

**INDIA'S MOST IMPORTANT  
*UNDERGROUND* MOVEMENT**

**GROUNDWATER**

**Nation's Water Lifeline  
*suffering multiple crisis***

# Groundwater in the water cycle

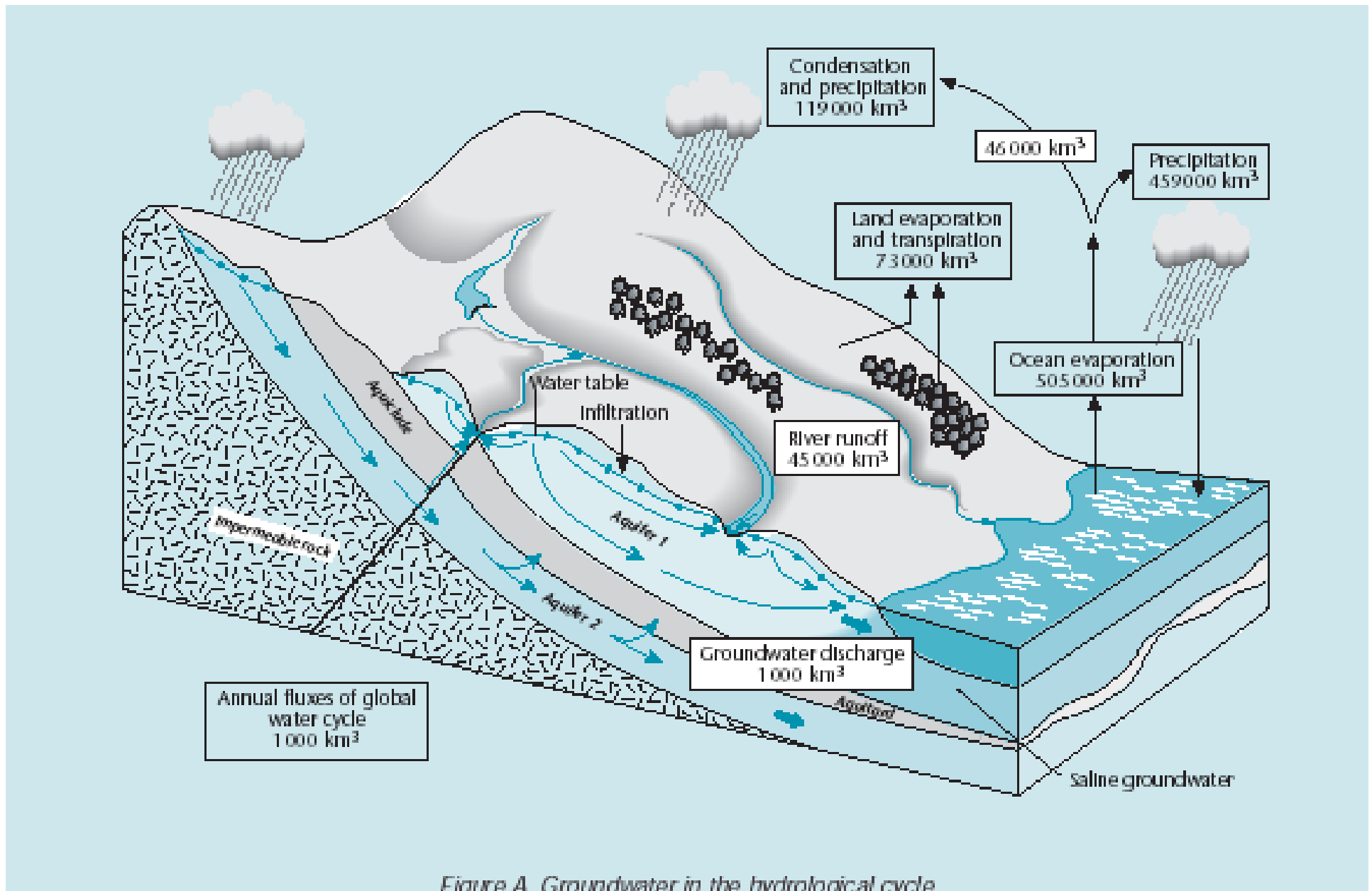


Figure A. Groundwater in the hydrological cycle.

# Some basic Characteristics of GW

- More or less universally available with variation in levels, quantity, quality
- Decentralised source
- GW constitutes 95% of freshwater on planet (excluding water locked in polar caps)
- Dynamic equilibrium between rainwater, soil water, surface water bodies (lakes, ponds, wetlands, rivers) and GW
- SW in upstream can go into GW and GW in downstream can appear as SW
- GW is generally considered cleaner, but that assumption is increasingly less reliable.
- It is easy to develop even for individuals.
- Common property resource
- Unfortunately it has become private property resource by use and legal situation

# Types of Groundwater

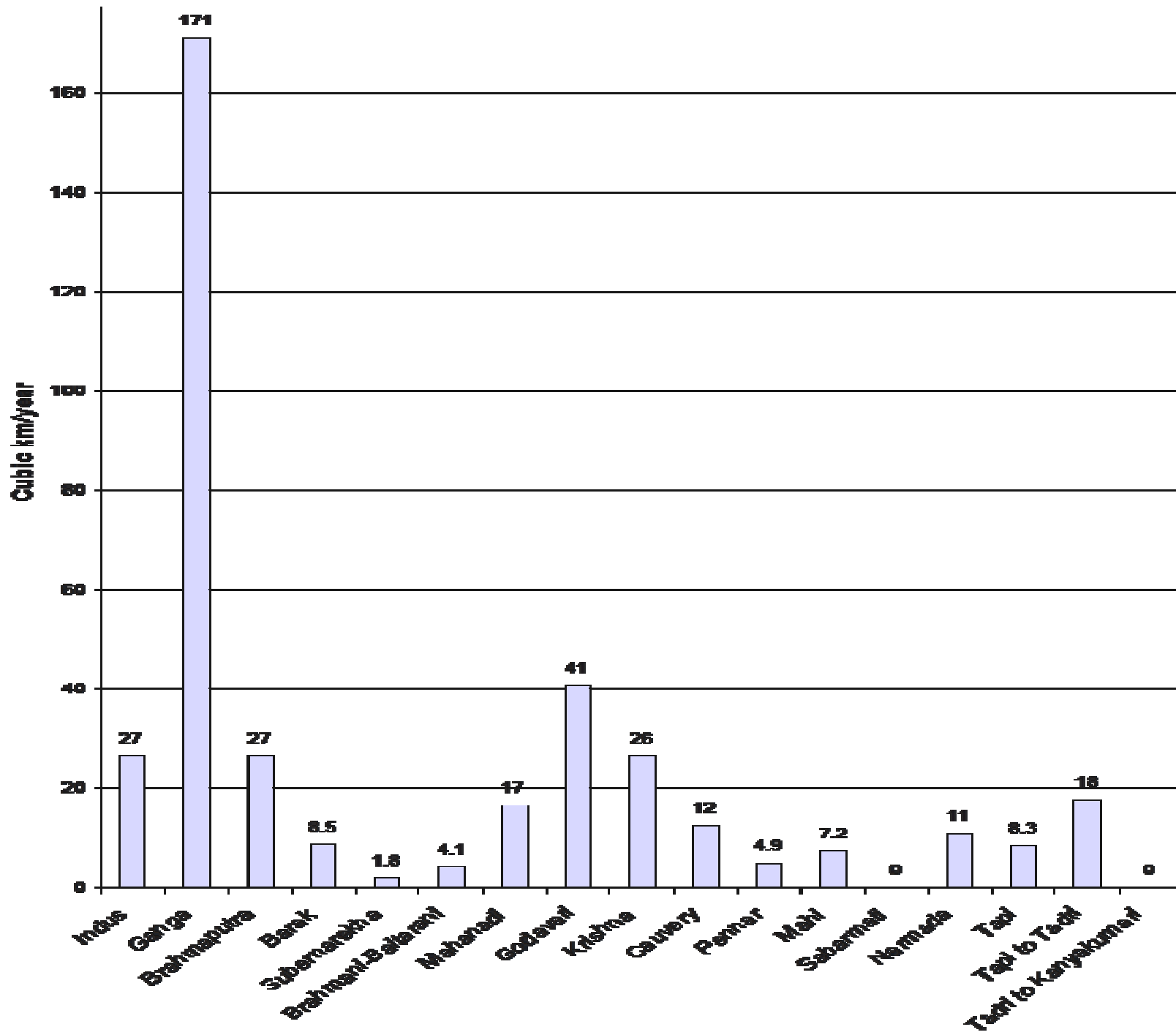
- Shallow aquifer
- Deep aquifer
- Alluvial aquifer
- Hard rock aquifer
- Static
- Dynamic

# Issues of Quantity

- According to the report of the National Commission on Integrated Water Resources Development (GOI Sept 1999), the total replenishable ground water is estimated as 432 BCM. Out of this, 396 BCM is considered utilizable – 71 BCM (15%) for domestic, industrial and other uses and 325 BCM (90% of the balance) for irrigation.
- The figure of 431.9 BCM is the estimate of the Working groups (constituted in 1994-5) based on large volume of hydrogeological and related data generated by CGWB and state ground water organizations. This is the sum total of the potential due to natural recharge from rainfall (342.4 BCM) and the potential due to recharge augmentation from canal irrigation system (89.5 BCM).

## Dynamic Fresh Ground Water Resource - Statewise

No	States	Replenishable GW From Normal Natural Recharge	Replenishable GW Due to recharge from Canal Irrigation	Total Annual Replenishable GW
1	Andhra Pradesh	20.03	15.26	35.29
2	Arunachal Pradesh	1.44	0.00	1.44
3	Assam	24.23	0.49	24.72
4	Bihar	28.31	5.21	33.52
5	Goa	0.18	0.03	0.21
6	Gujarat	16.38	4.00	20.38
7	Haryana	4.73	3.80	8.53
8	Himachal Pradesh	0.29	0.08	0.37
9	Jammu & Kashmir	2.43	2.00	4.43
10	Karnataka	14.18	2.01	16.19
11	Kerala	6.63	1.27	7.90
12	Madhya Pradesh	45.29	5.60	50.89
13	Maharashtra	33.40	4.47	37.87
14	Manipur	3.15	0.00	3.15
15	Meghalaya	0.54	0.00	0.54
16	Mizoram	Not assessed		
17	Nagaland	0.72	0.00	0.72
18	Orissa	16.49	3.52	20.01
19	Punjab	9.47	9.19	18.66
20	Rajasthan	10.98	1.72	12.70
21	Sikkim	Not assessed		
22	Tamil Nadu	18.91	7.48	26.39
23	Tripura	0.57	0.10	0.67
24	Uttar Pradesh	63.43	20.39	83.82
25	West Bengal	20.30	2.79	23.09
26	Union Territories	0.35	0.05	0.40
	<b>Total</b>	<b>342.43</b>	<b>89.46</b>	<b>431.89</b>



# Issues of Quality

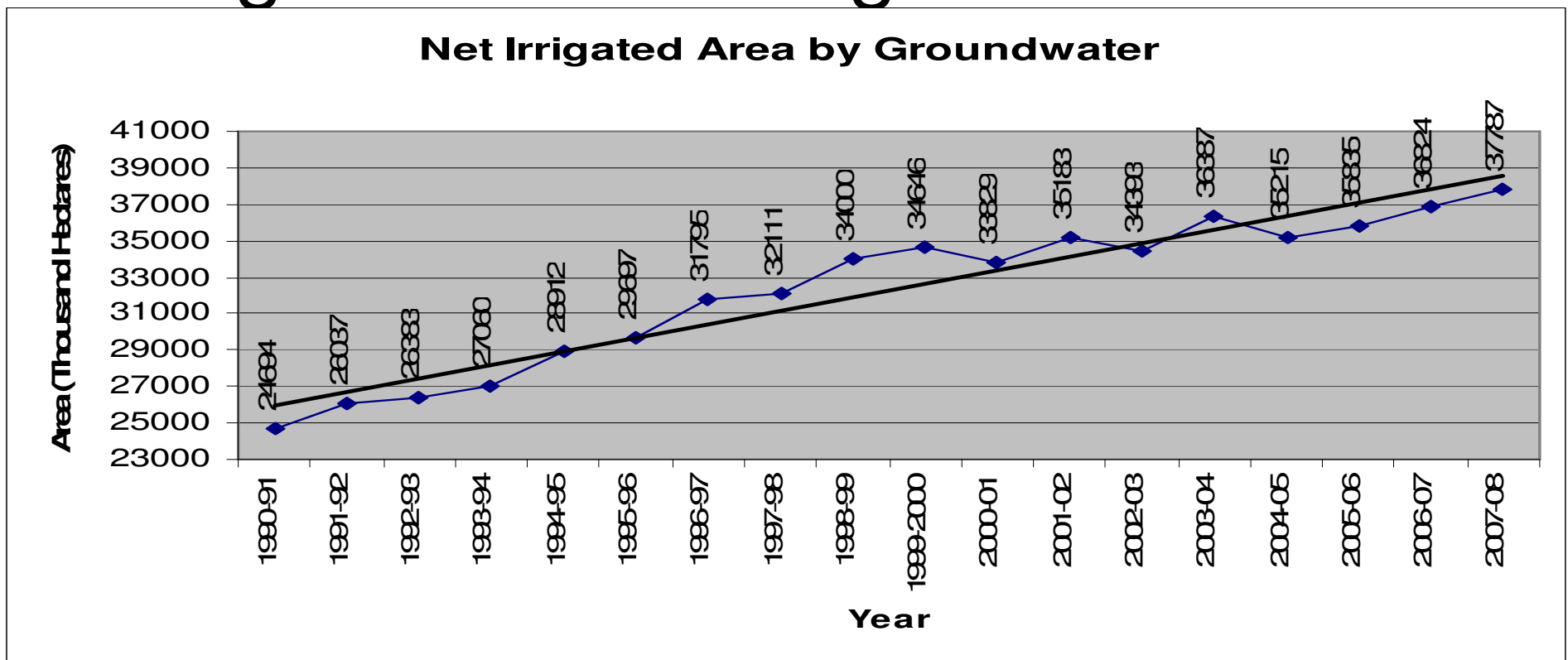
- The GW quality is being monitored through regular sample testing from around 15640 locations, this is sought to be raised to 50000 in 12th plan
- Geogenic
  - Arsenic
  - Fluoride
  - Iron
  - Nitrates
- Anthropogenic
  - Nitrates
  - Chlorides
  - Salinity
  - Toxics
  - Radioactivity



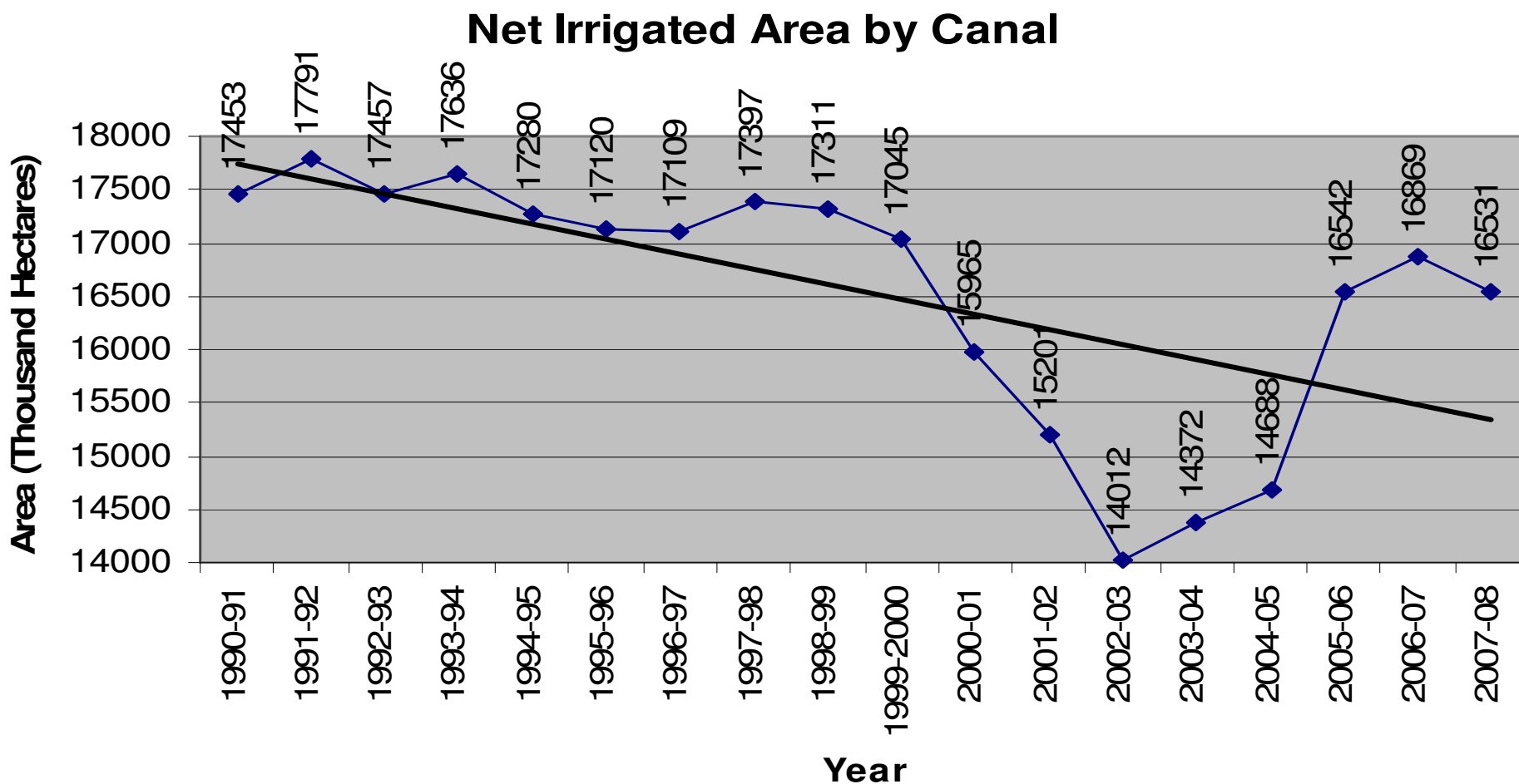
# Importance of GW in India's water sector

- 85% of Rural Water Supply comes from GW
- Over 55% of Urban Water Supply comes from GW
- Over 50% of Industrial water supply comes from GW
- 61% of net irrigated area gets water from GW. The % of Gross irrigated sourced from GW is even greater. Every ha of GW irrigated area yields more output than surface water area.
- With every passing day, our dependence on GW in each of these sectors is increasing.
- Such dependence is going to be part of our water sector for many years to come.
- However, the dependence is most unsustainable.

The increase in overall irrigated area, in spite of decrease in contribution from big dam irrigation projects was possible due to the steep increase in groundwater irrigated areas.

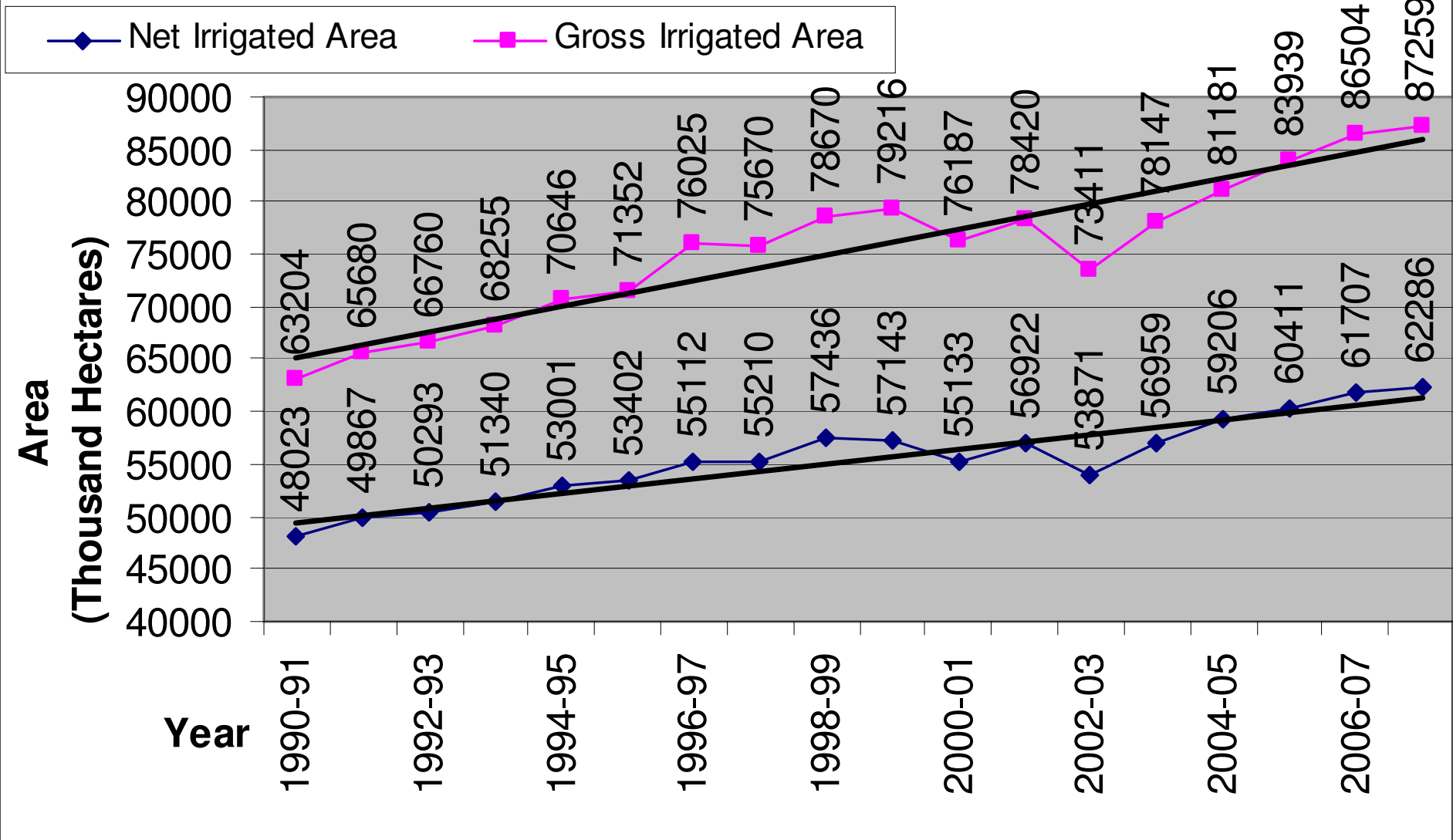


**In 16 years between 1991-92 to 2007-08, after spending Rs 142000 crores on big irrigation projects, there is decline of over 1 M ha in canal irrigated areas**



# Total Net & Gross Irrigated areas have been going up over the last 2 decades

## Net and Gross Irrigated Area by All Sources





# Over Exploited figures

- The Planning commission, in mid term appraisal of the 9th Plan has said that there had been an increase of 51 % in the number of over exploited and dark blocks from 1985 to 1999. While the number of over exploited and dark blocks was 253 in 1985 it went up to 428 in 1999, the numbers further going up in 2004
- However, there are no detailed figures available after 2004
- ILR water balance figures do not bother abt increasing GW use
- Inter state water disputes tribunals & water do not include GW use

# The Agrarian crisis & groundwater

- Everyone from the Prime Minister, the President, down to the farmers agree that India's agriculture is facing serious crisis. Farmers are committing suicides in thousands every year. Agriculture growth rates are down to 1-2%, yields are stagnating or declining, and canal irrigated areas are decreasing in a number of states
- Everyone also agrees that every farmer would benefit from better water management
- India continues to be blessed with a bountiful monsoon which can be a great resource for every farmer if put to use through local water systems.
- GW is India's lifeline: That lifeline is in serious crisis
- Only way to sustain this lifeline is through local water systems, recharging GW
- But big dam dominated WRD won't allow that to happen

# Agenda for Action

Broadly, action is required on three fronts:

- Protection of existing groundwater recharge systems: local water bodies (lakes, tanks, johads, ahars, pynes, kuhls, guhls, tankas, bawdies), wetlands, forests, rivers flowing with clean water
- Creation of more recharge systems
- Regulation of groundwater use
  - Community driven regulation is the only option
  - Siting policies for water use activities
  - Water footprint calculations and policies and incentives to reduce water footprint



# What the govt has been doing:

- Govt has declared a monopoly for itself in water sector in general: No role for the people, no democracy in water sector
- Govt cannot exercise monopoly over groundwater due to the nature of decentralised resource that can be used by anyone who owns a piece of land.
- There are over 17 million groundwater extraction units in India today, growing steeply even now.
- However, government action and inaction in water sector has huge impacts on groundwater recharge and use.
- Govt has been providing huge incentives for groundwater use in various forms: loans for wells, motors, electricity subsidies, incentivising cropping patterns, industrial activities and residential uses.

# What the govt has been doing-2

- Existing groundwater recharge systems: Govt has been guilty of directly and indirectly destroying them. By systemic neglect, allowing land grabbing, destroying rivers, forests and wetlands directly. Without even putting any value to the services provided by these.
- It is paying some lip service to rejuvenation of water bodies in recent years, but is most non serious.
- It is also paying some lip service to creation of more groundwater recharge systems, but again it is most non serious.
- **It is yet to acknowledge by words and action that GW is India's water lifeline.**

# **What the govt has been doing-3**

- **GW regulation draft bill**
- **CGWA set up under EPA 1986 in 1997 through a SC order**
- **It is being used largely as an agent of GW exploitation**
- **It is top down, un accountable, bureaucratic institution that has completely failed in achieving any regulation**
- **The govt has shown no seriousness in pushing bottom up groundwater regulation**

# Govt plans

- Aquifer mapping
- National GW Quality Mission under NWM
- Increase the number of monitored wells from 15640 to 50000
- Increase water use efficiency by 20% by 2017
- A plan for GW quality mapping through monitoring 200 locations
- Increasing GW recharge

# Some Positive signs

- Watershed development
- MGNREP
- Increased awareness about GW recharge
- Hundreds of successful examples of local water systems
- AP attempt at farmers driven GW management

## Climate Change, NAPCC & GW

- Climate change will worsen India's water and power, floods situation.
- India is more vulnerable to climate change than US, Europe or China
- Within India, poor people, rural population, coastal population, tribal population are most vulnerable.
- India's NAPCC is mostly blind to this reality.
- It has no place for these people in its plans, in missions, in visions or even in its formulation.
- This is not being very smart.

# Options Exist – Lessons-1

- There are some success stories in India where people and ecosystems are given priority over everything else. Here the improved decision making through multi-stakeholder planning processes on water services have delivered sustainable solutions rather than trade offs
- It is possible to cater to the justifiable demands of the people over large areas spanning over several districts, through hundreds of small projects.
- These projects have much more equitable, sustainable benefits and there could be unexpected spin off benefits, as against unexpected, spin off losses in large projects. (e.g. GW levels go up, sometimes the seasonal rivers become perennial)
- These projects can also help evolution of institutional mechanism for decision making and management.
- These provide real option for people to earn decent livelihood in sustainable way, without brutalising them first, without involving toxic, dehumanising corporate dreams. On the lines of what is making organic cool and chemical uncool.

# Options Exist – Lessons-2

- Organic farming, with support for carbon build up in soil would help water conservation, soil conservation and also reduce global warming in the process, but there is no support for it. As the World Development Report 2008 shows, GDP growth generated by agriculture is four times more effective in benefiting the poorest half of the population than growth in other sectors, but there is no support for such activities.
- People are striving, fighting for this in different ways. E.g. in Alwar (Rajasthan) and Narmada Valley
- The large stock of created infrastructure and the poor performance of the same also provides an option to achieve better benefits
- Techniques like the SRI also offer great potential
- An important exception though: In all such success stories, demand is not sacrosanct by itself, unlike it is in the market. This is also indicated by the global warming issues. Only justifiable demand can have a place in a just world.
- There can be many ways for a better future, status quo is not one of them.....
- **Let us end on that hopeful note....**



# The best solution

- As usual comes from Bollywood:

सिटी बजा के बोलो

आल इज़ वेल

# THANK YOU

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