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

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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**

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**

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

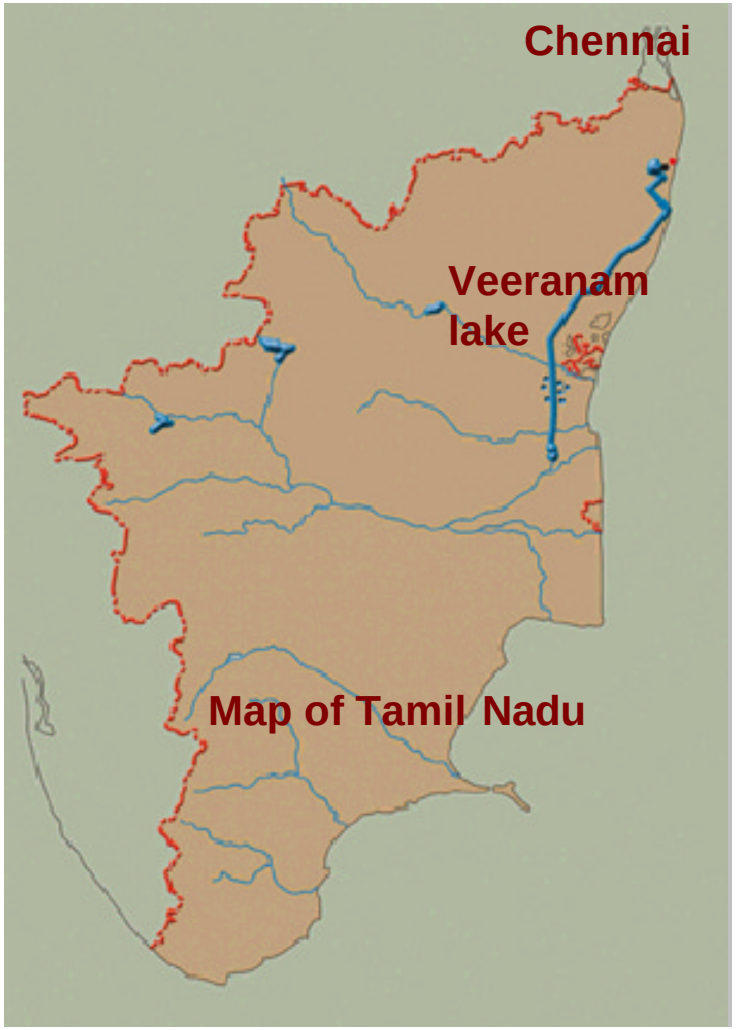
- **Cities and industries growing. Will need water. Increasing stress on rural water**
- **Cities use clean water and discharge polluted water. Add to water stress**
- **Need to reinvent the water paradigm for urban South**
- **Need answers to minimise water use; to generate less waste and to treat,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

Cities in search for water

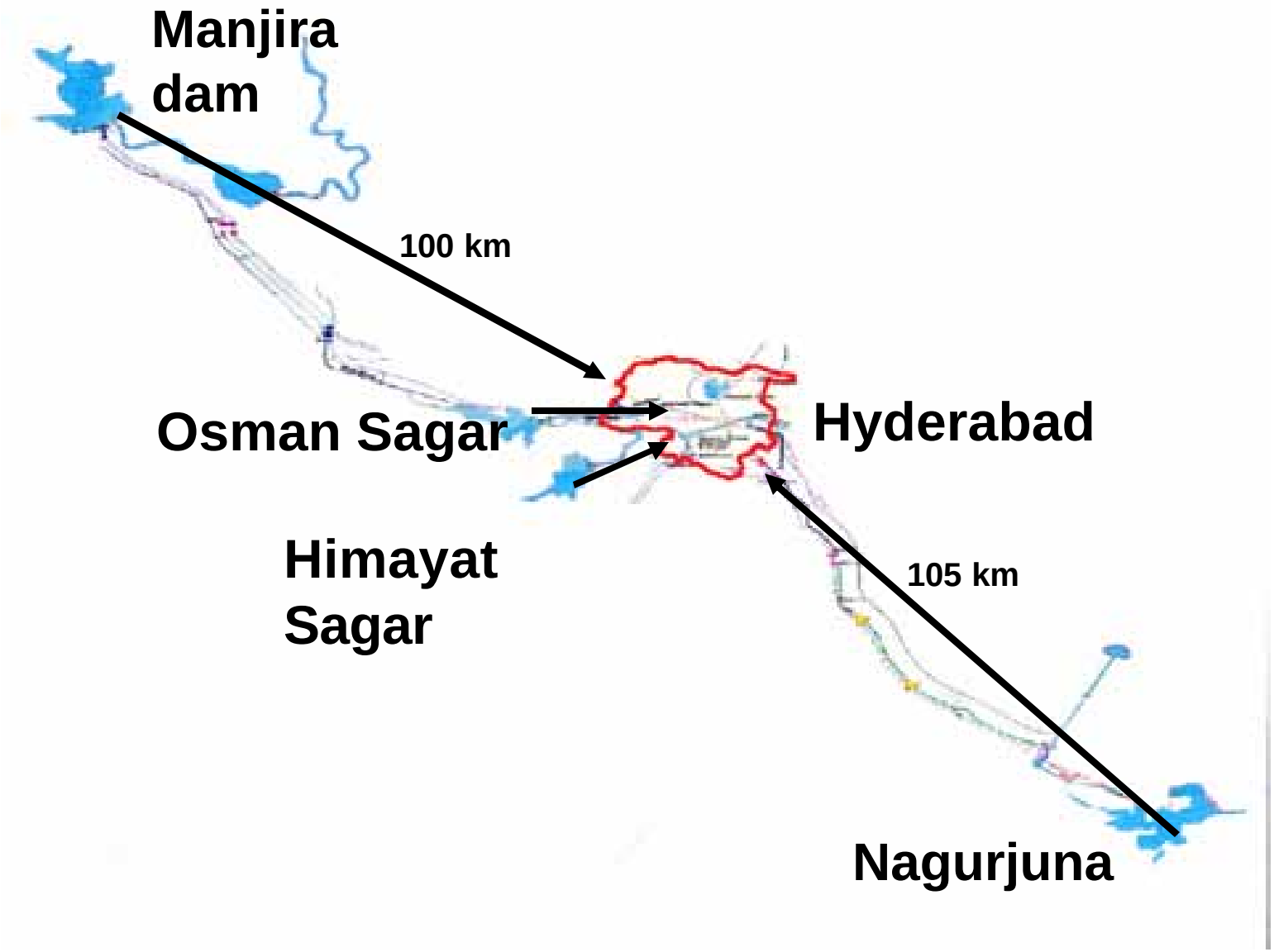
Chennai: **235 km**
(Veeranam lake) and now planning to go farther 300 Km (Veeranam extension project).

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

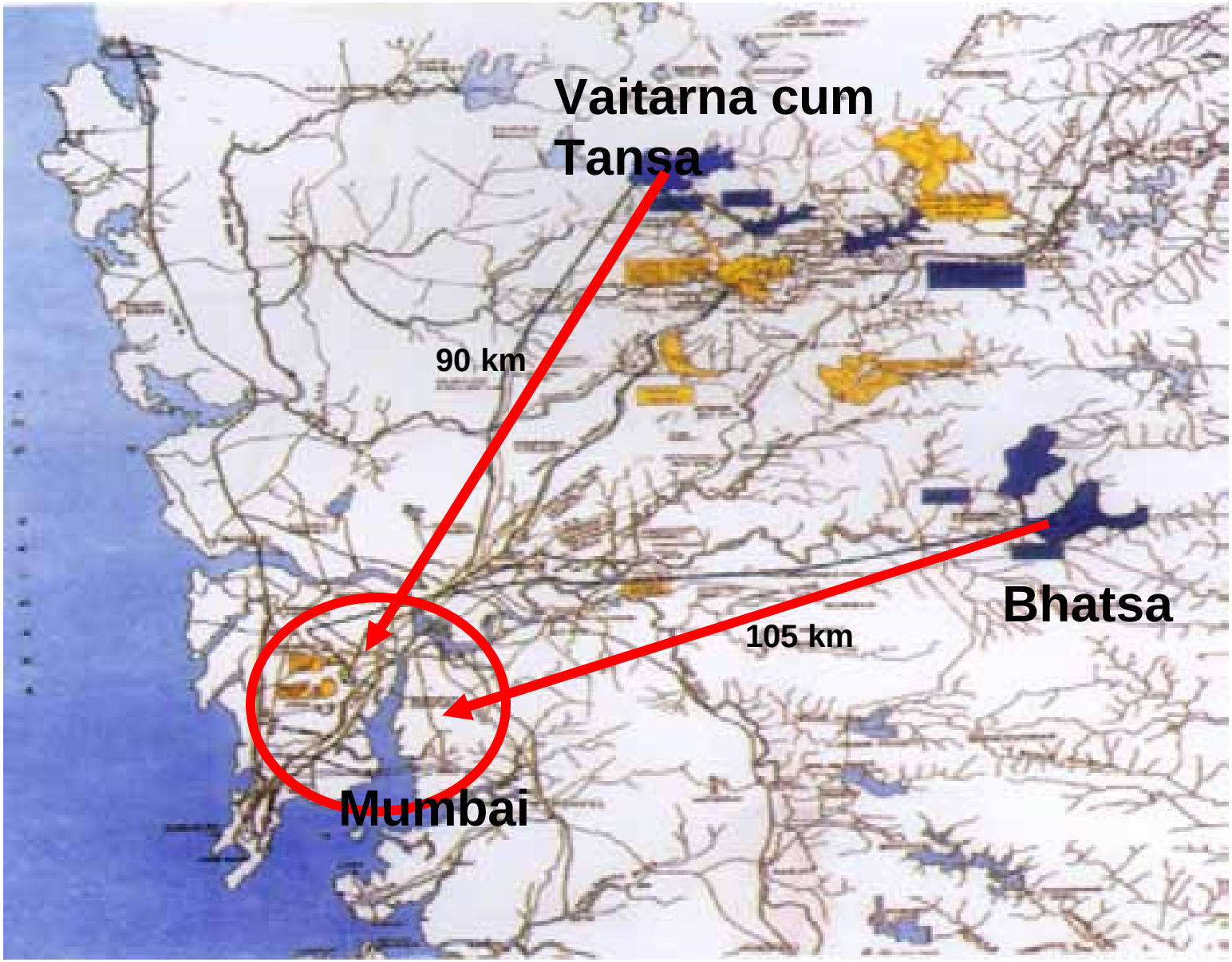
Delhi**: 450 to 500 km**
(from Tehri dam)



Catch water where it falls



Catch water where it falls



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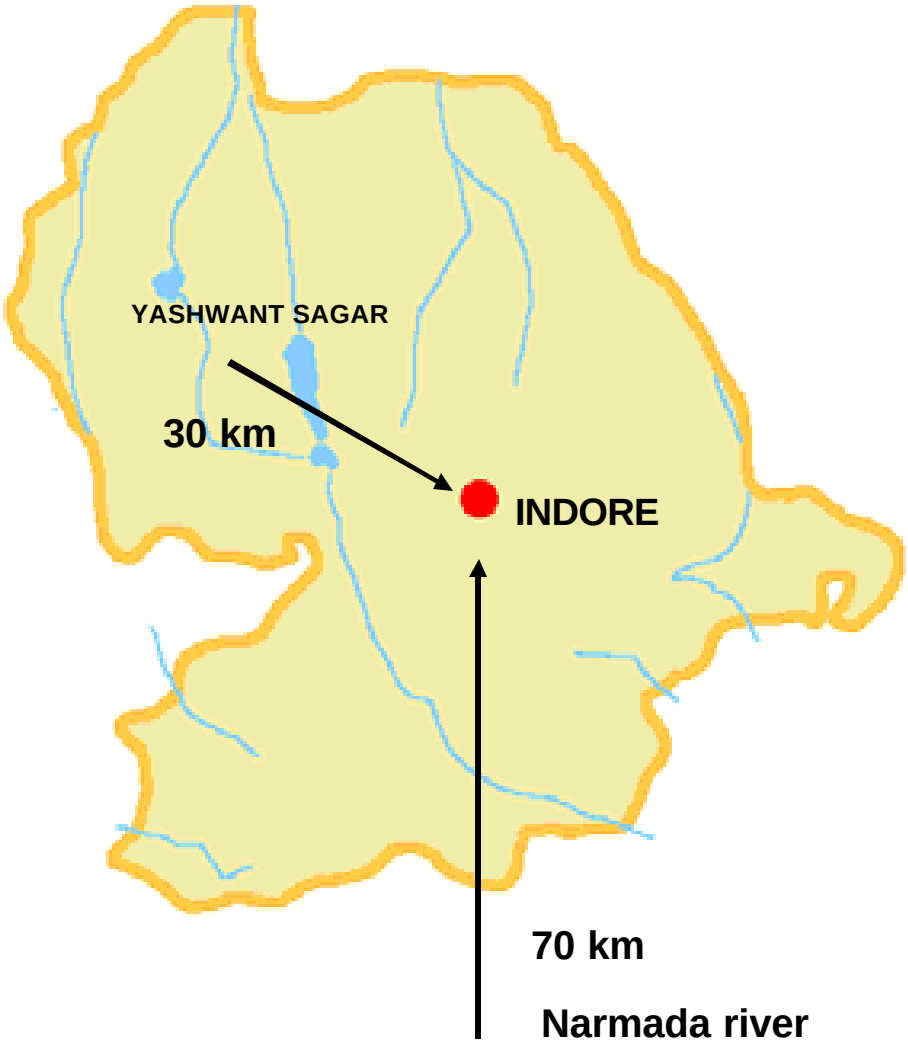

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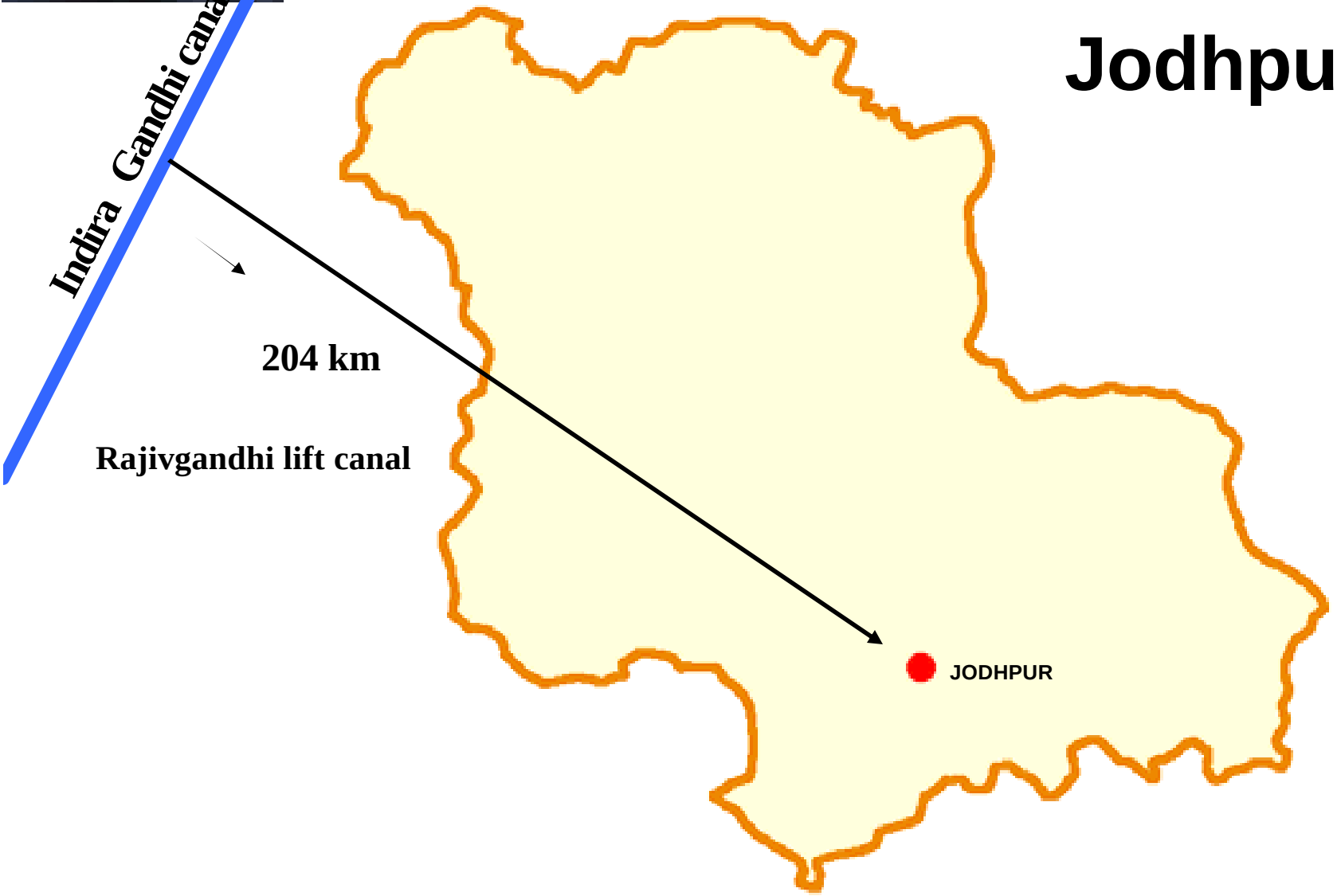


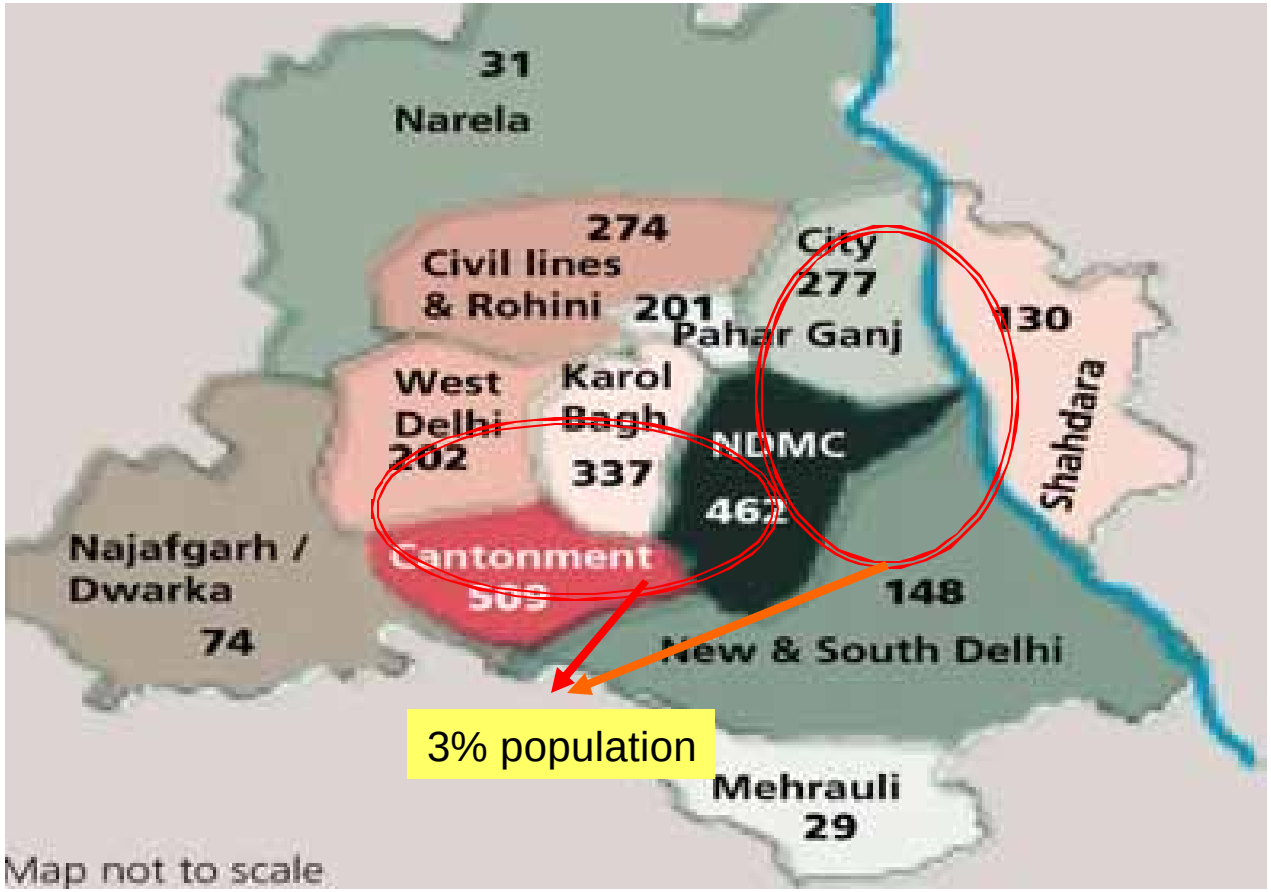
Jodhpur

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.



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**

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**

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..**

Subsidy to the rich to excrete in convenience.

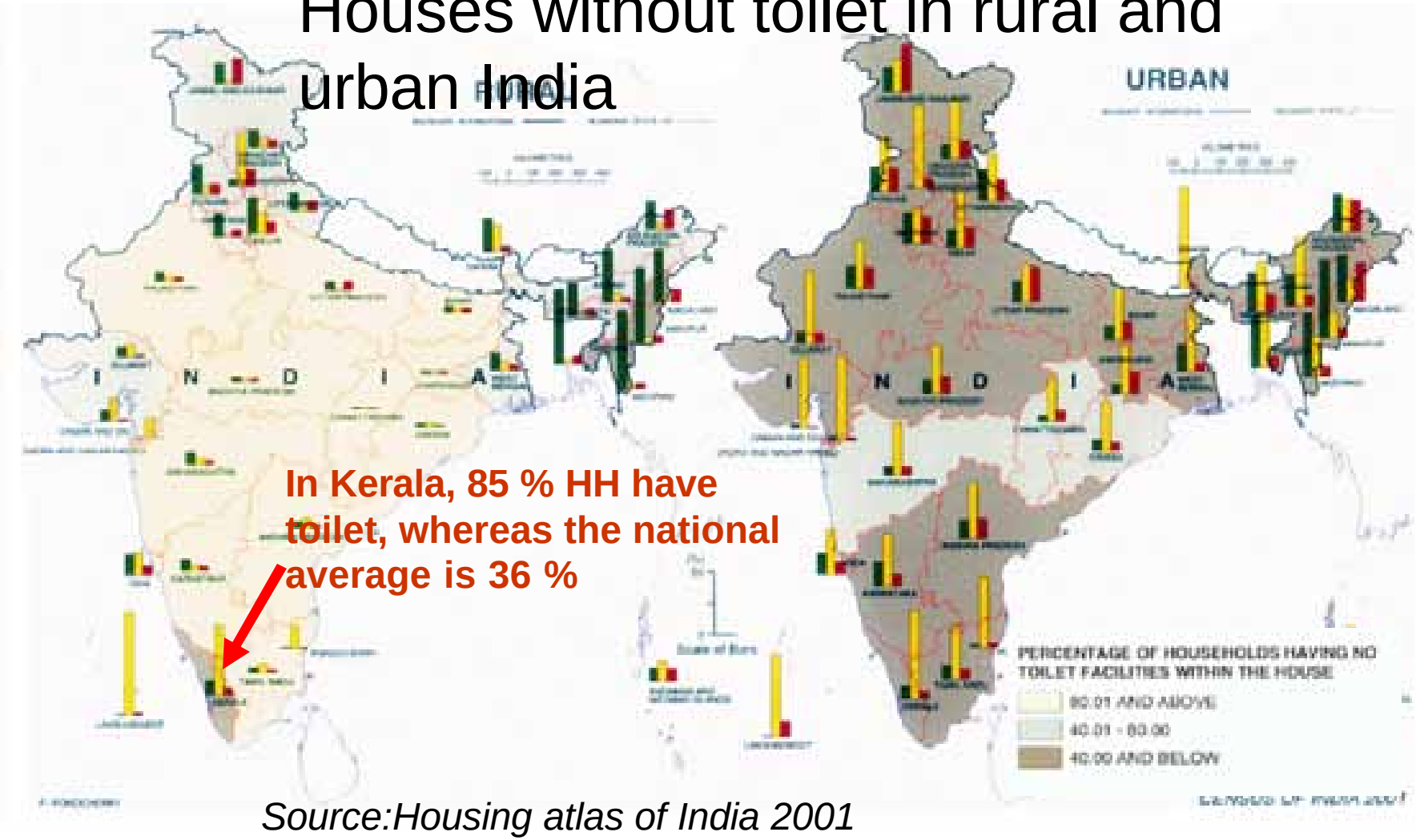
- **River action programmes. All sewage treatment plants built in river cleaning programmes as grants/loans/public investment.**
- **Even when capital cost paid. No money to run. Governments subsidises again.**
- **Massive subsidy to sewered populations. Polluters never pay**

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 nominally and only for some, not all**

Catch water where it falls

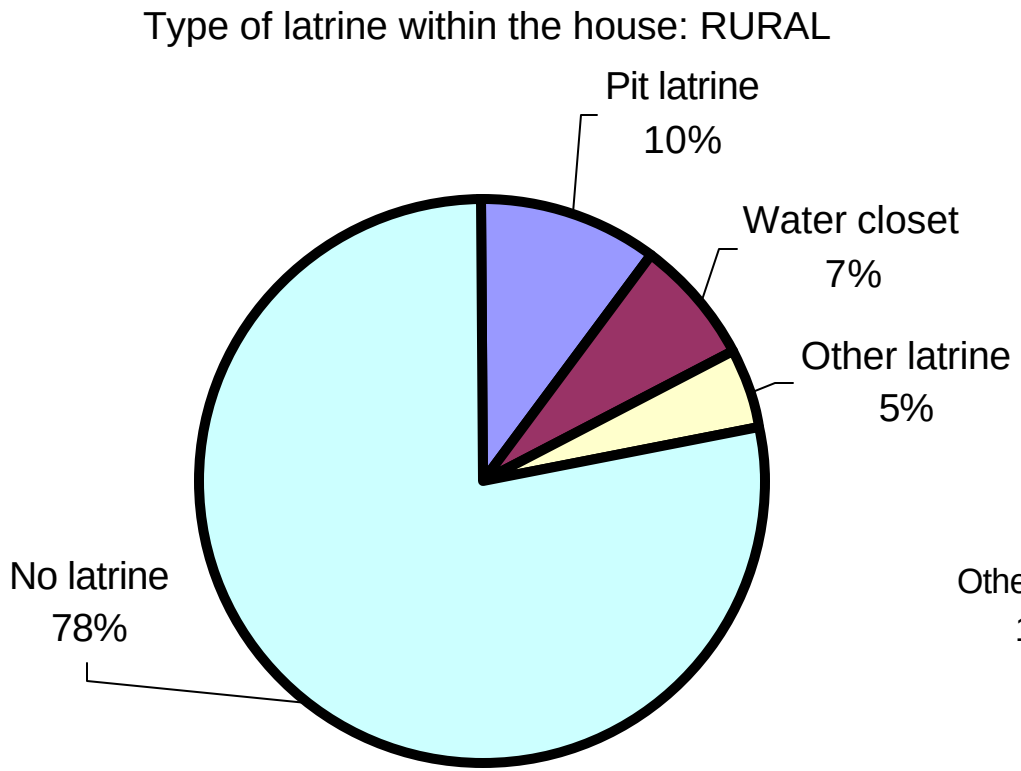
Houses without toilet in rural and urban India

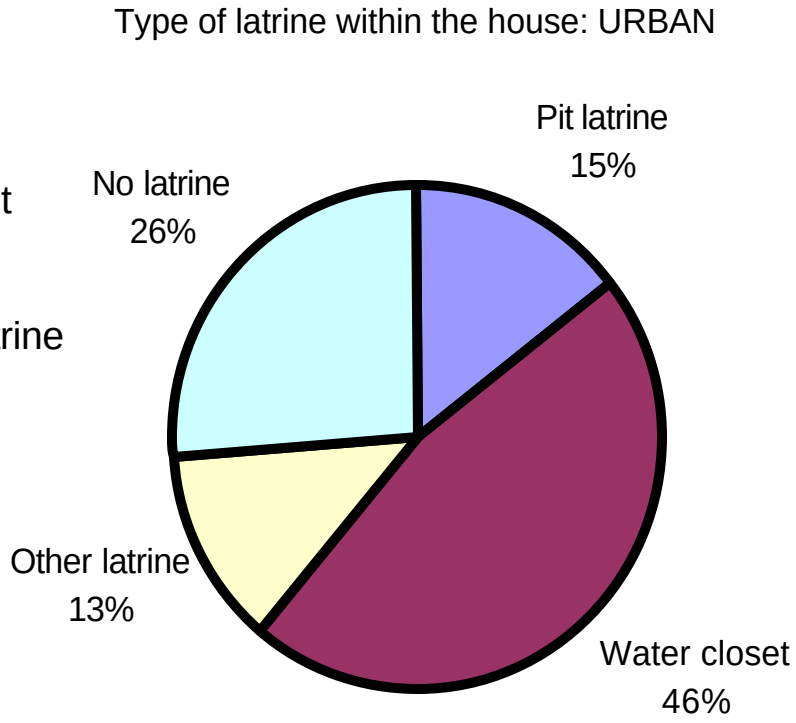


In Kerala, 85 % HH have toilet, whereas the national average is 36 %

Source:Housing atlas of India 2001

Toilets..


Type of latrine within the house: RURAL
Pit latrine
10%
Water closet
7%
Other latrine
5%
No latrine
78%

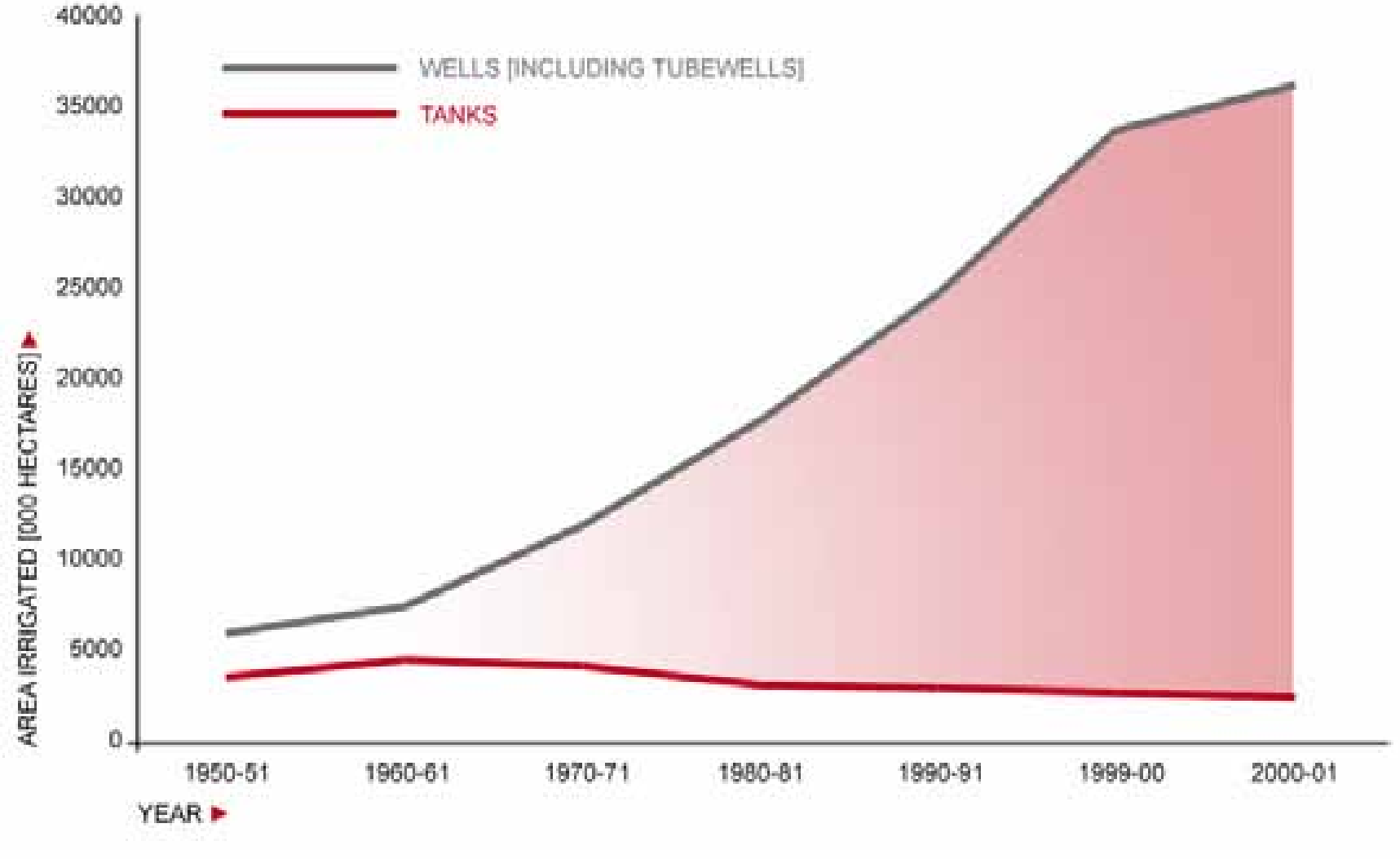

Type of latrine within the house: URBAN
Pit latrine
15%
No latrine
26%
Other latrine
13%
Water closet
46%

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.**

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.**

Potential of rainwater harvesting

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

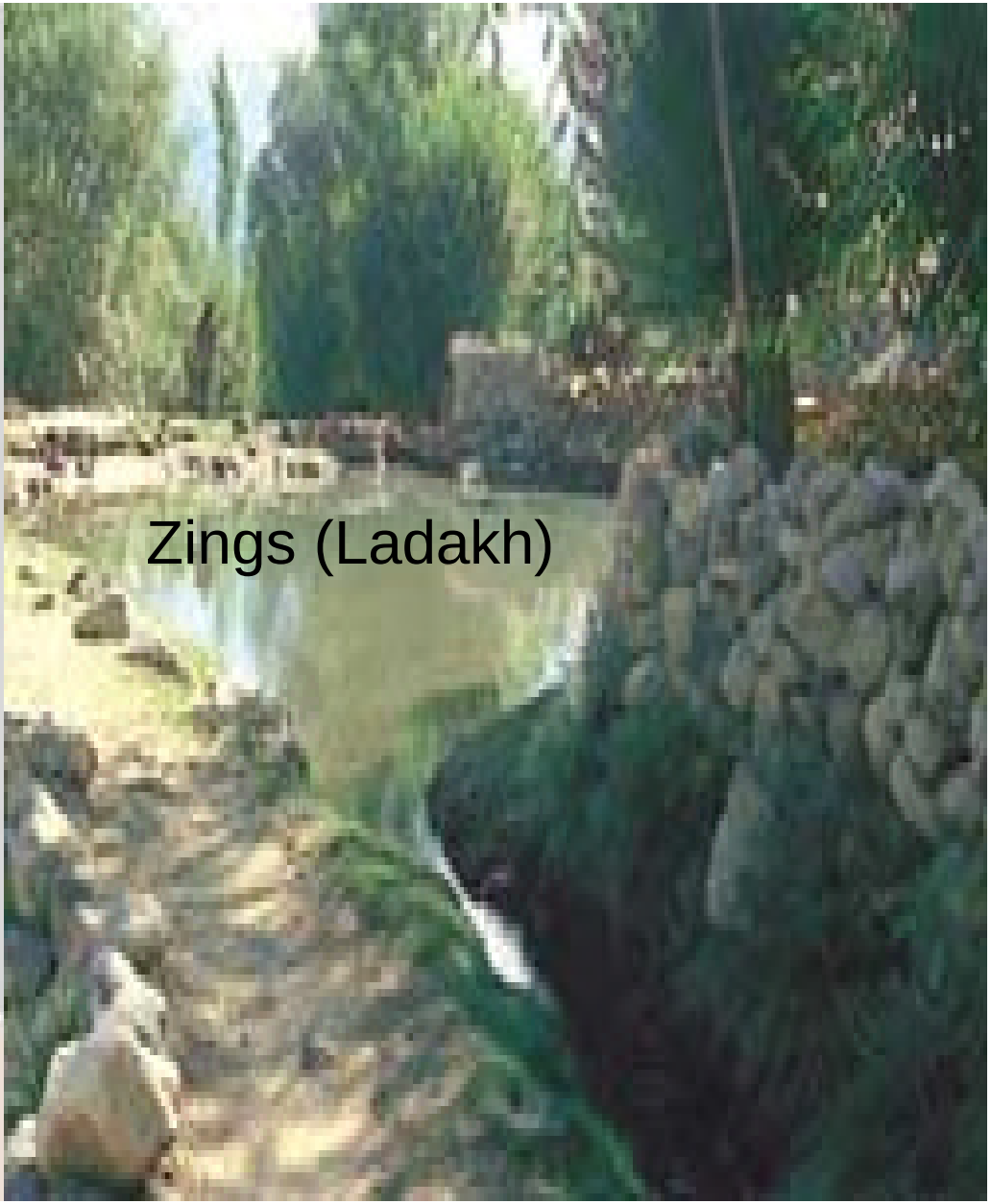
Rainwater harvesting is a key.
Hold rainwater when it falls.

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.**

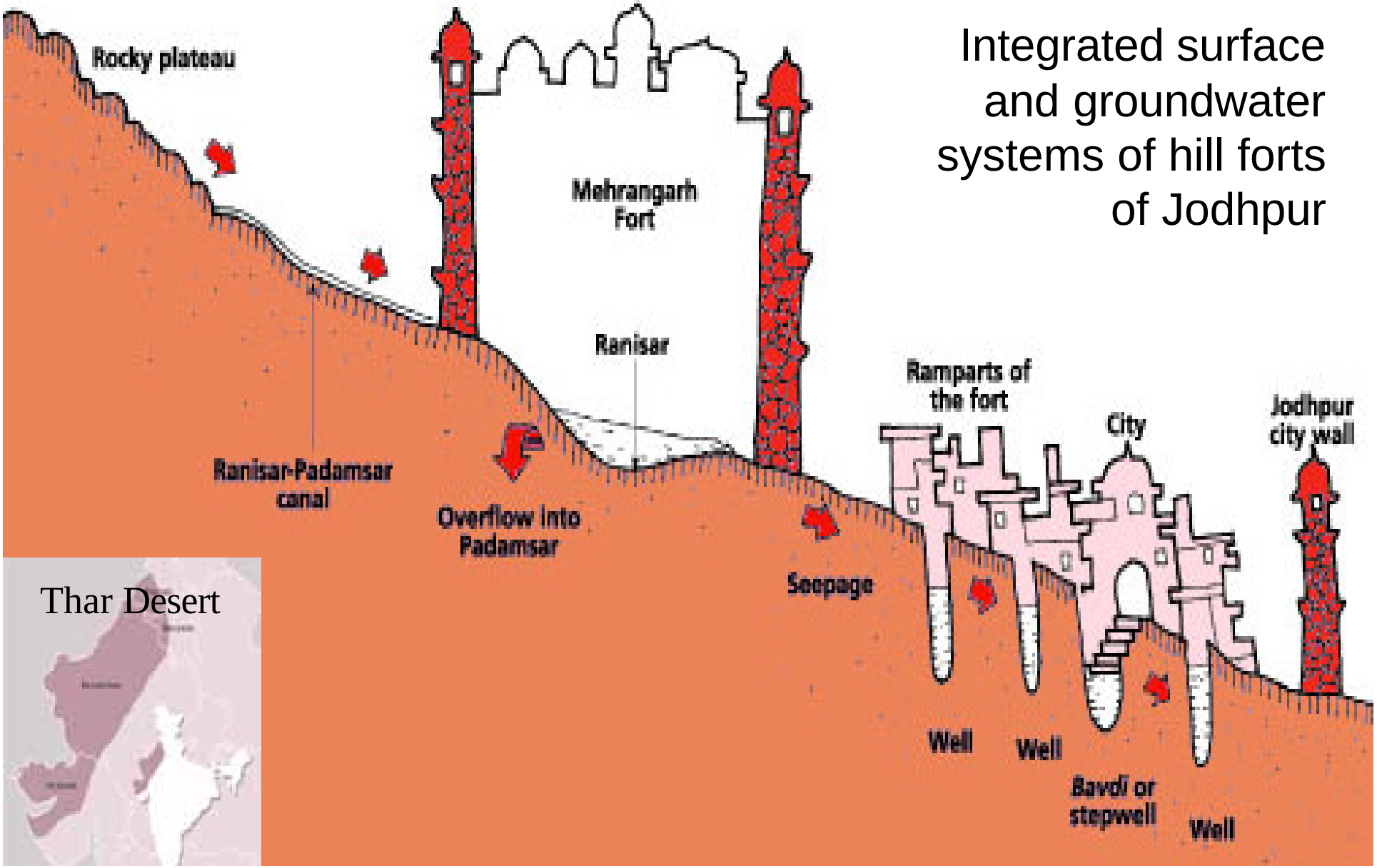
Catch water where it falls

Trans-Himalayan Region

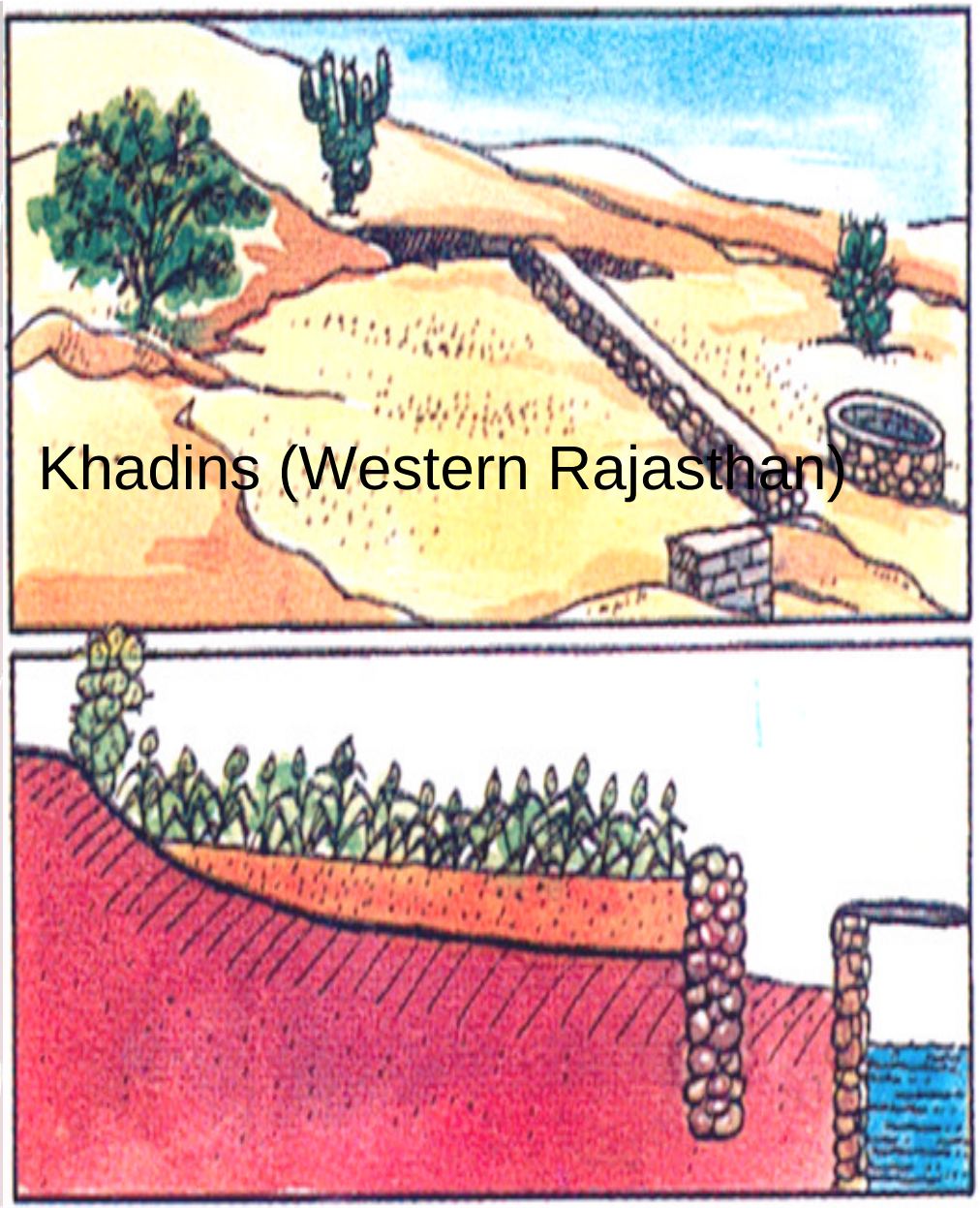


Catch water where it falls

Integrated surface and groundwater systems of hill forts of Jodhpur



Catch water where it falls

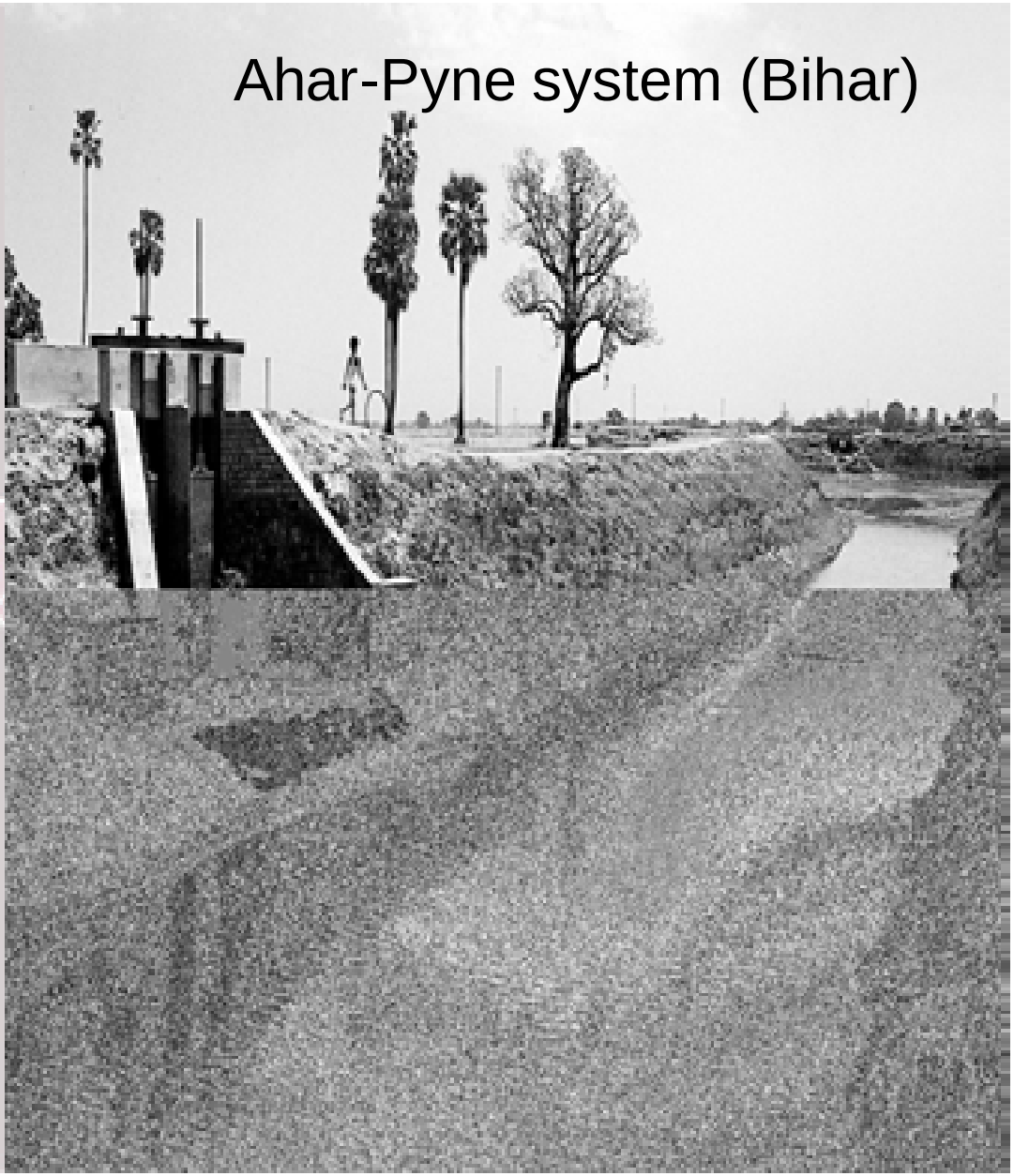


Khadins (Western Rajasthan)

Catch water where it falls

Indo-Gangetic Plains

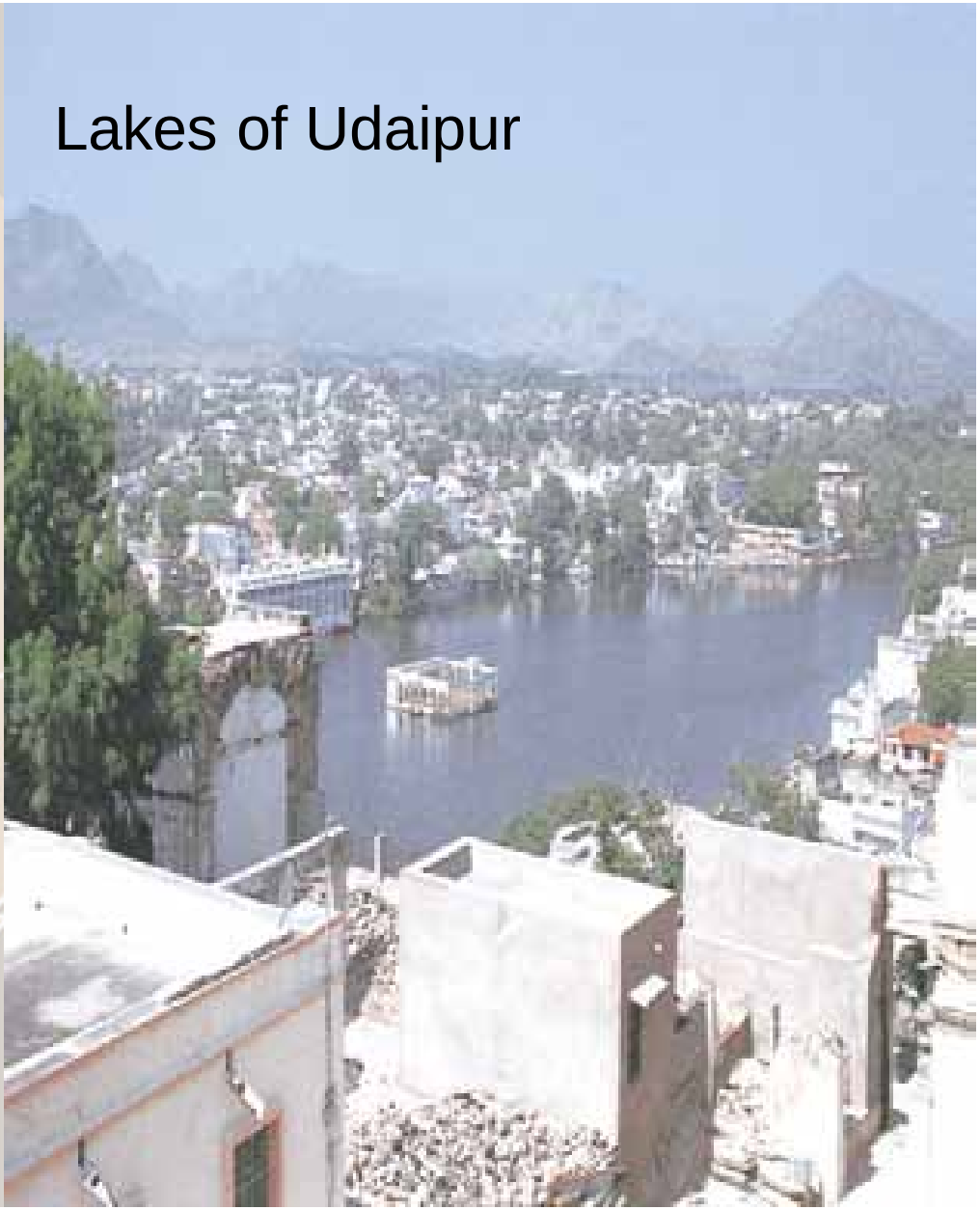
Ahar-Pyne system (Bihar)



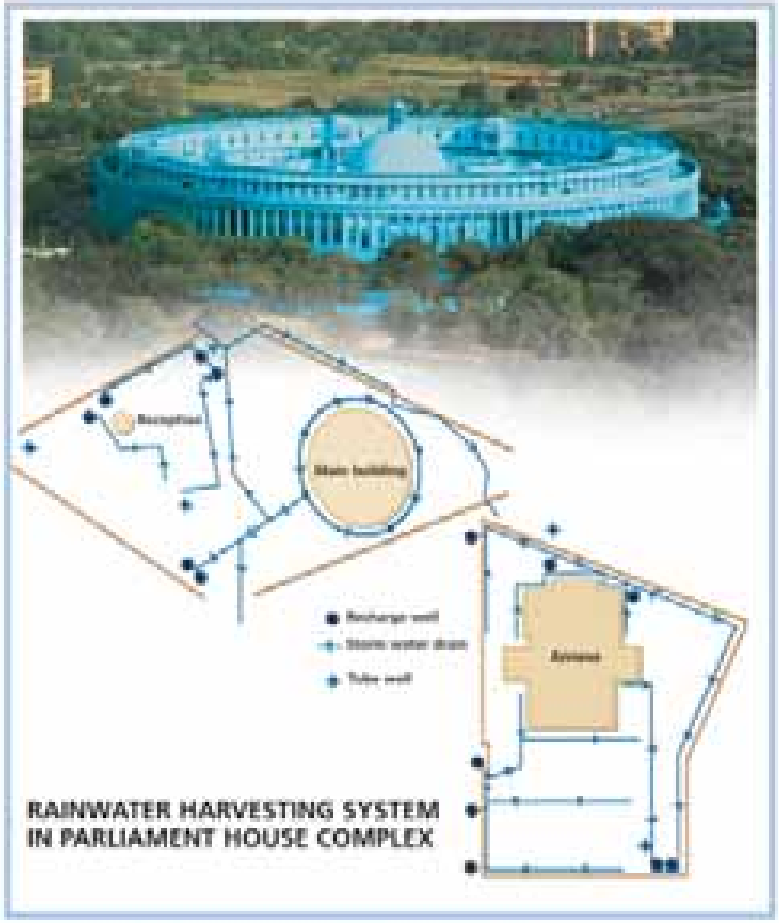
Catch water where it falls

Central Highlands

Lakes of Udaipur



Catch water where it falls



RAINWATER HARVESTING SYSTEM IN PARLIAMENT HOUSE COMPLEX

INDIA'S PARLIAMENT HARVESTS RAINWATER.

DO YOU?

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

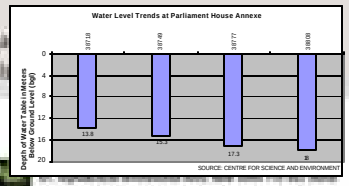
Lok Sabha Speaker Somnath Chatterjee invited the Centre for Science and Environment to provide technical assistance for a rainwater harvesting project at the Parliament House complex. The scheme was designed and implemented by the Central Ground Water Board and the Central Public Works Department.

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 dra
It seeps into the ground through 14 recharge well



"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

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

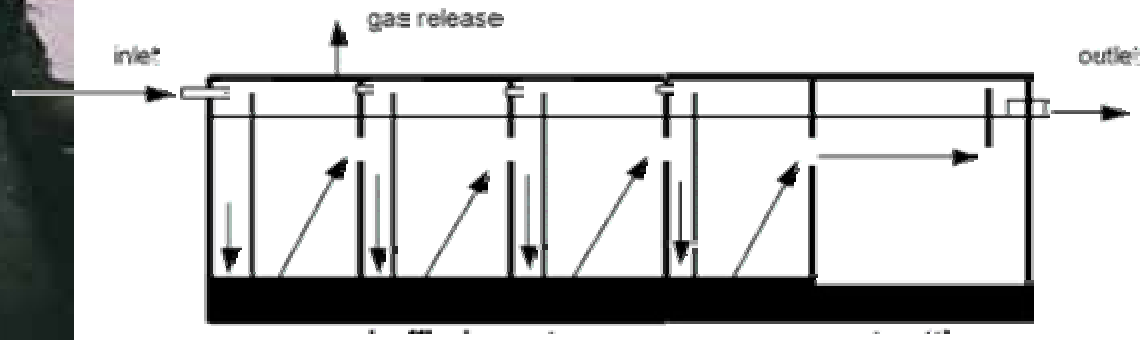
for urban areas
with case studies

CENTRE FOR SCIENCE AND ENVIRONMENT

Catch water where it falls

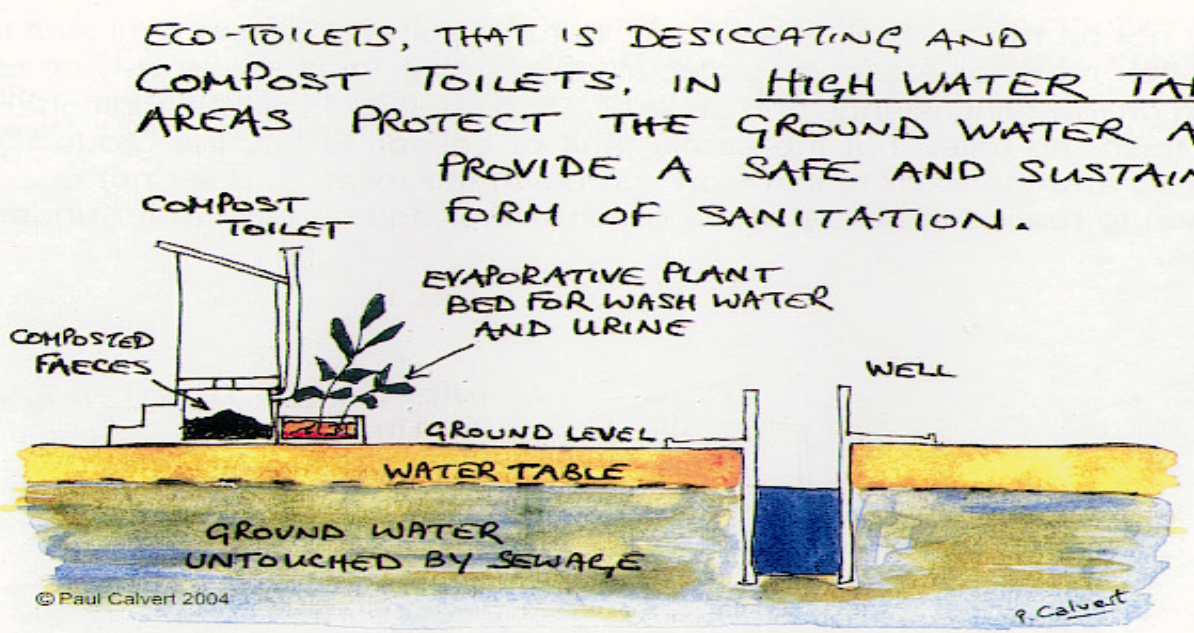
Anaerobic baffled reactor >

Primary treatment **>** CSE building



Eco sanitation > Principle

Eco-Toilets in High Water Table



Ecosan Vs Conventional

- 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

- 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

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