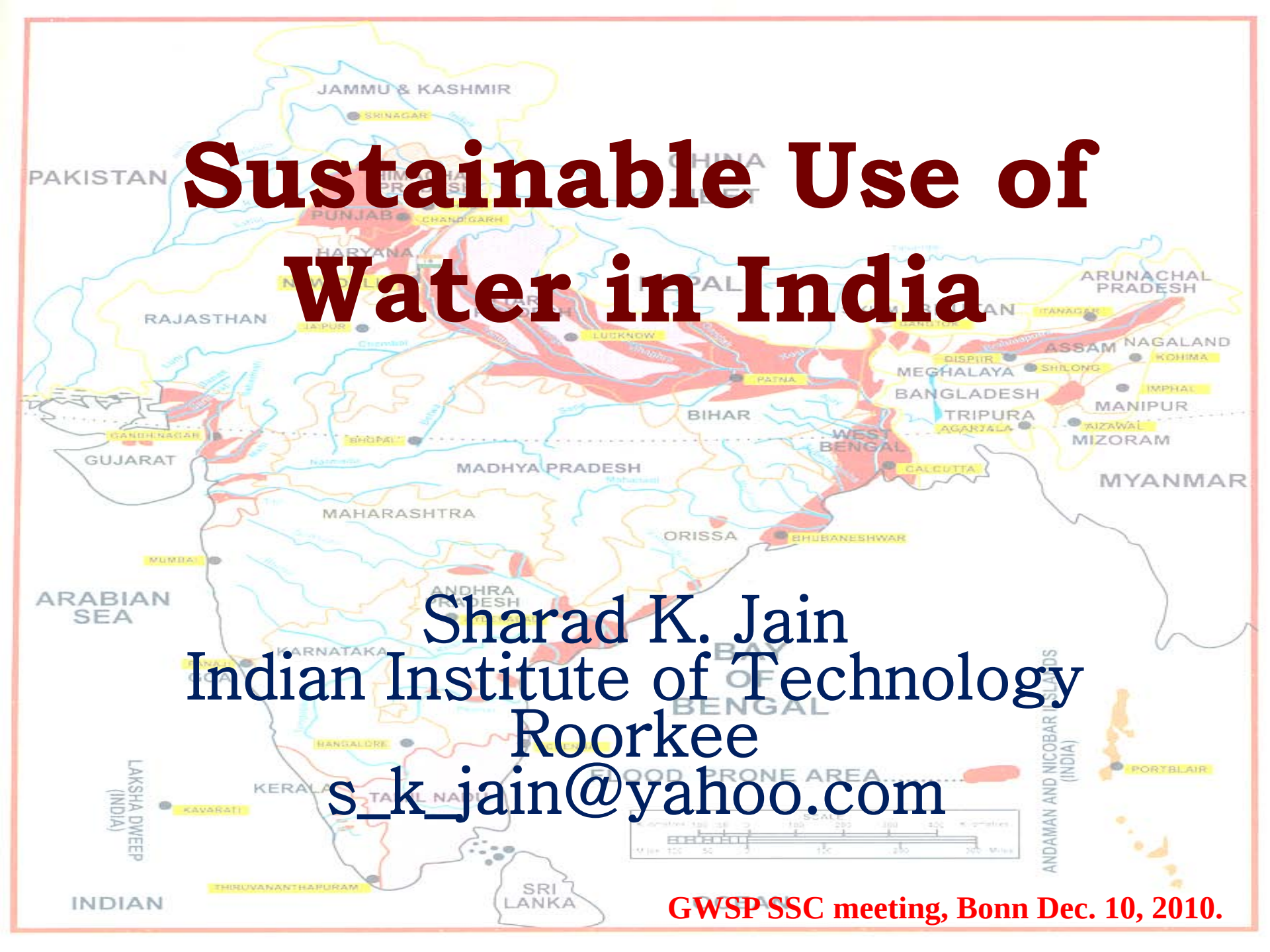
Sustainable Use of Water in India



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GWSP SSC meeting, Bonn Dec. 10, 2010.

Outline

- Water management in India
- Study on virtual water
- GWSP related work

Land-Water-Social setting

India has:

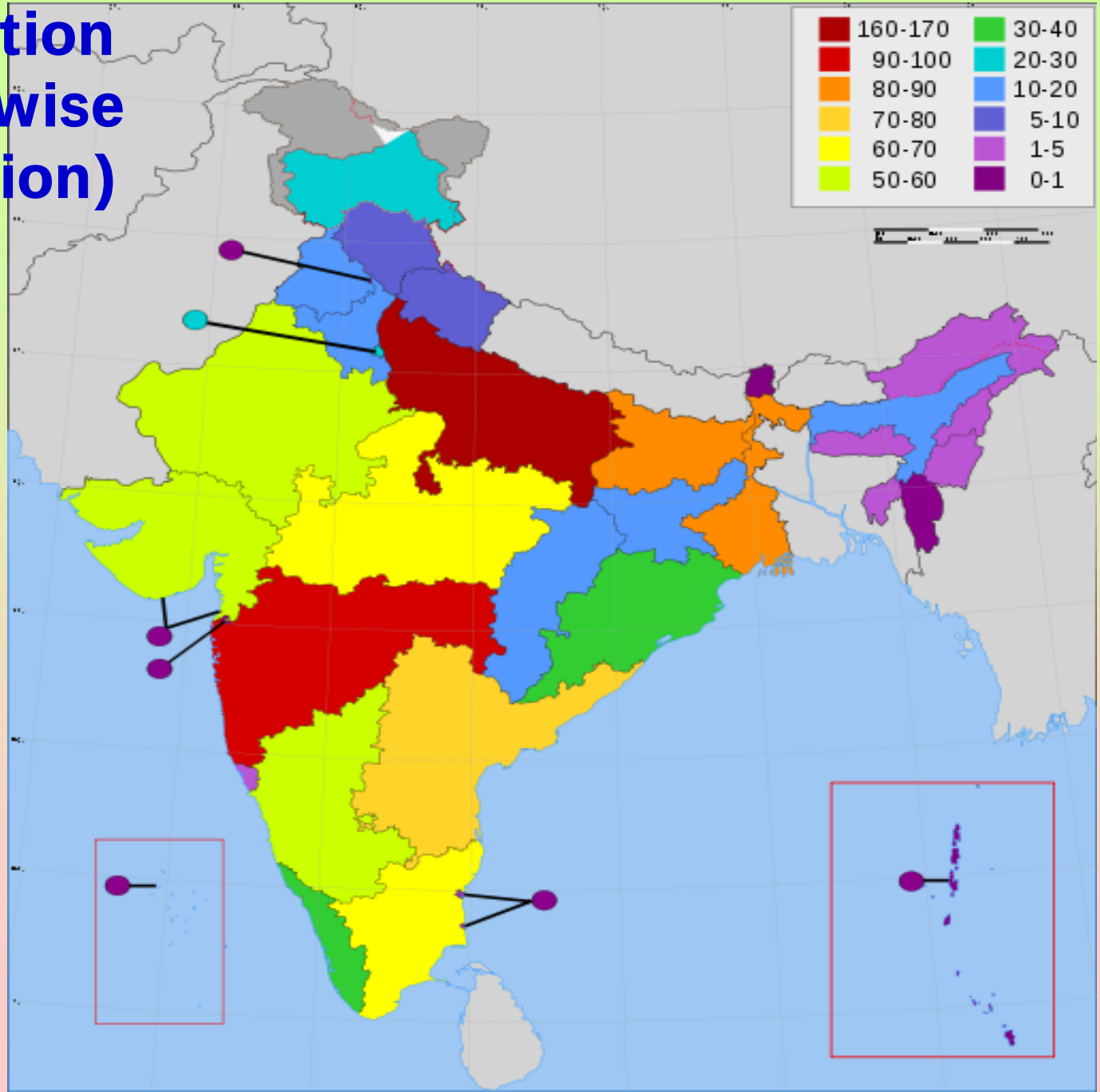
- 2% of world's land
- 4% of world's freshwater resources
- 16% of world's population

Precipitation

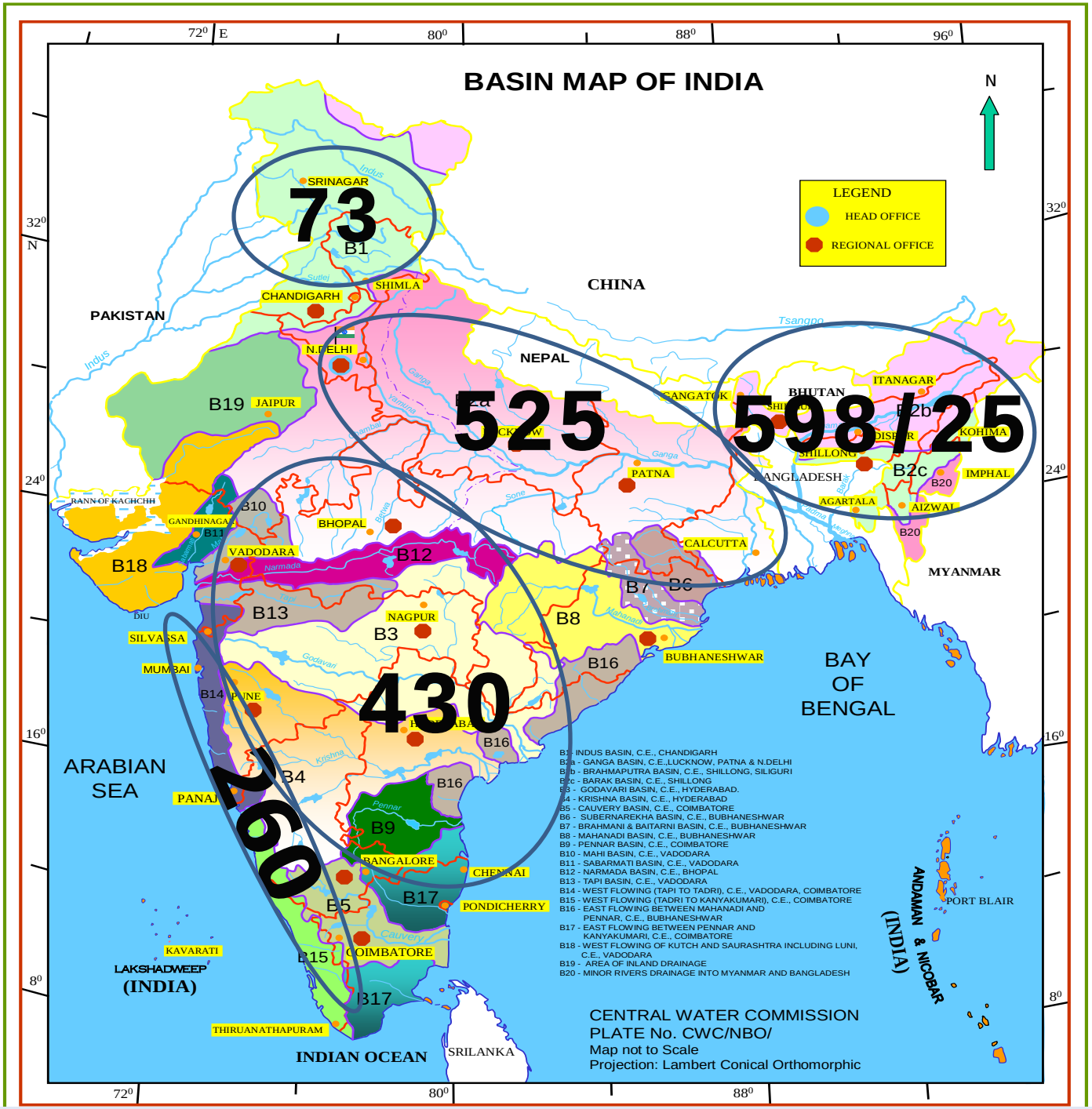
Confined to a relatively short season (4 mths)

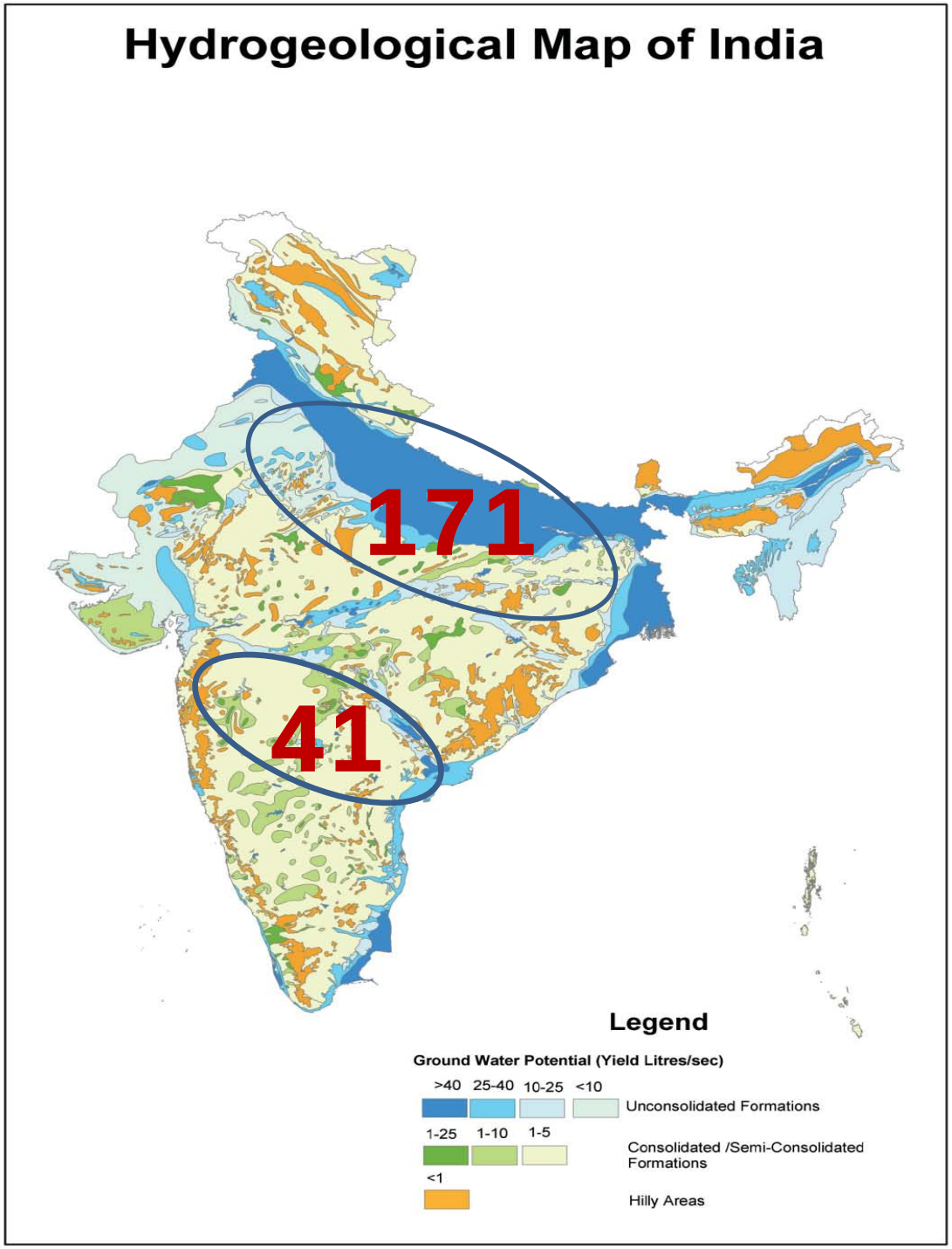
- Makes irrigation necessary for sustained agricultural production
- Necessitates river regulation

Population – statewise (in million)



Variability of Surface Water Potential





GW-Potential & Variability

Brahamaputra, Indus, and Krishana basins each have a potential of about 26 BCM/year.

Total GW Potential = 433 BCM/year.

MAIN CAUSES OF WATER RELATED PROBLEMS IN INDIA

- Skewed distribution of water availability – floods, droughts
- Rapidly rising water demands, putting immense pressure on resources by excessive surface and GW exploitation
- Neglect and degradation of environment
- Problems due to climate change
- Lack of coordination among states, water sharing disputes.
- Inability to take and implement strong and firm decisions.

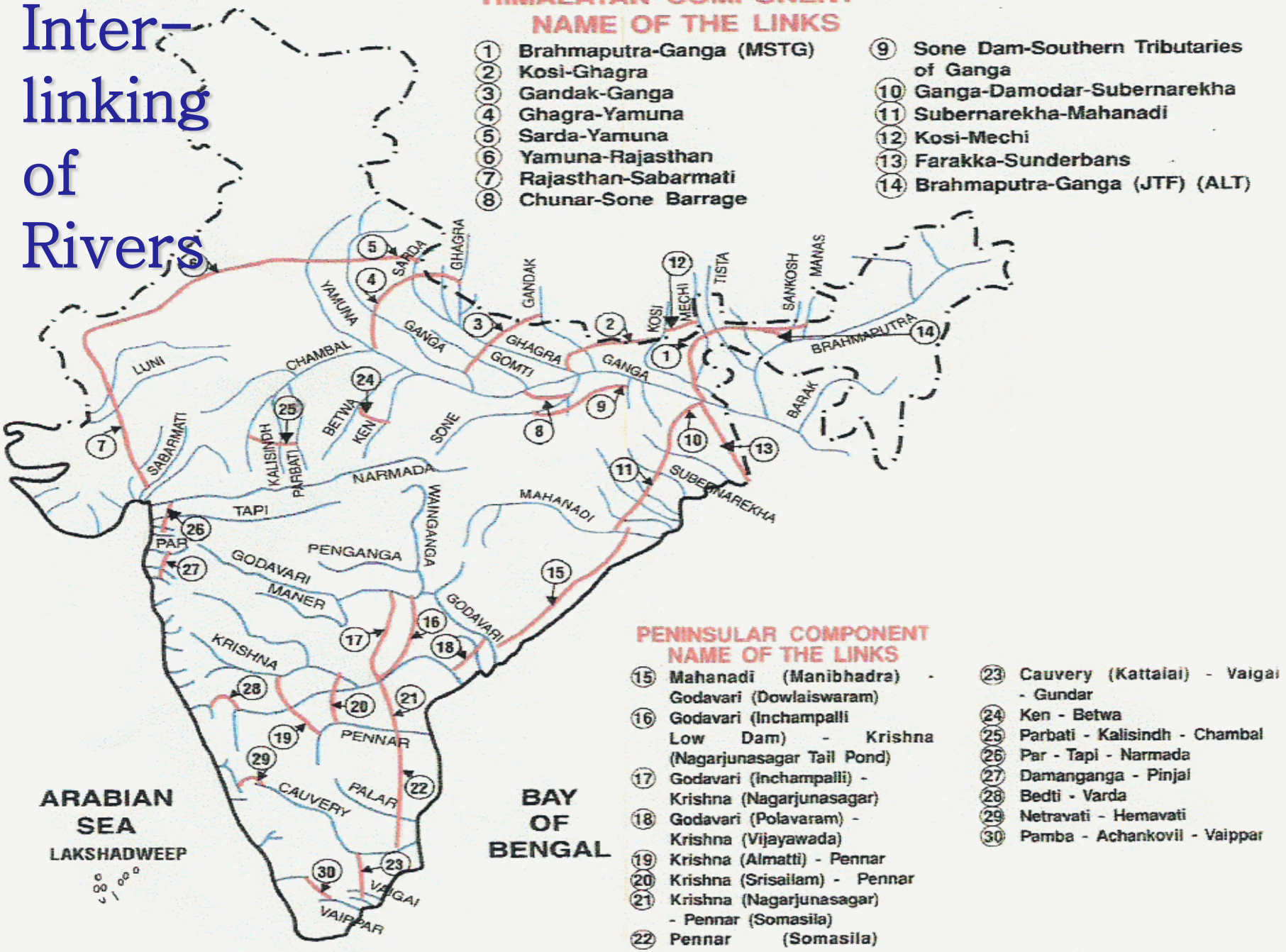
Major Challenges for Water Managers

- Assure water (with good quality and reliability) and sanitation for the people
- Secure water for food and energy production
- Deal with variabilities in time and space
- Protect and restore vital ecosystems
- Ensure collaboration across sectors and regions
- Create will to take appropriate decisions and implement them
- Overcome fragmented governance -- 11 ministries of GOI manage water in different sectors; same at the State level.

WRM … Policy Issues

- **Increase river regulating capacity by creating more storages,**
- **Integrated Urban Water Management – supply, drainage, waste treatment,**
- **Water charges to avoid wastage and generate funds for maintenance,**
- **Prepare river basin master plans and carry cumulative impact assessment,**
- **Annual performance appraisal and review for hydro-infrastructure,**
- ***National Water Development and Management Authority* for optimal use of water.**

Inter–linking of Rivers



WRM … Analysis

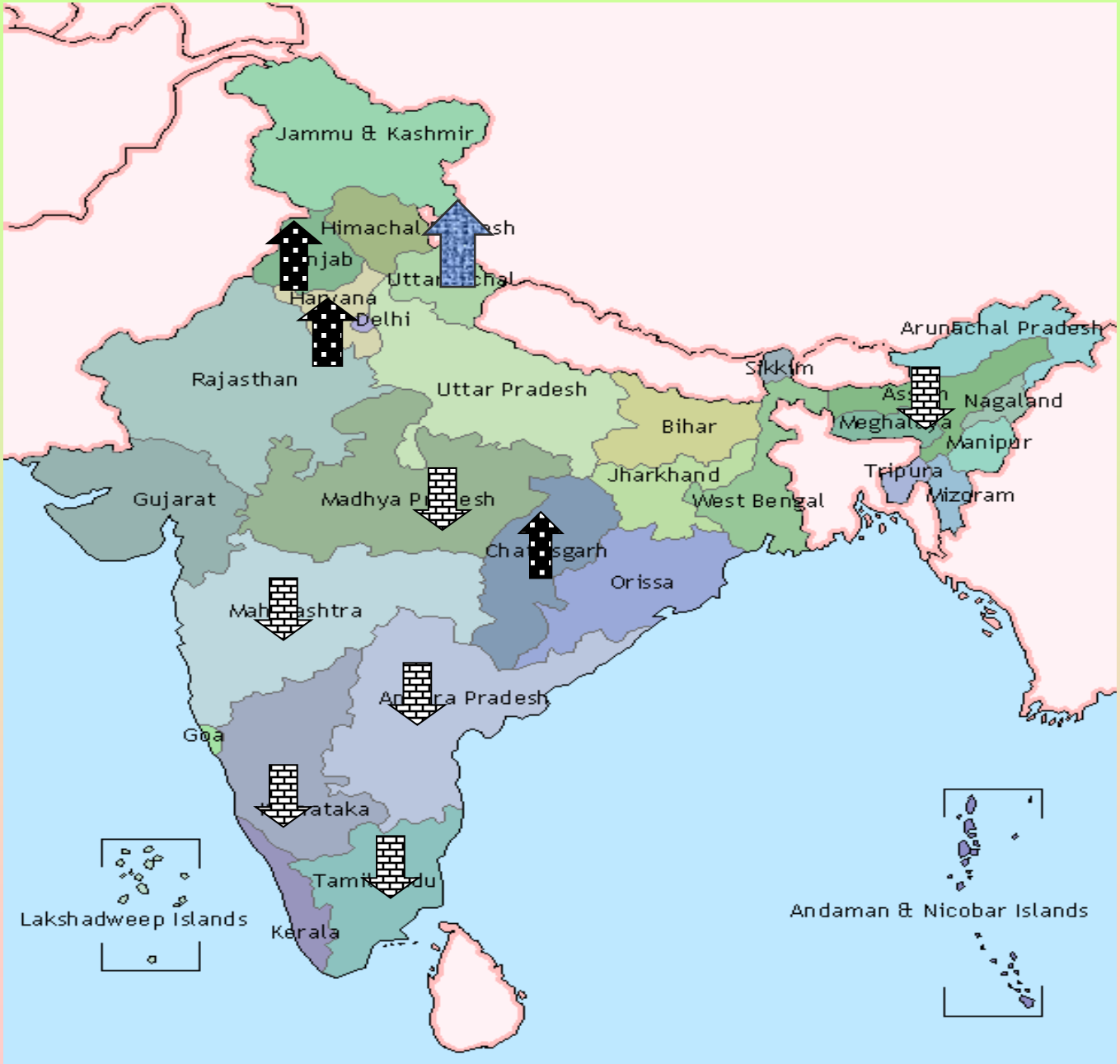
- Develop a long term perspective, accounting for uncertainties of various types.
- Scenario analysis need to be used to arrive at the optimal decisions.
- Sincere efforts are required to build capacities and overcome institutional constraints.
- Initiate adaptation measures in water sector, keeping in view climatic and LULC change .

VIRTUAL WATER TRADE AMONG STATES OF INDIA THROUGH FOOD GRAINS

- There is large disparity among states in production of food grain.
- Various central and state government agencies purchase food grains for central pool
- These food grains are sold under a Public Distribution System and various welfare programmes in different states.
- Food Corporation of India (FCI) keeps record of purchase and sale of food grains for different states.
- Virtual water content of wheat and rice for different states was determined.

Virtual Water Trade among States

- **Considering the data of 4years (2003-2007) and two food grains (wheat, rice), Punjab, Chhattisgarh, Haryana, and Uttarakhand are the net exporters of virtual water.**
- **All other states are net importers of virtual water through these two food grains.**
- **Among the net importers, Maharashtra was at the top closely followed by Karnataka.**
- **Rainfall in the large exporter states is much less than that in importing states. Farmers in many states get subsidized energy to pump ground water which largely insulates them from vagaries of rainfall.**
- **States that are advanced in industry and services sector are not necessarily advanced in agriculture.**



Virtual water trade (through wheat and rice) among states of India

Virtual Water Trade among States

- Punjab, Haryana and UP contribute about 98% of wheat and 52% of rice to the central pool.
- About 41 billion m^3 of virtual water goes out of Punjab through food grains, 76% of it is ground water.
- Average annual -ve balance of 12 billion m^3 of water, leading to sharp decline in the GW levels. With present trend in declining GW levels, electricity consumption for agriculture will double by 2023.
- Average GW utilization is about 145 %; it is 254 % in the Jalandhar District.

Virtual Water Trade among States

- Land availability, productivity, agricultural infra-structure, land reforms, farmers' entrepreneurship, and rural credit system are the key factors in crop production.
- Remedy for this malady lies in Punjab and elsewhere, say Eastern India with 2-3 times more RF compared to Punjab, high unexploited good quality ground water.
- A "**regional productivity index**" can better determine surplus quantity of exportable harvest.

Limitations Data for purchases/sales of food grains from different states to/from central pool were used.

- Data of only two major food grains was considered.

Proposed GWSP related activities

- Workshop on “Climate Change Adaptation” in collaboration with GWSP Asia
- Workshop on IWRM/ Water Governance / Virtual Water
- Cumulative Impact Assessment of hydropower projects
- Distributed hydrologic modeling under changed climatic and LULC conditions
- Statistical downscaling of hydro-climatic variables
- Editing publications
- …

Thanks