Transboundary basin management: Water allocations & trade-offs
June 15, 2016
A shared resource at risk

**Domestic**
- Millions without drinking water and sanitation
- 80% urban sewage untreated
- Demand to grow by 40% by 2025

**Agriculture**
- Largest water consumer; highest water footprint
- Demand to grow by 10% ~ 675 cubic km by 2025

**Ecology**
- No dedicated allocations for ecology
- Threatened habitats, declining aquatic biodiversity

**Industry**
- Sector with highest demand growth
- Expected demand to be ~ 92 cubic km by 2025
Multi disciplinary, multi stakeholder approach

- Growing competition for water
- Individual action focused
- Collective ownership, vision for the basin yet to be mainstreamed
- Spaces for conversations are opening up, but limited
- Spaces for collective action limited
- No realisation of the Shared risk
For a shared vision
Need to bring together and engage competing users

Basin water governance

Development, supply chain and climate drivers
Basin planning philosophy

Environment & land use
- National environment conservation plans
- Regional environment conservation plans
- Local environment conservation plans

National policy and legal arrangements
- National Water Strategy

River Basin Plan
- Regional water plans
- Local water plans

Development & finance
- National economic & sector plans
- Regional economic & sector plans
- Local economic & sector plans

Coordination & Integration is key
Findings, lessons and recommendations from existing projects/programmes
- Existing information, plans, strategies
- Outcome of basin planning process
River Basin Plan

Goals / Vision

Protection
- Groundwater protection
- River & estuary protection
- Riparian & coastline

Development
- Strategic objective & action

Disaster Risk
- Strategic objective & action

Institutional
- Stakeholder engagement
- Institutional coordination
- Financial mechanisms

Implementation/Detailed Plan
- Monitoring & information
- Water quality management
- Flood risk management
- Disaster/drought response
- Water allocation
- Water use efficiency
- Water supply & irrigation
- Hydropower & Navigation
- River restoration
- River conservation
- Hydropower & Navigation
- Water supply & irrigation
- Monitoring & information
- Financial mechanisms

Strategic objective & action
- Strategic objective & action
- Strategic objective & action
- Strategic objective & action
Basin plan

Sub basin plans

Sub basin plans

Catchment plans

Catchment plans
River Basin organisation

State level Multistakeholder committee

- District (river Conservation Committee)
  - Blocks
  - Village
  - Village level

- District (river Conservation Committee)
  - Block
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Integrating E-flows into basin plans

Draft National Water Framework Bill 2016:
• Calls for integrated river basin development and management
• Environmental flows adequate to preserve and protect a river basin as a hydrological and ecological system shall be maintained.

Temporal and spatial variations in quantity and quality of water required for freshwater and estuarine systems to perform their natural ecological functions (including material transport) and supports the spiritual, cultural and livelihood activities that depend on them (IITC 2012)
Implementation Challenge

- Understanding of socio-economic costs and benefits: 148
- Political will: 145
- Legal, institutional and monitoring arrangements: 113
- Effective stakeholder involvement: 106
- Financial resources: 101
- Expertise / technical support: 95
- Public acceptance: 68
- Capacity for modelling and scenario development: 63
- Hydrological data: 59
- Other: 39

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<th>Future priorities</th>
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<th>Progress</th>
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<td>Definition of e-flows for India</td>
<td>Not yet considered</td>
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<td>Options analysis and planning to include e-flows</td>
<td>Initial thinking completed</td>
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<td>Aims and objectives of e-flows</td>
<td>Practical aspects considered</td>
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<td>Centralised coordination of e-flows</td>
<td>Some aspects in place</td>
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<td>Public engagement on e-flows</td>
<td>Fully operational</td>
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<td>Training in e-flows methods</td>
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<td>Research, data collection on e-flows</td>
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<td>Centralised e-flows knowledge base</td>
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<td>Preliminary e-flows assessments using desktop methods</td>
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<td>Implementation of e-flows</td>
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<td>Monitoring e-flows outcomes</td>
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Key issues

• What are the costs, benefits and trade-offs of using environmental flows for riverine ecosystem rejuvenation?

• What strategies (investments, policies...) need to be adopted to manage the trade-offs and to implement environmental flows?
matrix of various values of inflows, withdrawals and remaining water that can be used for satisfying E-Flows requirements under various scenarios

Water Shortage Analysis (w.r.t. recommended E-Flows)

- E-Flows Water requirement
  - Recommendations under various scenarios

  Additional water required as compared to present day flows

  Present Status
  - Hydrology (Present day flows)

Water Budgeting

- Withdrawals (Power, Irrigation, Domestic)
- Water availability under various levels of withdrawals

Water availability

- Historical flows
- Barrage operations and policies
- Upstream Dam operation (Tehri)
- Release d/s of barrages
- Inter basin transfers (Ramganga)

Decision making and Tradeoffs

- Barrage re-operation policies
- Cost benefit analysis of water diversions and re-allocations
- Irrigation efficiency (Long term goals)
Trade off analysis

Environmental flow assessment (Upper and Lower Ganga)
- Site/stretch selection
- Hydrological/geomorphologic/biodiversity and socio-cultural status
- E-Flow requirements analysis
- Recommendations under various scenarios

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  - Recommendations under various scenarios
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Environmental flows assessment

1. Identify key river assets
2. Determine flow requirements for the assets
3. Identify options to meet e-flow requirements

Supply and demand assessment

1. Identify available water resources and development opportunities
2. Identify consumptive water requirements
3. Identify development and allocation options for meeting supply requirements

Scenario analysis

Trade offs between supply and e-flow options

Water Resources Allocation Plan

Robert Speed et.al
Key lessons

- E-flows are central to water planning and allocation process.

- EFA is an evolving science. Capacity building on E-Flows at different levels needed.

- Need to collaborate on documenting the cost-benefits, trade-offs and demonstrating E-flows.

- Framework to integrate E-flows and trade-off management in basin management plans.
An nationwide approach for E-flows assessment

An approach for Cost benefit tradeoff analysis

Illustrating how e-flows can be embedded in basin plans

Case study of small basin under allocated

A big basin over allocated

• Developing a framework (social, institutional and technical for E-Flows

• Proof of concept demonstration to assess costs-benefits and tradeoffs

Recommendations for integrating e-flows in basin plans
THANK YOU
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