

# Indian Irrigation in Transition:

Growing Disconnect between  
Public Policy and Private Enterprise

Tushaar Shah

[t.shah@iwmi.org](mailto:t.shah@iwmi.org)



# Highlights

Indian irrigation is like a palimpsest with old scripts making room for new ones: individual Farmer is displacing the State and the community as architect, Builder and manager of irrigation.

Despite massive investments, public & community irrigation commands are Shrinking because of widening rift between surface irrigation technology and India's changing socio-technical fundamentals.

It will not help if irrigation institutions reform. Public Irrigation systems Need to morph to make water-scavenging irrigation sustainable. They Can do this by turning *demand-driven*.

Ostrich-like, Indian irrigation policy keeps building more canal Irrigation and promote fairy-tale institutional reforms. But it has little to do with India's *real* irrigation economy.

An irrigation policy that can shape India's *real* irrigation economy Will need to understand its underbelly and pursue an IWRM ***but*** of a Uniquely Indian variety.

# Evolution of Indian Irrigation: Era of adaptive irrigation-upto 1830

- *Community was the unit of irrigation management*

% Contribution to aggregate  
Farm output and incomes



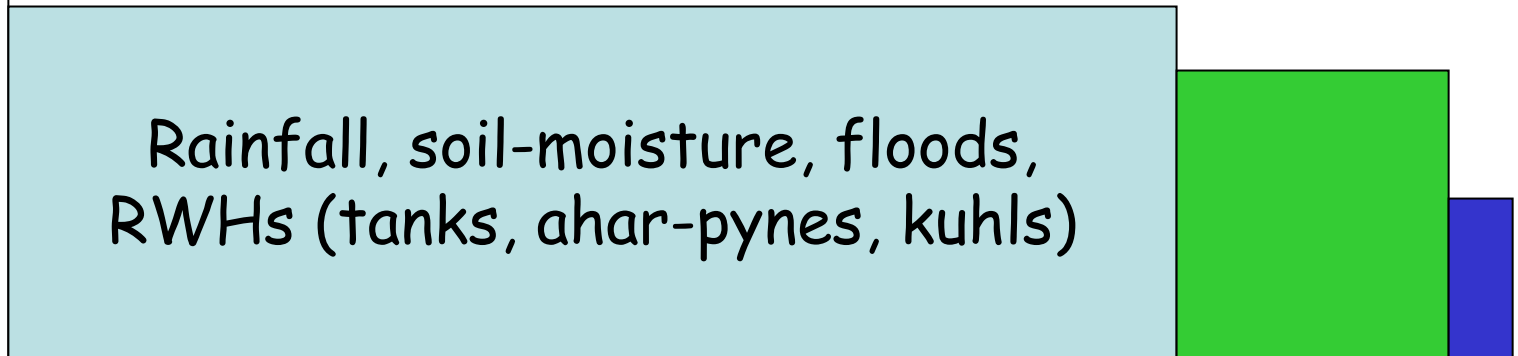
Rainfall, Soil moisture and RWHs



Flow irrigation from large canals, rivers



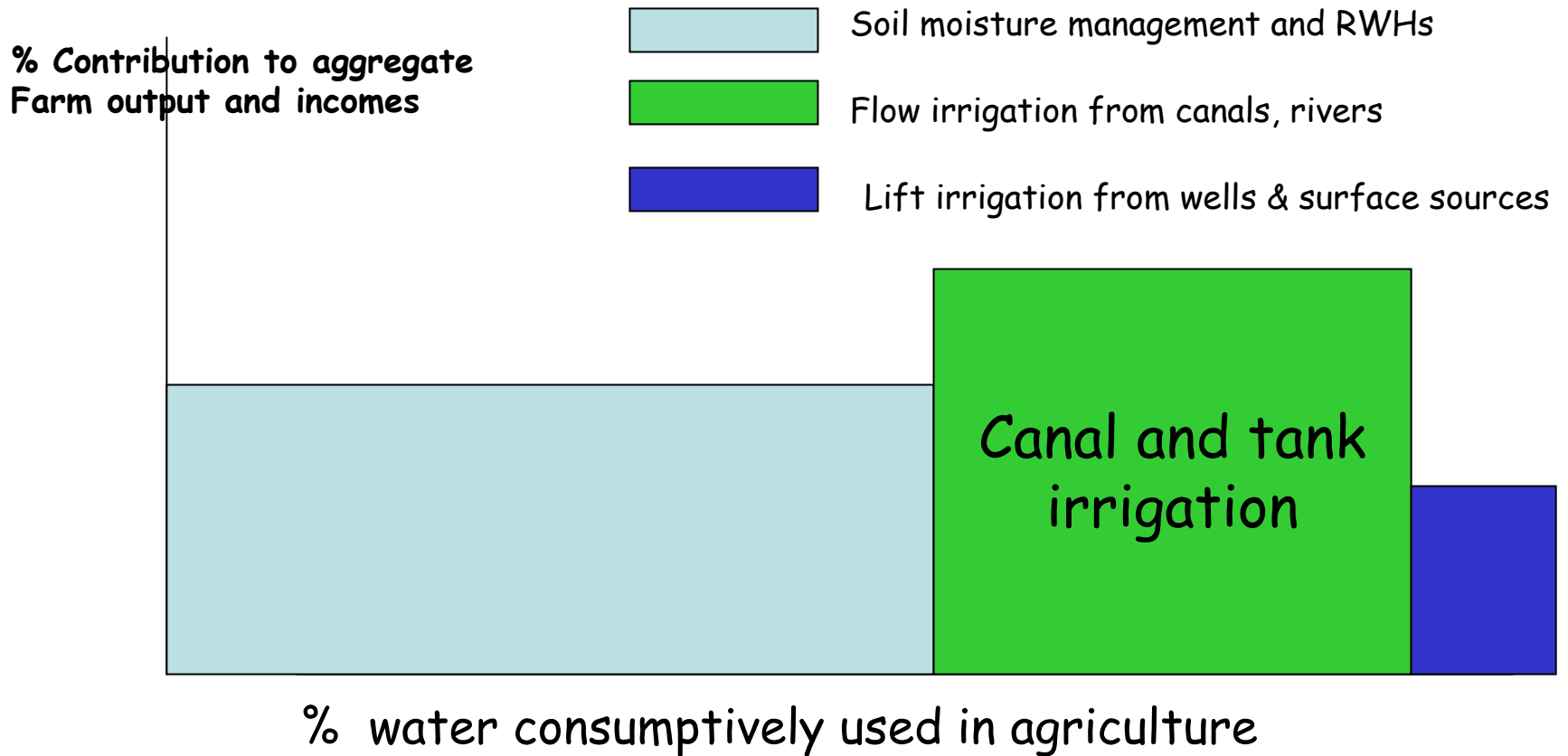
Lift irrigation from wells and surface sources



% of water consumptively used in agriculture

## Evolution of Indian Irrigation: Era of canal construction-1830-1970

- *State emerged as the architect, builder, manager of irrigation*



# Evolution of Indian Irrigation: Era of atomistic pump irrigation-1970-todate

## *Individual farmer as the irrigation manager*

% Contribution  
To Farm output &  
incomes



Soil moisture management



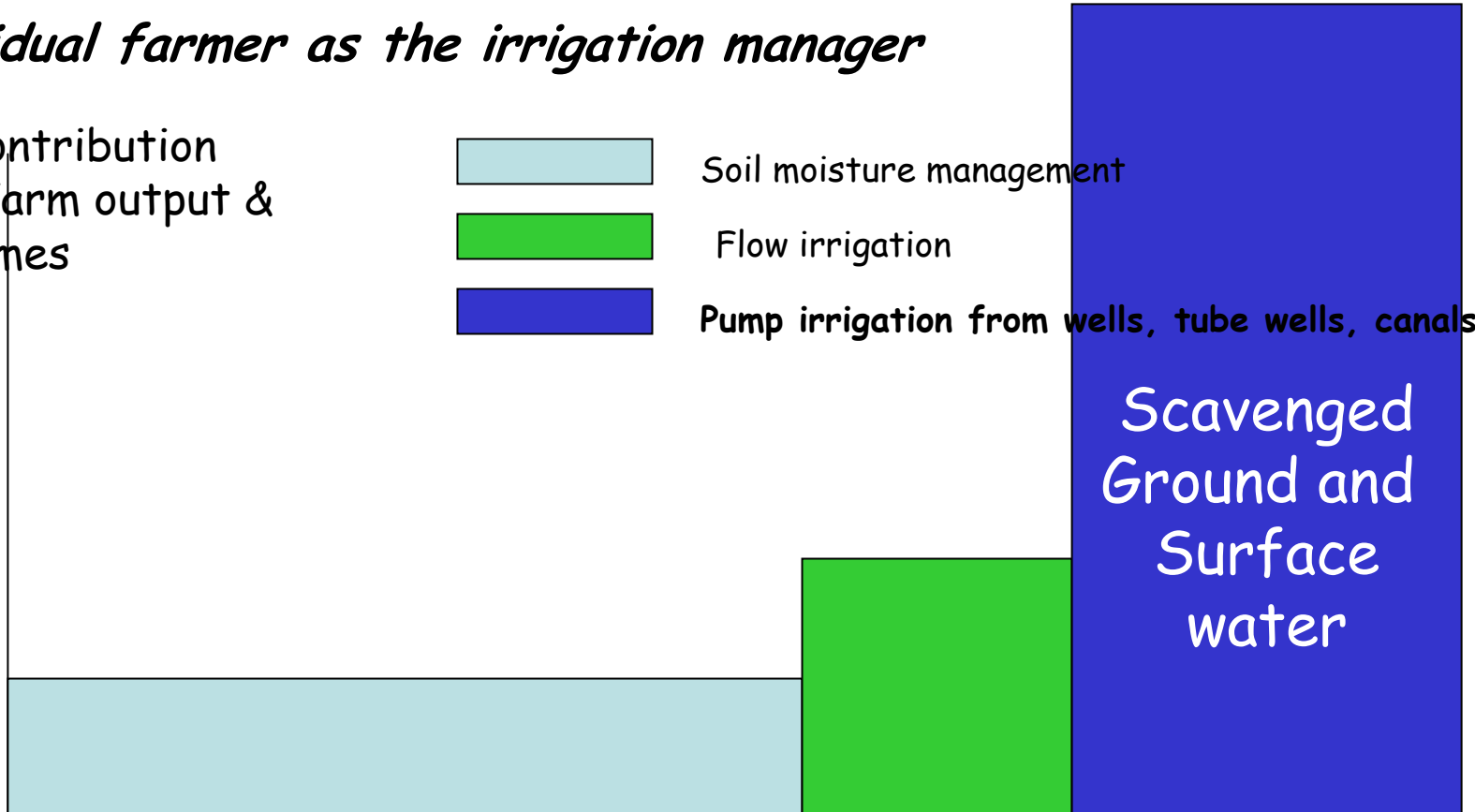
Flow irrigation



Pump irrigation from wells, tube wells, canals

Scavenged  
Ground and  
Surface  
water

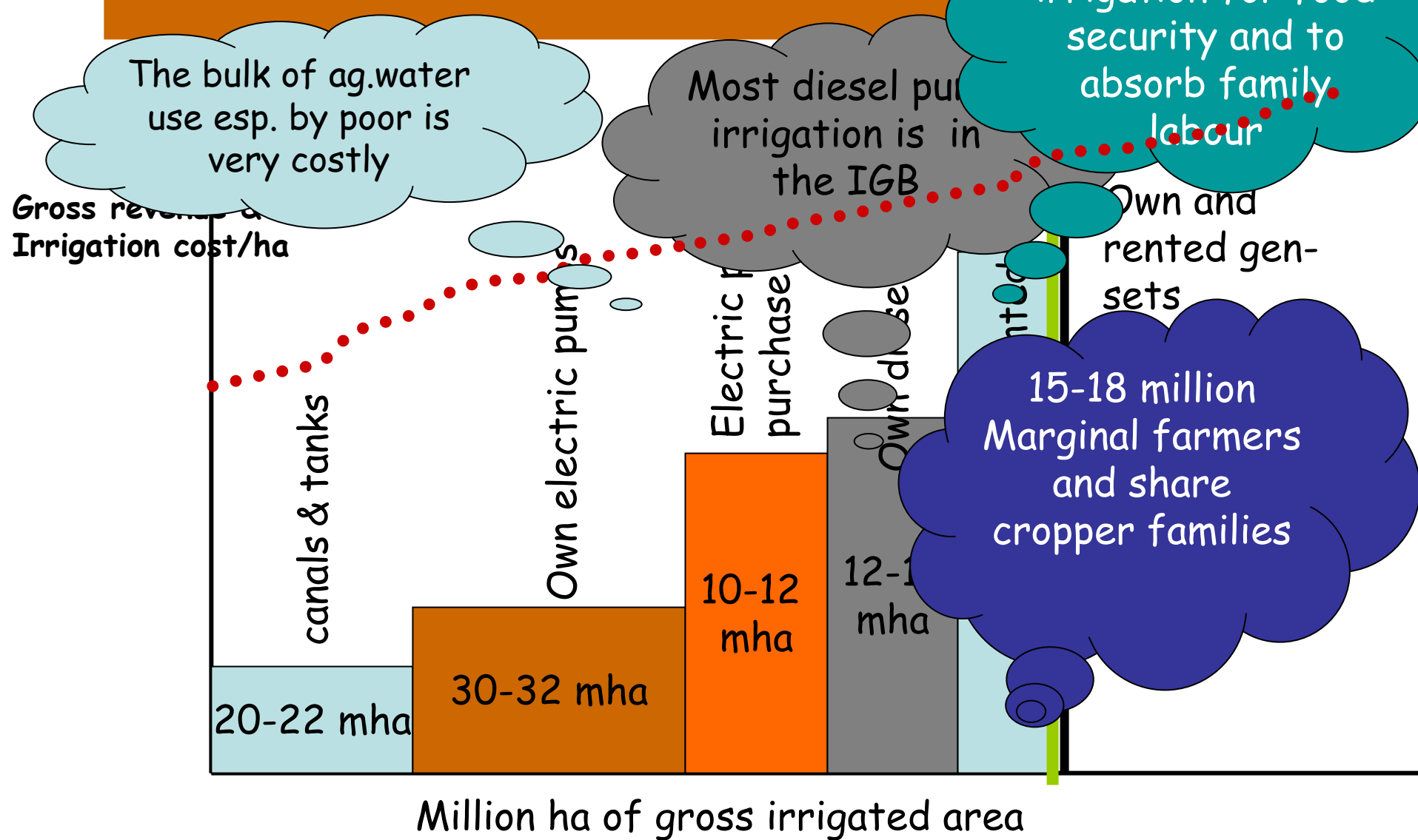
% of water consumptively used in agriculture



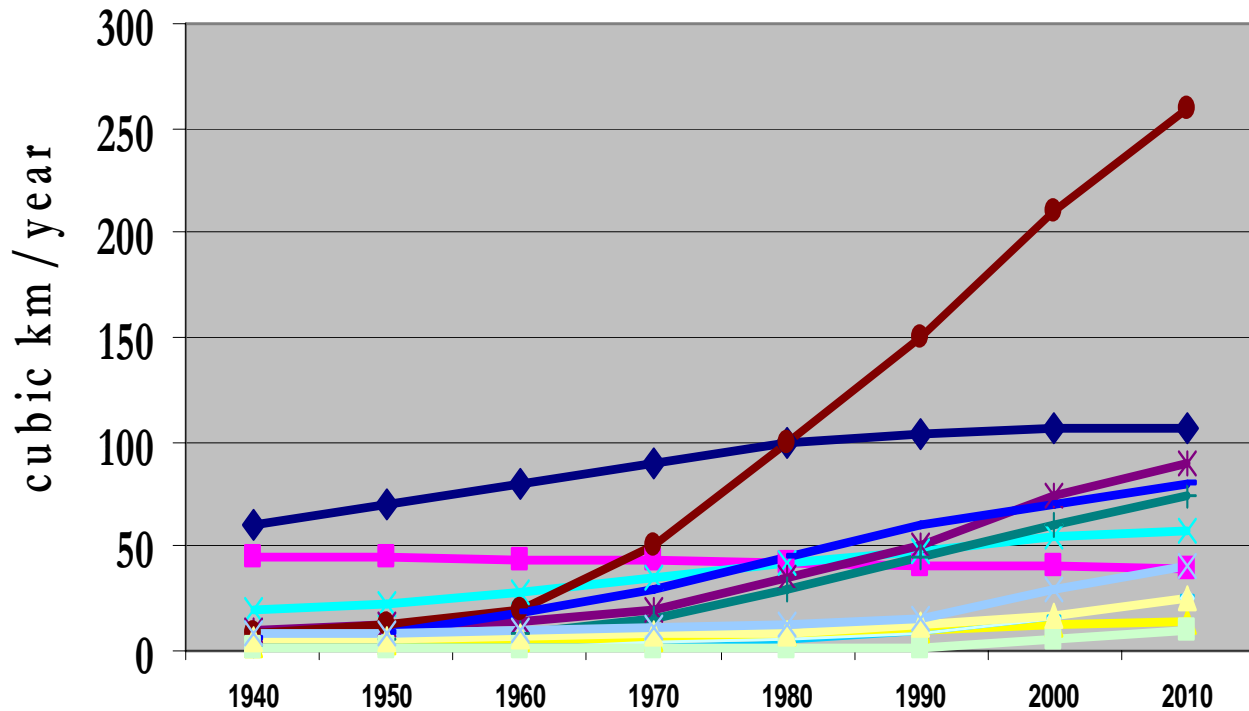
# Command areas in South Asia are shrinking..

	Net irrigated area under surface irrigation (000'ha)			Net irrigated area served by groundwater (000' ha)		
	1993-4	2000-1	% change	1993-4	2000-1	% change
Andhra Pradesh	2523	2269	-10.1	1678	1829	+9
Arunachal	29.7	39.2	+24.2	0	0.77	Na
Assam	140.6	58.6	-58.3	34.9	106	+37.2
Bihar & Jharkhand	1762	986.8	-44.0	2029	2111.5	+40.7
Goa	6.9	13.1	+47.3	3.5	2.9	-17.2
Himachal	83.9	85.8	+2.2	11.7	14.8	+26.5
MP & Chattisgarh	2140	1279.1	-40.2	1535	2300.9	+49.9
Orissa	1076	967	-10	147	141	-4.1
Punjab	1283.4	1168.7	-8.9	2622	2438	-7.1
Rajasthan	1815	1439	-20.7	2702	3450	+27.7
UP & Uttaranchal	3837	2106.6	-45.1	5630	8493	+ 50.8
West Bengal	935	622	-33.5	1020	872	-14.5
Pakistan Punjab	4240	3740	-11.8	8760	10340	+18
Sind	2300	1960	-14.8	140	200	+42.9
Bangladesh	537	480	-10.7	2124	3462	+63
All areas	22709	17215	-24.2	28437	35762	+25.8

# Classes of Irrigators in South



India is the world's largest user of groundwater in agriculture in the world.



India has over 20 million irrigation wells. We add 0.8 million/year.

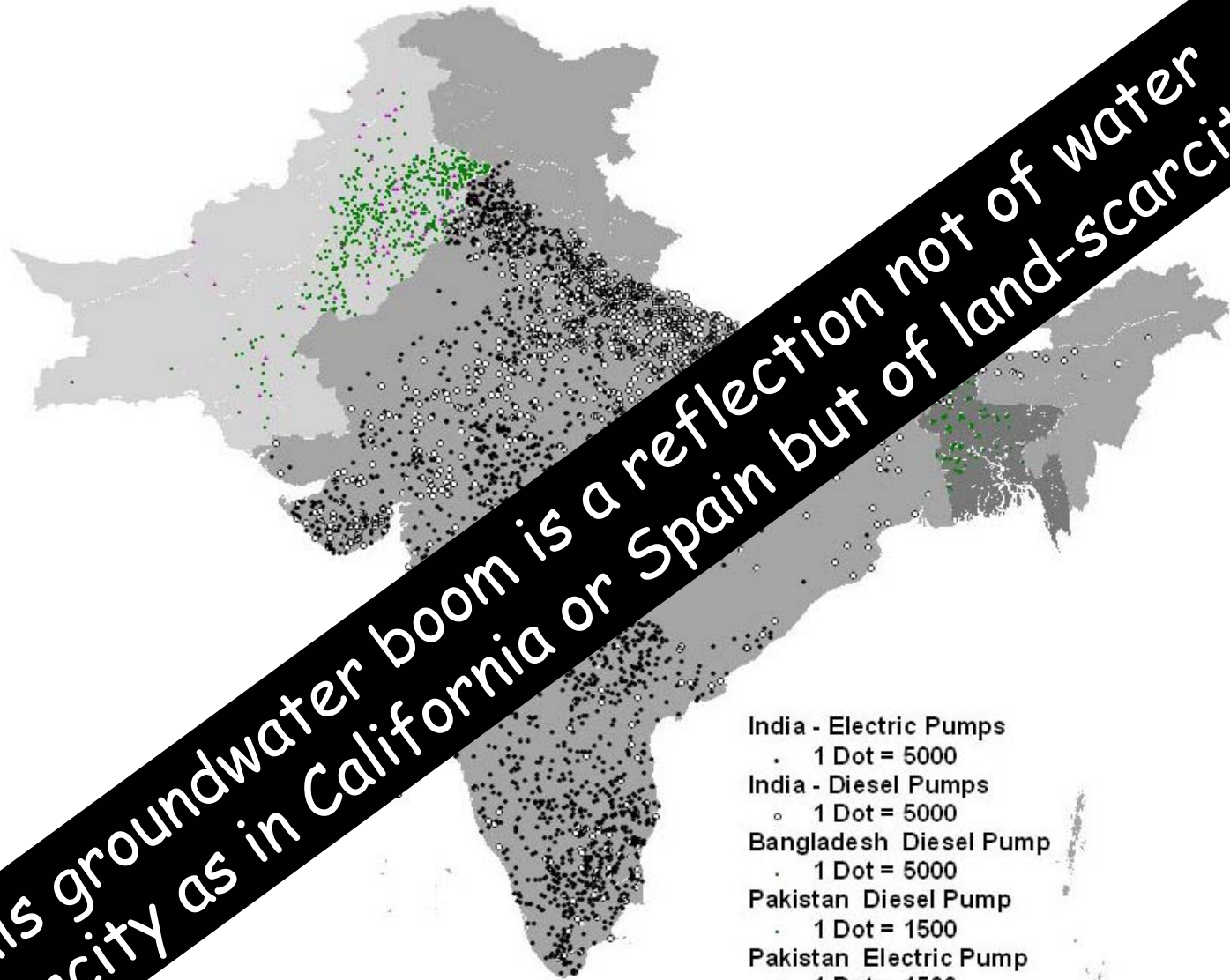
Every fourth cultivator owns an irrigation well; non-owners depend on groundwater markets.

Increasing irrigation in canal and tank commands is with Pumped water





This groundwater boom is a reflection not of water Scarcity as in California or Spain but of land-scarcity.



India - Electric Pumps

• 1 Dot = 5000

India - Diesel Pumps

◦ 1 Dot = 5000

Bangladesh Diesel Pump

• 1 Dot = 5000

Pakistan Diesel Pump

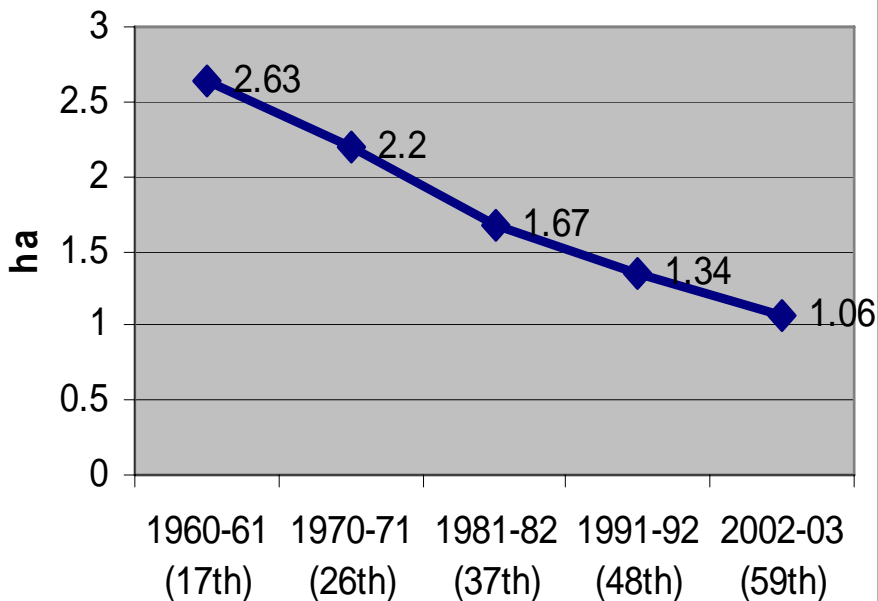
• 1 Dot = 1500

Pakistan Electric Pump

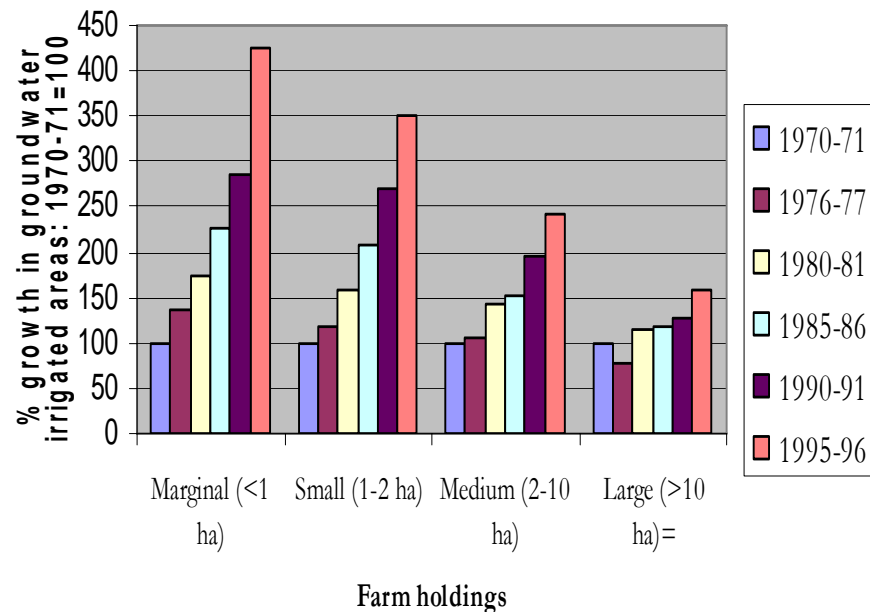
• 1 Dot = 1500

# Drivers of Atomistic Irrigation: Ghettoization of India's Agriculture

Shrinking of operated farm holdings in India  
(Source: NSS reports)



Small-holders add most to groundwater irrigation  
(Source: Agri. Census)

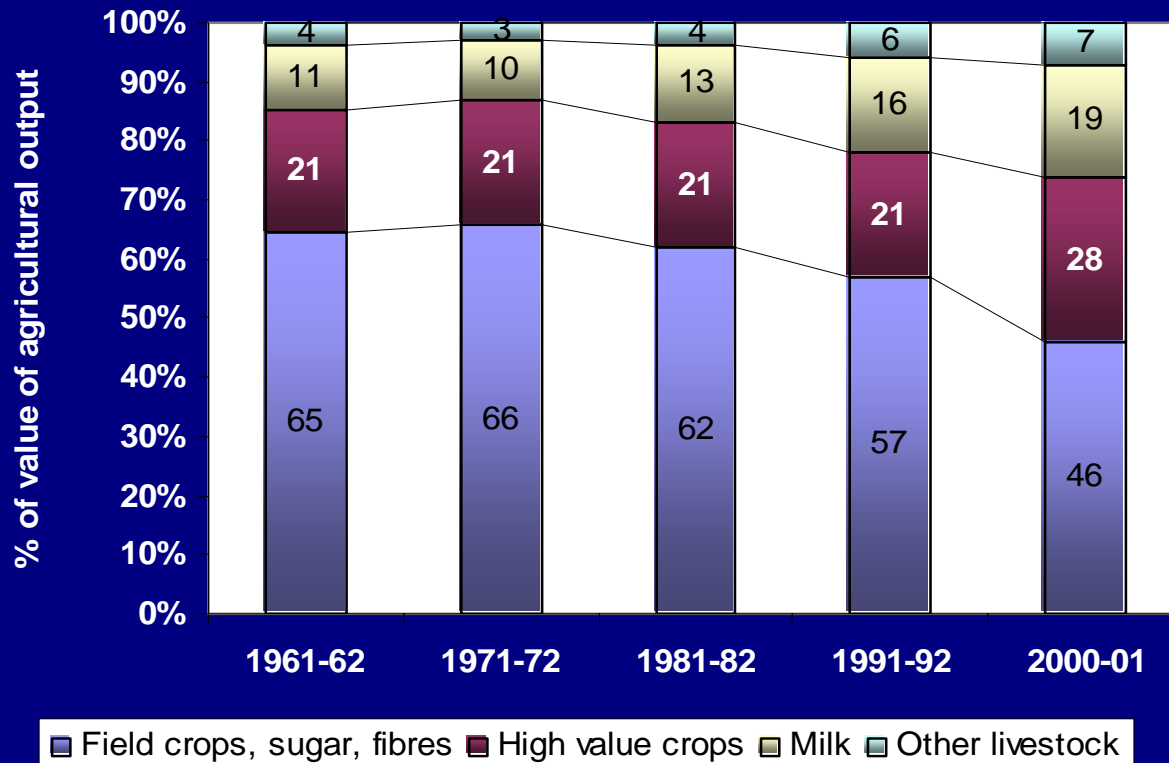


The compelling advantage of pump irrigation is that instead of adapting agriculture to Irrigation system, it adapts irrigation to farming system.

# Drivers: Intensive Diversification

Our irrigation planning is preoccupied with food grains;  
Indian farmer is diversifying in a hurry.

Figure Changing structure of Indian agricultural production



Canal and tank irrigated areas condemned to low-value crops unresponsive to precision irrigation.

Much diversification is Occurring outside Command areas (IFPRI).

Much diversification Requires small dozes of Year-round, on-demand Irrigation.

Value added small-scale farming booms with pump Irrigation.

# Irrigation Management Challenges: Then and Now

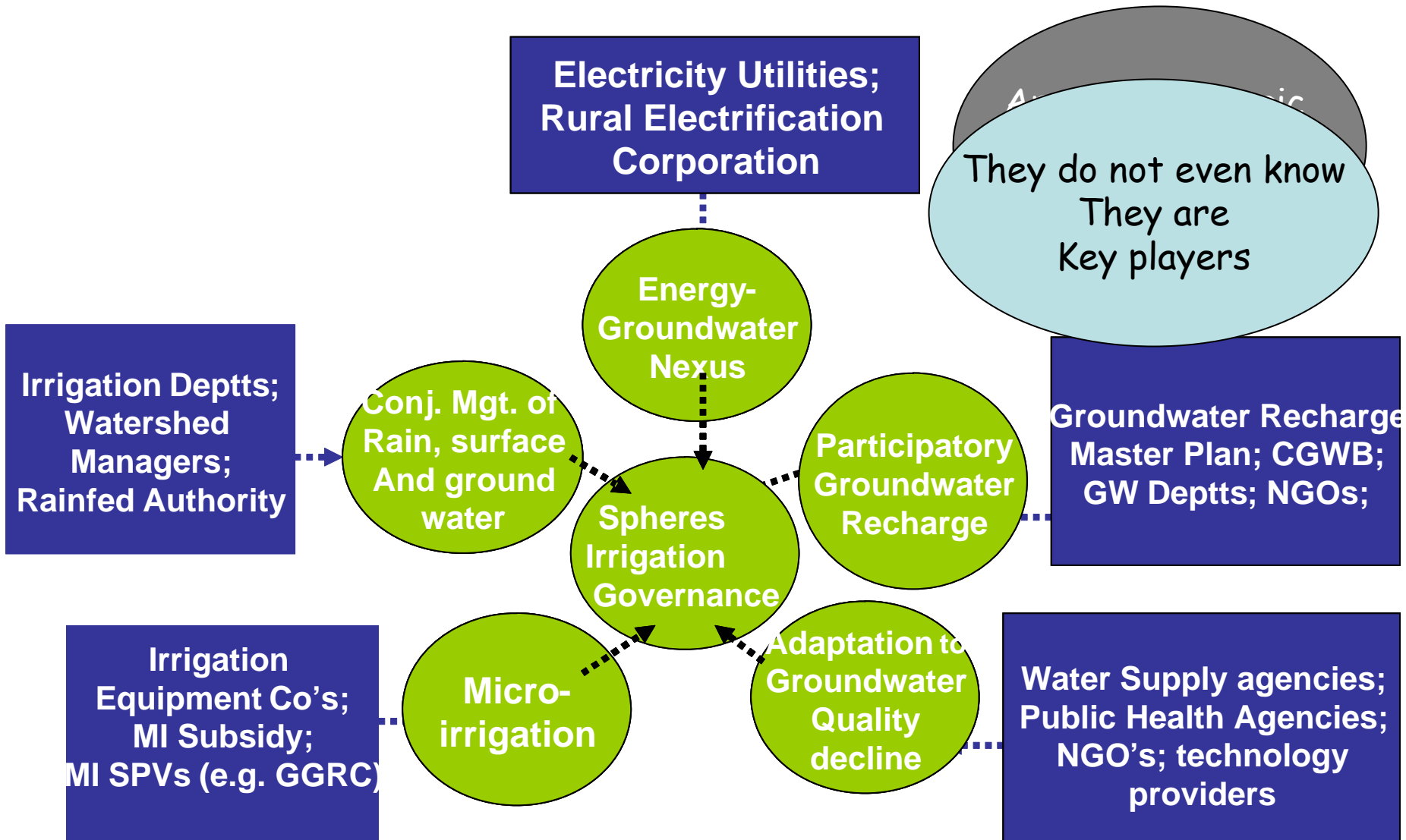
## • 1960's

- Investing in public and community irrigation
- Command Area Development
- Control of water logging and salinization
- Financial sustainability of irrigation systems
- Modernization of large and small surface systems
- Efficiency and equity in water distribution
- Reorienting irrigation bureaucracy
- Farmer management
- PIM/IMT

## • 2000+

- Groundwater regulation
- Arresting and reversing groundwater depletion;
- Groundwater quality
- Fluoride and arsenic contamination
- Electricity subsidies
- Energy efficiency of irrigation
- Water productivity
- Hydro-climatic change
- Groundwater recharge
- Integrating surface and groundwater storages

# India's New Irrigation Playing Field: *Integrated WRM of a different sort..*



# Conclusion?

"The development of irrigation has outrun its administration ..."

*Col. W. Greathed, Chief Engineer, Upper Ganga Canal, 1869*

Thank you for your  
attention..



# Taming the Anarchy

GROUNDWATER GOVERNANCE IN SOUTH ASIA

Tushaar Shah

