

A satellite-style map of India showing a network of rivers and their basins. The map uses different colors to represent various terrain types: green for forested areas, brown for arid or semi-arid regions, and white for snow-covered mountains. The river network is shown in a light blue/grey color, with major basins clearly delineated. The text is overlaid on the map.

Status and institutional arrangements of River Basin Management in India: Some analytical insights

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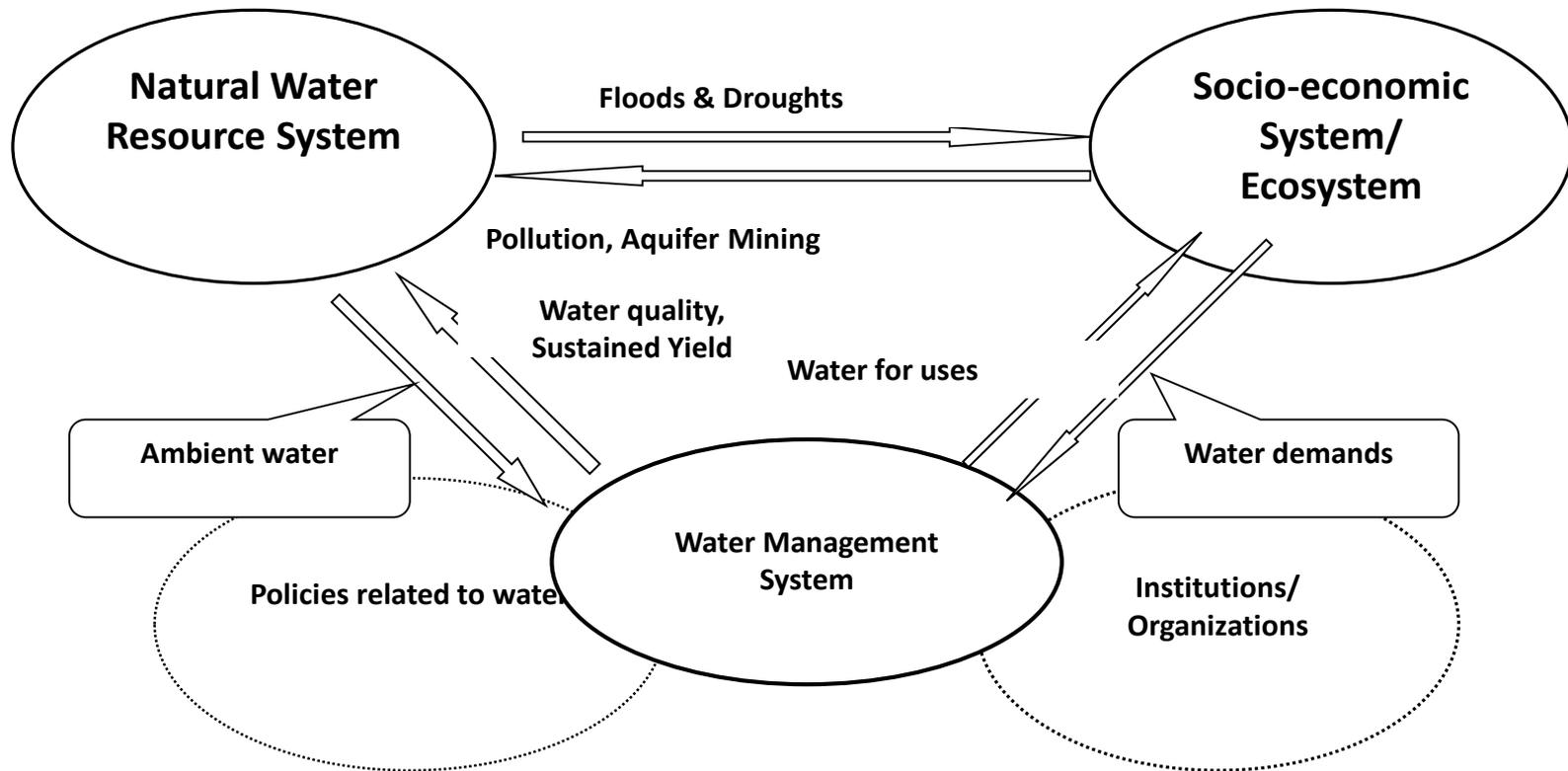
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Institutional and Policy Regimes Governing Water Development & Use

A Framework for Analyzing Institutional and Policy Regimes in Water Management



How stakeholders work at cross purposes in a basin?

- ✦ Intensive u/s WH impacts on committed downstream flows in water scarce river basins, thereby affecting benefits of irrigation, drinking water supplies and hydropower
- ✦ Increase in green water use by rainfed farmers in basins reduces the blue water flows; but this doesn't get counted in water accounts. Blue water use for crop production generates much higher value in economic terms than green water
- ✦ Large I & FC reservoirs capture low frequency floods of high magnitude; but reduces the benefits from high frequency floods of low magnitude
- ✦ While irrigation benefits increase due to large storage, benefits of nutrient transport and fish production from wetlands reduces

How stakeholders work at cross purposes in a basin?

- ✦ Intensive groundwater use in the upper catchments reduces base flows, thereby adversely affecting the lean season flows for lower basin areas drastically.
- ✦ But this is not taken cognizance of in the 'awards' of water dispute tribunals of inter-state river basins
- ✦ In flood prone basins, communities want agencies to invest in 'food control structures', rather than putting their own resources for making their assets flood proof
- ✦ Land use management measures—such as increasing forest cover in the catchment--, would increase flood cushioning, but might reduce income of upper catchment farmers

Institutional landscape in water resources development & water management

- + Central agencies--CWC, CGWB, NWDA, NWM, GFCC, NMCG
- + State Water Resources Departments
 - + Major and medium; minor irrigation department (tanks, etc.)
 - + Flood management cells
- + State Groundwater Departments--groundwater planning
- + State Water Supply and Sewerage Boards--domestic WS
- + Municipalities and Corporations with water wings
- + SPCBs --responsible for WQM and PC
- + SWDAs /rural dev. dept. responsible for watersheds
- + Informal rural groundwater markets—water allocation
- + Rural urban water markets for domestic water supply

Current institutional arrangements for flood management

- ✚ GFCC flood management planning—reviewing/clearing proposals for techno-economic feasibility of State WRD' proposals
- ✚ NDMA preparing national disaster management policies; rescue force for major national calamities
- ✚ CWC regional offices: carry out hydro-meteorological observations, flood forecasting of flood prone rivers
- ✚ **SDMAs:** formulates disaster management policies; capacity building of state agencies and communities, and structural interventions for 'disaster preparedness'; also disaster response in some cases
- ✚ State WRDs: plan, design and execute flood control structures; issues flood warnings through bulletins; participate in flood fighting
- ✚ State disaster rescue force and district disaster management teams undertake rescue and relief operations respectively

Institutional Issues in water management

+ Single Institution; multiplicity of functions

- + Water resource assessment vs water resource planning & development
- + Irrigation vs flood control services
- + Water quality monitoring vs pollution control

+ Fragmented; sectoral and supply side approaches

- + Surface water and groundwater planned separately
- + Separate planning for irrigation, drinking water supply and e-flows
- + Too little focus on water demand management

+ Inadequate water resource and use monitoring

- + Lack of scientific data on water withdrawal from aquifers, no accounts of basin wide blue and green water use, water quality data is limited

+ Lack of well defined water rights, or water entitlements

+ Centralized nature of institutions

- + Top down and centralized planning and decision making
- + Very little connect with the local communities—flood management, IP

Institutional issues in flood management

- ✚ The existing institutions in FM are not adapted to IFM requirements
 - ✚ ‘Flood forecasting’ is based on gauge to gauge forecasting of ‘water levels’ in rivers and ‘inflow volumes’; community needs to know where inundation occurs and how much area
- ✚ Focus on reducing exposure to floods (flood control structures); no emphasis on reducing the “flood hazards”
- ✚ The state budget allocations address different sectors separately; no effort at creating mechanism for flood proofing, and land use regulations in the flood plains.
- ✚ The focus of the WRDs is on structural solutions, and little integration of community concerns in decision making

Policies influencing water use, pollution and floods

- ✚ Electricity pricing policies
 - ✚ Concern to increase cost recovery and reduce the transaction cost
 - ✚ Lack of integration of concerns of efficient water use; and environment (flood control etc.)
- ✚ Pricing of canal water
 - ✚ Not linked to the volumetric delivery
- ✚ No pollution tax; enforcement of pollution control Act is weak
- ✚ Land use policies influence frequency and magnitude of floods -- lack of effective regulations on flood plain & catchment land use
- ✚ Pricing of water used in urban areas
 - ✚ Limited metering, and mostly bulk metering of water use and therefore prices not linked to volumetric use for individual households; Water Cess linked to property tax in towns

Why River Basin Organizations?

- ✚ Currently no agency generates information to improve water management and FM at the basin level using IWRM concepts, which captures physical, social, economic and environmental considerations
- ✚ Data, information and knowledge for operationalizing IWRM & IFM come from many disciplines, and cannot be generated by a single agency.
- ✚ It is also unlikely that the required HR capabilities, tools and finances for the same are available with a single agency
- ✚ We also need to avoid situations of single agency performs multiplicity of functions, which reduce ‘institutional effectiveness’.
- ✚ Building **accountability and transparency** in the system--WRD doing flood forecasting; revenue dept. doing damage assessment, SPCBs enforcing pollution control norms need to be avoided
- ✚ Create the right kind of incentives for agencies to perform

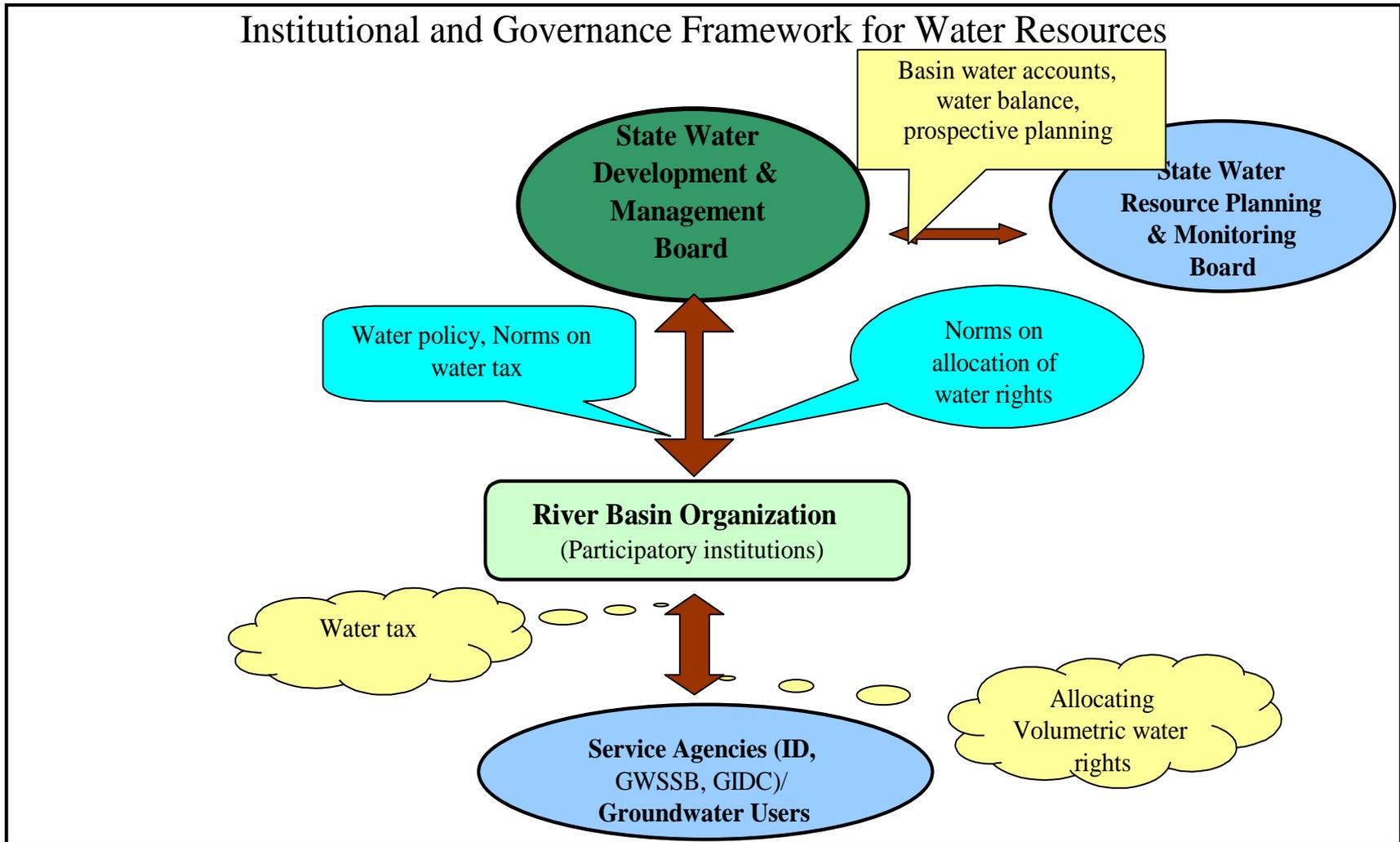
Institutional design principles for integrated water resources management

- ✚ Clear distinction between water development and water resources management functions
- ✚ Institutions responsible for water allocation/regulating water use have to be different from water service agencies--viz., irrigation dept., water supply dept., environmental management agencies
- ✚ Institutions responsible for water quality monitoring and those for managing water quality cannot be the same
- ✚ The institution responsible for investment in water quantity management and WRM should also be enforcing norm and regulations on water use

Institutional design principles for flood management

- ✚ The agency which develops FMP should not be executing it to avoid creation of vested interests and bias.
- ✚ The agency which executes work for flood control/prevention (such as WRD) should not be doing flood forecasting—as they are likely chances of over-estimating the flood volume, in an effort to hide their operational inadequacies.
- ✚ The agency executing flood control work should not be engaged in flood damage assessment—as they might try and show less damage. Instead, NDMA should appoint an independent committee to assess the damage.
- ✚ The agency doing rescue operations should be responsible for issuing flood warnings and community awareness and education about floods--as it has strong incentive to do it to reduce the amount of rescue and relief work
- ✚ Assessment of flood damages, especially the economic damage, which involve a lot of science, should be done by scientific agencies, in order that it attracts greater investment in flood management programmes
- ✚ The agencies which work on issues such as flood management, which is about minimizing the negative socio-economic and ecological impacts, needs to have inter-disciplinary orientation by design

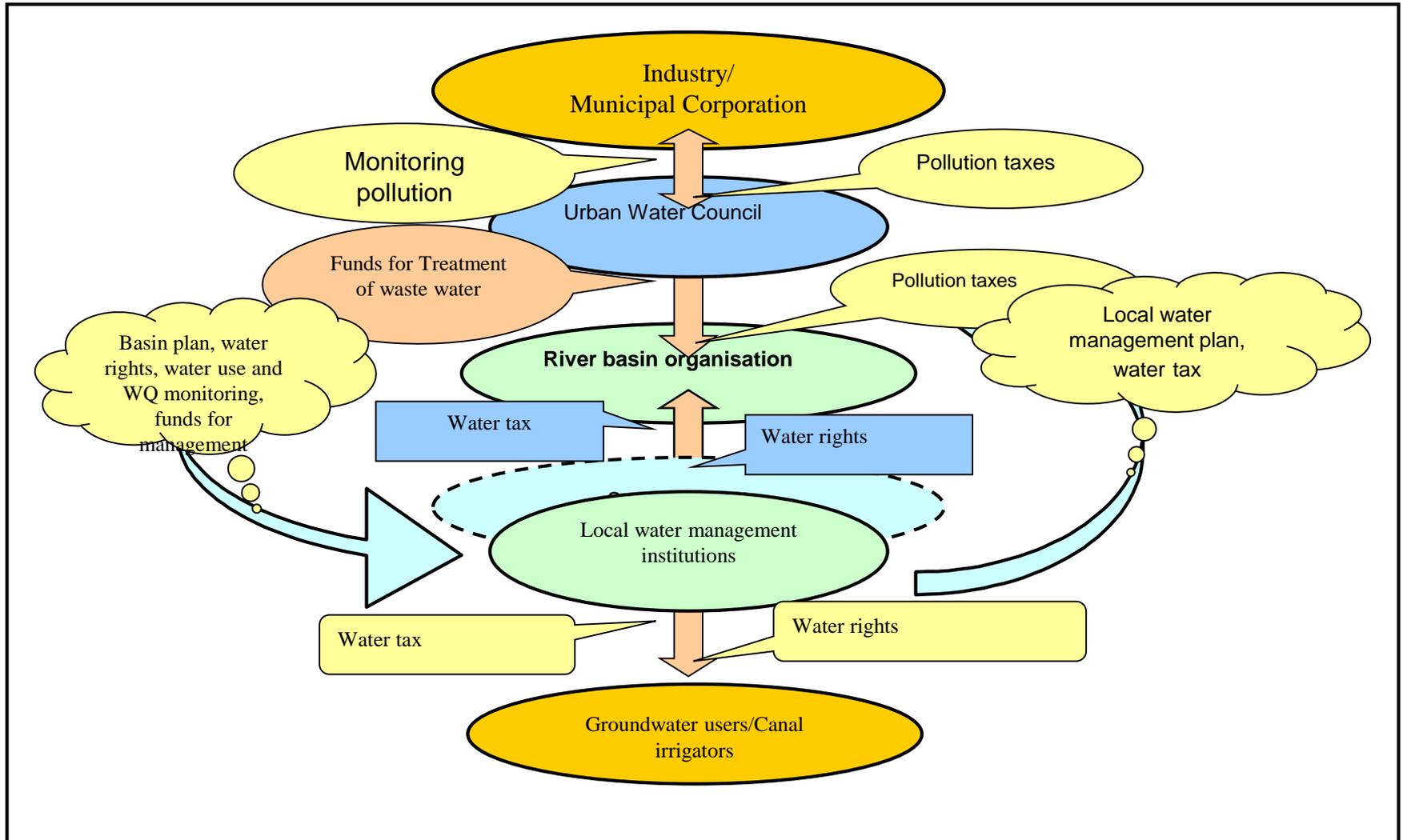
Institutional Regime Changes



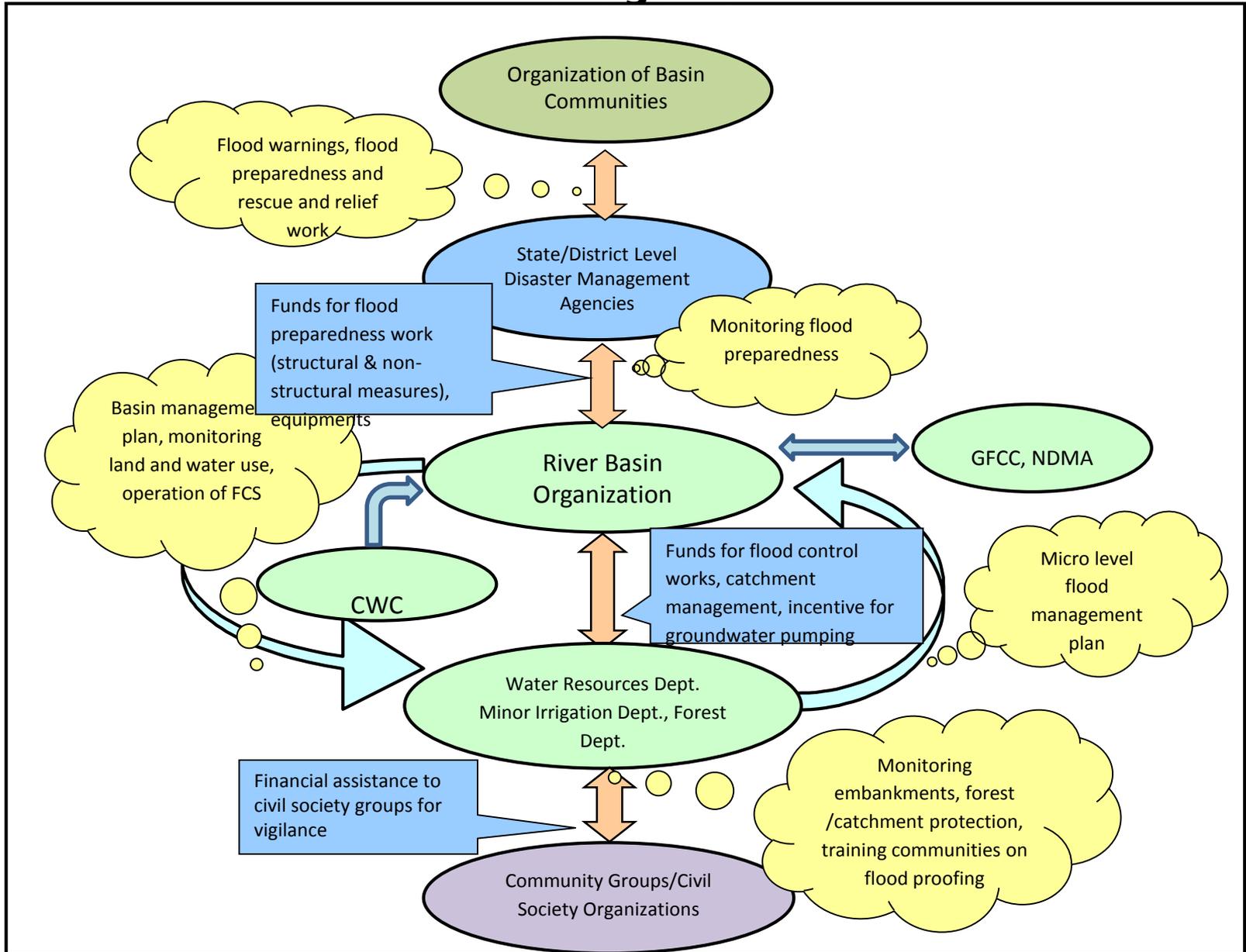
Institutional strategy

- ✚ Institutional capacity building should focus on three aspects: institutional reforms; organizational strengthening and HRD. The following are critical as 'institutional reforms'
- ✚ A framework water law, which defines and enforces private property rights/'entitlements' in surface water and groundwater, in water scarce regions
- ✚ The formulation and enforcement of an **Act on flood control and management** will be critical to institutional reform.
- ✚ The Act should lay down standards, rules and guidelines on the functioning of various agencies which work on flood control and management.
- ✚ A RBO shall be created as a coordinating institution, which would monitor the performance of line agencies
- ✚ It should have six distinct functions related to water resources management, with particular focus on FM.

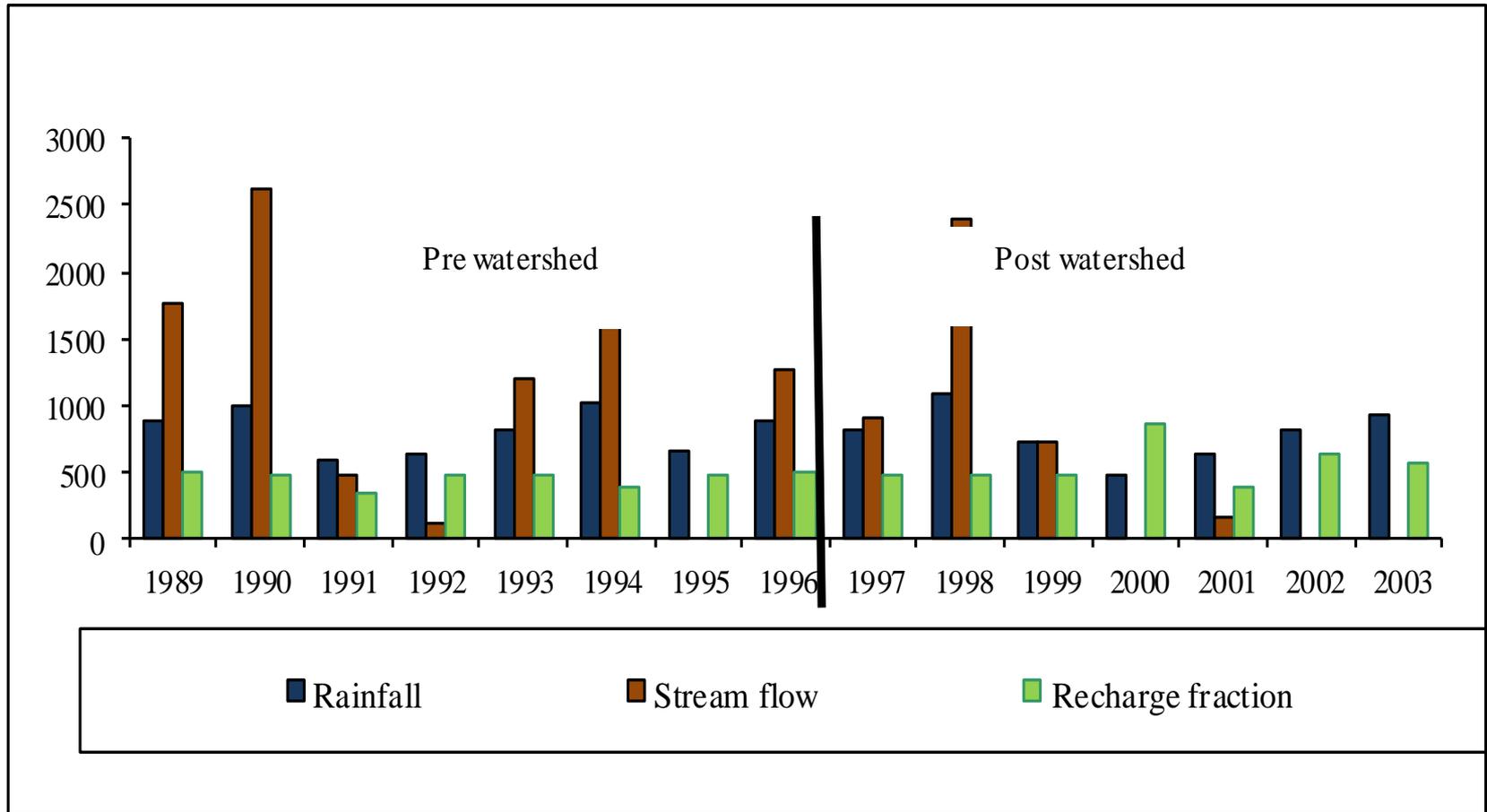
Institutional arrangements for IWRM at the Basin Level



Institutional Arrangements for Integrated Flood Management

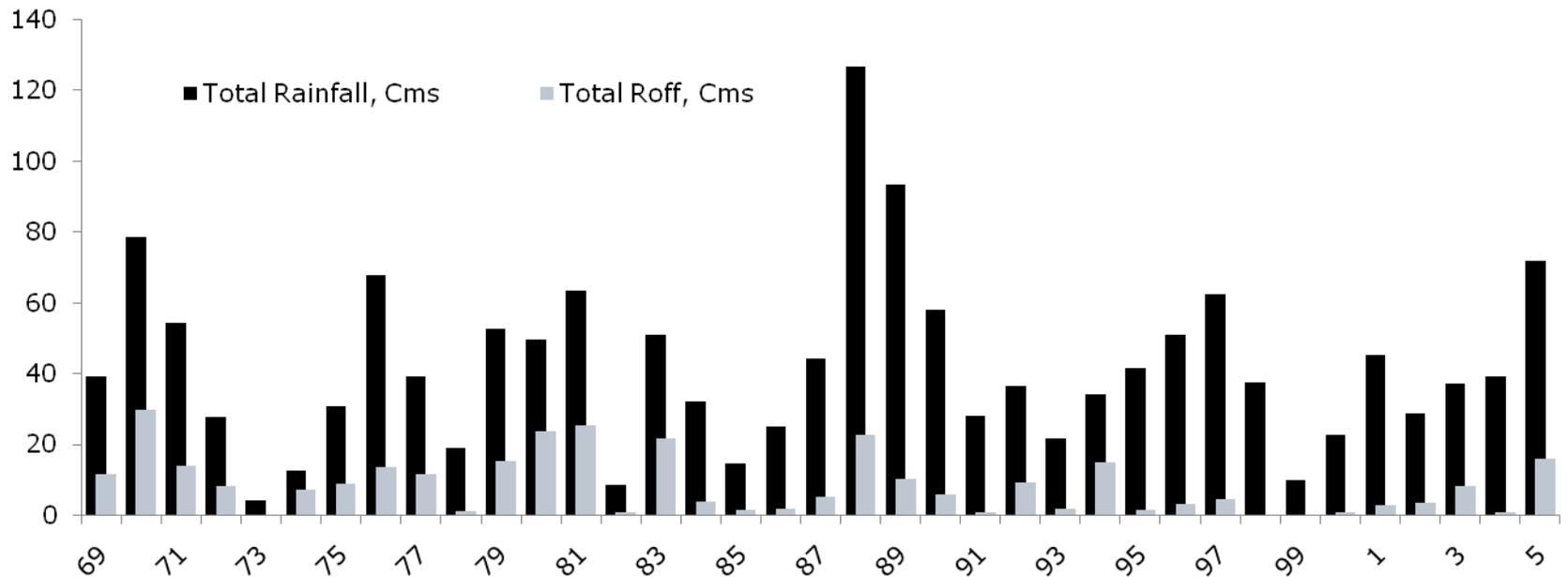


Effect of Watershed Interventions on Stream flows (Kundi sub-basin, Narmada)

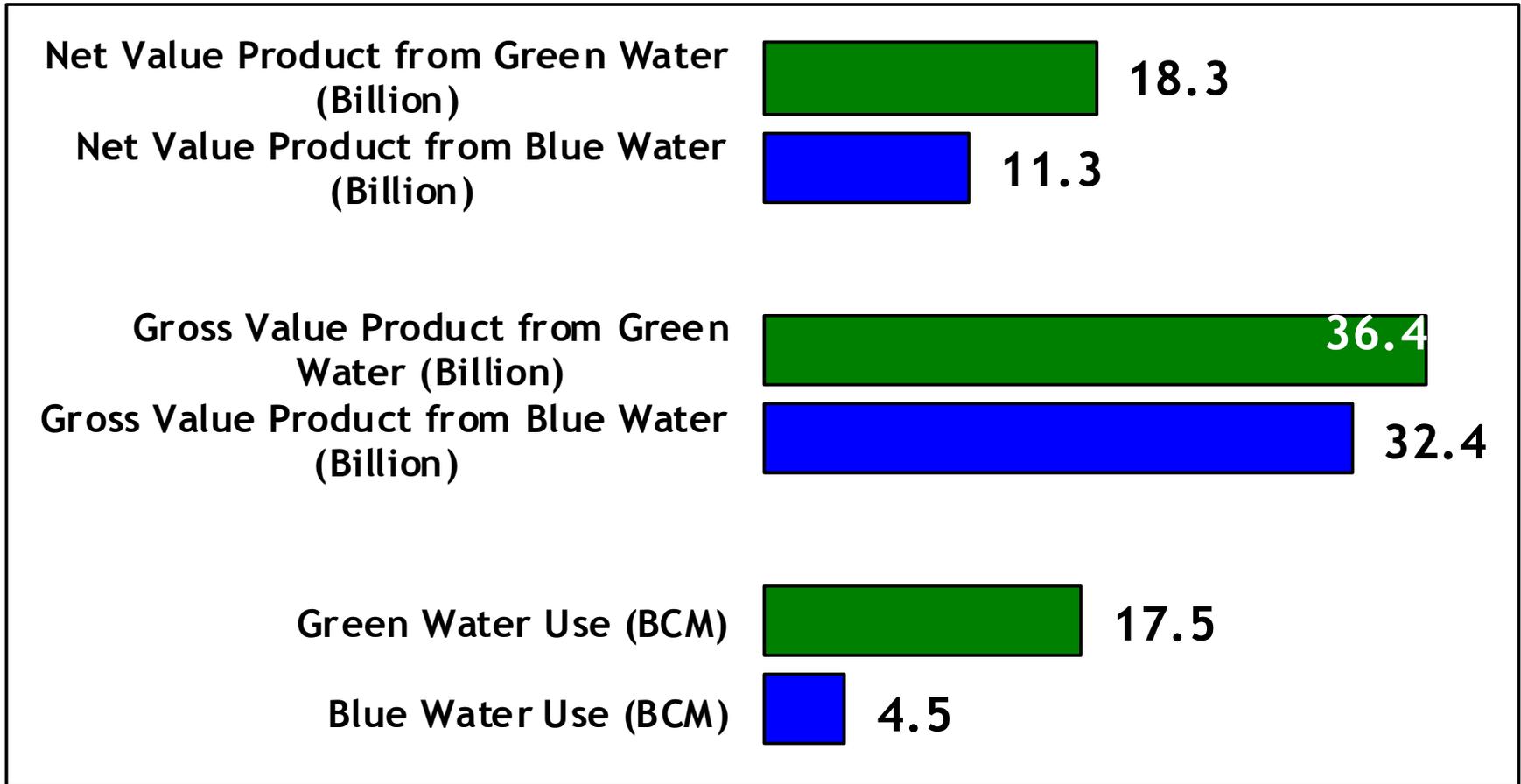


Effect of watershed interventions on run-off

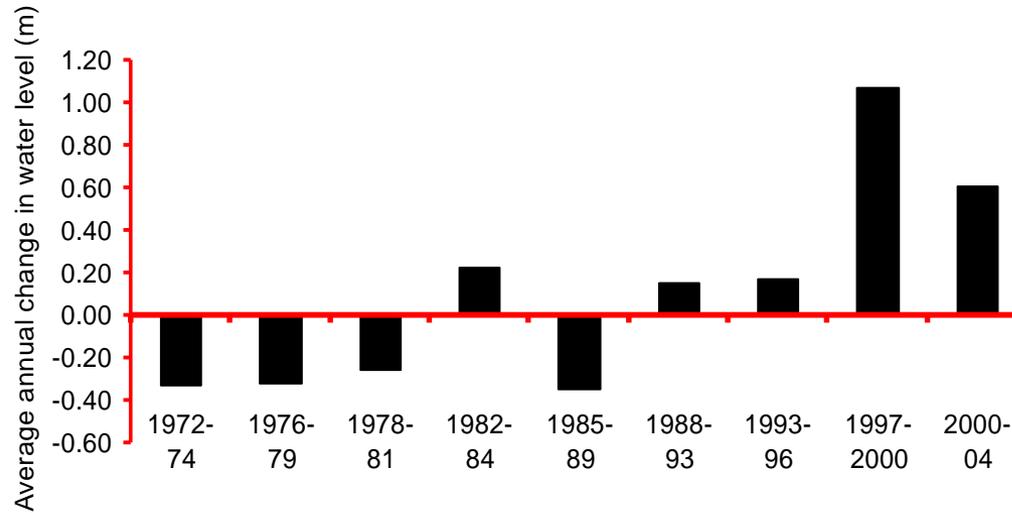
Ghelo-Somnath Rainfall and Reservoir Inflows



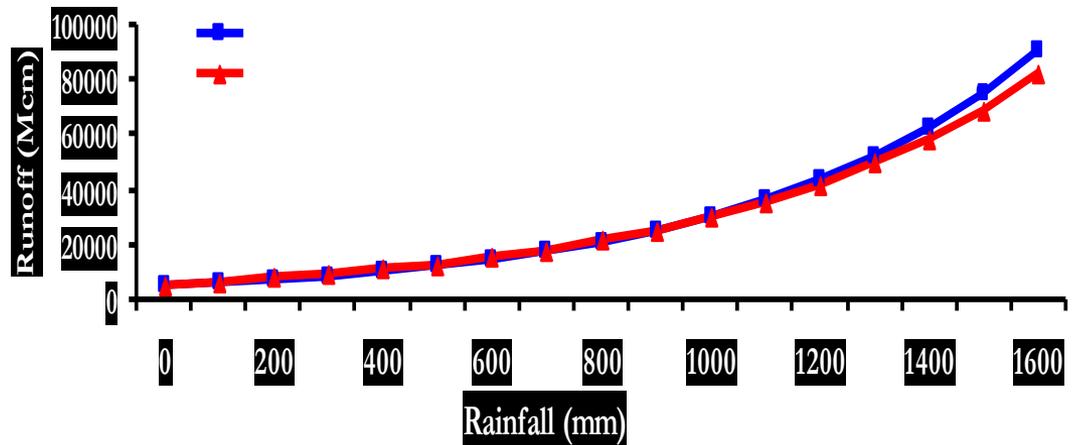
Green and blue water Use and economy in Narmada Basin



Changing groundwater-surface water Interactions



Reducing streamflows in Narmada



Functions of the RBO

- ✦ Developing basin management plan (including FMP), with strategies and integration with local management plans
- ✦ Water rights and water allocation amongst different sectors, levying water resource tax and pollution tax through line agencies
- ✦ Allocating funds for catchment management activities & wastewater treatment; and monitoring water use & water quality
- ✦ Monitoring of operation of flood control/regulation structures, including dams, by the agencies concerned to ensure that they are according to the plan
- ✦ Monitoring land use changes (forest cover, agricultural land use)
- ✦ Inspection system for WWT plants, flood control structures, checking and authorization, monitoring the flood fighting system, and providing support systems for flood fighting
- ✦ Monitoring the flood warning system, flood preparedness and maintenance system
- ✦ Monitoring the community engagement system, monitoring the resources, and monitoring the communication system.