IWMI: International Training and Research Program 2006-2007
Groundwater Governance in Theory and Practice
Day 1 - November 9, 2006

Lecture 1

An Overview of Groundwater Use and Abuse in India: Some Socio-Political, Economic and Institutional Characteristics

S.Janakarajan
Professor
Madras Institute of Development Studies
Chennai 600 020

janak@mids.ac.in

The road map of the lecture

1. Introduction
2. Groundwater stock and use across different regions in India
3. Groundwater markets – Efficiency and Inefficiency arguments
4. Wells and welfare
5. Wells and Illfare
6. Emerging issues
7. Concluding observations

Context: 1 Changes

What are the changes that the South Asian communities and economies have been experiencing during the past five decades?

- Transformation: Dynamic - socio-economic, agro-technical
- Political: stability, instability, lapses in governance and corruption and the stress
- Openness of rural economies
- Globalization, WTO, GATS, Privatization efforts etc

Context 2: Challenges

- Rising demographic pressure
- Rapid industrialization
- High degree of urbanization and rural-urban migration
- Pollution of river basins and other water bodies
- Climate change, variability and extreme events
- Increasing food and environment insecurity
- Scarcity of surface water and neglect of traditional water institutions
- Over-extraction of groundwater
- Competing demand for water
- Water conflicts
- Lapses in water governance – lack of coordination and commitment
- Competitive populism
- Lack of participation of water users, in particular women, in water management – top down – technocrat driven approach
- And many more

Solutions

- Water pricing
- Water privatization
- IWRM

water pricing and water privatization are closely related and very much a part of a global debate

Let us consider GW use and abuse in the above context

First and foremost
What is so good about groundwater?

- Individually owned and managed
- It is available on one's own command
- Relatively more productive compared to surface water
- More controllable and quality of irrigation is far better
- Timely availability

Furthermore and most significantly,

It is widely believed that promoting groundwater use is a remarkable tool to address the issue of rural poverty

-- the most vital issue in the South Asia's political context

Government of India and so also other SA countries, have made five major interventions in the rural areas since independence

They are,

- Construction of major dams
- Introduction new high-yielding bio-chemical crop technology
- Rural electrification – cheap power for agricultural pump sets
- Cheap credit through nationalization of banks and coop societies
- Promoting groundwater irrigation on a massive scale

- Please note the nexus between the bio-chemical agricultural technology and groundwater

- Nexus between cheap power and expansion of GW expansion

And

- The consequent neglect of traditional irrigation institutions

The scenario before these interventions:

- Traditional irrigation institutions such as canals / diversions from rivers and tanks were in full use – in the four southern states alone, there were **125,000 tanks providing irrigation to 2 million hectares**
- Traditional varieties of crops were cultivated
- Low level of agro-chemical technology
- Low crop yields

In the past four or five decades, the village economies have undergone a tremendous socio-economic, technological and political transformations:

- Landlords and upper castes cultivators have left or leaving villages
- Owner cultivation has emerged as the most important mode of cultivation
- The hitherto tenants have become cultivators who are more market and profit driven

- Penetration of relatively better organized agrarian markets into the villages, thanks to good transport and communication networks

Direct Impacts

- Neglect of traditional small irrigation systems such as tanks, springs and canals
- Massive groundwater expansion
- The intensive use of GW and HYV crops
- Higher yields, higher cropping intensity and overall increase in production
- More agricultural employment

Two phases of groundwater irrigation:

- Mid 1960s onwards and until 1990
- 1990 onwards

Research issues in the first phase were:

- Equity and access to GW
- Productivity impact due to GW and comparisons between and surface and GW
- Impact of well irrigation on farm income and employment
- Groundwater markets
- Crop pattern change due to GW
- Pumping technology and costs of pumping

Wells and Welfare

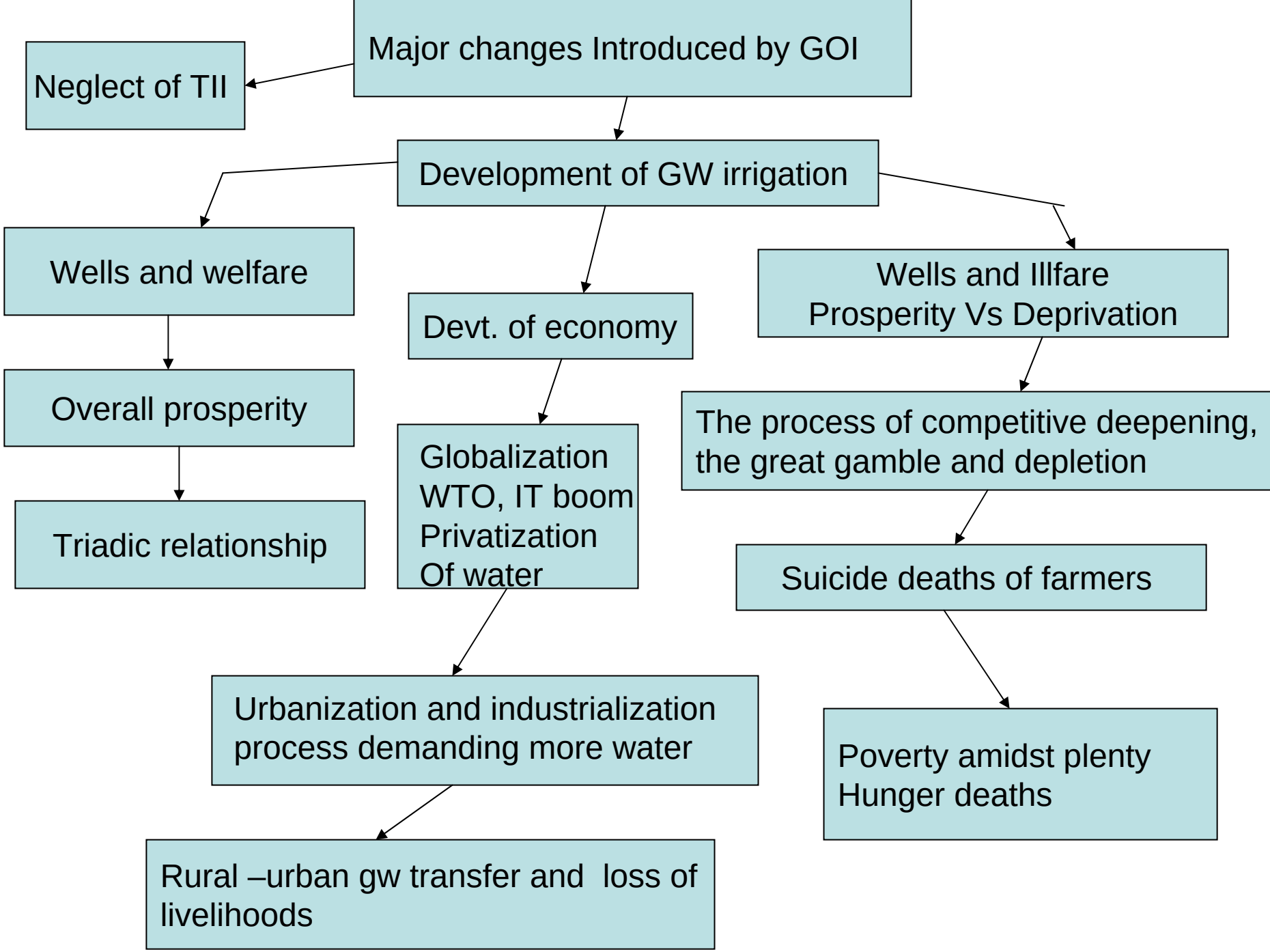
Wells and welfare: Main arguments

- Intensive cultivation
- More productivity and increase in overall production
- More employment
- Availability of irrigation even to all those hitherto unirrigated areas
- Even those who cannot invest on one's own wells get access to well irrigation due to operations of water market – market efficiency

This is a short term gain

In the long-run, due to secular lowering of water table and due to water depletion, farmers have lost access to well water and also to livelihoods

Wells and Illfare
The process of Competitive deepening and debt trap
The triadic relationship – reduced to dipolic relationship – between wells owners and traders only
Net result: Gable on GW, Debt trap and suicide deaths


Major changes Introduced by GOI
Neglect of TII
Development of GW irrigation
Wells and welfare
Devt. of economy
Wells and Illfare
Prosperity Vs Deprivation
Overall prosperity
Triadic relationship
Globalization
WTO, IT boom
Privatization
Of water
The process of competitive deepening, the great gamble and depletion
Suicide deaths of farmers
Urbanization and industrialization process demanding more water
Poverty amidst plenty
Hunger deaths
Rural –urban gw transfer and loss of livelihoods

Research issues in the Second Phase were:

- Mining of groundwater and groundwater depletion
- Increasing cost of well irrigation / investment
- Competitive deepening of wells and secular lowering of water table
- Conflicts in the use of groundwater
- Competing demand for water
- Taking water out of agriculture
- Decline in the groundwater market within rural areas and increase in the rural-urban water trade

Contd….

Research issues in the Second Phase (contd)

•Over-use and declining yield of groundwater

•Mismatch between extraction and recharge

•Groundwater pollution

•The menace of sea-water intrusion in coastal areas due to over-extrction

•Groundwater – energy nexus and the whole debate on electricity subsidy

• GW laws and GW regulation

•Wells and Illfare

<u>This was also the period which witnessed</u>

•Rapid rural – urban migration

•Rapid industrial expansion and foundations were laid for economic liberalization

•Very high degree of urbanization process

All these mean increased demand for water – good quality water – which, came from villages

It has resulted in enormous stress on the farming community due to

•Competitive deepening and competition between sectors – rural versus urban, agriculture Vs industries

•The process of consolidation and exclusion – *Wells and Illfare*

•Groundwater has emerged as a source of power and accumulation

•The new inequity between those who could consolidate and those who have been excluded; success for a few and deprivation for many

•Indebtedness and getting into a debt trap

•Pollution leading to out-migration: ***environmental refugees***?

•Drinking water crisis

•Pollution of groundwater leading to health problems

The impacts

- Massive groundwater expansion – Area under wells increased from 6.6 million hectares in 1950 to 23.4 million hectares in 1990

- The intensive use of GW and HYV crops

- Higher yields, higher cropping intensity and overall increase in production

Utilizable GW irrigation potential (in Million Hectares) **and percentage utilization for major states in India at the end of the IX plan (1997-2002)**

Major States	Utilizable GW irrigation potential	Percentage utilization
Andhra Pradesh	3.96	83.61
Assam	0.9	49.11
Bihar	4.95	81.51
Gujarat	2.76	87.70
Haryana	**1.46**	**162.8**
Himachal Pradesh	0.07	39.40
Jammu and Kashmir	0.71	01.84
Karnataka	2.57	51.30
Kerala	0.88	20.13
Madhya Pradesh	9.73	42.82
Maharashtra	3.65	97.18
Orissa	4.20	13.20
Punjab	**2.92**	**237.39**
Rajasthan	1.78	253.74
Tamilnadu	2.83	81.25
Uttar Pradesh	16.80	97.32
West Bengal	3.32	67.48
All States incl. UT	64.17	85.57

Source: Lok Sabha Question No.81, Dt. 18-11.2002

Role of South Asia's Groundwater-based Agrarian Economy

Country	Annual groundwater use (km^3)	No. of agricultural ground-water structures (million)	Extraction/ structure (m^3/year)	% of population dependent directly or indirectly on groundwater irrigation
India	150	19	7,900	55-60
Pakistan-Punjab	45	0.5	90,000	60-65
China	75	3.5	21,500	22-25
Iran	29	0.5	58,000	12-13
Mexico	29	0.07	414,285	5-6
United States	100	0.2	500,000	<1-2

Source: Tushaar Shah, 2003, Population Watch, More Crop per Drop' , *UN Chronicle*, Online Edition, Issue 1

Net Irrigated Area by sources, All India – 1950-51 to 2001-02 (area in '000 hectares)

Year	Canals	Tanks	Wells	Others	Total
1950-51	8295	3613	5978	2967	20853 (28.7)
1960-61	10370	4561	7290	2440	24661 (29.6)
1970-71	12838	4112	11887	2266	31103 (38.2)
1980-81	15292	3182	17695	2551	38720 (45.7)
1990-91	17453	2944	24694	2932	48023 (51.4)
2000-01	15710	2518	33775	2831	54833 (61.6)
2001-02	15877	2336	34836	2827	55876 (62.3)

Source: Ministry of Agriculture, GOI

Overall, look at the contradiction in our economy

300 million tonnes food grain buffer stock and India emerging as the net exporter of food grains

While at the same time, still about one-third of our population live below poverty line

Extensive reporting of drought and floods

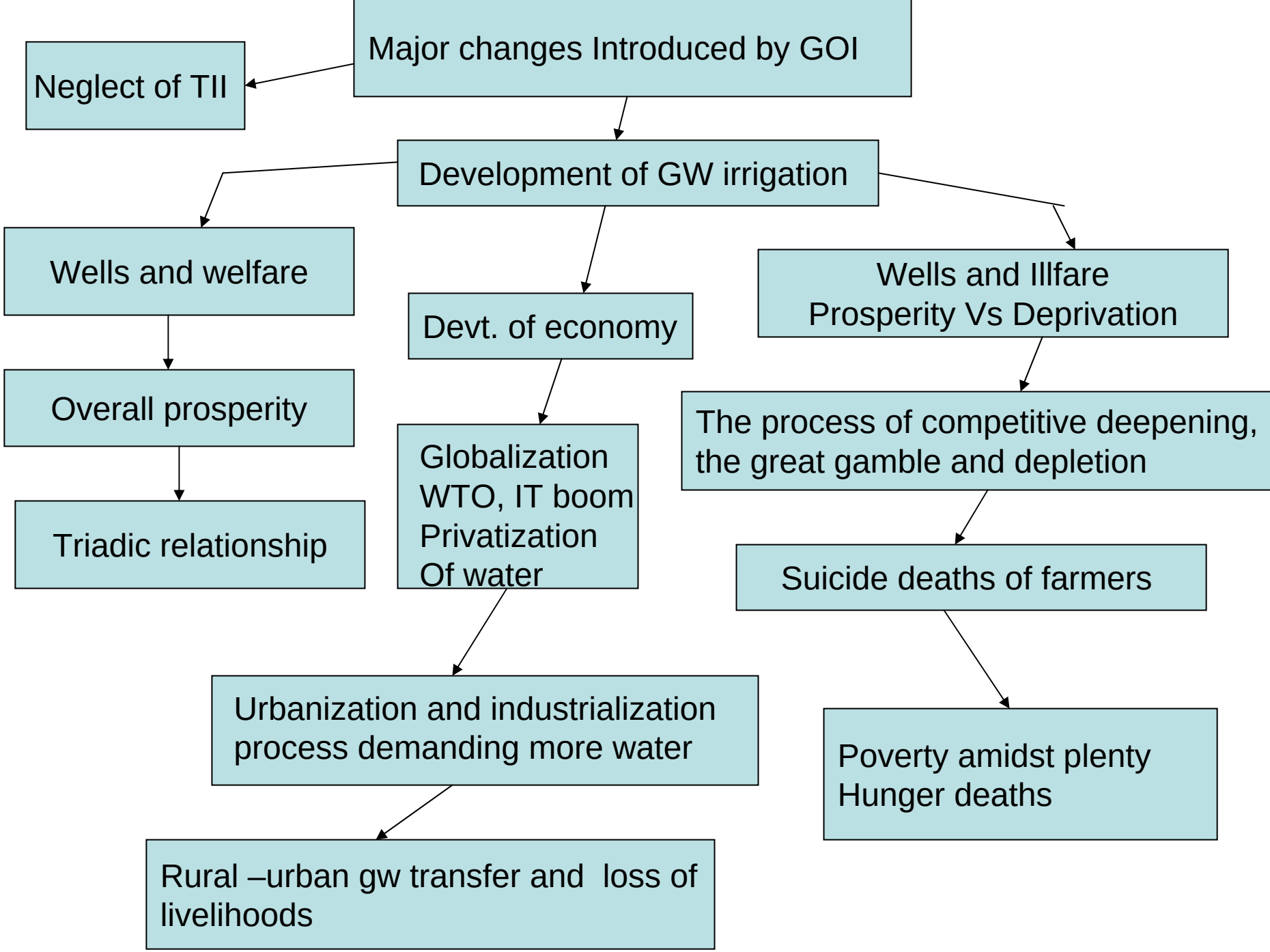
Extensive reporting of starvation deaths

And so on and so forth…

These were precisely the maladies which we thought we would be eradicating through big dams!!

Wells and Illfare

While it may be argued that GW use has helped to reduce poverty, the counter is also becoming increasingly true; suicide deaths
Wells and welfare Vs and wells illfare; The over-exploitation / depletion of groundwater is becoming a major problem in many part of India (Southern India, western India and North India)


Major changes Introduced by GOI
Neglect of TII
Development of GW irrigation
Wells and welfare
Devt. of economy
Wells and Illfare
Prosperity Vs Deprivation
Overall prosperity
Triadic relationship
Globalization
WTO, IT boom
Privatization
Of water
The process of competitive deepening, the great gamble and depletion
Suicide deaths of farmers
Urbanization and industrialization process demanding more water
Poverty amidst plenty
Hunger deaths
Rural –urban gw transfer and loss of livelihoods

- Natural sub-system
- User-sub-system
- Institutional sub-system

The mismatch between natural user and sub-systems and the failure of institutional system in restoring equilibrium

Two important questions arise here:

- ***Why the existing laws do not deliver?***
- ***Do we have enough laws or do we need more?***

- ***Or*** **To what extent legislations can be helpful - if at all - in sustaining GW use?**

- *Do we face a dead-lock situation?*

- *Do we have a way forward?*

Let us see in this context to what extent GW laws have delivered in the Indian context

Way out and Solutions

The solutions to sustainable development of groundwater are quite closely associated with integrated view of water governance – of surface and groundwater - with commitment and vision – which should be far from policies centering around

politics of competitive populism

•This encompasses issues such as

long-term perspective

participatory planning

broad based partnership of all sectors of economy

fruitful and sustained dialogue among all key stakeholders supported by government

Inclusiveness in policy framework

Thank you