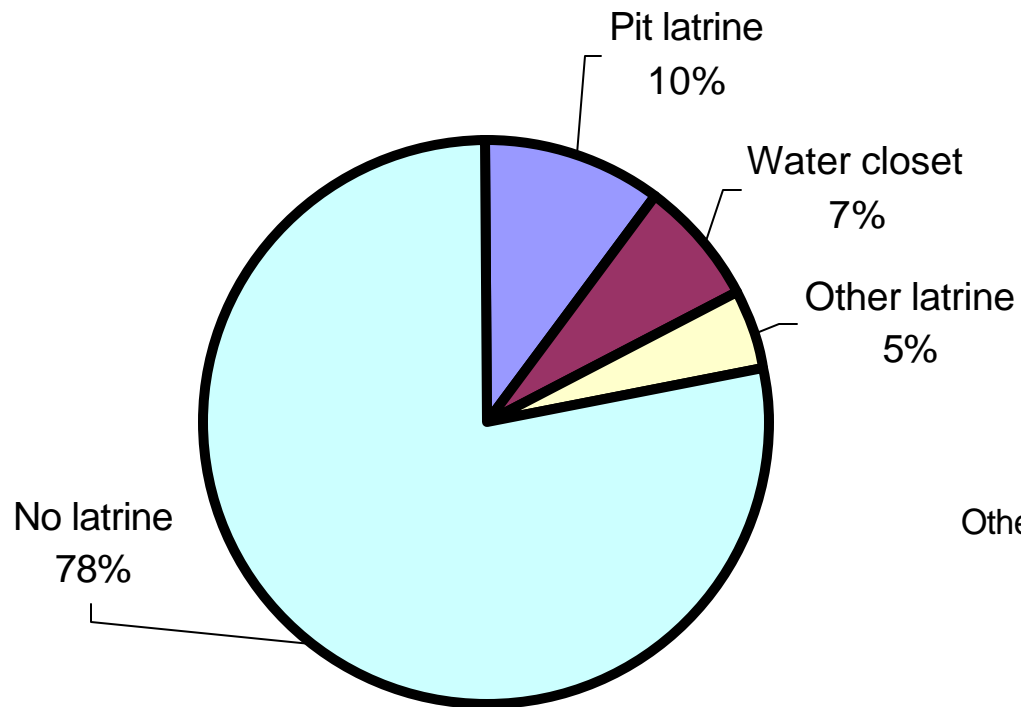
Source: Housing atlas of India 2001

Catch water where it falls

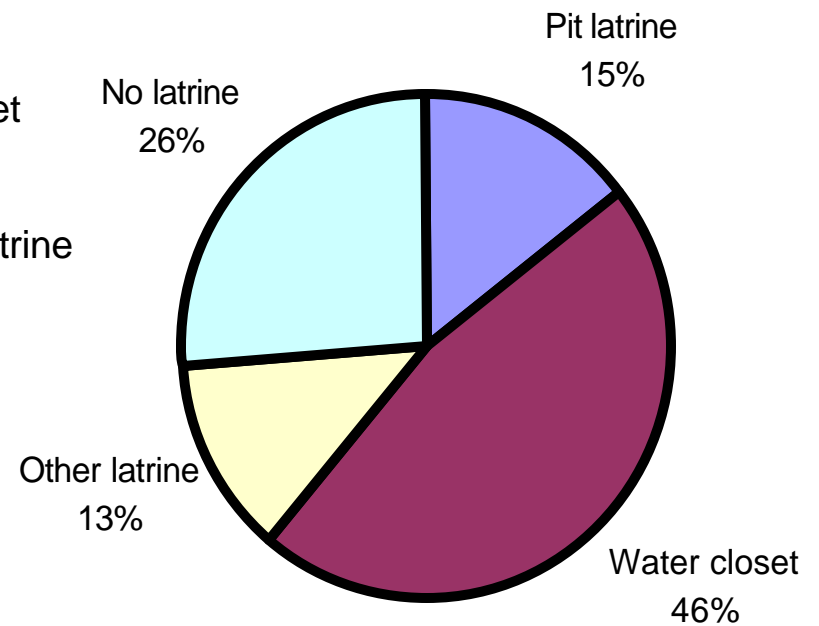


Toilets..

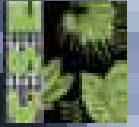
Type of latrine within the house: RURAL



Type of latrine within the house: URBAN



Catch water where it falls

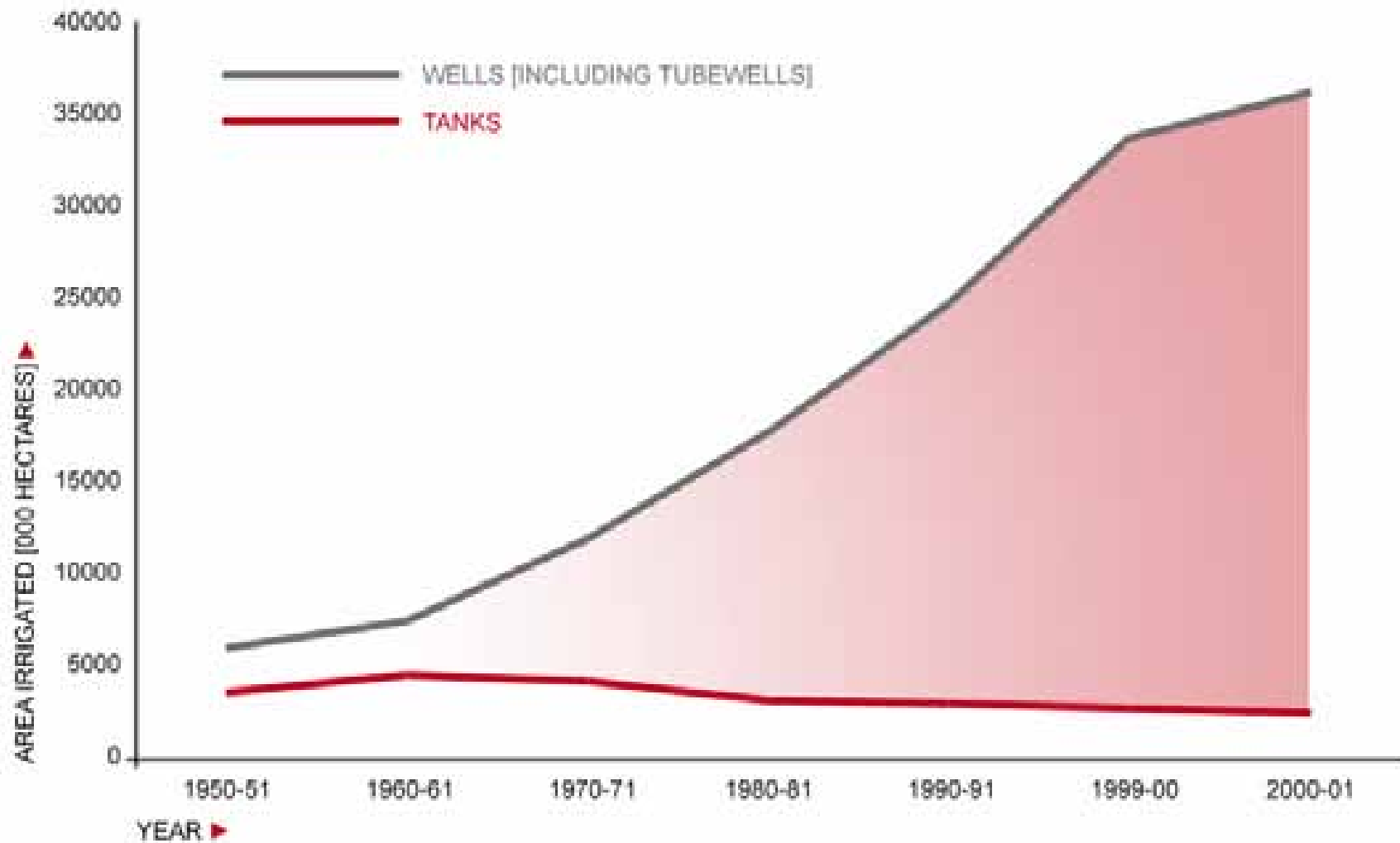


Reinvent water-sanitation systems

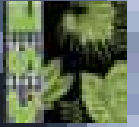
Cut cost of water supply; make source of water sustainable

- Borrow from the **past**: Rainwater harvesting to collect every drop of water; recharge groundwater
- We need **distributed sources** of water and **distributed recharge** of groundwater for distributed water and sanitation
- No option. Learn from traditions. Build for the future

Catch water where it falls

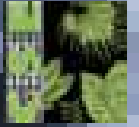


Catch water where it falls



- The **lakes and ponds and tanks** were the recharge systems for groundwater.
- These have been destroyed.
- We use water in '**decentralised**' manner. But we recharge water in '**centralised**' manner.
- These were the **sponges**, to harvest rain, to harvest the flood water so that groundwater could be recharged.

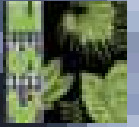
Catch water where it falls



Water flows fast

- Out of **8760 hours** in a year, most of the rain in India falls in just **100 hours**.
- The solution is in extending the monsoon
By capturing, storing, recharging and then using the bounty over the dry periods.
- **Water practices of arid regions teach us this.**

Catch water where it falls

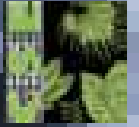


Potential of rainwater harvesting

- **1 ha of land X 100 mm of rainfall
= 1 million litres of water**

**Rainwater harvesting is a key.
Hold rainwater when it falls.**

Catch water where it falls

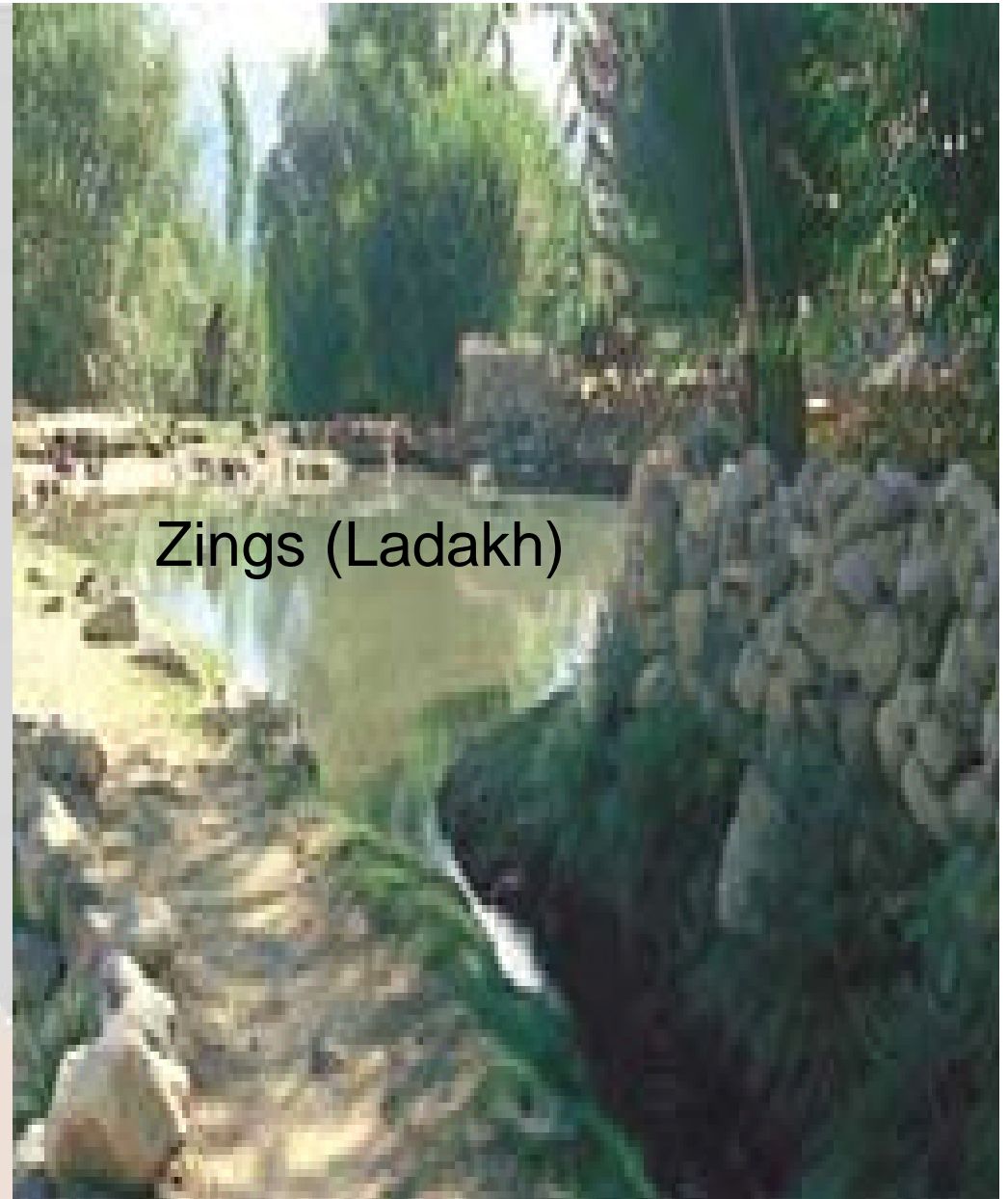


- **Decentralised growth needs decentralised access to resources;**
- **Adopt Inventive thinking based on the ingenuity of the past;**
- **Work with it to improve efficiencies;**
- **Not to negate it. But to work it.**

Catch water where it falls

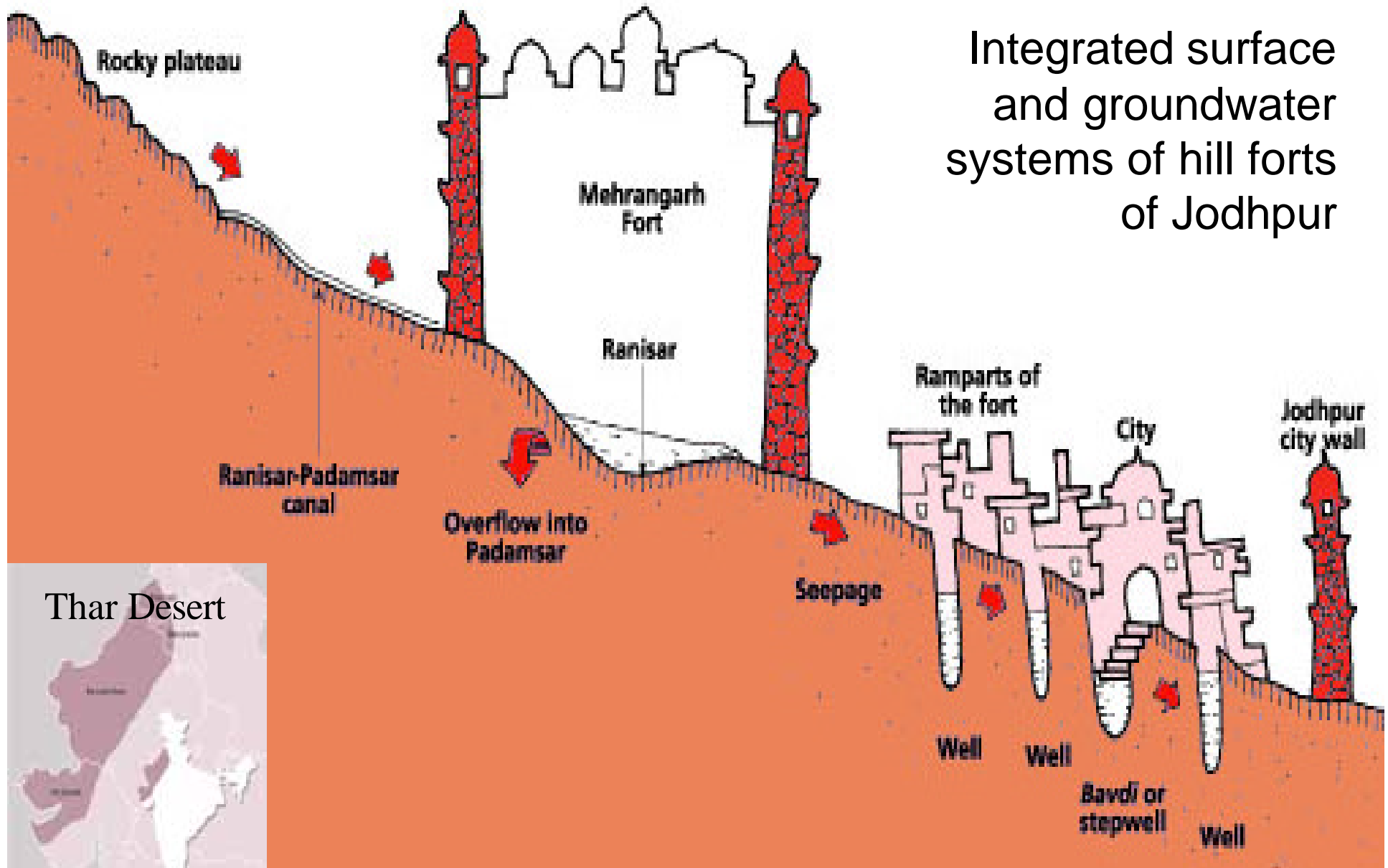
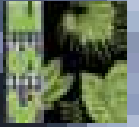


Trans-Himalayan Region



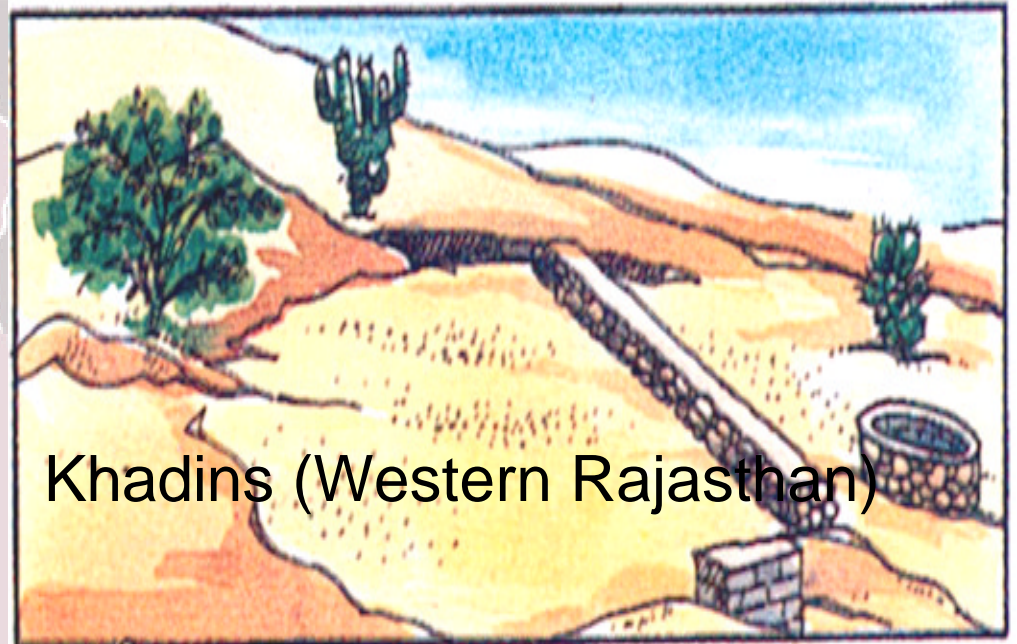
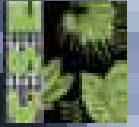
Zings (Ladakh)

Catch water where it falls

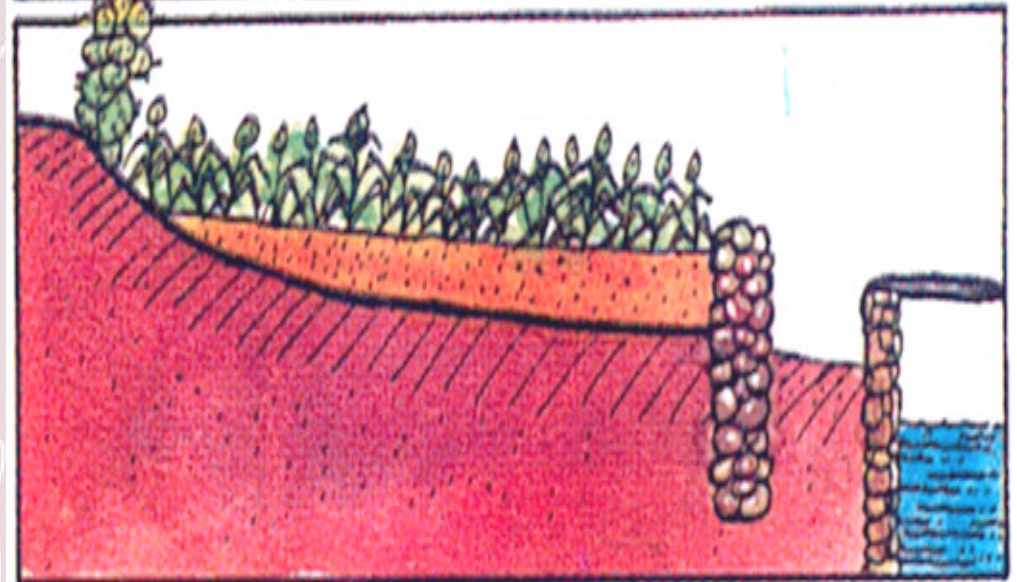


Integrated surface
and groundwater
systems of hill forts
of Jodhpur

Catch water where it falls



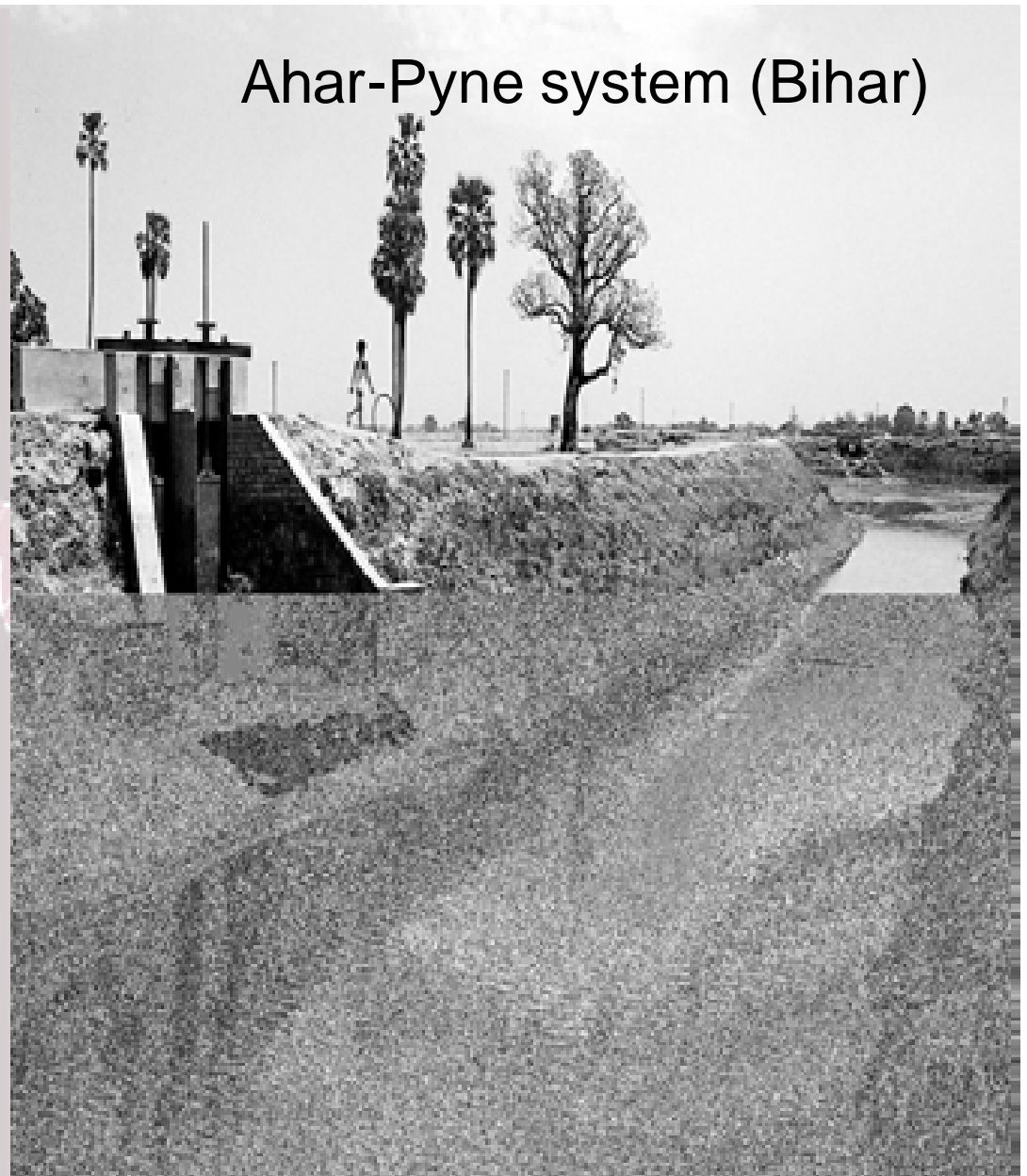
Khadins (Western Rajasthan)



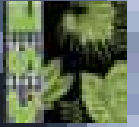
Catch water where it falls



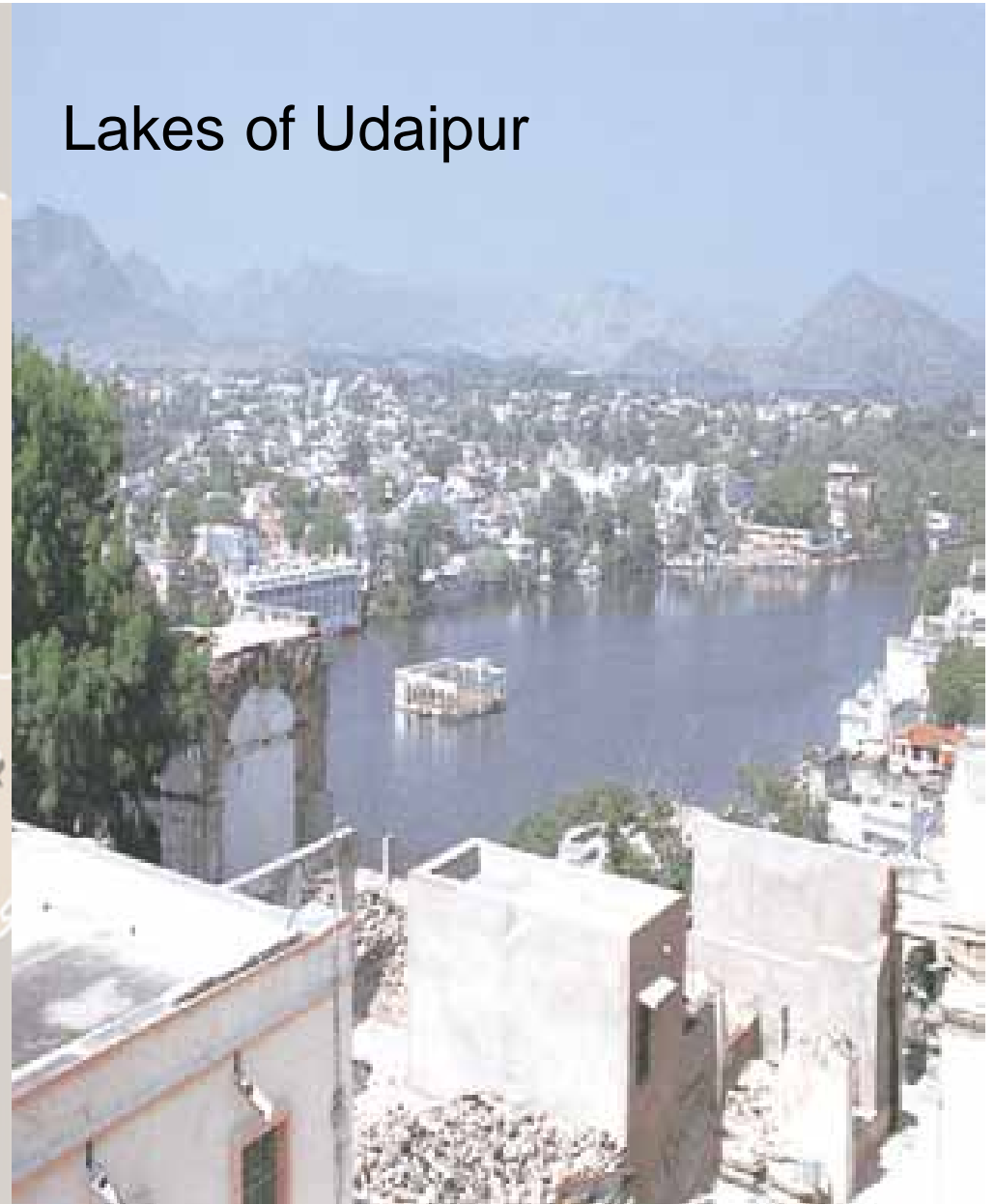
Ahar-Pyne system (Bihar)



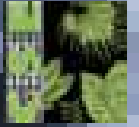
Catch water where it falls



Lakes of Udaipur

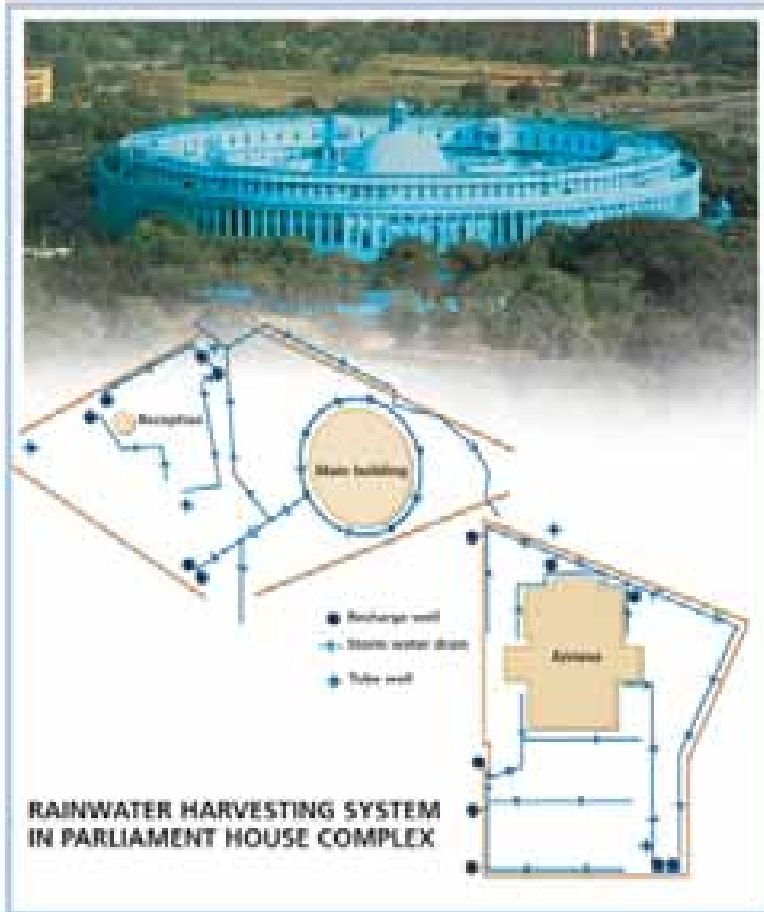


Catch water where it falls



INDIA'S PARLIAMENT HARVESTS RAINWATER.

DO YOU?



"I am sure we, being elected representatives of the people, can do our bit in the nation's efforts to solve the water problem."

"To manage our water resources for diverse use, we must work with a participatory approach involving not only government agencies but also the common people in the process of planning, designing and execution of all our schemes focused on water."



Somnath Chatterjee,
Speaker, Lok Sabha

RAINWATER HARVESTING

The collection and storage of rainwater for direct use or recharge of groundwater instead of allowing rainwater to run off, we can use it to meet most requirements.

CATCH WATER WHERE IT FALLS

WATER WOES

The Parliament House complex uses approximately 570,000 litres of water daily, a requirement met through four tubewells in and around the complex, and through municipal water supply.

In the past three years, the groundwater level here has dropped three metres.

THE SPEAKER'S INITIATIVE

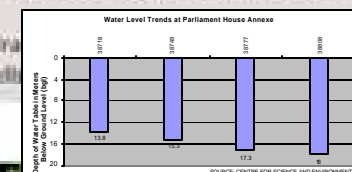
Lok Sabha Speaker Somnath Chatterjee invited the Centre for Science and Environment to provide technical assistance for a rainwater harvesting project at the Parliament House complex. The scheme was designed and implemented by the Central Ground Water Board and the Central Public Works Department.

THE WAY AHEAD

PARLIAMENT COMPLEX AREA: 10.34 hectares

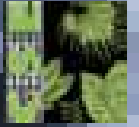
RAINWATER RECEIVED: 4.33 million litres (equivalent to water requirement for 76 days)

Rainwater is collected through the stormwater drain. It seeps into the ground through 14 recharge wells.



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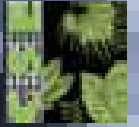
Catch water where it falls



Invest in sustainability

- **Already 20% of funds are allocated to:**
 - Sustainability of source**
 - Quality of water**
- **Now government planning to invest more in sustainability: critical**
- **Cannot plan for sanitation without planning for sustainable water supply**

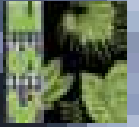
Catch water where it falls



Borrow from the future

1. **Minimise water use – use sewage technologies that close waste-nutrient loop; use less (no water); put nutrients back into the ground (not water)**
2. **Recycle and reuse every drop of water – membranes that cost less (water from sea or water from sewage)**

Catch water where it falls



A WASTEWATER RECYCLING MANUAL

for urban areas
with case studies

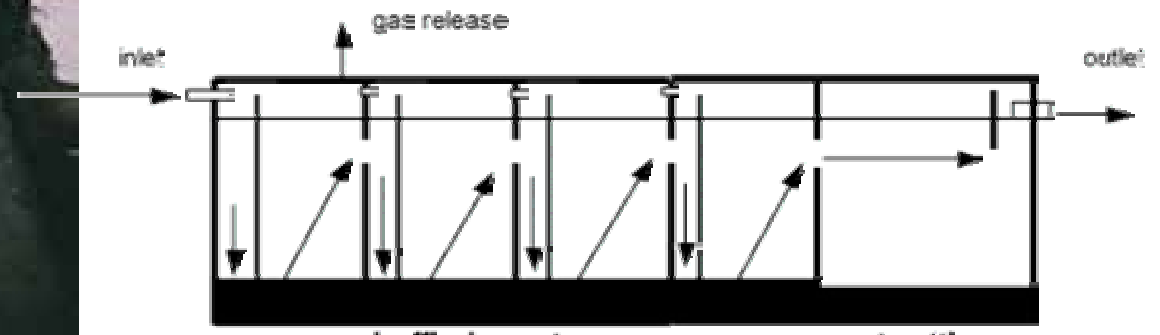
CENTRE FOR SCIENCE AND ENVIRONMENT



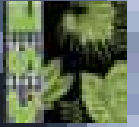
Catch water where it falls



Anaerobic baffled
reactor >
Primary treatment > CSE
building



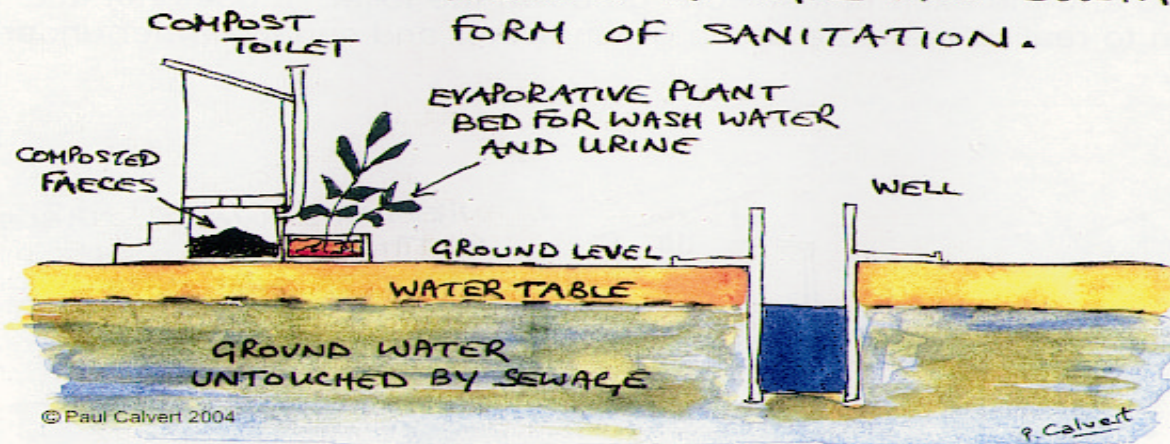
Catch water where it falls

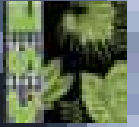


Eco sanitation > Principle

Eco-Toilets in High Water Table

ECO-TOILETS, THAT IS DESICCATING AND COMPOST TOILETS, IN HIGH WATER TABLE AREAS PROTECT THE GROUND WATER AND PROVIDE A SAFE AND SUSTAINABLE FORM OF SANITATION.

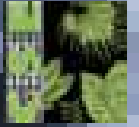




Ecosan Vs Conventional

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Recycles and values the nutrients and organic matter in excreta• Sanitises excreta (kills the germs that cause disease).• Minimises the use of water• Avoids mixing urine and faeces• Prevents pollution | <ul style="list-style-type: none">• Wastes the nutrients in our excreta.• Transport, dispose and disperse excreta and germs• 10 to 12 litres of water is wasted every time• Every thing is mixed up• Increases pollution |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Catch water where it falls



Think **great**. Not **big**

- Have to rework paradigm of water and waste
- Have to rethink waste – so that we generate less; can treat cheaply; can reuse
- No options
- Remember: **We all live downstream**

Catch water where it falls

