

Food Security in a Challenging Economic Environment

Threats to food security with Asian monsoon vagaries & India's preparedness

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&

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Times Cartoon by R K Laxman (1959)



The shortage of foodgrain and consequent high prices led to violent protests by the people

India made some **impressive** strides in its food front...

- A change from dependency to self sufficiency; 'ship to mouth' shifted to *“roti, kapda, makan”* (*“feeding, clothing and sheltering for all – a popular terminology equivalent in Hindi*)
- **Food production** increased from 65 million tons in 1960s to 236 in 2008
- **Calorie intake** increased from 1900 to 2600 Kcal/capita/day
- **Poverty** decreased in rural areas from 55% (in 1973) to 26% (in 1998)
- **Human development index** moved from 0.41 (in 72) to 0.619 now

Still, the total riddance of food insecurity is seemingly at a distance

- The **largest of the world's hungry** live in India
- The **largest of the world's malnourished children and women**, over 40%, is also in India
- **India does lag in achieving MDG1**, aimed at halving the hungry lot, before 2015
- And the worst challenge is upfront before us. In 2009, there is a likely **reduction in total food production, by about 10 %**, with a failed monsoon
- It is not unusual to hear news of farmers' suicides in India. Given a choice, 40% farmers would like to quit farming (NSSO, 2005)

India

Land, Water & Agric. Production

- India shares 17% of global population
- India has just 2.4% share of global land
- Only 4% of available global fresh water is in India
- India's last year production stood at +231 million tonnes of grains. This is about 15% of World Grain Production
- The importance of agriculture for the economy is around 25% . There are efforts to move it up, given its importance for the Indian rural poor who are sizeable
- India had been and is introducing new programmes, unique in its nature for protecting its rural livelihood and poverty alleviation.
- The unceasing and tireless efforts in this direction are yet to yield expected results, fully..

Agriculture & its high dependency on monsoon precipitation

- The 65-70 per cent of the population, dependent on agriculture for their livelihood need enough water for their farming
- About 52 % of them are engaged in farms directly and the women represent about 50%
- 60 per cent of area sown is dependent on rainfall (for a single season crop). The agricultural output is still dependant on monsoon for its rainfed 40-45 % production
- Save some parts of India, the country had been affected by poor rains during the last four months. Rainfall during the monsoons of 2009 was deficient all over India by 23%
- This may adversely impact production by over - 10%

2008 economic downturn; Impacts on Indian food security

- India could withstand the impacts of the 2008 economic downturn, particularly in food security. It re-gearred itself with certain *(inevitable)* measures like
 - ban on export of foodgrains to boost domestic availability;
 - increased resource allocations for securing rural livelihood like NREGA;
 - waiver of deferment of loan repayment and
 - many similar focused action like extending credit to farmers at low interests , enhanced procurement price for stocks etc...
- However, the shocks due to the '2009 failing monsoons' pose a greater challenge.

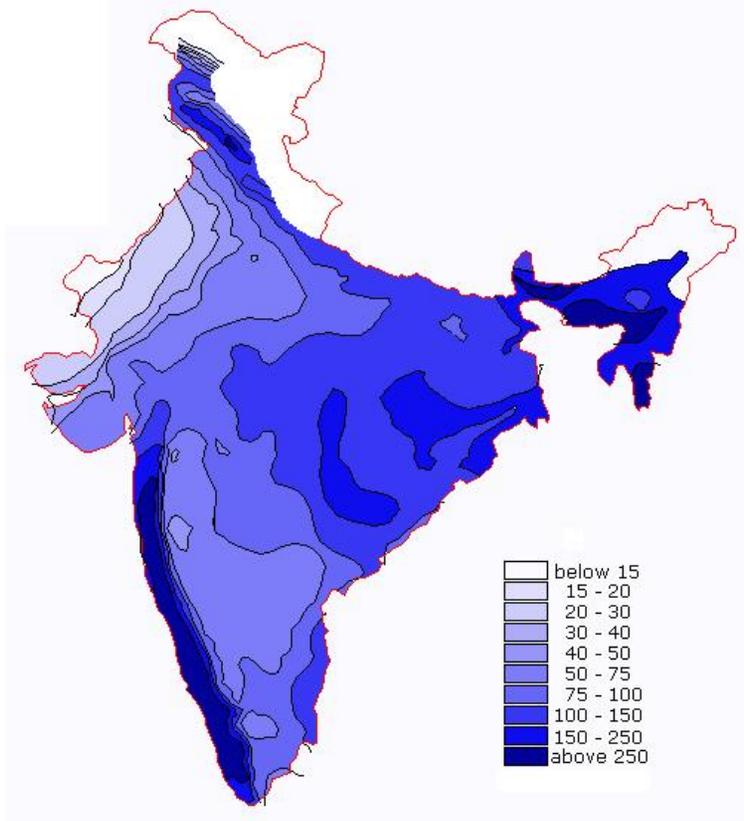
Managing the food crisis contd..

- Much of the availability-demand gap is to be met with from available grain reserves that is good.
- However, Crop production in Khariff 2009 will be below normal; (rice, maize and pulses, sugarcane..).
- More rabi production (winter crops - essentially wheat, oilseeds etc) may perhaps help
- A subsequent failure of monsoon, *God forbid*, can impose difficult consequences for food security
- Assured energy / irrigation is likely to be affected due to a lack of enough 'carry over storage' in the reservoirs built up

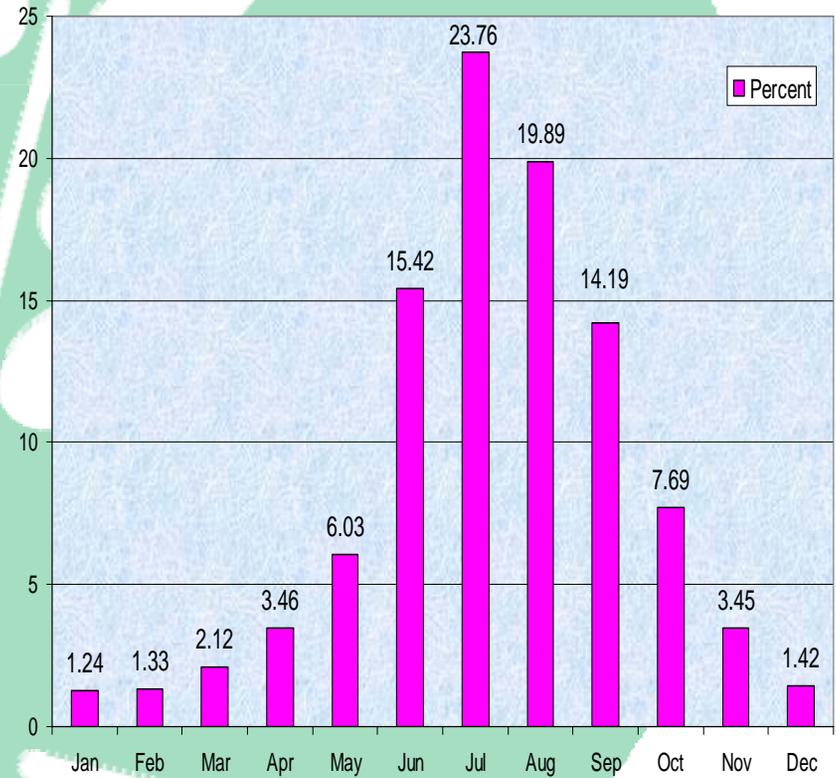
The Asian Monsoons

Precipitation Patterns in India

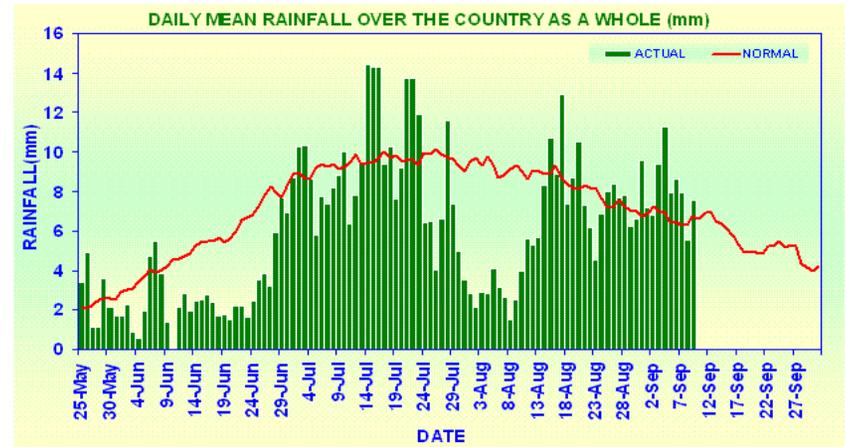
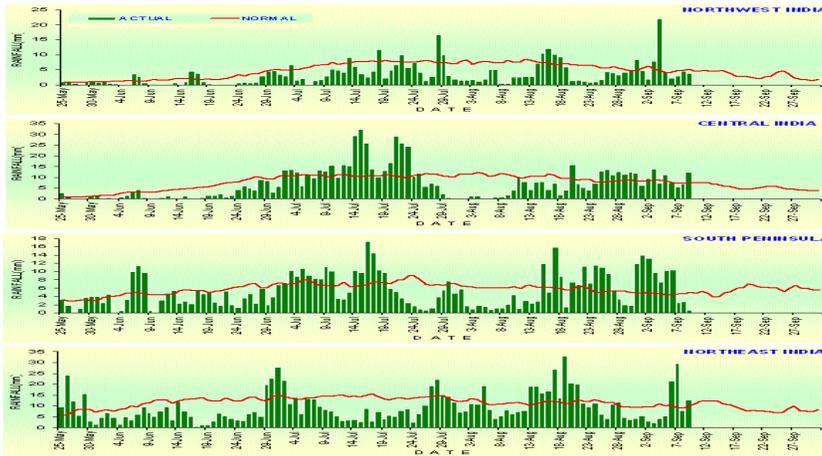
Precipitation -Spatial variation



Temporal Distribution - rainfall



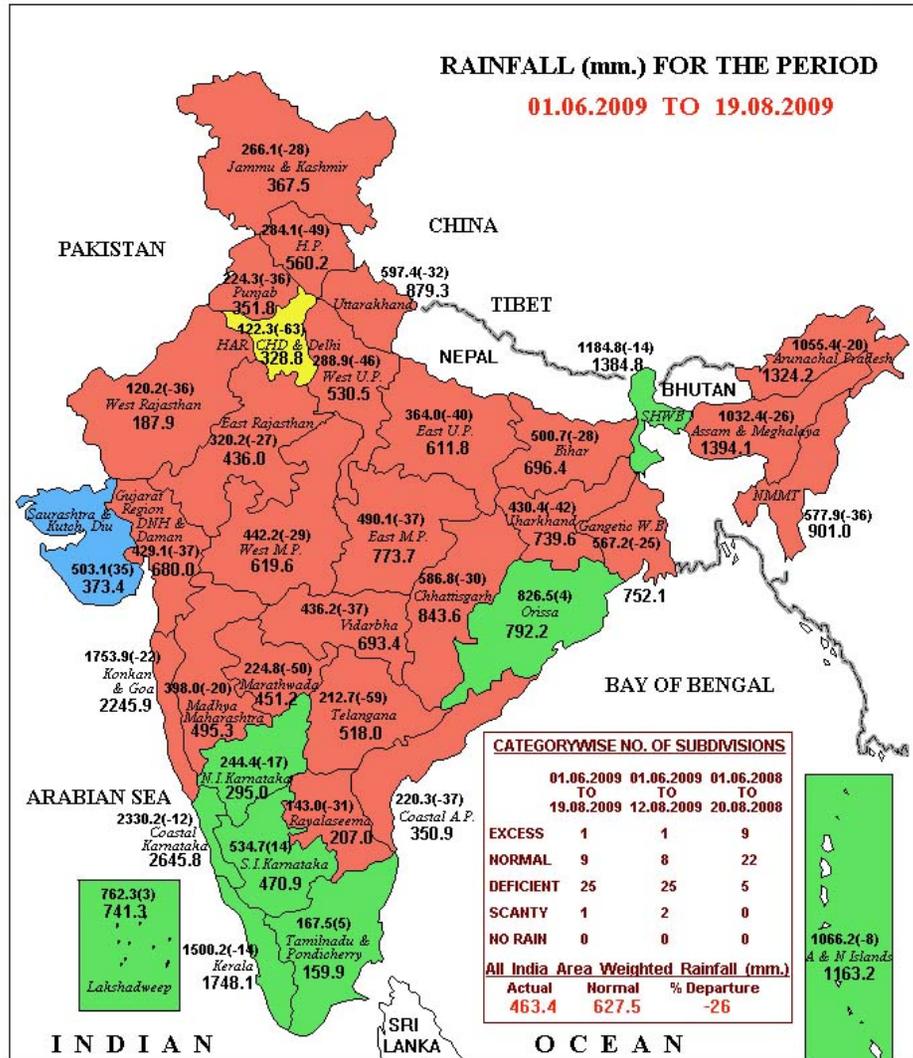
2009 Monsoons



The regional patterns show worst suffering region as NW, Central and southern peninsula

All India Seasonal (2009) precipitation averages were discouraging consistently; It has resulted in a poor storage situation in countries' many reservoirs

भारत मौसम विज्ञान विभाग INDIA METEOROLOGICAL DEPARTMENT



LEGEND: ■ EXCESS (+20% OR MORE) ■ NORMAL (+19% TO -19%) ■ DEFICIENT [-20% TO -59%]
■ SCANTY [-60% TO -99%] ■ NO RAIN [-100%] □ NO DATA

NOTES:

- [a] Rainfall figures are based on operational data.
- [b] Small figures indicate actual rainfall (mm.), while bold figures indicate Normal rainfall (mm.)
Percentage Departures of Rainfall are shown in Brackets.

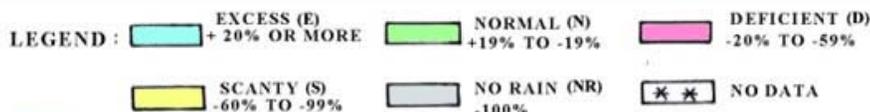
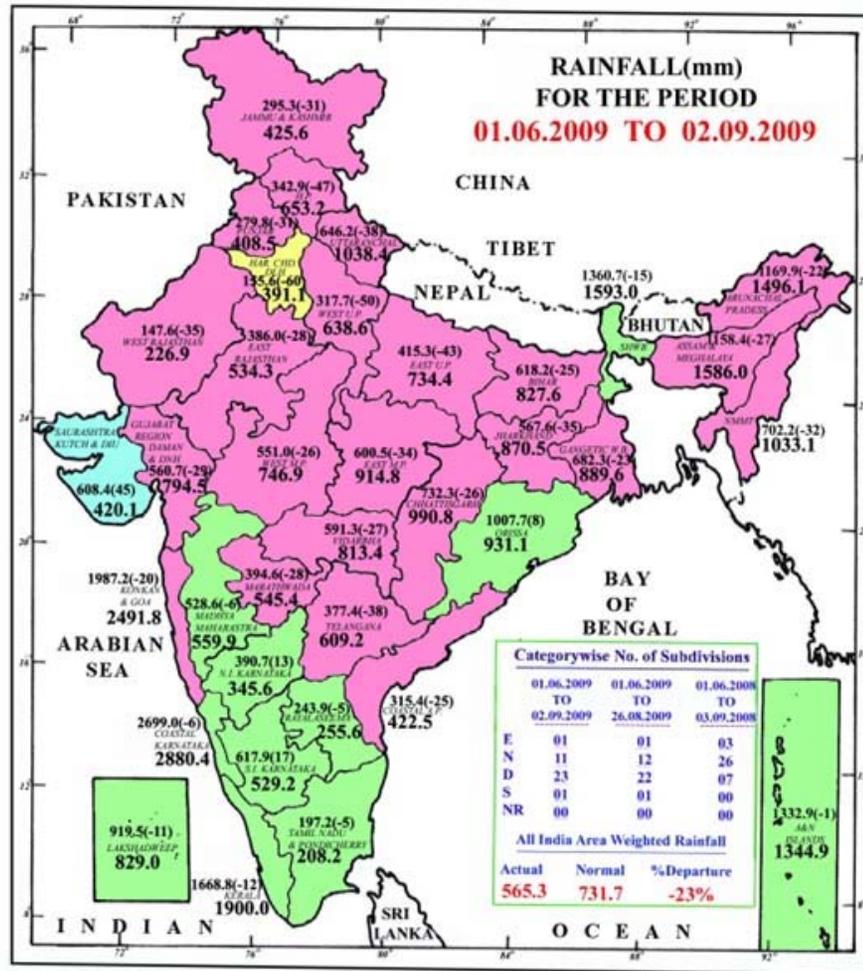
Mid - August 2009 Scenario

India's official weather map is a mass of red – meaning "deficient" rains, defined as 20 percent to 59 percent below normal.

Some 177 out of India's 626 districts were in the grip of drought –rice being the worst hit.

Only a thin strip along the western coast received normal rain at this stage.

भारत मौसम विज्ञान विभाग INDIA METEOROLOGICAL DEPARTMENT



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End of August 2009 Scenario

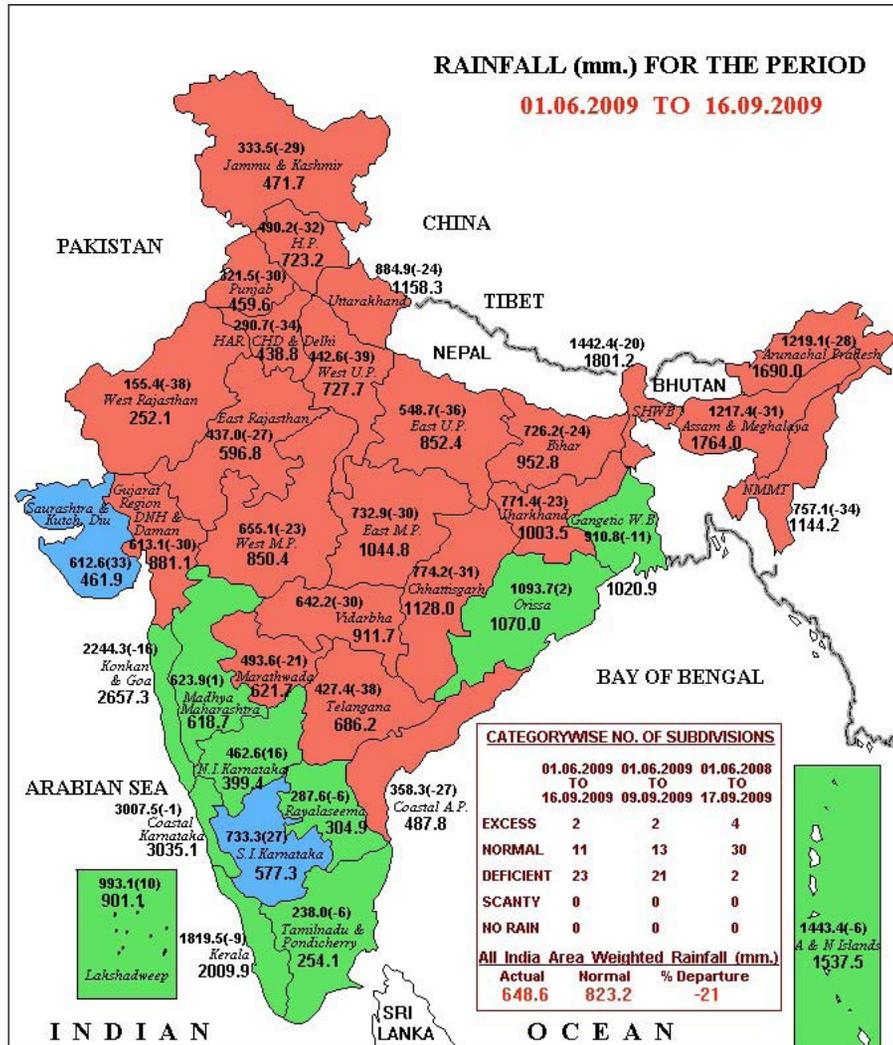
For millions of Indian farmers, especially the smallholders making out a living, a bad monsoon is a real disaster as it wipes out their livelihoods.

In 2004, rainfall was minus 13 percent normal and in 2002 minus 19 percent. The monsoon 2009 is minus 23%. 2002 drought reduced growth by 3.8%, the lowest in 11 years.

Growth then rebounded to 8.5 percent the next year when the monsoon revived. Thus we've hopes that the next good monsoon can wipe the problem.

But the worst hit rice bowl areas in Indo-gangetic plains could impact more as it contributes quite sizably

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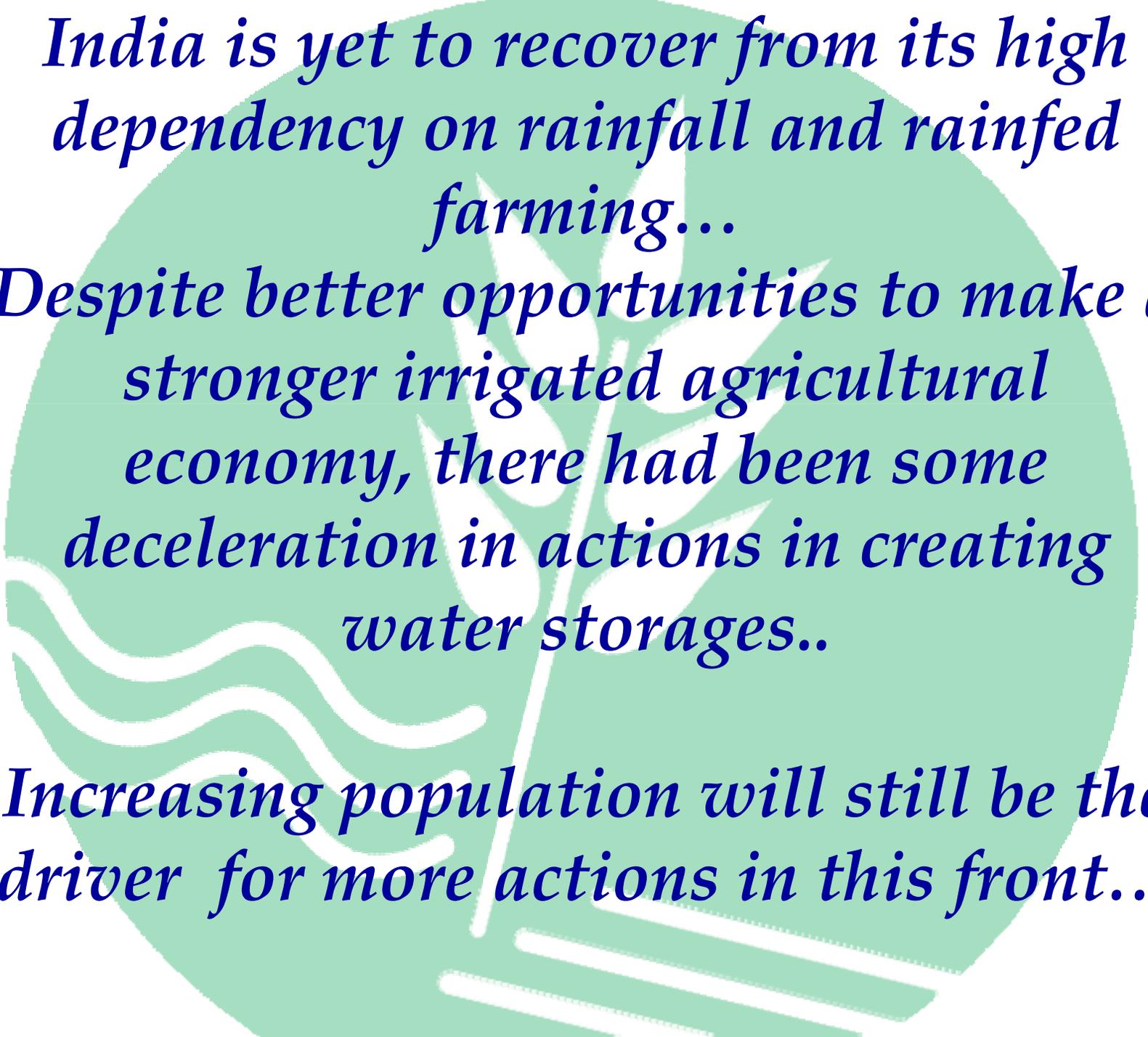
And by end of September the final situation turned grimmer

Overall deficit for the country as a is adjudged at 23%

Hopes to get the best out of Rabi crops in upper India - the last Spell of rains in early September Was a little above normal

The hope to fill in reservoirs with the Last few spells of rains diminished;

At the end of September, the overall Storage situation is lower than 2008



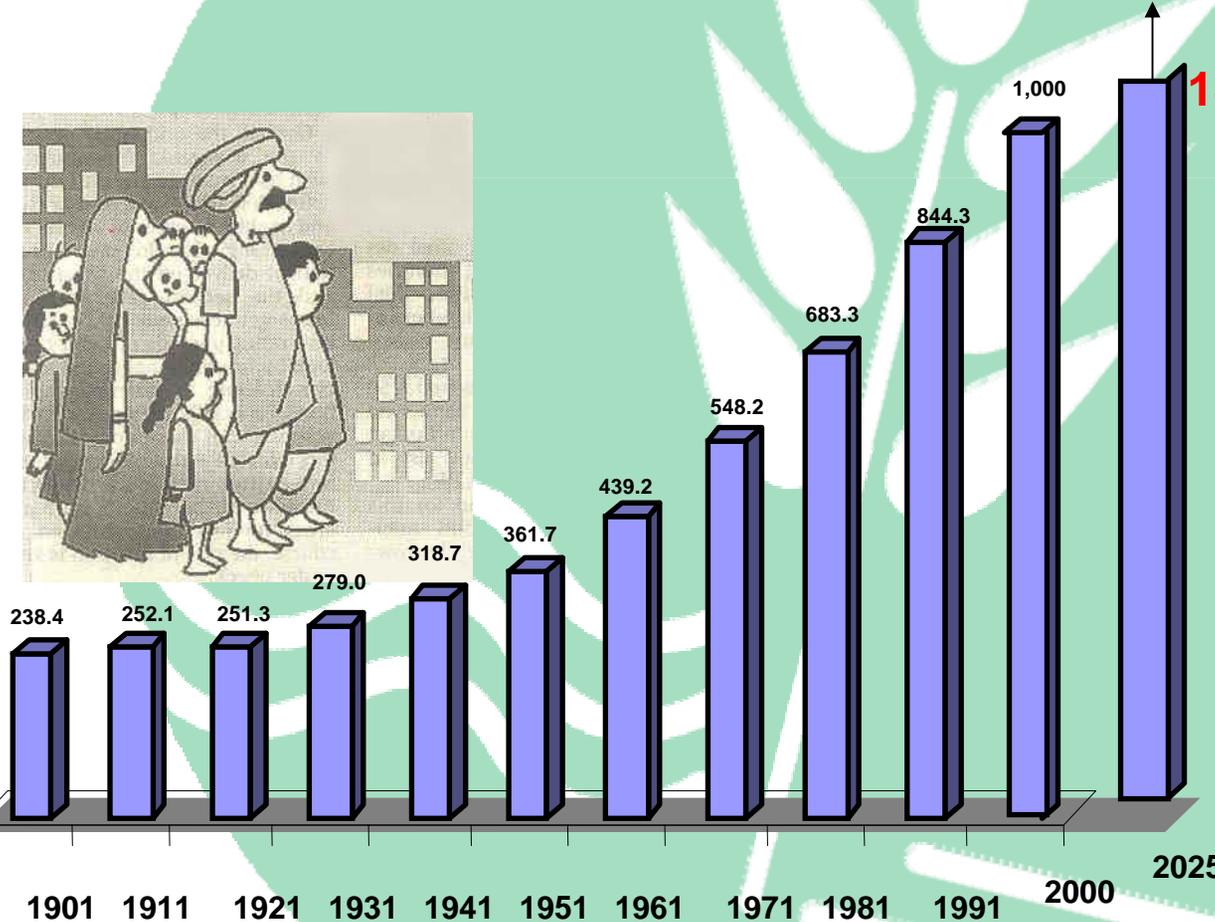
India is yet to recover from its high dependency on rainfall and rainfed farming...

Despite better opportunities to make a stronger irrigated agricultural economy, there had been some deceleration in actions in creating water storages..

Increasing population will still be the driver for more actions in this front...

INDIA : COPING WITH POPULATION EXPLOSION

- India's population crossed the one billion mark in 2000 - It stands at 1.166 billion, now.
- This is 17% of the world's population living on 2.4% of the globe's land area. Global population increased threefold in the last century, while India's grew nearly five times.
- If the current trends continue, India will overtake China in 2030 to become the most populous country in the world.



1400 by 15 more years?

Vital Statistics

Birth Rate

From 40.8 in 1951 to 21.76 in 2009

Infant Mortality Rate

From 146 in 1951 to 59.78 in 2009

Death Rate

From 25 in 1951 to 6.23 in 2009

Life Expectancy at Birth

Increased from 37 in 1951 to 69.89 in 2009

Total Fertility Rate

From 6 in 1951 to 2.72 in 2009

Urban : 29% in 2009

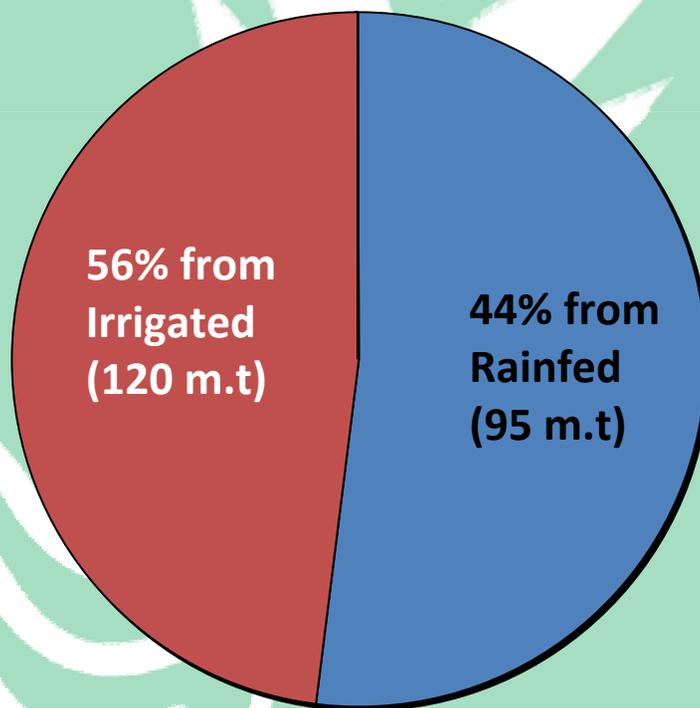
Rural : 71% in 2009

The ever daunting Challenges..



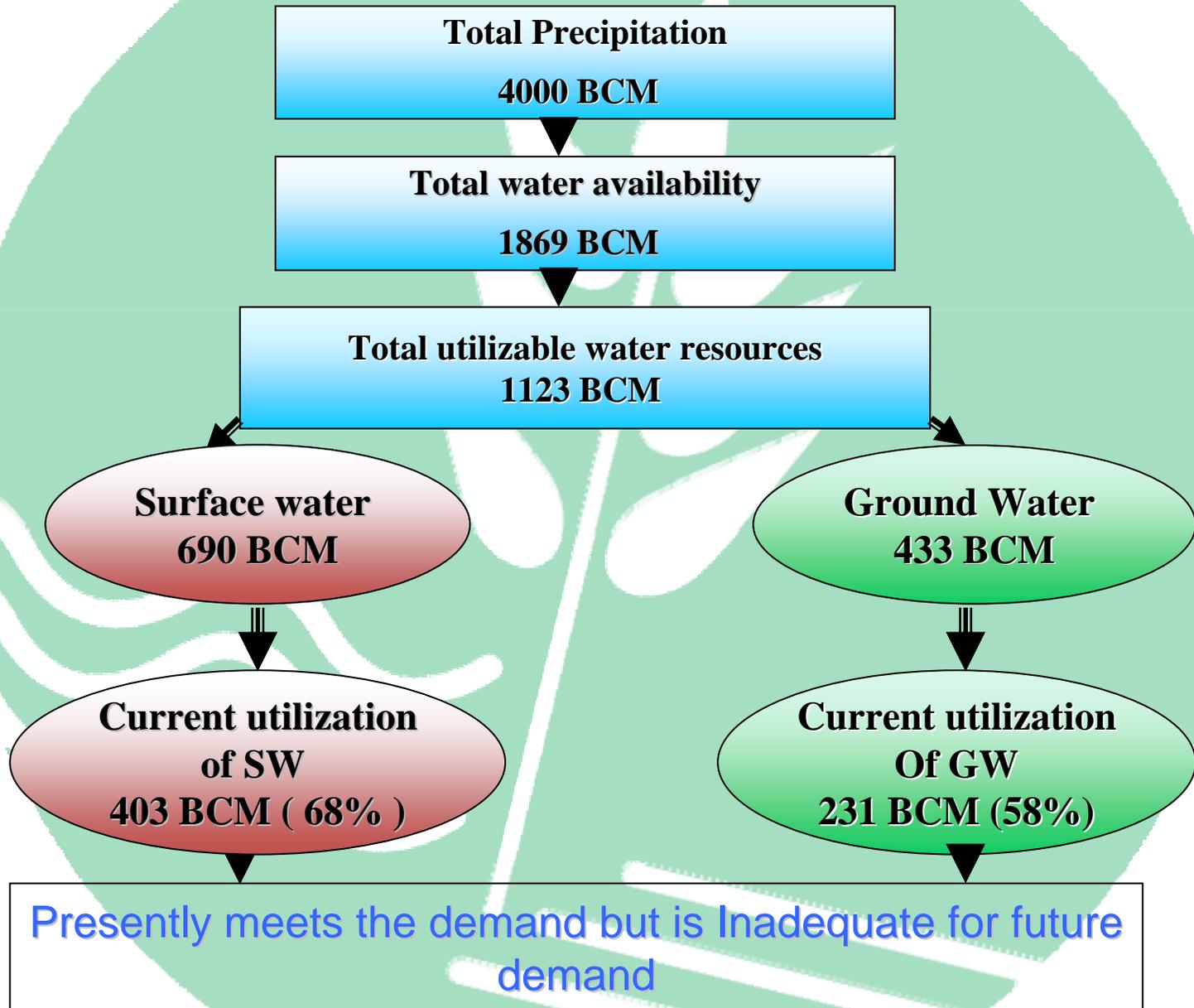
- Increasing demand for food
 - ✓ Reducing / stagnating crop yields
- **Higher demand for irrigation** with a severe competition for resources
 - ✓ For land, water, capital, and labour from industry and urban settlements
- Increasing variability of global supplies, **and prices**
- Increasing climatic risks, **erratic monsoons** with consequent flood and drought risks at an enhanced scale

Food production – Current status

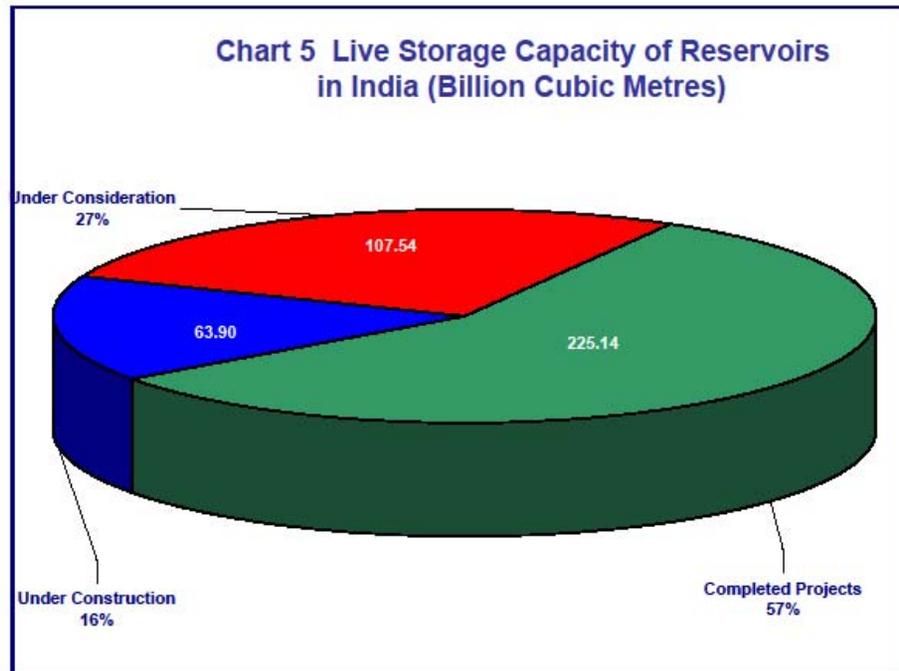


Presently, about 56% of agricultural production from Irrigated agriculture ensures India's Food Security (balance 44% is *a higher risk related, due to rainfall vagaries*)

India - Water Availability



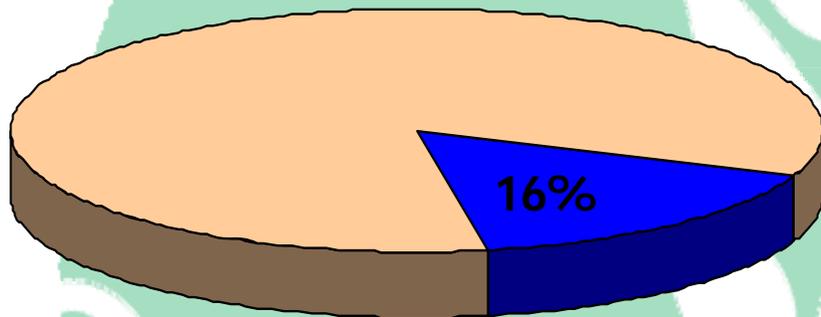
India: Dams and Water Storage



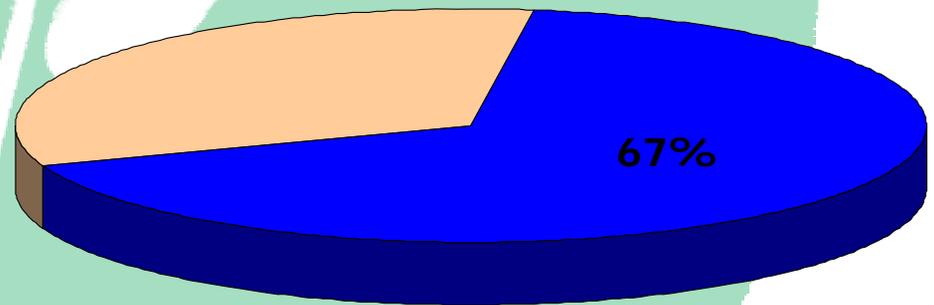
The Green Revolution in '70s was feasible with storage creation with construction of dams across major rivers for multi purpose projects

India's progress to Achieve Self Sufficiency assigning importance for irrigated agriculture

Potential Created as % of Ultimate Irrigation Potential
(141 Million Hectares)



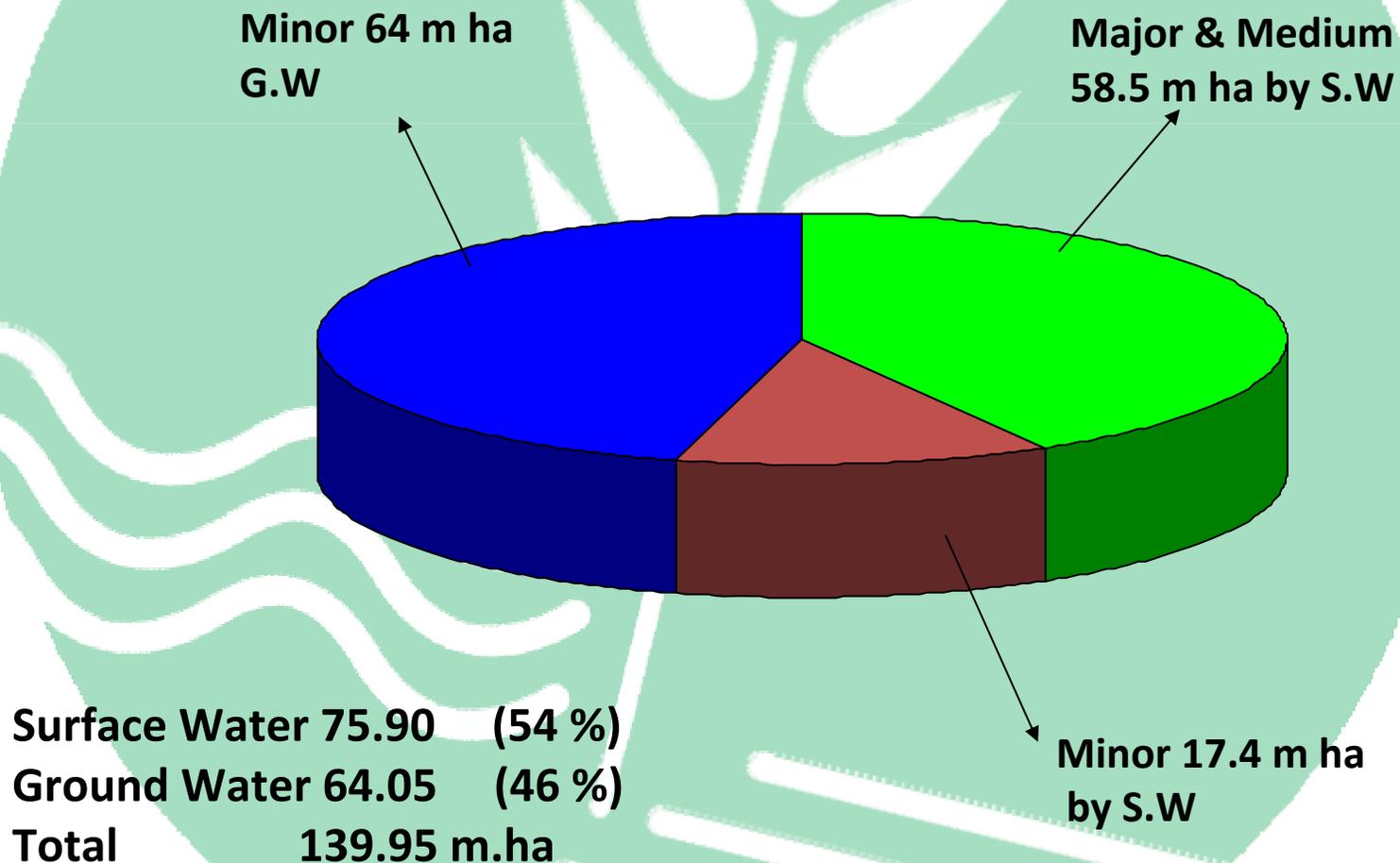
In 1951



In 2002

There is still a large scope to develop the available potential, essentially using surface waters for irrigated agriculture; a target of 10 million ha was set recently With Prime Minister's announcement of an initiative '*Bharat Nirman*', in 2004

The Potential for Irrigated Agriculture in India is a mix in both size as well as source-wise

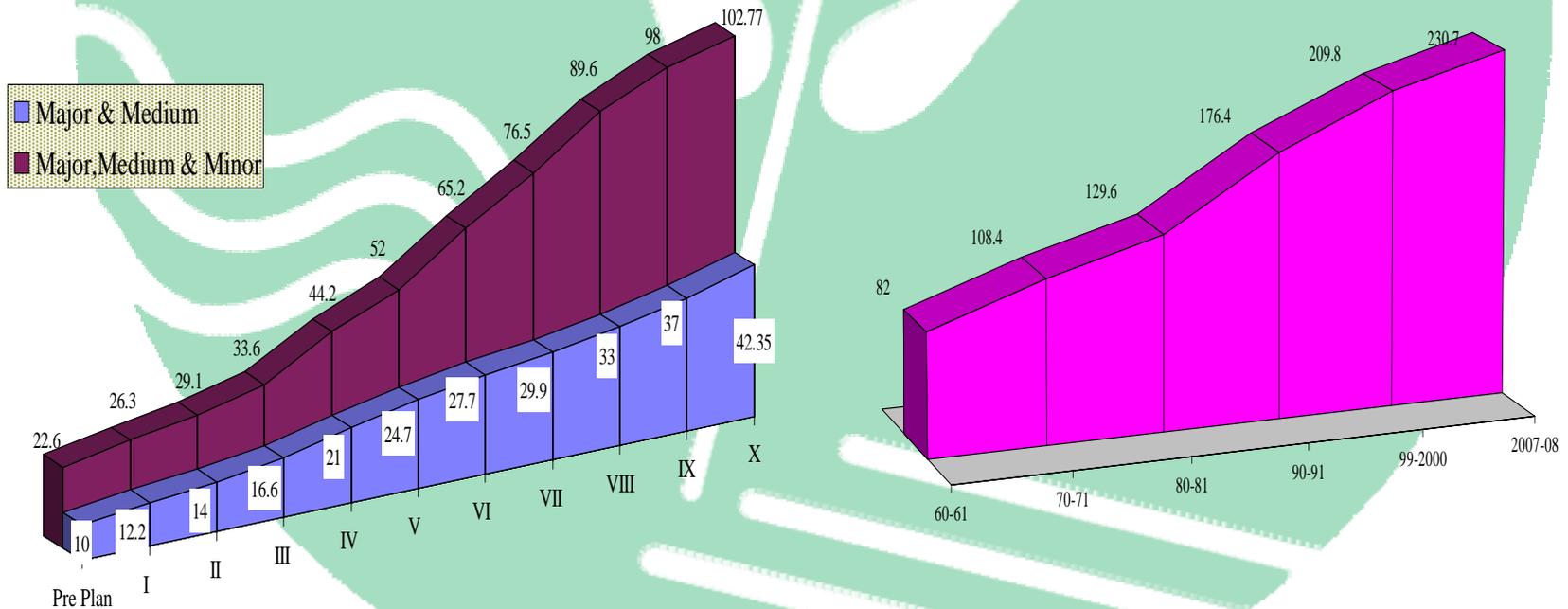


INDIAN IRRIGATION PROJECTS

	Major > 10000 ha	Medium <1000 <10000	ERM	Total
Completed	228	917	87	1232
Ongoing	162	221	85	468
Sub-Total	390	1138	172	1700
Total	1528		Numerous minor schemes >1000ha are in additon to the above	

Growth of Irrigation Potential was coupled with....

A good correspondence of increased food production; better agric., practices followed assured water with irrigated water supply



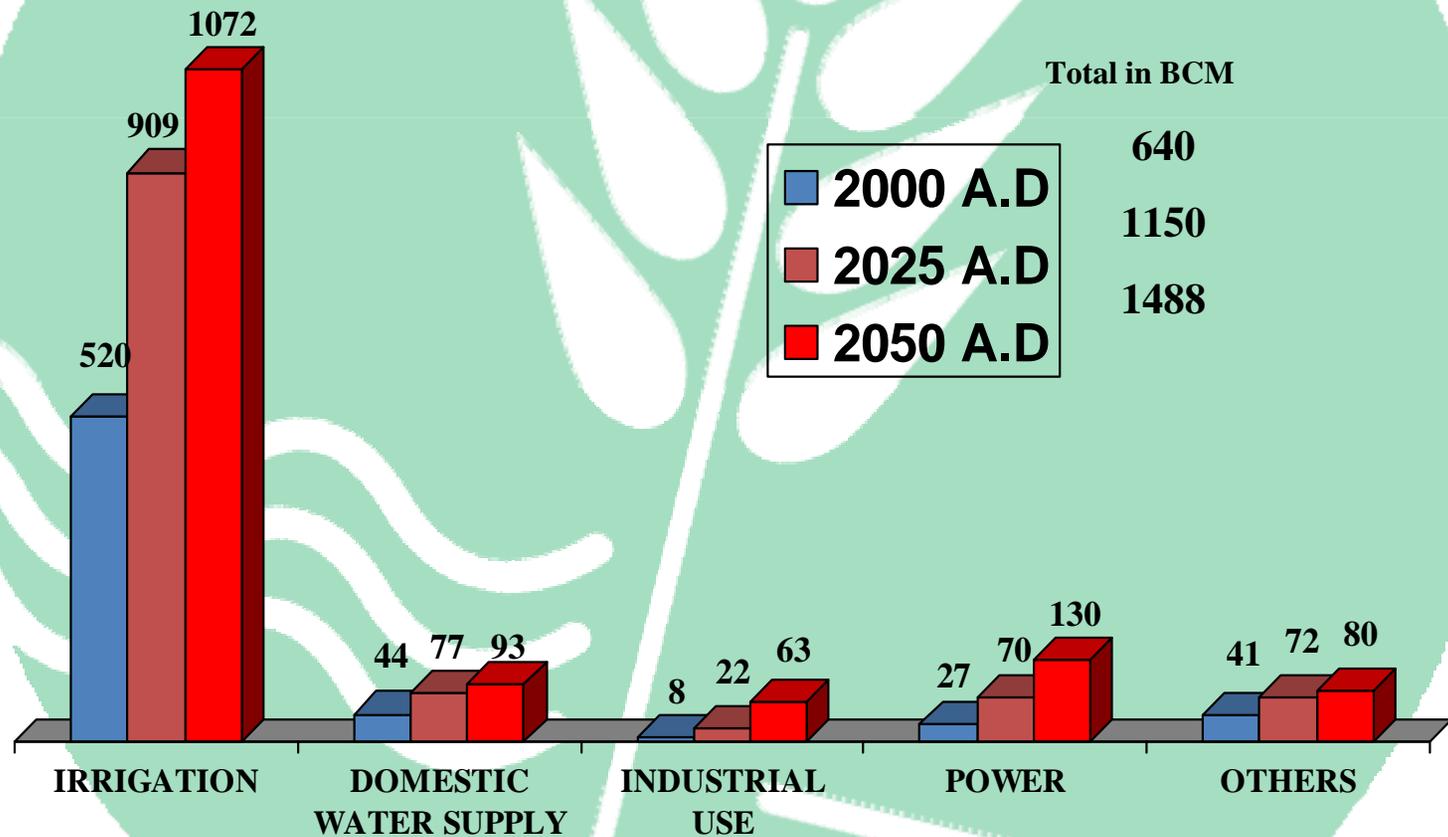
India's Future Food Requirements

Sl. No	Year	Population in billion	Requirements in tonnes
1	2000	1.025 billion	200 million
2	2025	1.3-1.6 billion	300- 350 million
3	2050	1.5 to 1.8 billion	450-500 million

If not self sufficiency, even meeting 90% of its needs internally, could mean a lot more action and business as usual would not be desirable...

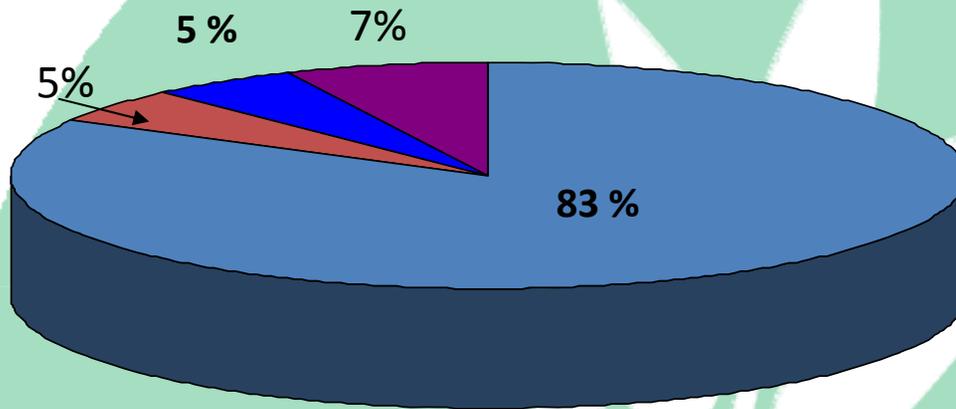
PROJECTIONS OF WATER DEMAND

More than double quantum is required as 'water for agriculture'



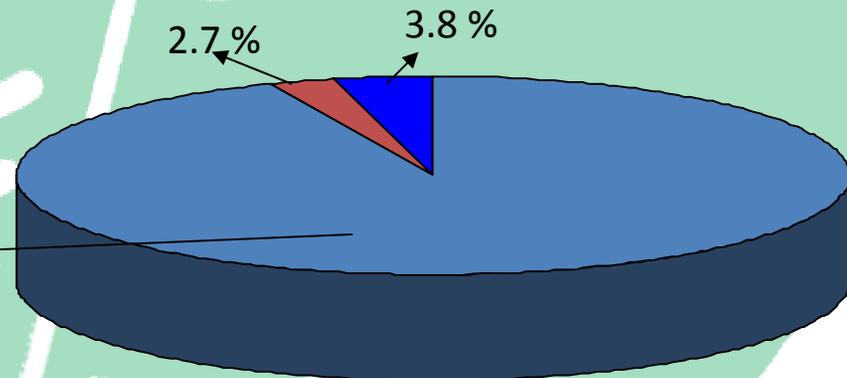
Sectoral Share of Water in India (2000)

Water Withdrawal



■ Agriculture ■ Domestic ■ Industry ■ Evaporation losses

40-80% depending on efficiency of surface or GW irrigation systems



Water Consumption

INDIA RIVER BASINS

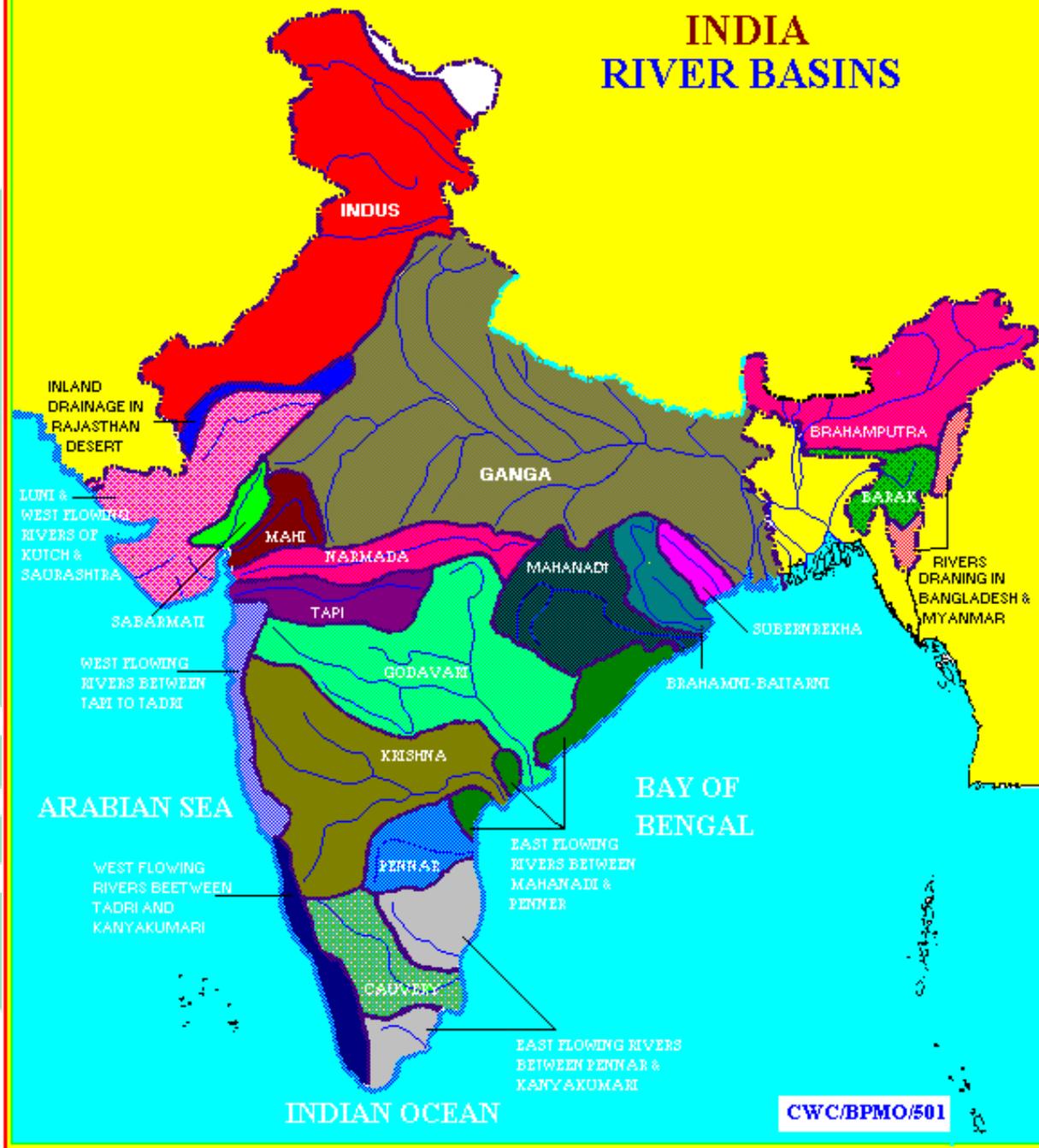
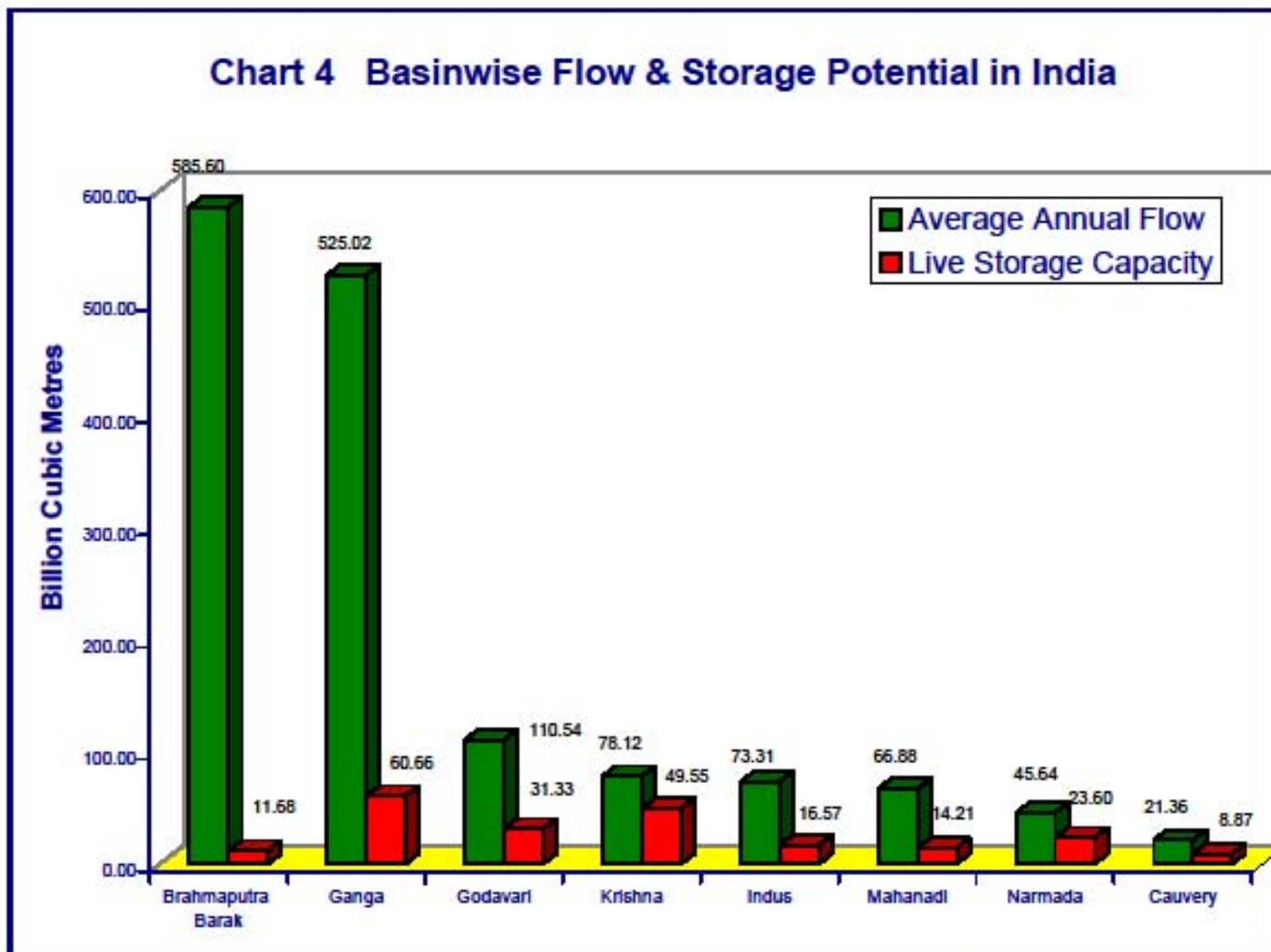
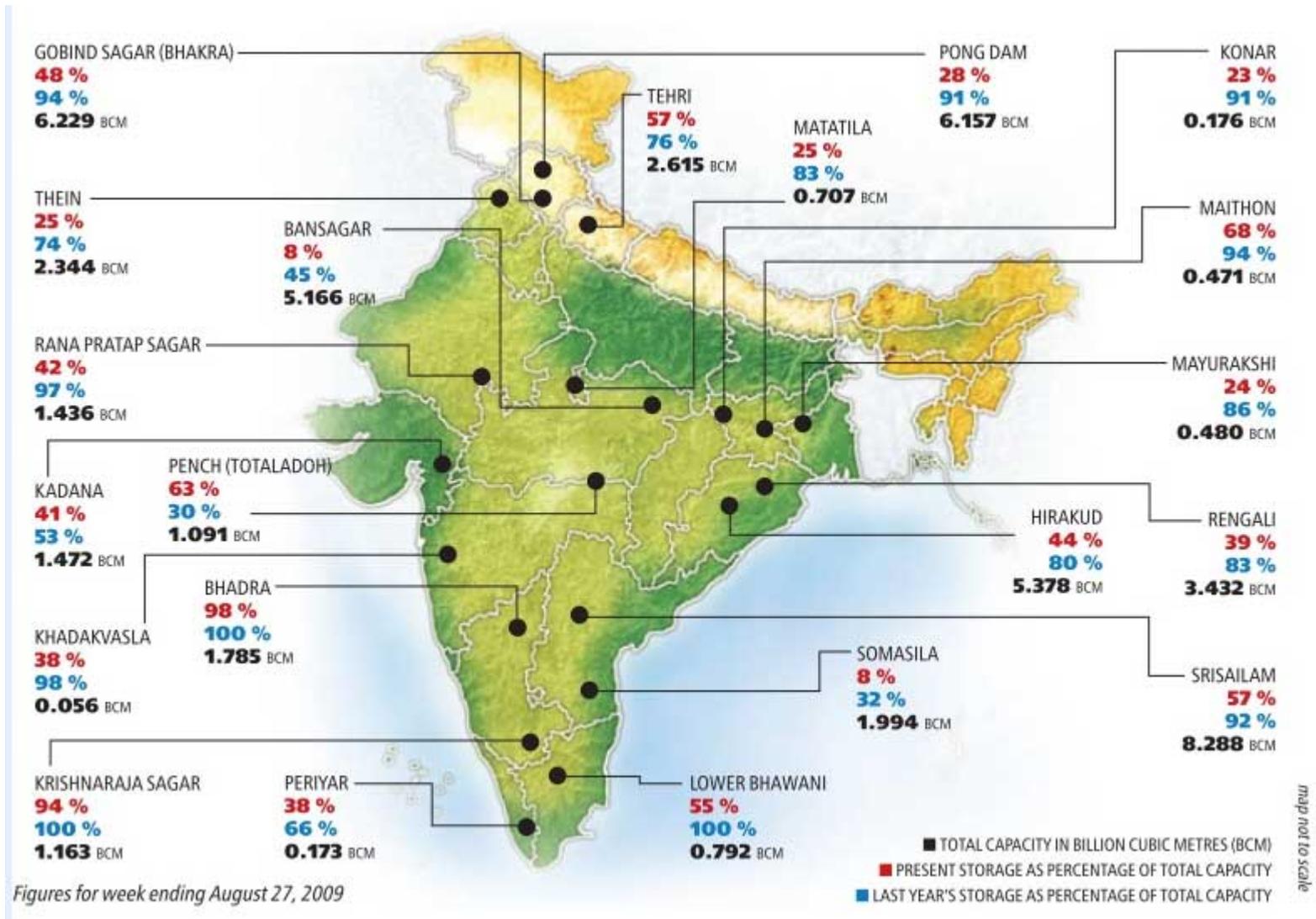


Chart 4 Basinwise Flow & Storage Potential in India



While some river basins do offer further scope for harnessing many do not ...

Poor Storage available might hurt adversely securing water in 2009 -10; causing a substantial reduction food stocks

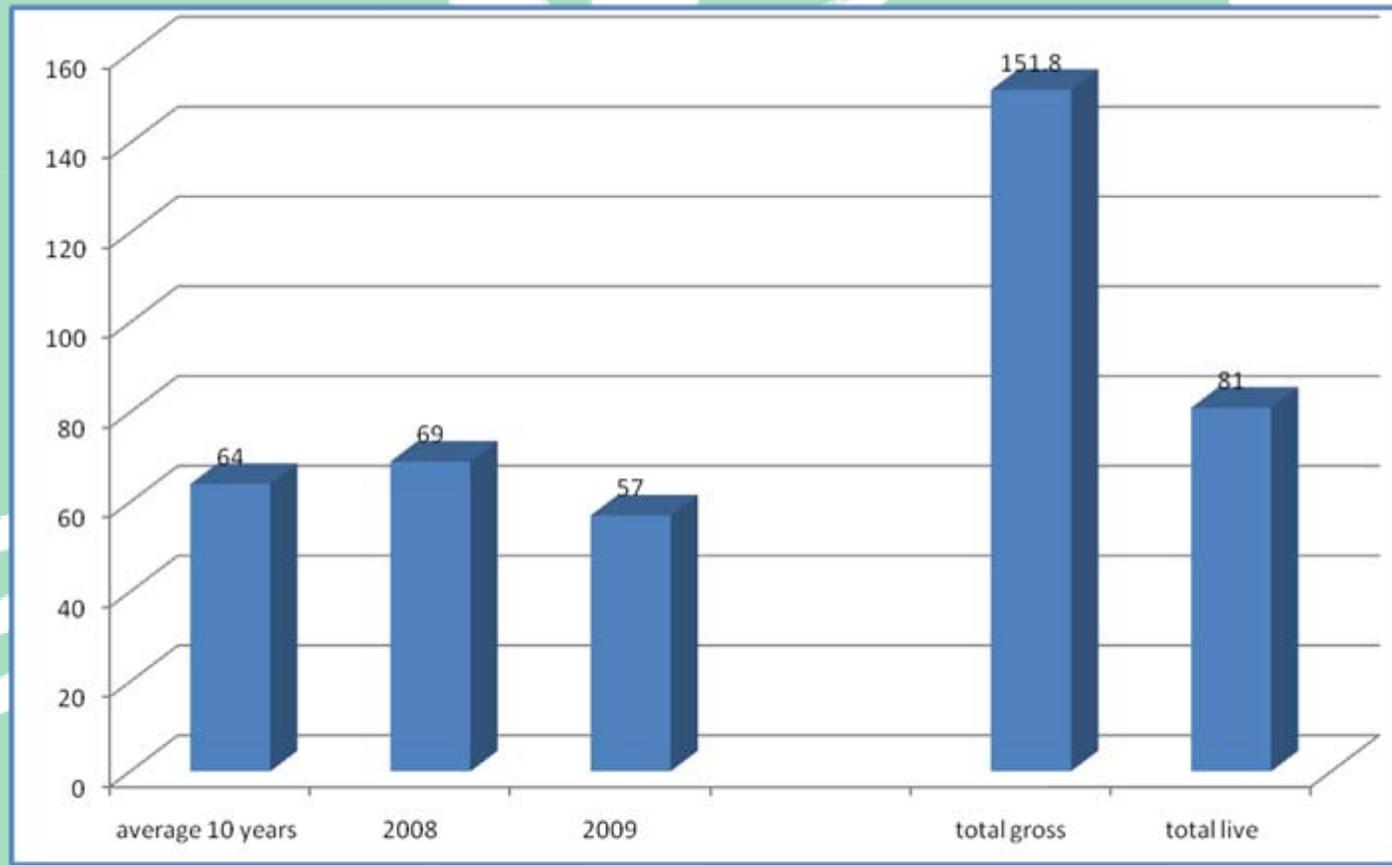


Storage situation in India had been abysmally low In 2009; there is a wide spread anxiety in regard to water availability to sustain irrigation & hence food production

Total Storage

(as on 18 Sept 2009)

Volume in
million m³



situation in storage of large reservoirs > 10 million m³

A comparison of India's storage created with a few other major arid and semi arid situations around the globe will indicate that, half way through, India had slowed down ...

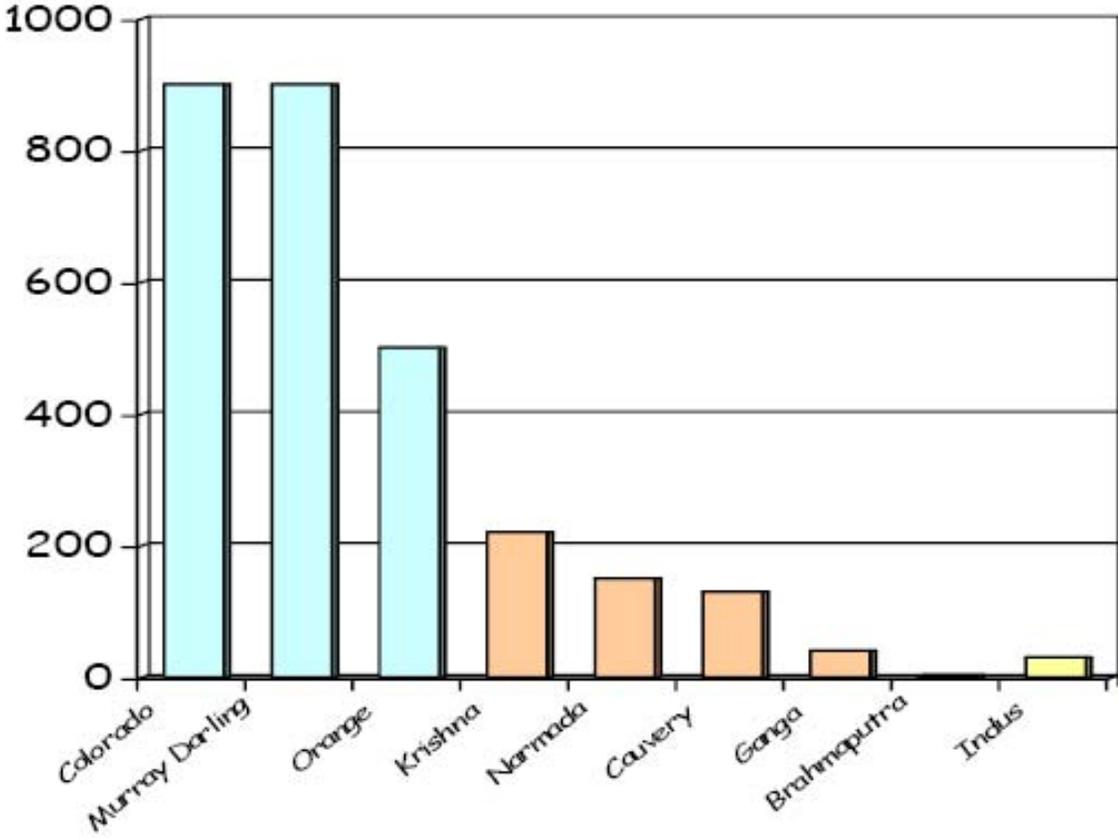


Figure 48: Days of average flow which reservoirs in semi-arid countries can store in different basins

cubic meters per capita

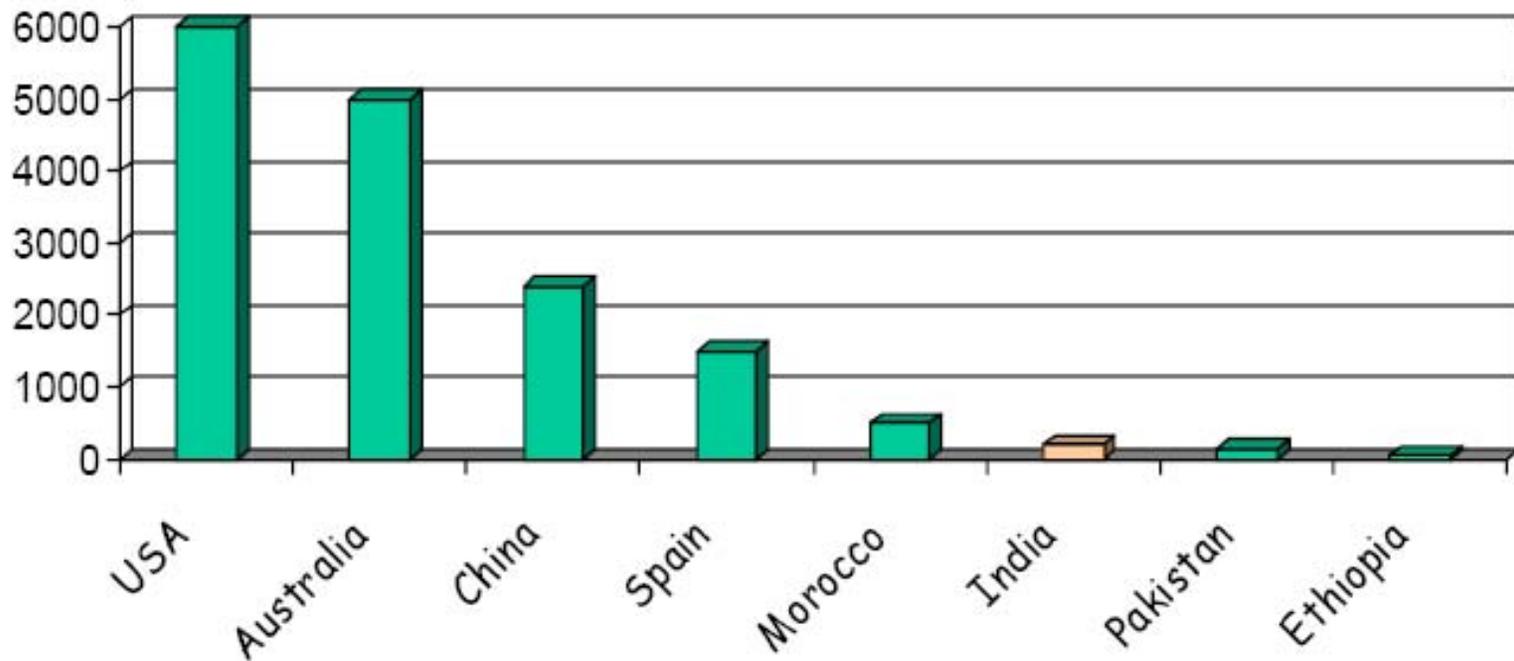


Figure 47: Storage per capita in different semi-arid countries

ICOLD data base

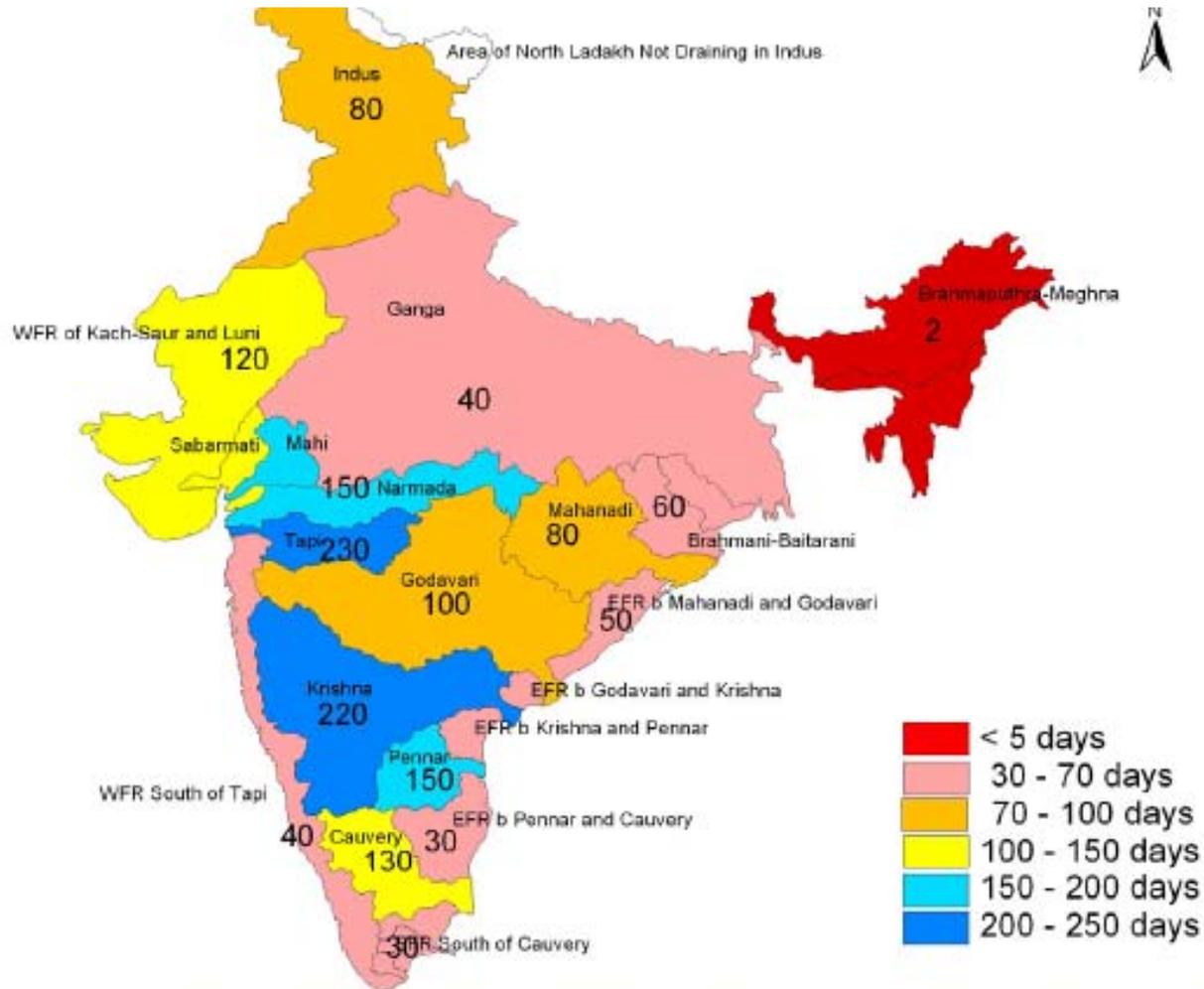
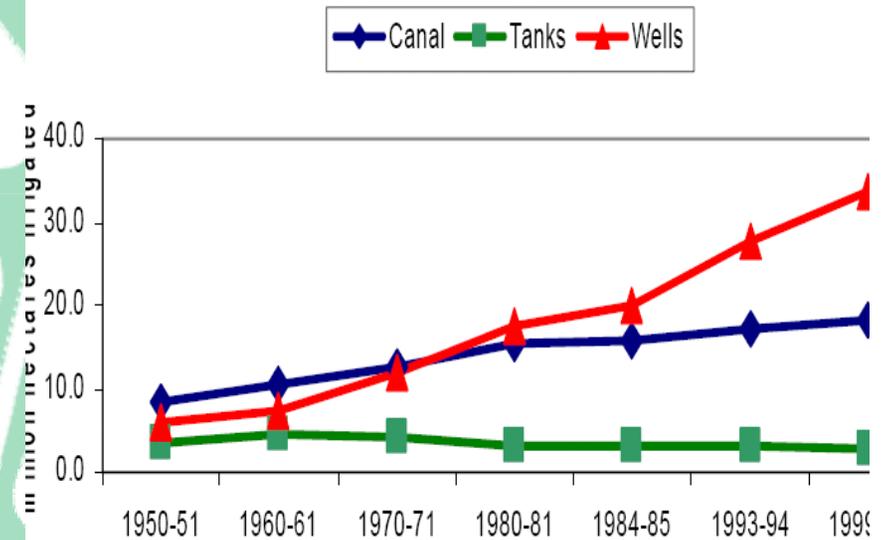
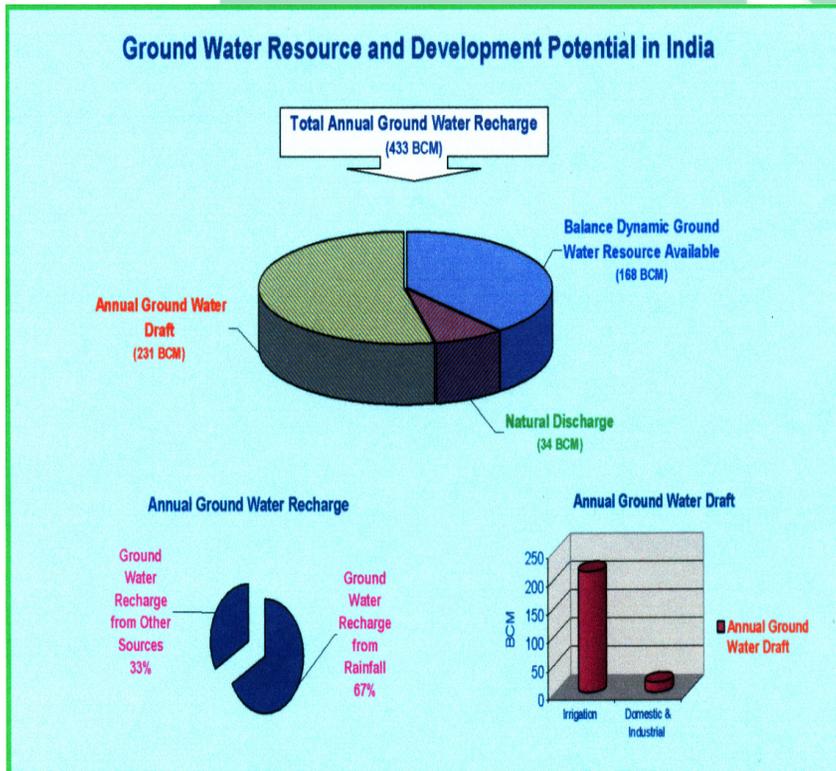


Figure 53b: The number of days of average flow that can be stored in different river basins in India

GIS presentation by IWMI

Ground Water Resource & Development Potential



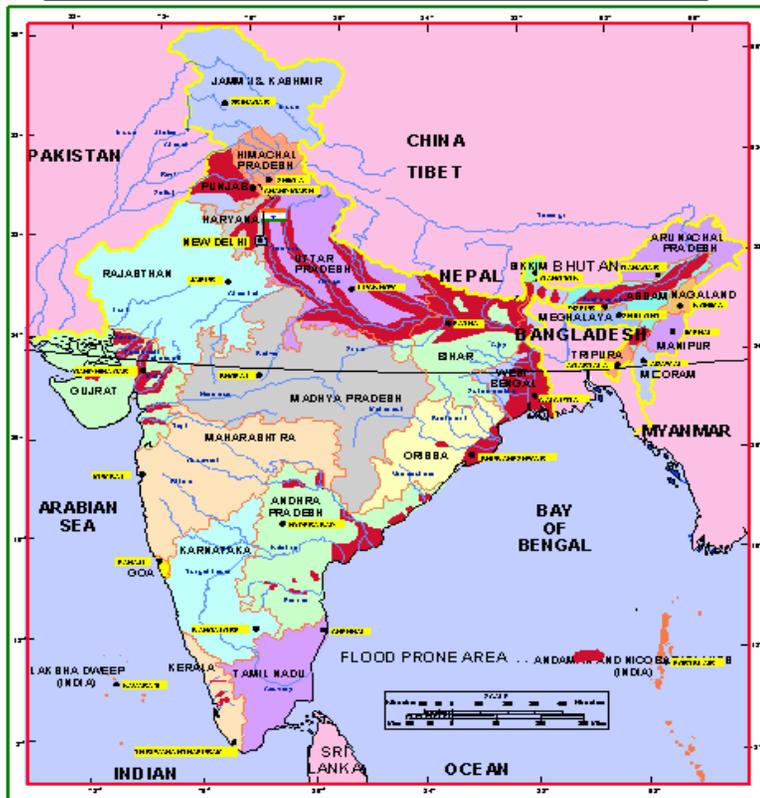
Over the last two decades 84% of addition to net irrigated area came from groundwater

An analysis of World Bank on the sustainability of dependence on Ground Water is a good pointer to seek an 'in depth' review of the present managerial trends

India: drowned under the syndrome of floods and droughts

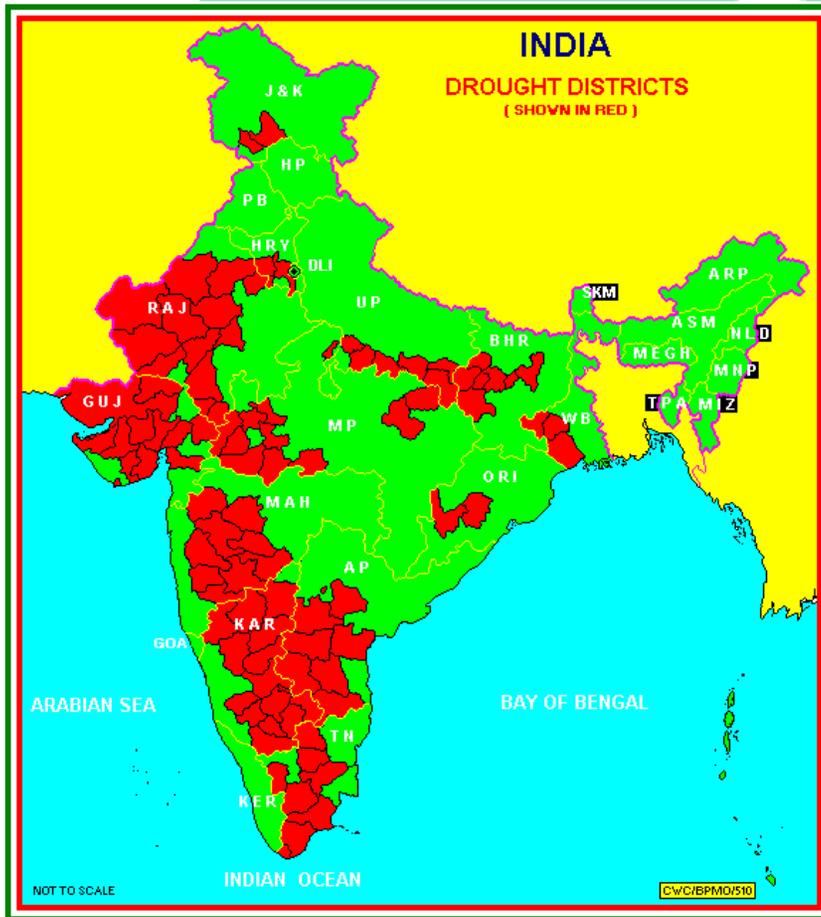
INDIA

AREA LIABLE TO FLOODS



Vast areas go under deep waters during intense floods(circa 36 m.ha is flood prone)

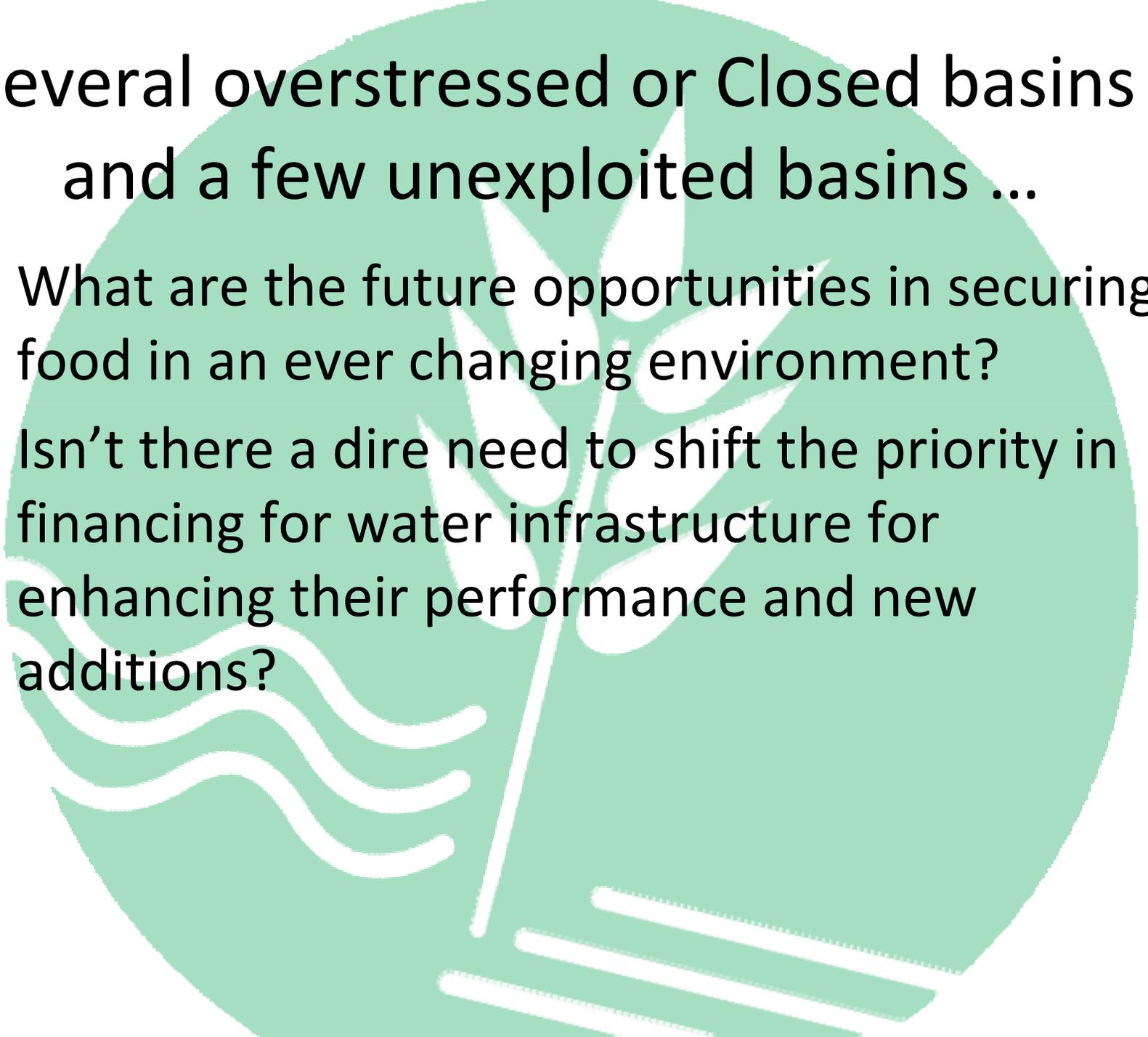
India: droughts in vast areas...2



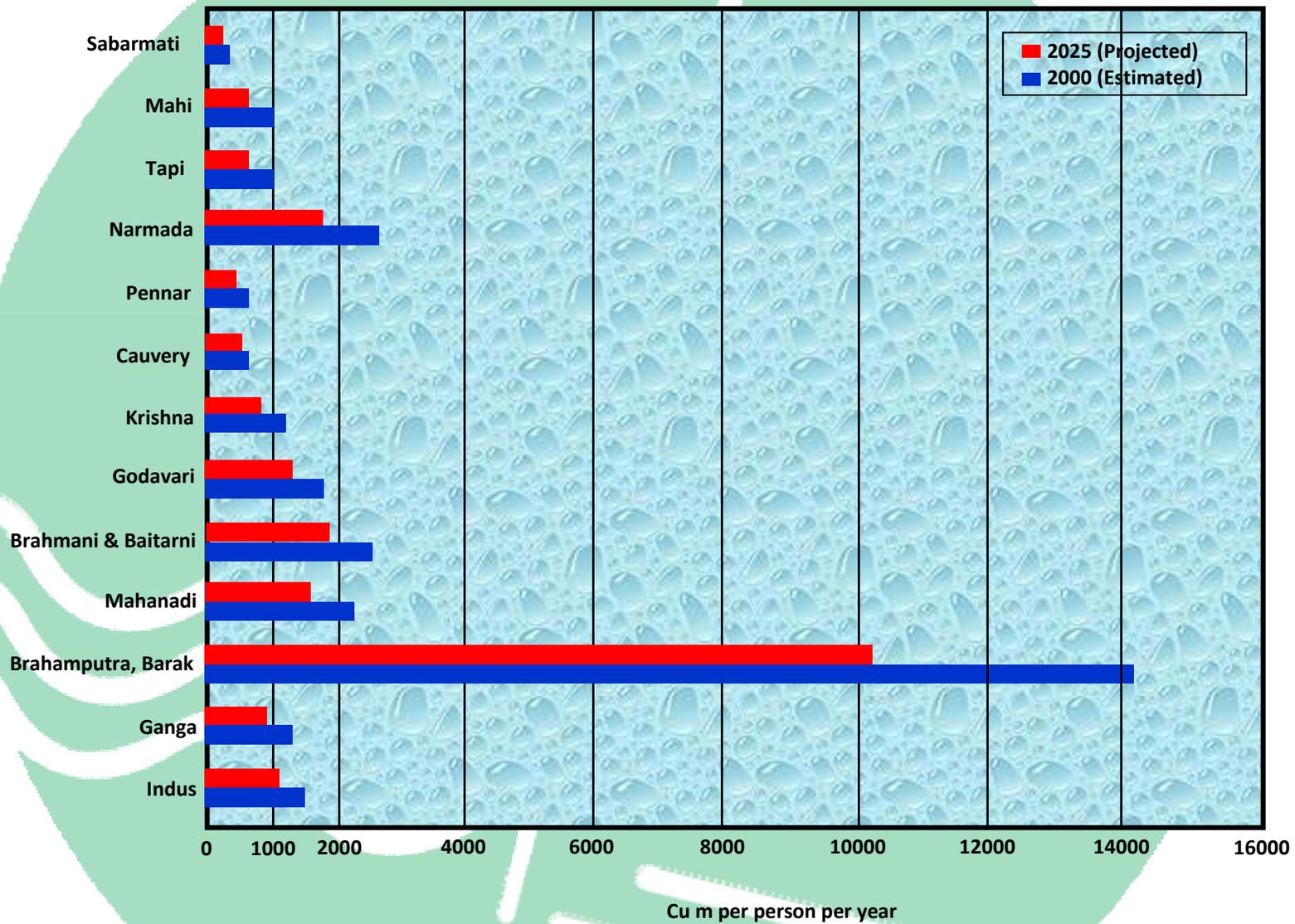
Parched drainage course in drought

Several overstressed or Closed basins and a few unexploited basins ...

- What are the future opportunities in securing food in an ever changing environment?
- Isn't there a dire need to shift the priority in financing for water infrastructure for enhancing their performance and new additions?



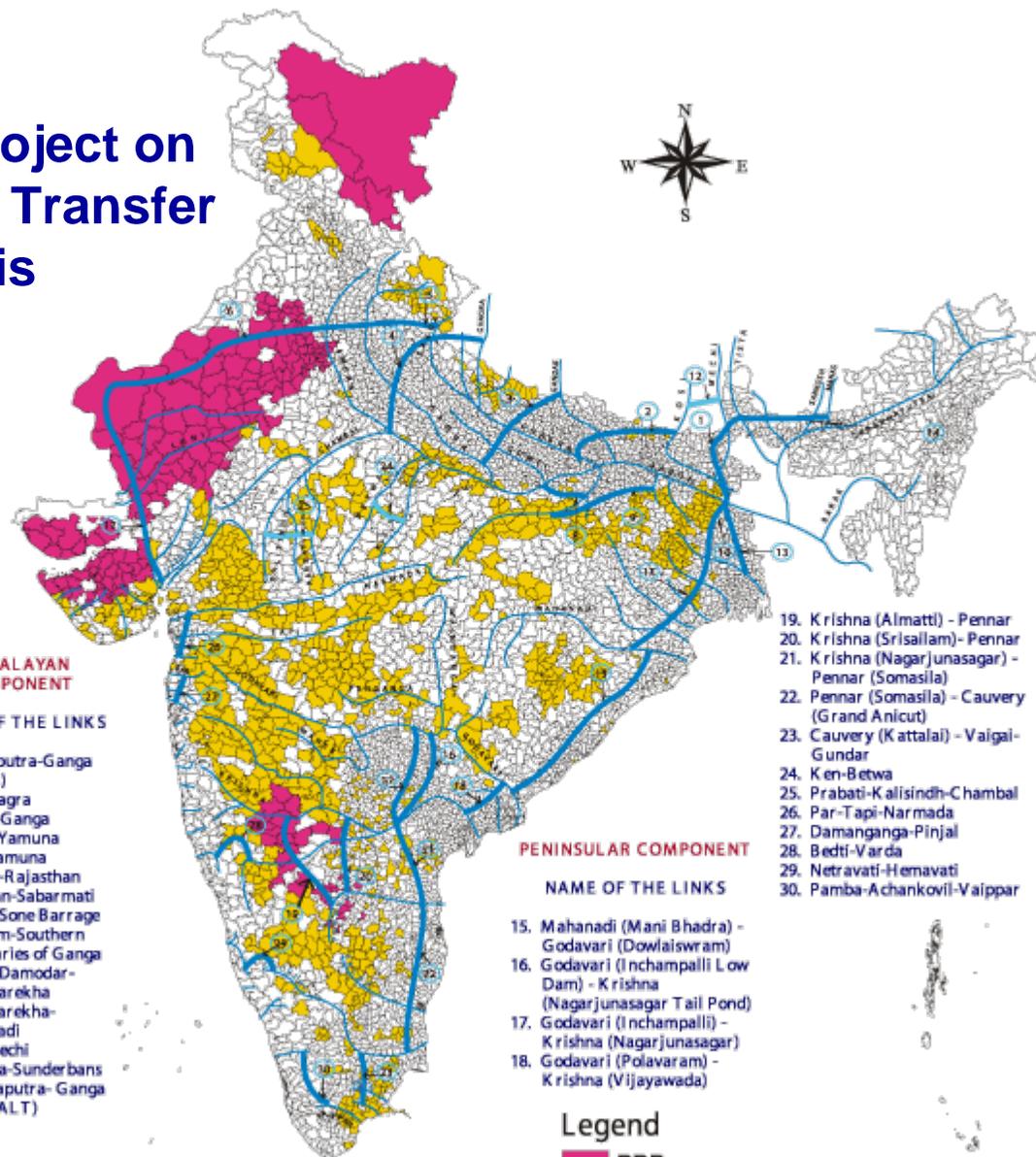
Changing scenario in the individual 'Basin-wide' surface water situation



Source : Ministry of Water Resources, 2002

Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP)

Can a National Project on Inter Basin Water Transfer help to solve crisis in drought areas, bring in additional Irrigation and augment food production?



HIMALAYAN COMPONENT

NAME OF THE LINKS

1. Brahmaputra-Ganga (MSTG)
2. Kosi-Ghagra
3. Gandak-Ganga
4. Ghagra-Yamuna
5. Sarda-Yamuna
6. Yamuna-Rajasthan
7. Rajasthan-Sabarmati
8. Chunar-Sone Barrage
9. Sone Dam-Southern Tributaries of Ganga
10. Ganga-Damodar-Subernarekha
11. Subernarekha-Mahanadi
12. Kosi-Mechi
13. Farakka-Sunderbans
14. Brahmaputra-Ganga (JTF) (ALT)

PENINSULAR COMPONENT

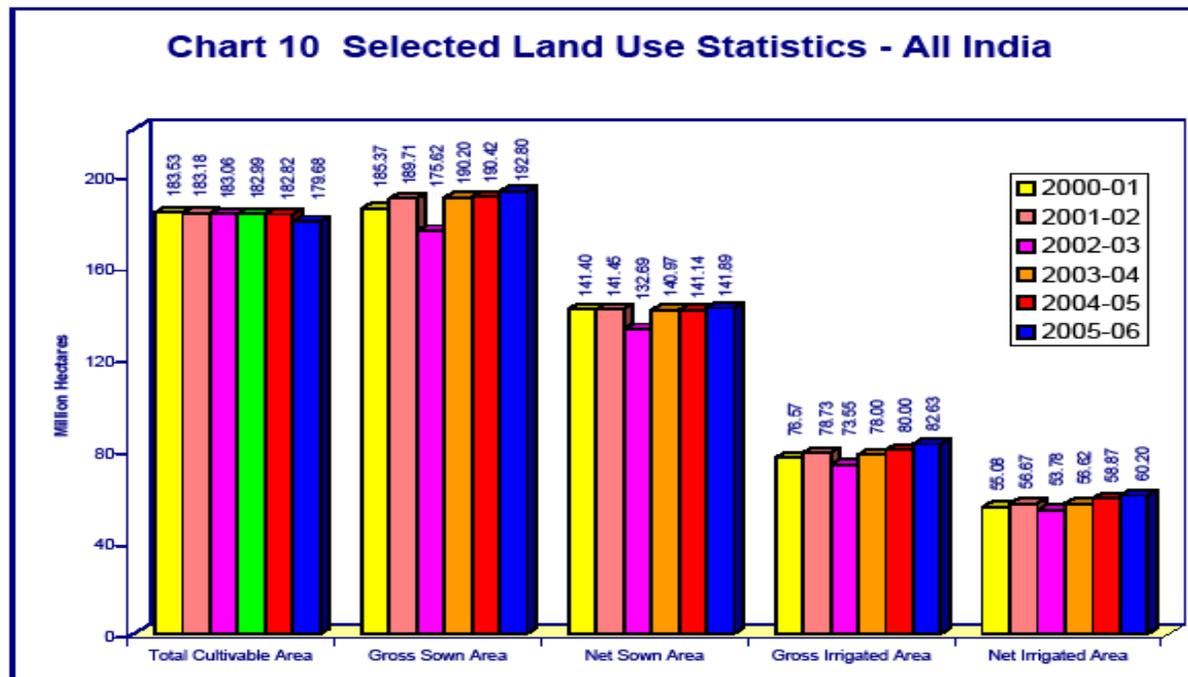
NAME OF THE LINKS

15. Mahanadi (Mani Bhadra) - Godavari (Dowlaiswram)
16. Godavari (Inchampalli Low Dam) - Krishna (Nagarjunasagar Tail Pond)
17. Godavari (Inchampalli) - Krishna (Nagarjunasagar)
18. Godavari (Polavaram) - Krishna (Vijayawada)
19. Krishna (Almatti) - Pennar
20. Krishna (Srisaillam) - Pennar
21. Krishna (Nagarjunasagar) - Pennar (Somasila)
22. Pennar (Somasila) - Cauvery (Grand Anicut)
23. Cauvery (Kattalai) - Vaigai-Gundar
24. Ken-Betwa
25. Prabati-Kalisindh-Chambal
26. Par-Tapi-Narmada
27. Damanganga-Pinjal
28. Bedti-Varda
29. Netravati-Hemavati
30. Pamba-Achankovil-Vaippar

Legend

- DDP
- DPAP
- Data Not Available

Is there a scope for additional irrigation in India to double the food production?



Yes...Irrigation expansion can be vertical as well as horizontal

International cooperation, for a 'gain-gain' in future ?

- Regional cooperation for Himalayan rivers may perhaps forge an enabling environ to develop additional storage in the Gangetic and the Brahmaputra river systems and GCC and vanishing Himalayan snow caps can trigger new interest for joint actions
- This will ask for new initiatives which can also take on board environmental and carbon emission concerns and new opportunities for financing lasting and durable solutions

Issues recognised in Government of India's National Water Mission (2008) Documents

- Building further blocks to 'National Water Policy 2002'
- A frame work to **optimize water use by increasing water use efficiency by 20%**, all round
- Encouraging **new development options** to augment water supply in critical areas, urban in particular
- Mapping areas likely to be experience floods and developing schemes to manage flood
- Customizing climate change models for regional water basins
- Developing digital elevation models for flood prone areas for forecasting floods

Issues ...2

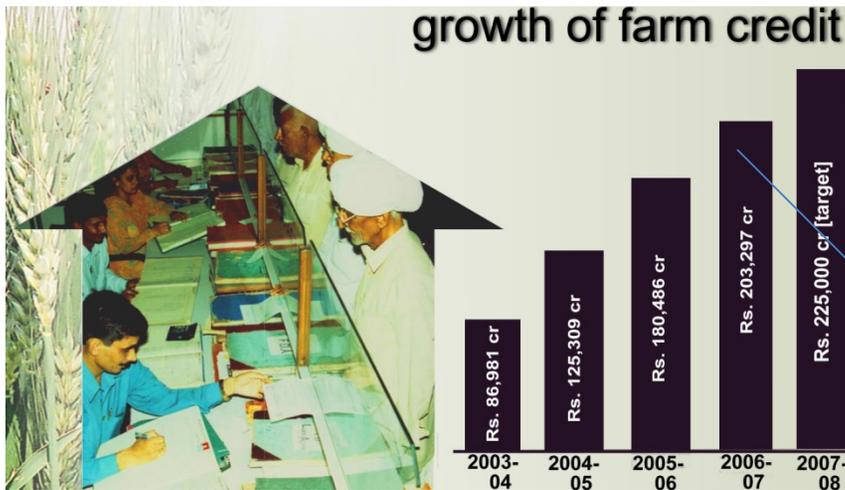
- **Rehabilitation of systems** that have been run down and also expand irrigation, where feasible, with a special effort to increase storage capacity.
- **Enhancing storage capacities** of multipurpose hydro projects, and integration of drainage with irrigation infrastructures
- Incentive structures to be designed to promote adoption of large scale irrigation programmes; shift to sprinklers, drip irrigation and ridge and furrow irrigation
- Restoration of old water tanks
- Developing models for urban storm water flows and estimating drainage capacities for storm water and for sewers based on simulation
- **Reviewing the Long Distance Inter Basin Water Transfer to see its viability to solve future water stress for food**

Irrigation to support India's 'Agricultural water needs' **shapes & reshapes**

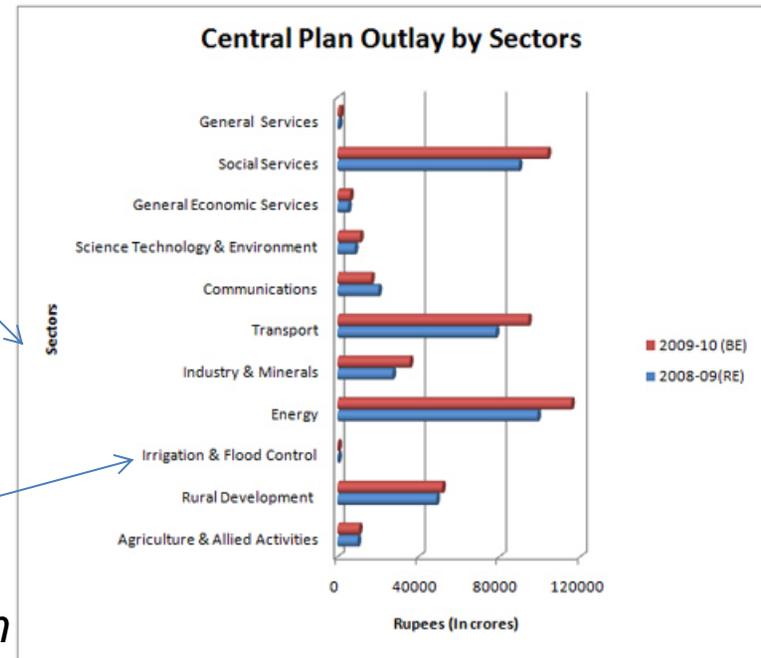
- **India needs doubling food production by 2050**
- **The failing monsoons compels action to shift dependency from rainfed to irrigated**
- **Infrastructure for water harnessing – to reverse lagging actions**
- **To combat postulated consequences due to GCC impacts, fund needs to be secured for the purpose.**

The Present trend in funding:

Where does Plan outlay goes?



How can investment move up for Water for food, meaningfully?



Irrigation and Flood Control gets low allocation

In the absence of development of adequate dams and storages, farmers' credit is found to not necessarily yield results ;India waived farmers' credit to the tune of US \$ 1.5 billion in 2008: **Can the trend in funding be altered to maintain and create new assets for 2050?**

In the end...

- **In developing countries with population stress, ensuring food is strongly linked with water**
- **The story is not just that of India alone. It is valid for many nations in Africa, drought stricken year after year, despite their resource availability and a lack of adequate development**
- **Economic downturn worsens the situation.**
- **Economic downturn or not, long term actions on food fronts are of key priority for countries in Africa and Asia.**
- **Water for agriculture needs to be secured. Water Storage with dams is a neglected agenda in the post WCD era and need a reversal with a renewed vigour**
- **The inclination in the recent G 20 summit not to contemplate an early withdrawal of some of the measures for rescuing the economic downturn impacts around the developing world is a welcome gesture**
- **Water for food is one that needs priority attention**
- **Thank you for your patience**