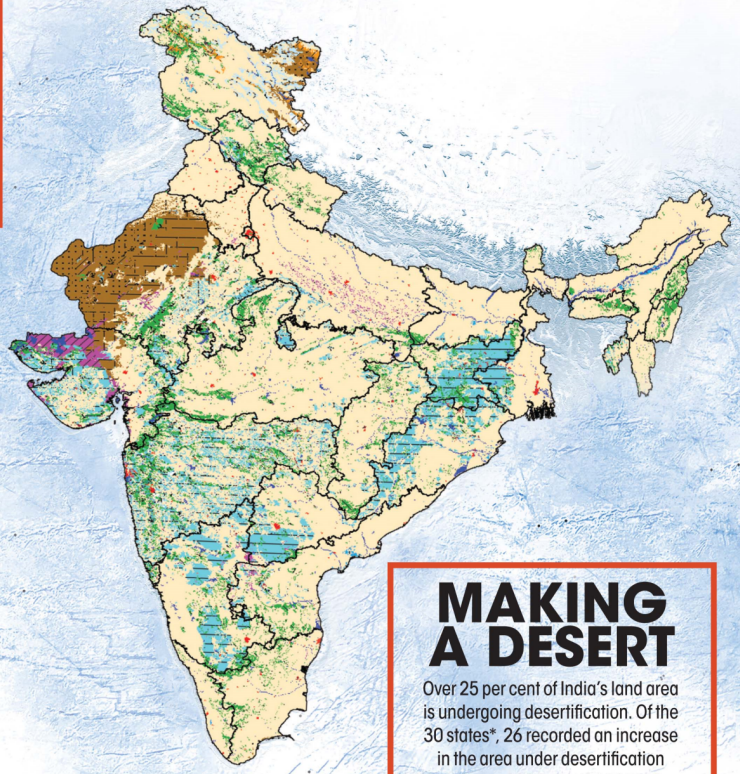
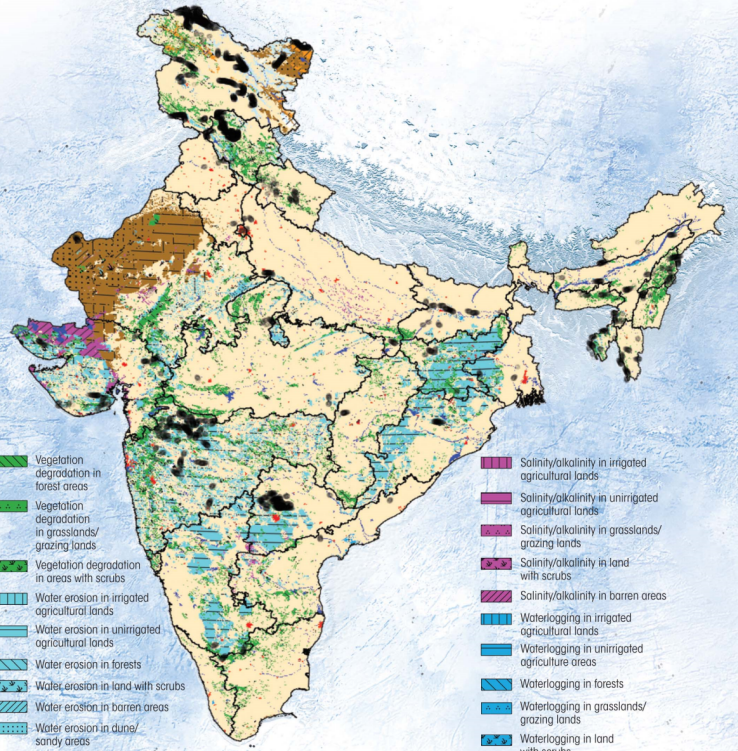
Water security in an age of climate risk: learning from traditional knowledge

Sunita Narain

CSE

2003-2005 2011-2013





Areas where land degradation severity has deteriorated or new land has been degraded between 2003-05 and 2011-13

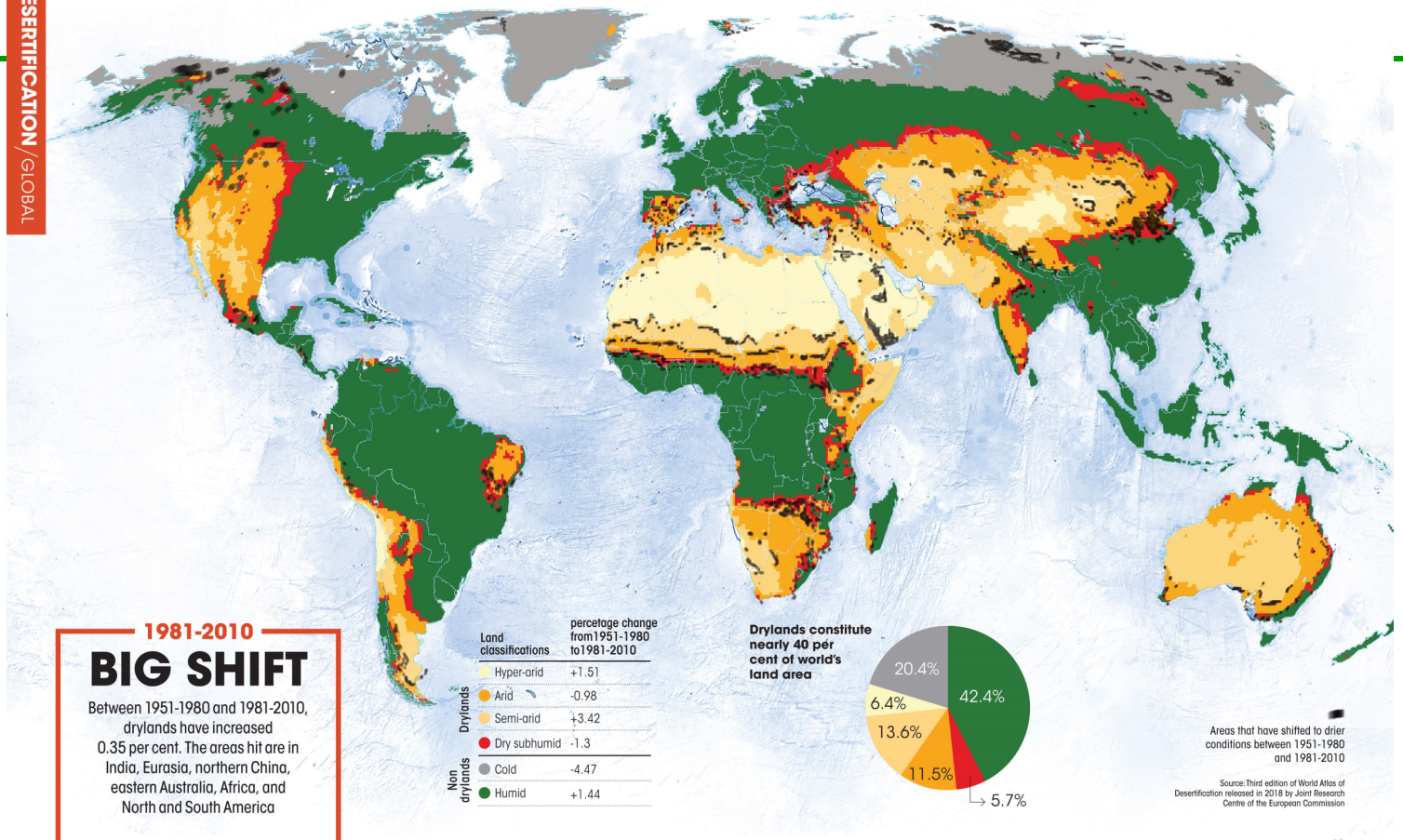
Source: Desertification and Land Degradation Atlas of India released in June 2016 by the Indian Space Research Organisation

MAKING A DESERT

Over 25 per cent of India's land area is undergoing desertification. Of the 30 states*, 26 recorded an increase in the area under desertification between 2003-05 and 2011-13

* includes Delhi and Jammu & Kashmir

- Vegetation degradation in forest areas
- Vegetation degradation in grasslands/ grazing lands
- Vegetation degradation in areas with scrubs
- Water erosion in irrigated agricultural lands
- Water erosion in unirrigated agricultural lands
- Water erosion in forests
- Water erosion in land with scrubs
- Water erosion in barren areas
- Water erosion in dune/ sandy areas
- Wind erosion in irrigated agricultural land
- Wind erosion in unirrigated agricultural lands
- Wind erosion in land with scrubs
- Wind erosion in barren areas
- Wind erosion in dune/ sandy areas
- Drainage in waterbody
- Salinity/alkalinity in irrigated agricultural lands
- Salinity/alkalinity in unirrigated agricultural lands
- Salinity/alkalinity in grasslands/ grazing lands
- Salinity/alkalinity in land with scrubs
- Salinity/alkalinity in barren areas
- Waterlogging in irrigated agricultural lands
- Waterlogging in unirrigated agriculture areas
- Waterlogging in forests
- Waterlogging in grasslands/ grazing lands
- Waterlogging in land with scrubs
- Waterlogging in dune/sandy areas
- Mass movement in barren areas
- Frost shattering in periglacial areas
- Frost shattering in rocky areas
- Humanmade activities in forests
- Humanmade activities in other areas
- Barren areas
- Rocky areas
- Settlements
- No apparent degradation



1981-2010

BIG SHIFT

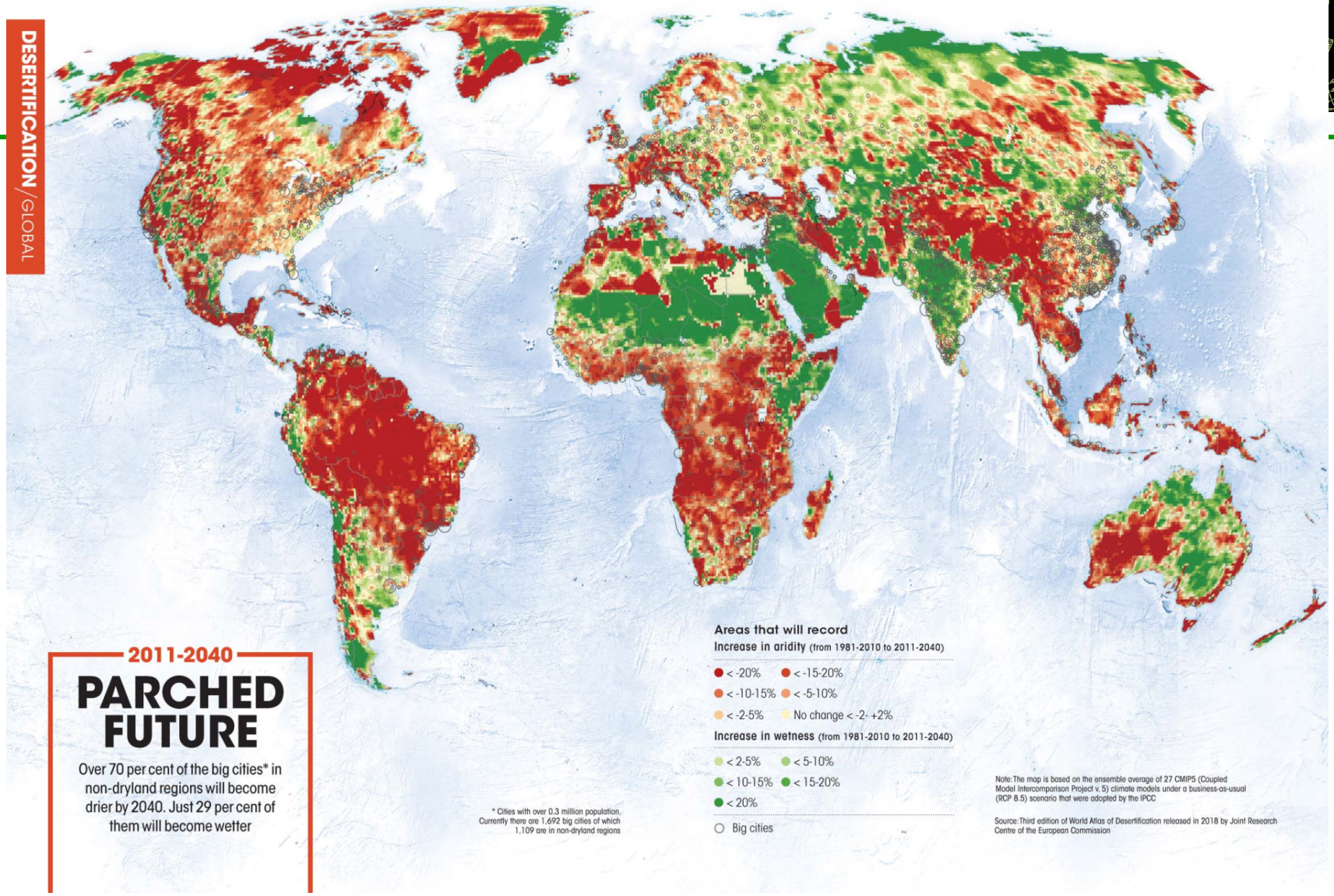
Between 1951-1980 and 1981-2010, drylands have increased 0.35 per cent. The areas hit are in India, Eurasia, northern China, eastern Australia, Africa, and North and South America

	Land classifications	percetage change from1951-1980 to1981-2010
Drylands	Hyper-arid	+1.51
	Arid	-0.98
	Semi-arid	+3.42
	Dry subhumid	-1.3
Non drylands	Cold	-4.47
	Humid	+1.44

Drylands constitute nearly 40 per cent of world's land area

Areas that have shifted to drier conditions between 1951-1980 and 1981-2010

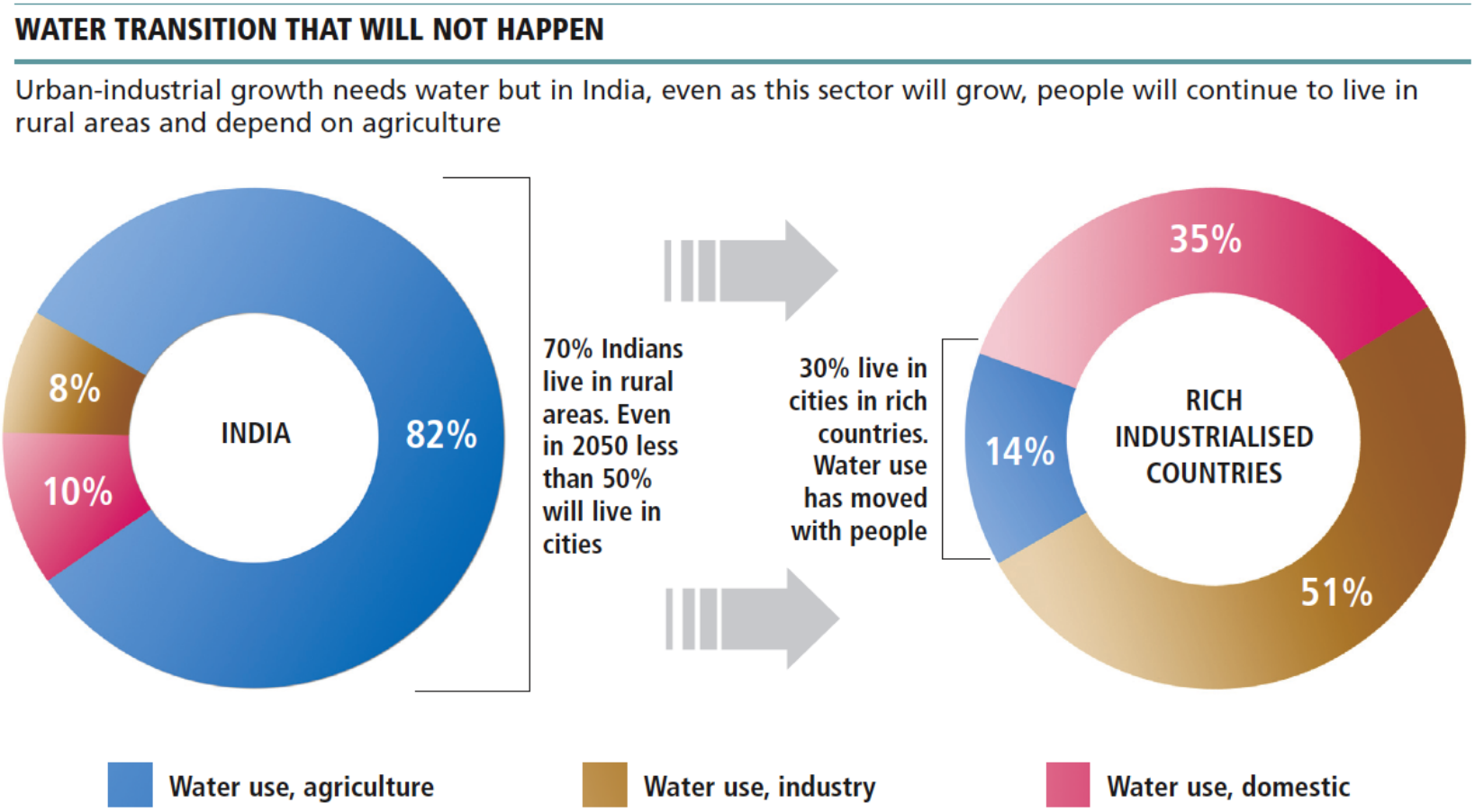
Source: Third edition of World Atlas of Desertification released in 2018 by Joint Research Centre of the European Commission


2011-2040
PARCHED FUTURE
Over 70 per cent of the big cities* in non-dryland regions will become drier by 2040. Just 29 per cent of them will become wetter
* Cities with over 0.3 million population. Currently there are 1,692 big cities of which 1,109 are in non-dryland regions
Areas that will record
Increase in aridity (from 1981-2010 to 2011-2040)
< -20%
< -15-20%
< -10-15%
< -5-10%
< -2-5%
No change < -2- +2%
Increase in wetness (from 1981-2010 to 2011-2040)
< 2-5%
< 5-10%
< 10-15%
< 15-20%
< 20%
Big cities
Note: The map is based on the ensemble average of 27 CMIP5 (Coupled Model Intercomparison Project v. 5) climate models under a business-as-usual (RCP 8.5) scenario that were adopted by the IPCC
Source: Third edition of World Atlas of Desertification released in 2018 by Joint Research Centre of the European Commission

Agenda for **water future**

- Management of **competing demands** – between agriculture and industry
- Management of **risk** – untimely and deficient rain
- Management of **pollution** – ensuring water is not degraded and so unusable

India will not follow transition of rich world – people move to cities; economies move to service-industry; water moves with it



Secure water for growth

- Agriculture will remain critical for livelihoods – 60% dependence
- But cities-industries will grow. Will need water for growth
- Unless we manage competing needs; violence will grow
- Already cases of protest and police firing over water allocation to industry or city

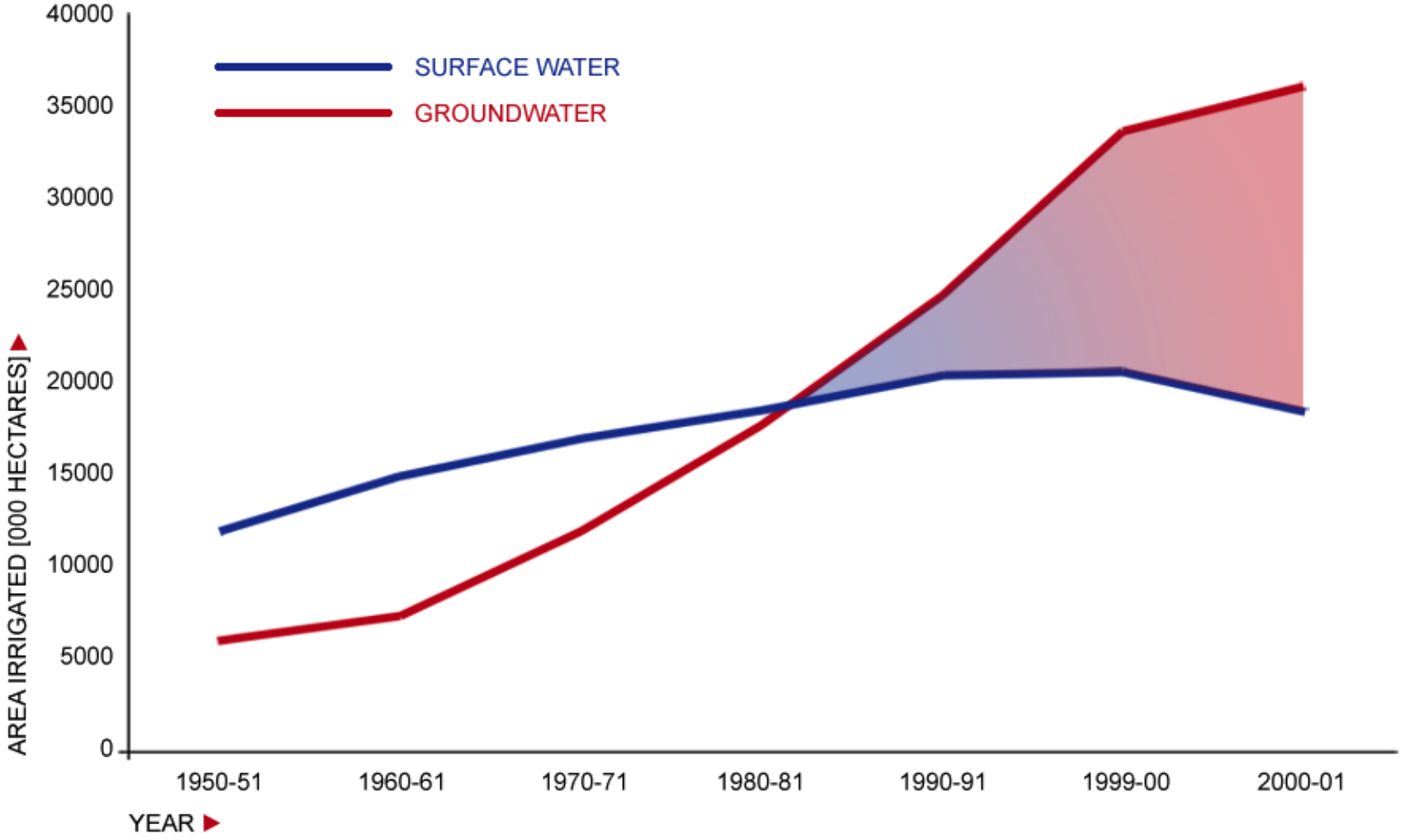
Augment supply

- Water for agriculture must be secured
- Recognise groundwater provides bulk of irrigation
- Recognise there are over 19 million well owners – they take decisions on water
- They are more efficient in use
- But crisis is growing – **groundwater levels falling**

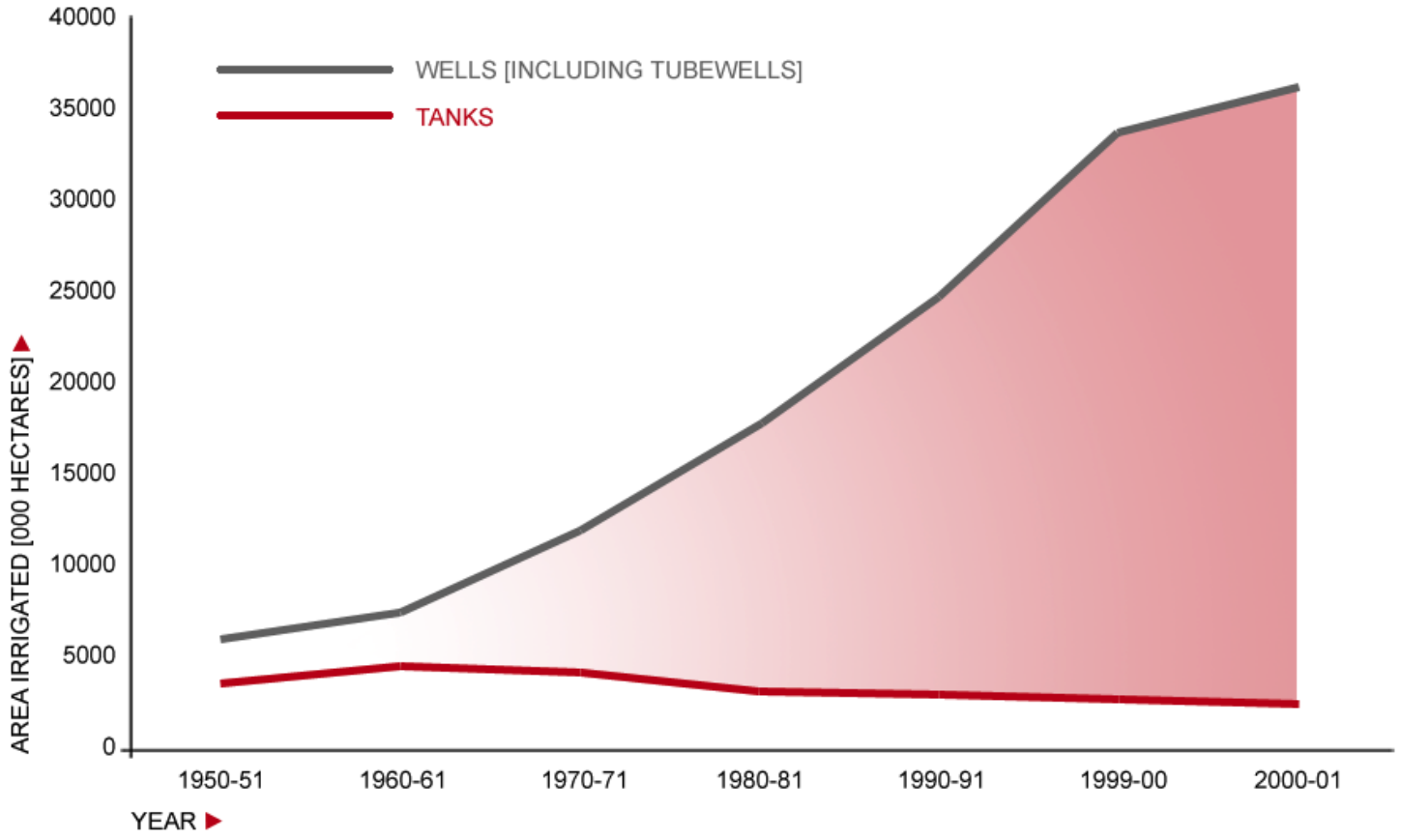
Groundwater: needs recharge

- Recognise recharge is critical
- Large reservoirs centralize recharge
- **But rain is decentralised**…

Groundwater irrigates more land than surface water



But structures for decentralised recharge have gone



Water flows fast

- Out of 8760 hours in a year, most of the rain in India falls in just 100 hours

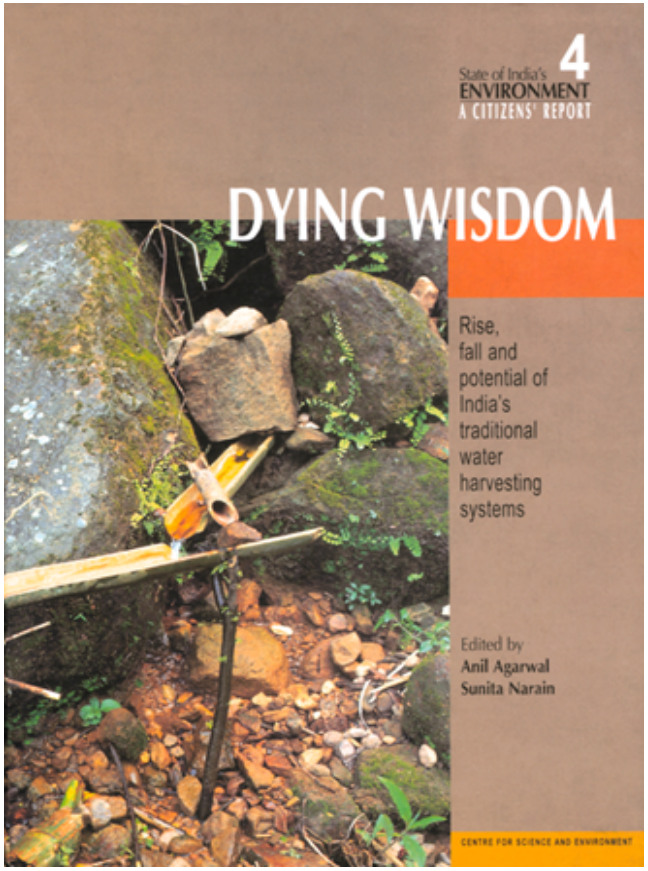
- The solution is in **extending the monsoon**
  By capturing, storing, recharging and then using the bounty over the dry periods

Learning from traditions…

In 1997 we published Dying Wisdom:

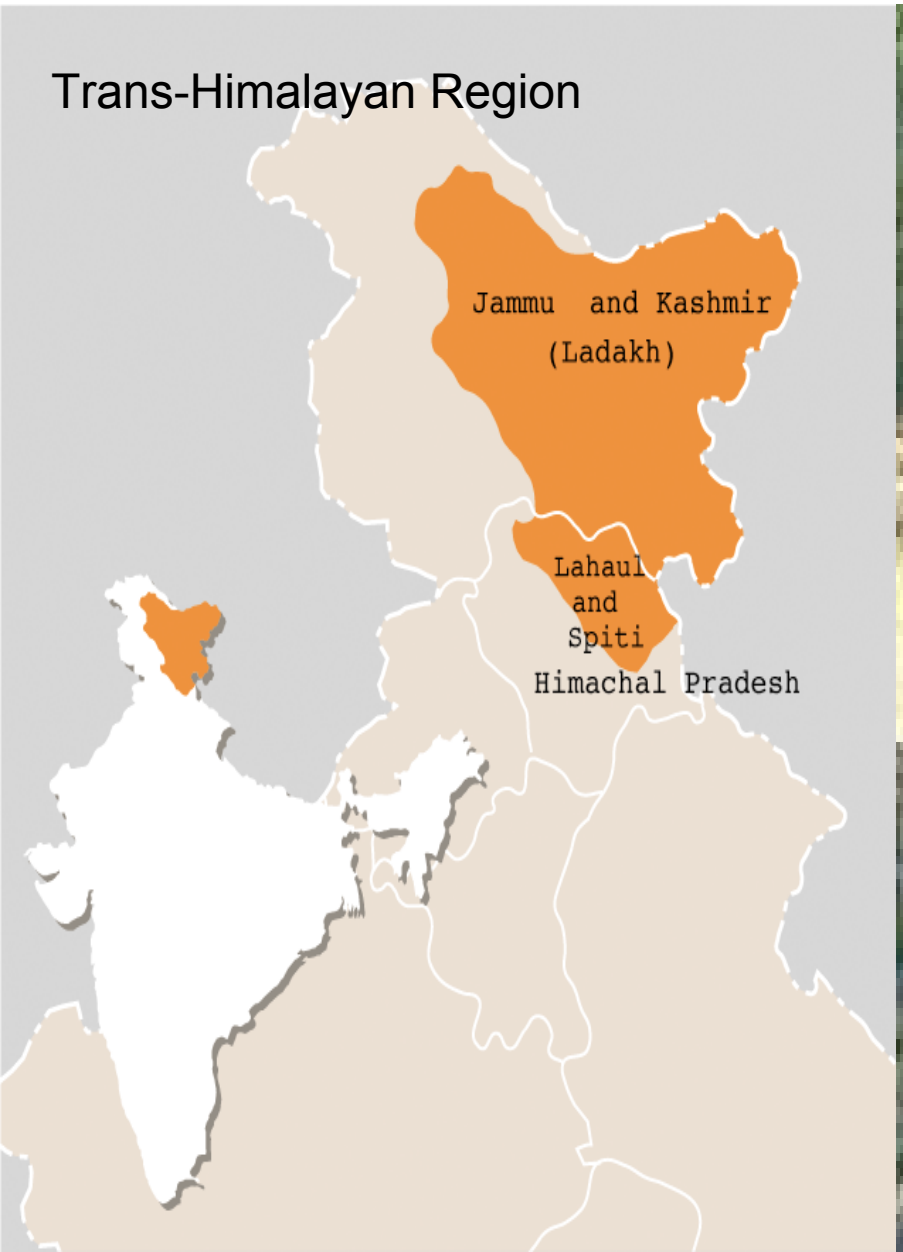
Rich learning of our traditions.

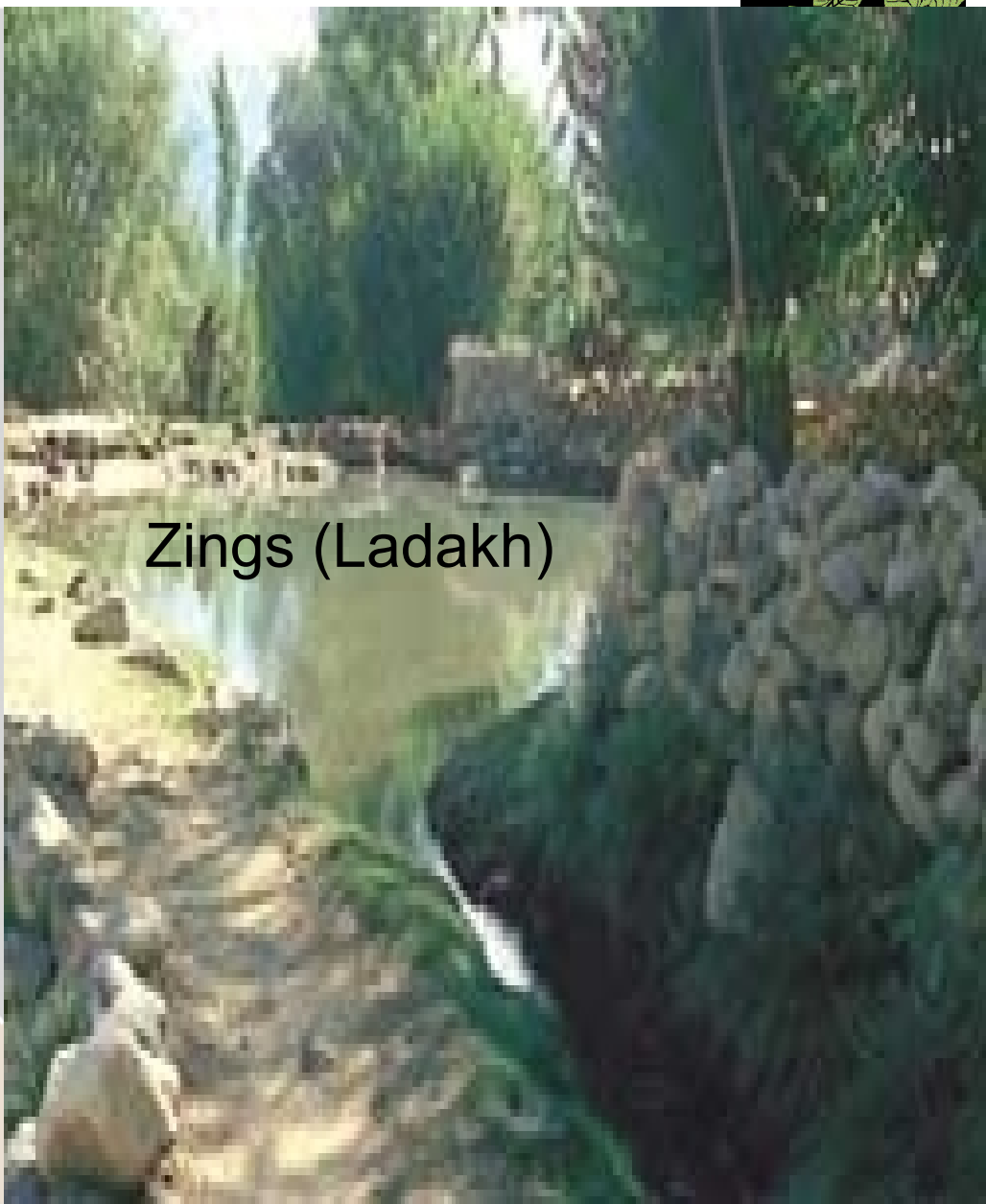
Enormous diversity, technological sophistication. Each region had its own system to hold, capture rain. *Zings, ahars, johads, tankas, phad*…..

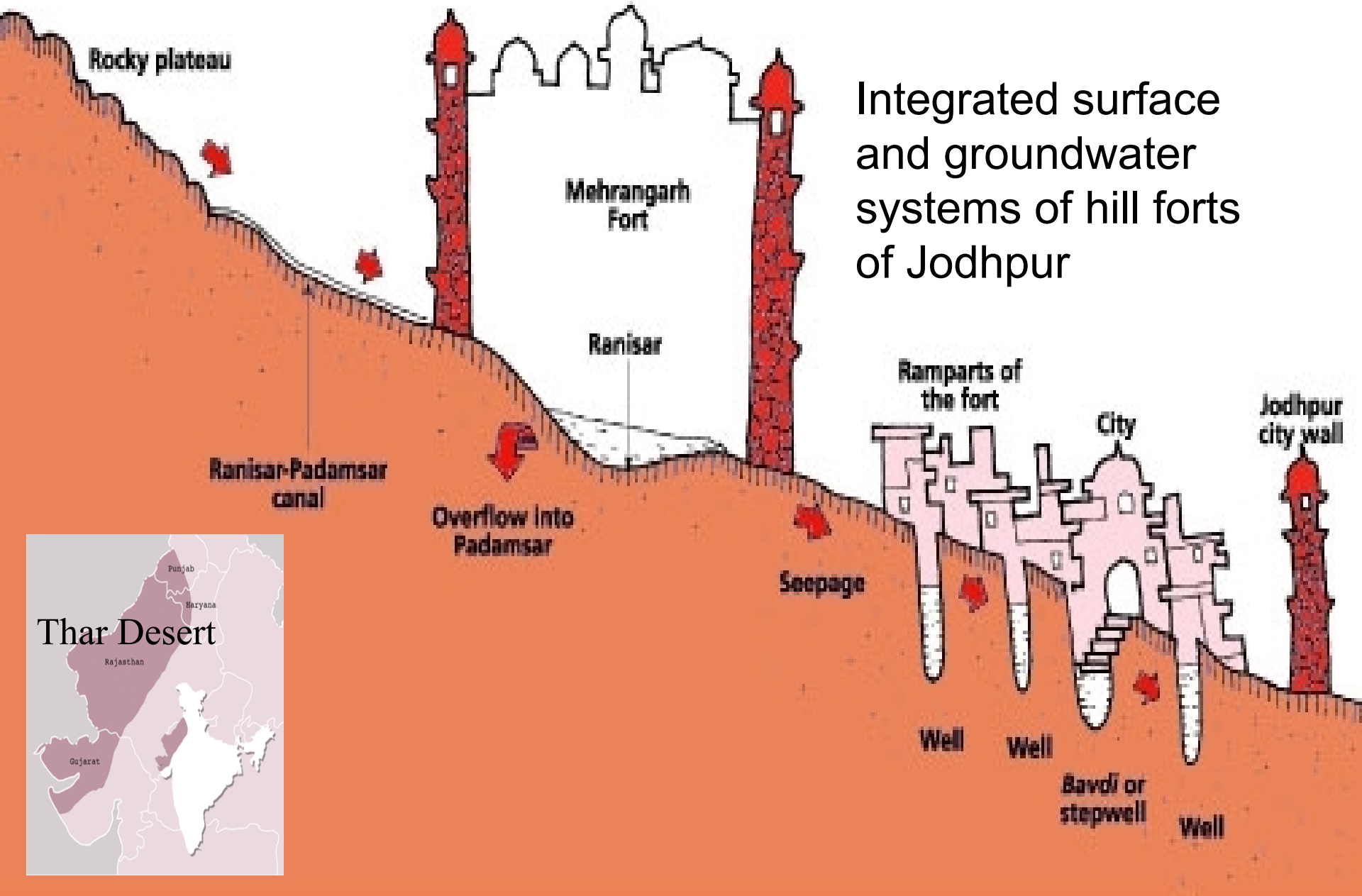


Catch water where it falls

Every region; its own water wisdom

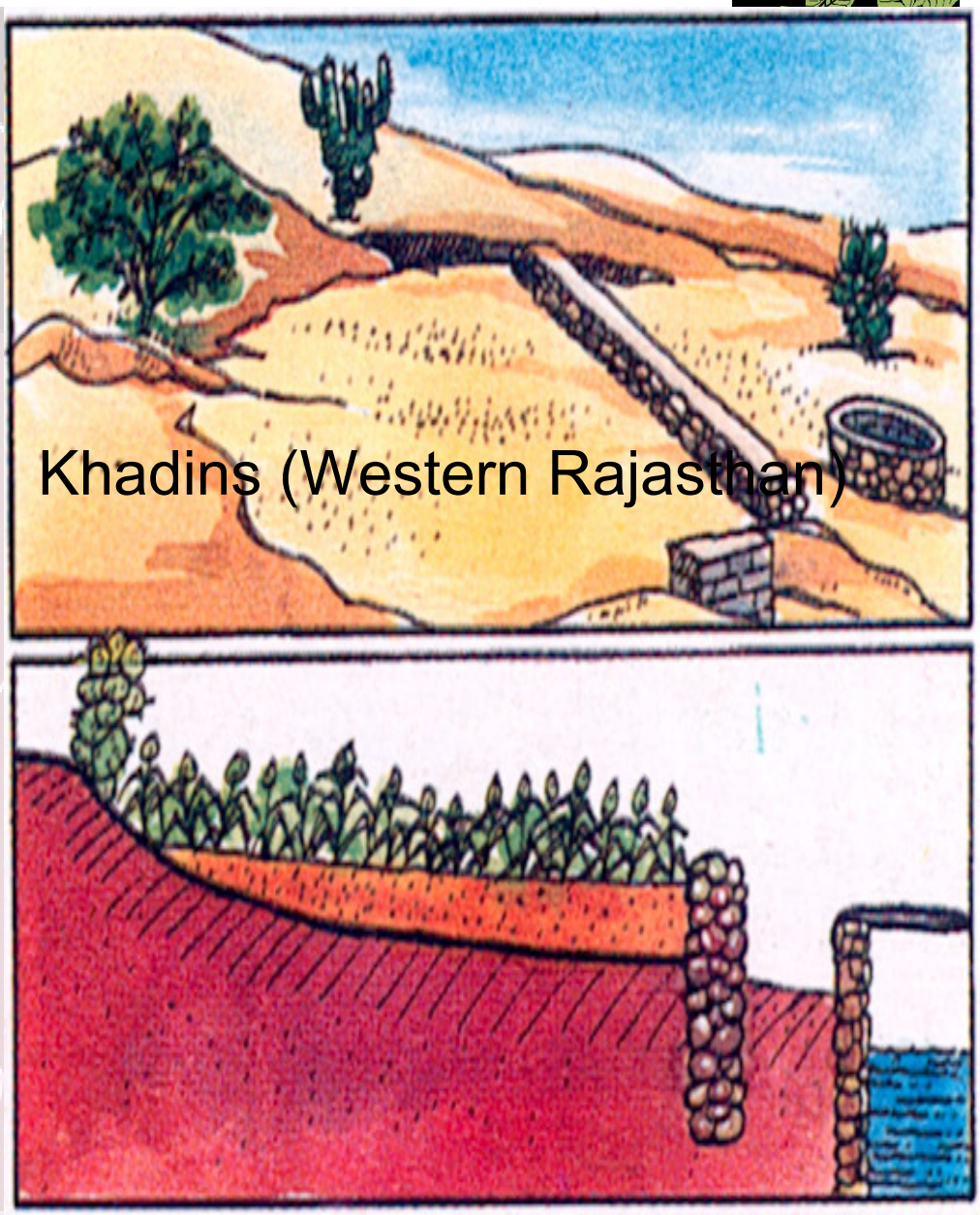




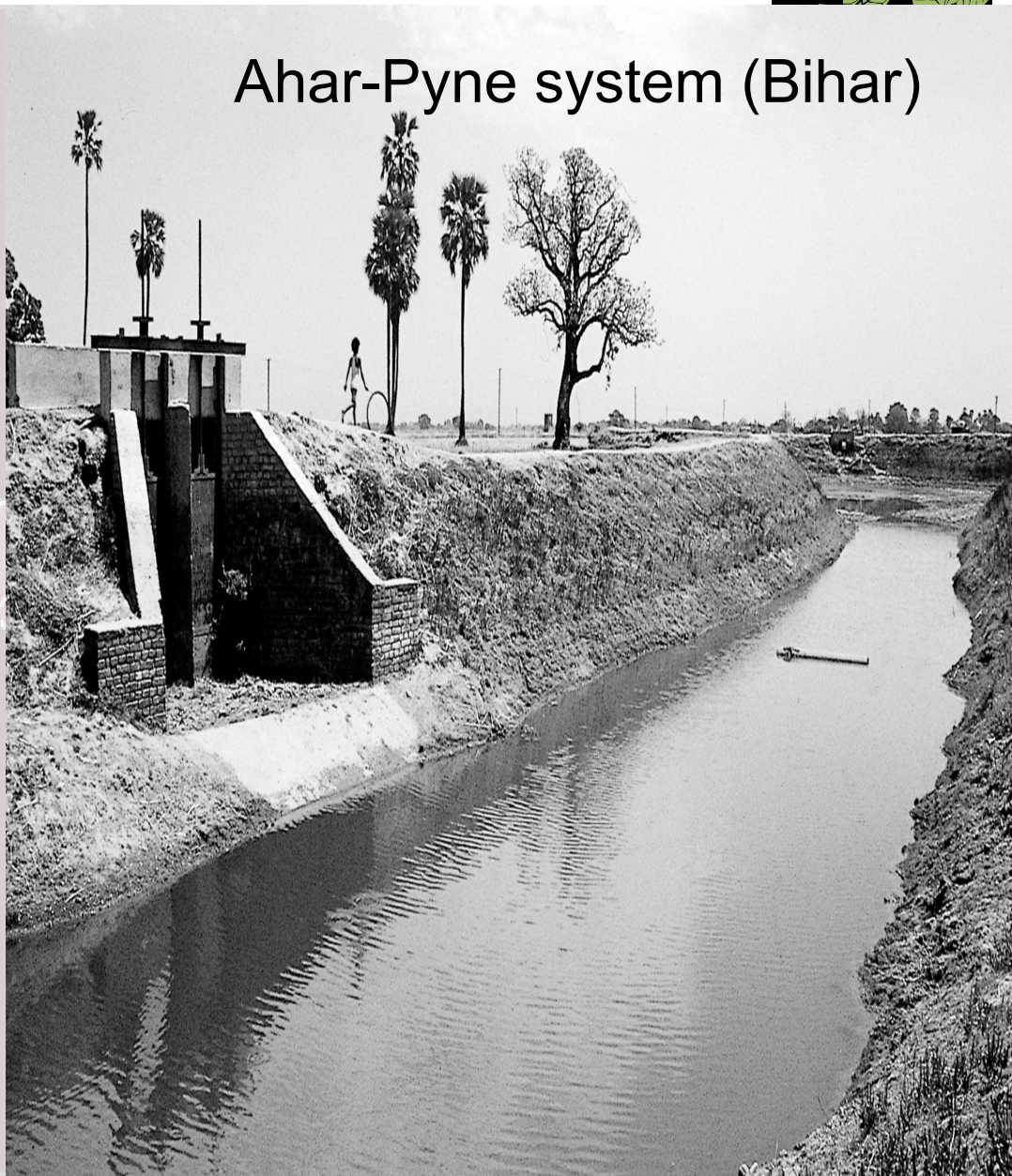


Integrated surface and groundwater systems of hill forts of Jodhpur


Punjab
Haryana
Thar Desert
Rajasthan
Gujarat


Khadins (Western Rajasthan)


Indo-Gangetic
Plains
Punjab
Haryana
Uttar
Pradesh
Bihar
West
Bengal


Ahar-Pyne system (Bihar)

Cascade tanks of South India – engineering marvels

Water security in new age

- Build millions of water recharge structures to improve productivity
- India's employment guarantee programme needs to be targeted to building durable assets
- But this is not enough

Link water with resilience

- Increase of productivity has to low-cost
- Higher cost, higher risk, higher loss
- Need multiple crops; need crops that are water resilient; need systems of agriculture that can improve coping abilities of farmers

Resilience is not technology

- Water is about cropping pattern
- Water is about food we eat
- **Diets are about food we are ‘sold’**
- Need to make this link
- Need to change nature of food industry in climate risked world

- **Not just rural..urban areas also need to learn the value of the raindrop; protect drainage and manage waste**

Mumbai > flood cushions built up; Entire city went under water