River Basin Management Cycle

Strategic Discussion on the River Basin Planning and Management Cycle

Skills and expertise for technical development and implementation of RBM plans

Distance learning, India and Germany

Support to Ganga Rejuvenation Project | June 2020

german cooperation
DEUTSCHE ZUSAMMENARBEIT

Implemented by
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INDIA-EU WATER PARTNERSHIP

Prepared by
AHT GROUP AG Management & Engineering
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Objectives and Components of the Training Programme

Objective

Experts from the various target groups of the Indian government at national and state level understand the RBM Cycle, and are able to apply it in the context of the Ganga basin and other (sub)basins in India.

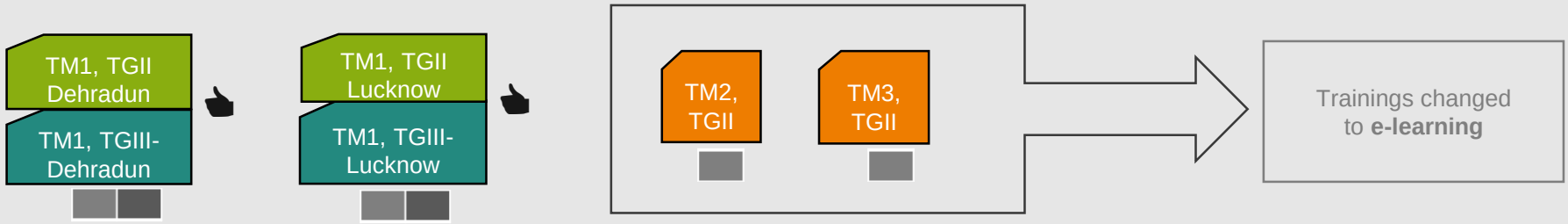
Components

- Training modules delivered in New Delhi, Dehradun, Lucknow and Pune.
- An e-learning platform
- Training of Trainers (ToT)

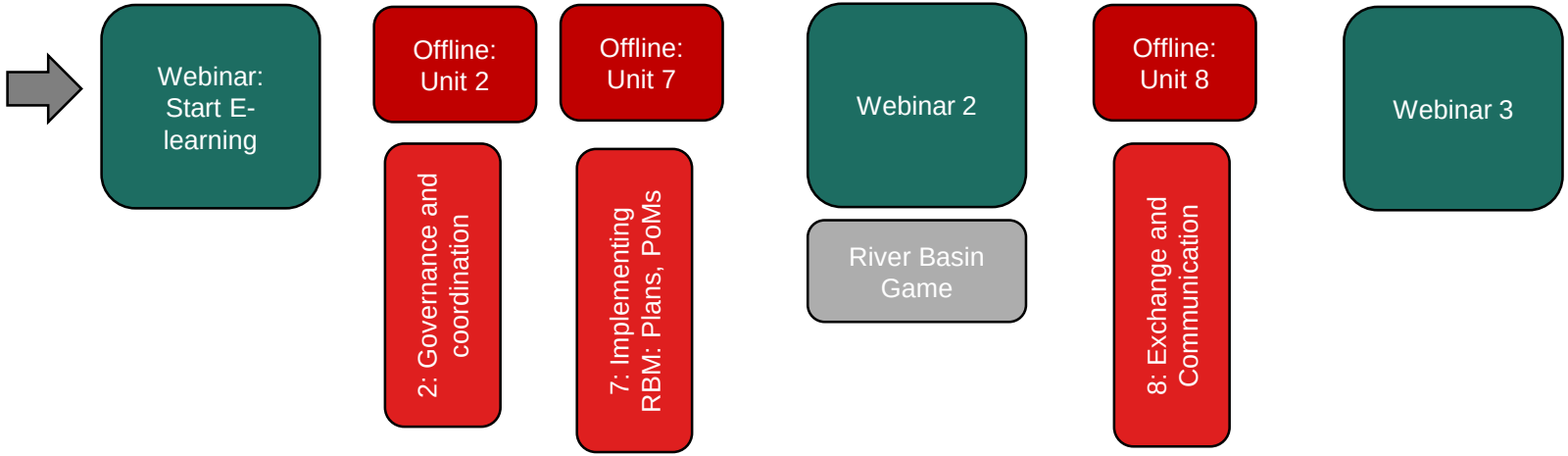
Milestones and Training Modules

Training Module	**Date**	**Target Group(s)**	**Duration** (days or days-equivalent	**Location**	**Status**
1: Understanding the RBM cycle and its steps	02.12.2019	I	1	New Delhi	Completed
	03-04.12.2019	II and III	2	Dehradun	Completed
	07-08.12.2019	II and III	2	Lucknow	Completed
2: Skills and expertise for technical development and implementation of RBM plans	**19.06.2020 until 21.08.2020**	**I**	**2**	**Online**	**Planned**
	19.06.2020 until 21.08.2020	**II**	**1**	**Online**	**Planned**
	26-28.02.2020	III	3	Pune	Completed
3: Solutions through exchange, information flow and cooperation	**28.08.2020 until 25.09.2020**	**I, II and III**	**1**	**Online**	**Planned**

RBM Cycle: Training Concept, Target Group II



e-learning concept; duration equivalent to **up to 2** days

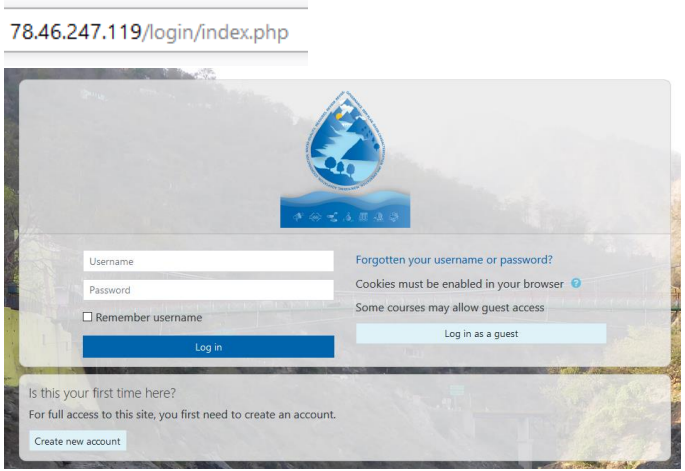


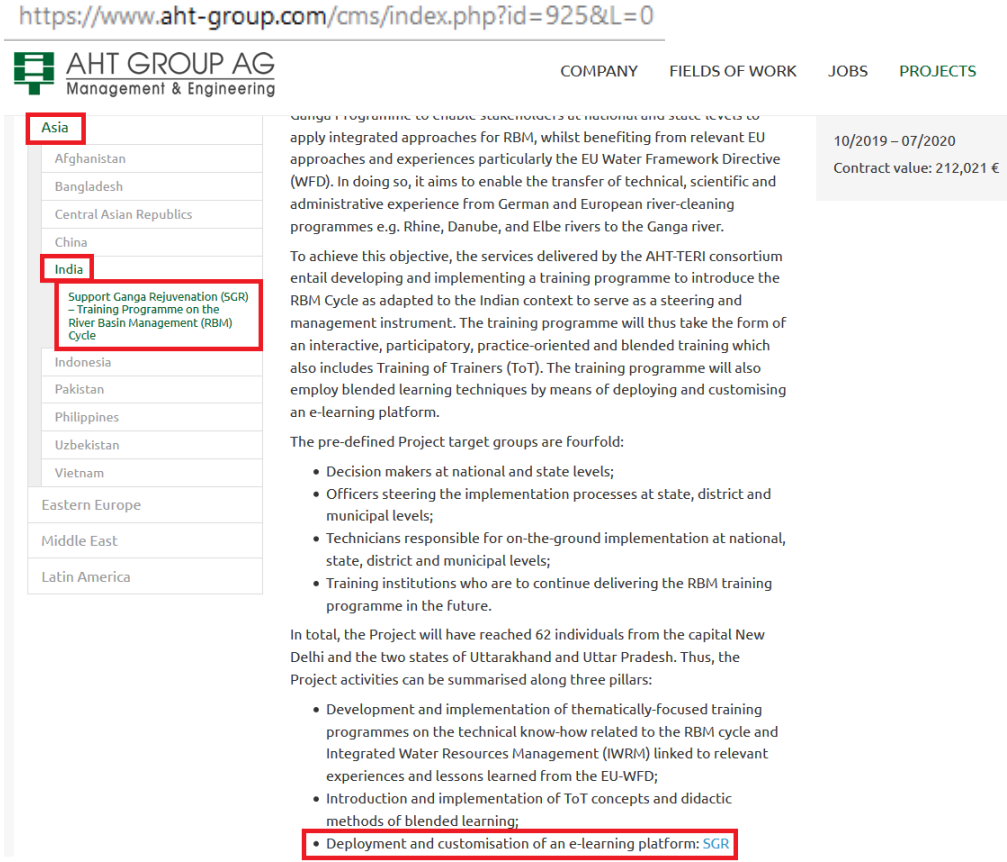
The e-Learning Platform “RBM Cycle Training”

via AHT’s homepage www.aht-group.com

Projects → Asia → India → SGR

Or directly via http://78.46.247.119

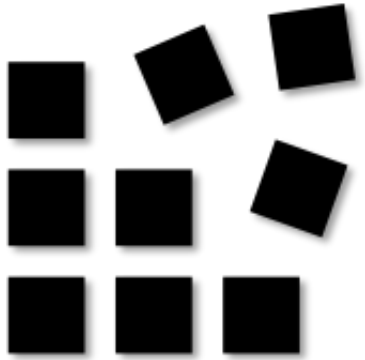




Online dicussion during the 2nd Webinar

To tailor the course content to your requirements, please contribute some key words about **your motivation** to participate.

Please also contribute **your expectations** - what do you want to get out of the course?



1 Introduction to River Basin Management

Elements of Water Management at Different Levels

National Level

- National water strategies and laws
- Harmonisation of investment planning
- Water sector reform including regulation

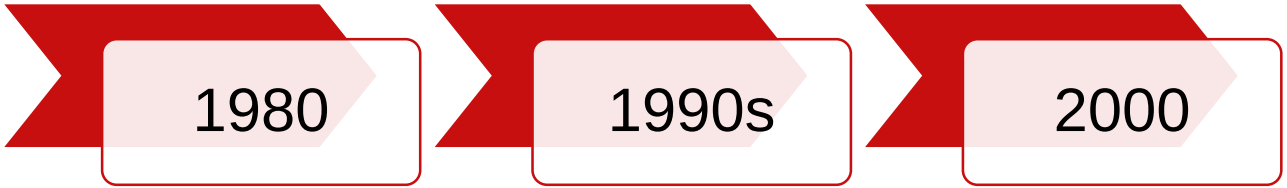
Basin Level

- Support of basin organisations
- **Data and information management, Decision-support Systems (DSS)**
- **Development of water management plans**
- **Multi-stakeholder agreements on Water Resources Management**

Local Level

- Participative management structures e.g. water user associations
- Wastewater treatment, water reuse
- Water storage, flood and rainwater management
- Water efficiency, energy efficiency

RBM in Europe: A Long Journey with the EU Water Framework Directive



Standards for drinking water, wastewater discharge and cont. surface and bathing water quality

Acknowlegded the need for broader water policies and an integrated approach

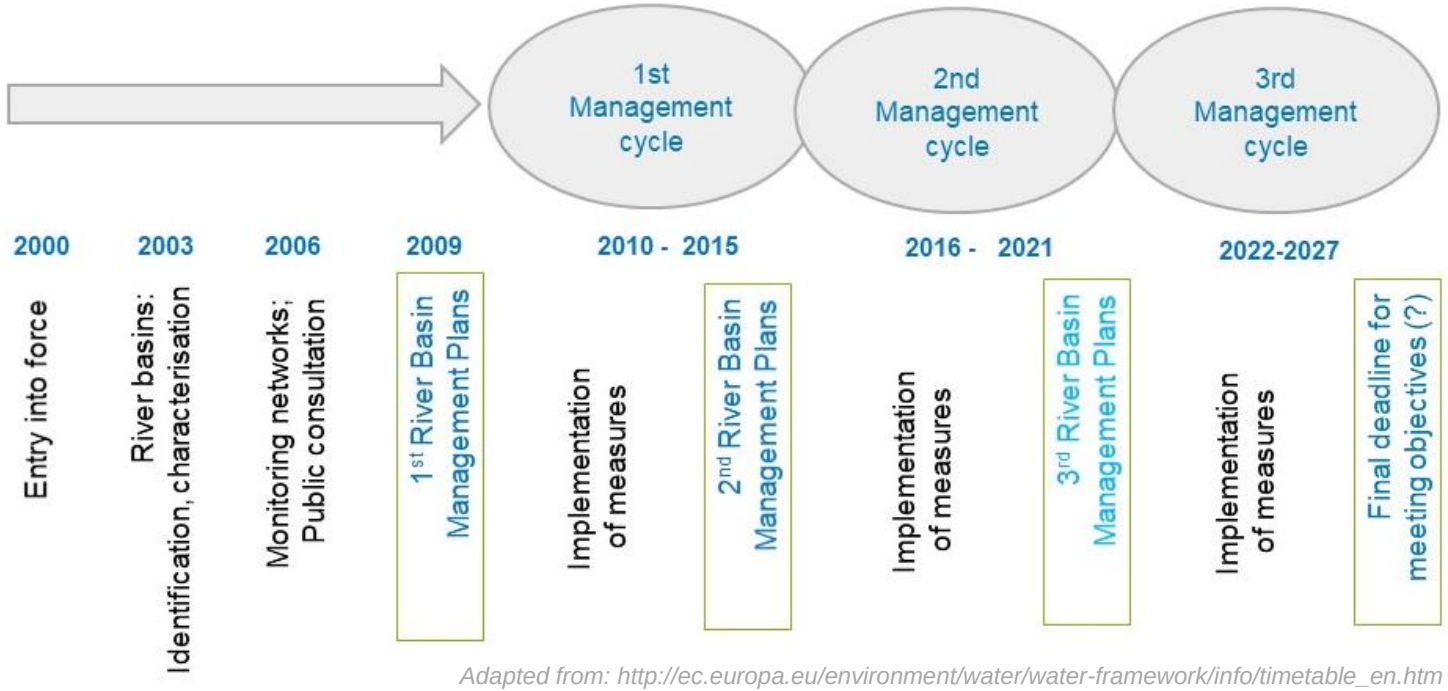
Development and adoption of the EU WFD

↓

River Basin Management

RBM Cycle

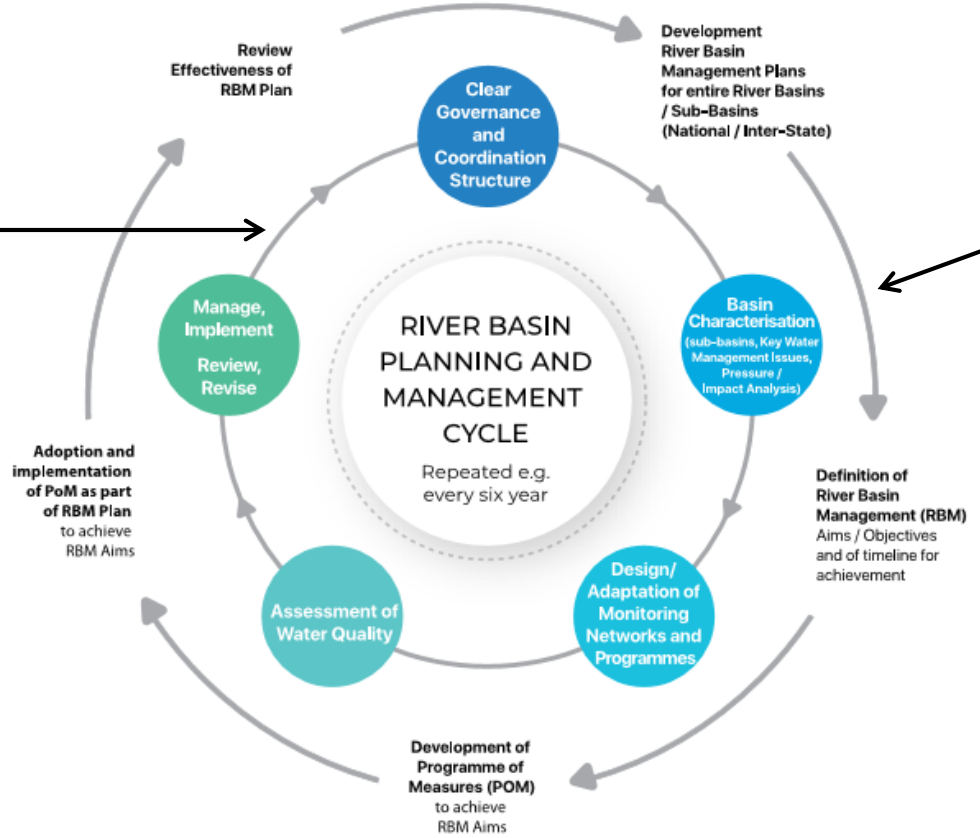
- In Europe: Years 2015, 2021,2027 → Cycle length 6 years



Adapted from: http://ec.europa.eu/environment/water/water-framework/info/timetable_en.htm

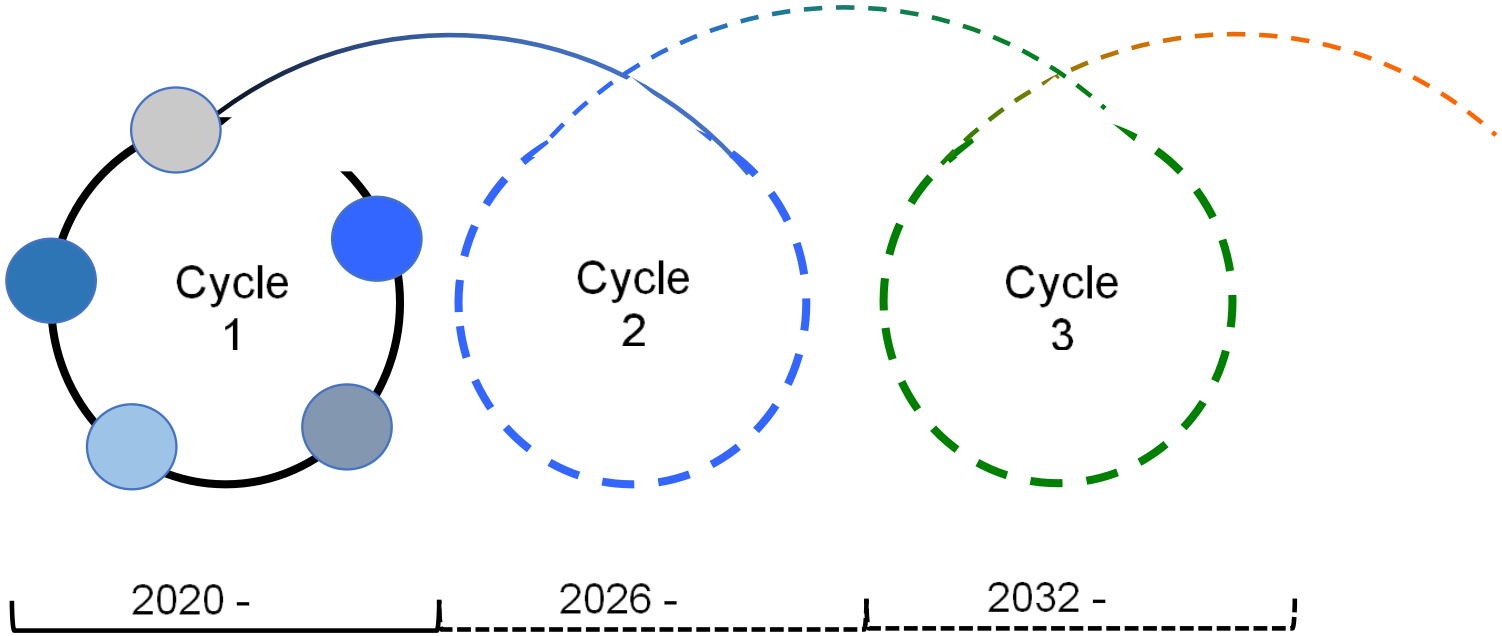
The River Basin Planning and Management Cycle

„Inner cycle“
Technical/
operational level“



„Outer cycle“
Planning and
decision making
level

The River Basin Planning and Management Cycle



- RBM process requires planning over several years and implementation cycles that are to be repeated in a certain frequency (e.g. 6 years).
- Each Cycle is a revision to adjust to new conditions in the basin and to addresses new challenges.

2 Clear Governance and Coordination Structure

2.1 Governance and Legal Framework
2.2 Basin Coordination Structures

The River Basin Planning and Management Cycle

„Inner cycle“
Technical/
operational level“

„Outer cycle“
Planning and
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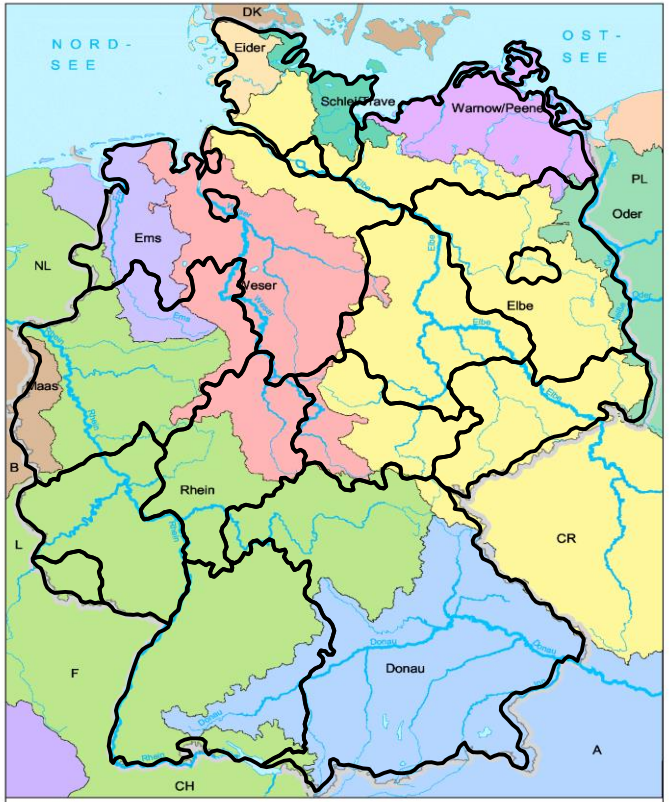
2 Clear Governance and Coordination Structure

2.1 Governance and Legal Framework
2.2 Basin Coordination Structures

Legal Setting in EU and Germany

- European Directives and Legislation originating from the European Commission.
- The Federal Water Act, federal law as framework under which the Federal States (Länder) formulate the corresponding water laws
- The Federal Water Law contains the provisions to provide the legal implementation of European Directives
- In Germany, the competence of water management issues rely with the Federal States and their competent institutions
- This results in 16 different State Water Laws in the federal system.
- Requires complex governance mechanisms that balance different geographical, political and other dimensions



Flußgebietseinheiten in Deutschland nach der Wasserrahmenrichtlinie

Maßstab 1 : 4.000.000

Quelle: Umweltbundesamt, Februar 2000

Legal Integration of the EU WFD in Germany

- The EU WFD obliges member states to set up the RBM Plans based on the **river basin** as a **hydrological unit** → Each of Germany's 16 federal states had to comply
- 10 river basin districts were delineated as binding water management units by the Federal Water Act (FWA) → International commissions for the protection of rivers were only established in Germany for larger rivers (e.g. Rhine, Elbe, Danube)
- The provisions of the WFD requires the (uniform) formulation of River Basin Management Plans for the catchments in Europe and ambitious timelines for reporting
- German federal states had to introduce a **combined approach** for regulating emission standards through permits and environmental quality standards for specific pollutants and priority substances

  → Before the WFD came into force, Germany followed the **precautionary principle** where discharge permits were exclusively bound to specific best available techniques (BAT) minimising emissions

Legal Integration of the EU WFD in Germany

- It was necessary to **amend the Federal Water Act (FWA)** of Germany → This required parliamentarian consensus on the federal state level
- A **federal Surface Water Ordinance** and **Groundwater Ordinance were established** to complement the provisions of the amended FWA
- Consequently, all **State Water Laws** (Landeswassergesetze) **had to be amended** as well to implement the new federal provisions
- With this, a common base for the implementation of a standardised water management system within the federal states was established

Linkages between the EU and the German National Level

European Legislation

- Urban Water Directive, 1991
- Nitrates Directive, 1991
- Drinking Water Directive, 1998
- Water Framework Directive, 2000
- Groundwater Directive, 2006
- Bathing Water Directive, 2000
- 2007 Flood Risk Management Directive
- Environmental Quality Standards Directive, 2008
- Marine Strategy Framework Directive, 2008

National Legislation (e.g. Water Code (WHG))
Regulations (e.g. Drinking Water Regulation)

State-level Legislation (State Water Codes (LWG))

Guidelines e.g. by the Water Association (DWA Regelwerk)
Not legally binding but rather setting a standard

EU Support for the Introduction of the WFD

- To assist the national water management administration and competent authorities with the new elements of the WFD → **Capacity building** and support was provided by the European Commission (EC) through a process **“Common Implementation Strategy (CIS)”** (only five months after the WFD entered into force)

- CIS included for e.g. the elaboration of guiding documents on various technical aspects of implementation, additional documents and references related to different aspects of the implementation (publicly available on CIRCABC website)

Source: https://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm

The EU WFD: A Continuous Effort

Despite the improvement achieved in Europe's water resources which are attributed to the EU WFD, the following needs to be acknowledged:

- Europe's water resources remain under pressure → Recent figures show that 20% of surface water is at serious risk from pollution
- 60% of European cities over-exploit their groundwater resources
- 50% of wetlands are endangered
- Demand for water is continuously growing
- About 75% of Europe's residents get their supply from groundwater sources
- Nearly half the EU population lives in 'water-stressed' countries where the abstraction of water from freshwater sources is too high

The EU WFD: A Continuous Effort

Year 2015

Proportion of classified river and lake water bodies in different EU River Basin Districts holding less than good ecological status or potential

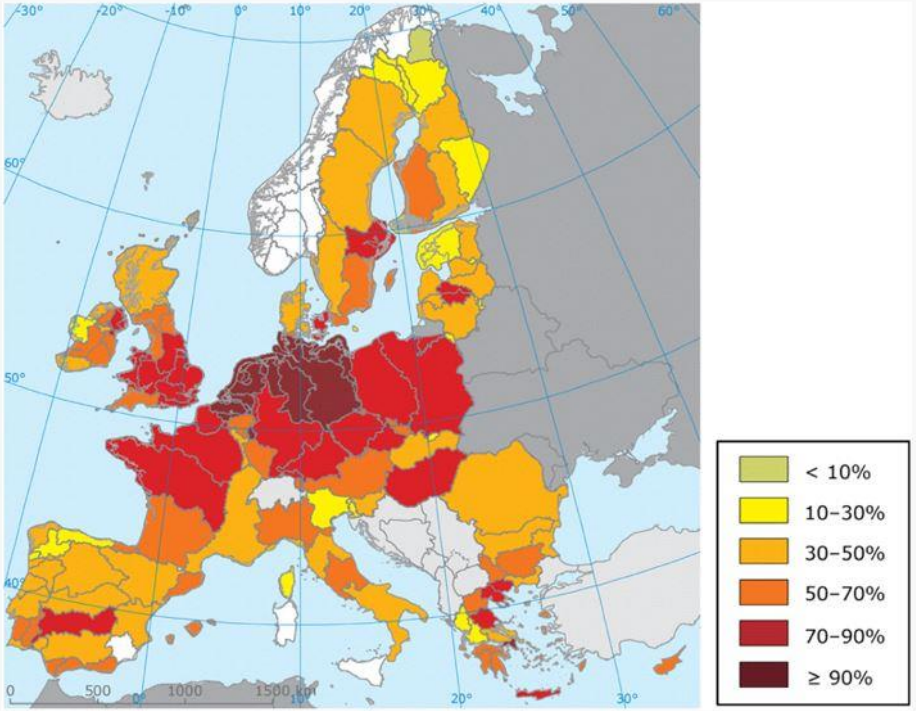


Fig. 1
Proportion of classified river and lake water bodies in different EU River Basin Districts holding less than good ecological status or potential (European Parliament 2015)

Example: Legal foundation of the International Commission for the Protection of the Danube River (ICPDR)

ICPDR IKSD
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

- 800,000 km²
- 19 countries
- 14 of those, together with the European Union, are contracting parties of the ICPDR.
- Considered as the most international river basin in the World.

Source: ICPDR

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Example: Legal foundation of the International Commission for the Protection of the Danube River (ICPDR)

ICPDR IKSD
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

- **The Danube River Protection Convention** (DRPC) is the overall legal instrument for co-operation and transboundary water management in the Danube River Basin.
- It was signed in 1994 and enforced in 1998.

Its main objective is *to ensure that surface waters and groundwater within the Danube River Basin are managed and used sustainably and equitably.*

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Example: Legal foundation of the International Commission for the Protection of the Danube River (ICPDR)

ICPDR IKSD
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

- When the EU Water Framework Directive (WFD) came into force in 2000, it established a legal framework to:
  - protect and enhance the status of aquatic ecosystems,
  - prevent their deterioration,
  - and ensure the long-term, sustainable use of water resources throughout the EU.

- In response, the 15 Contracting Countries of the ICPDR, including the 5 non-EU Member States (MS), agreed to implement the WFD throughout the entire basin.

- The contracting parties made the ICPDR the facilitating platform to coordinate WFD-related work.

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Video – International Commission for the Protection of the Danube River (ICPDR)

(Duration 4:45 min)

Legal Framework for Basin Management in India

- **Specific Acts** as seen in the case of the Brahmaputra Board (Brahmaputra Board Act, 1980) or Damodar Valley Corporation (DVC)
- **Tribunals** are established under the Inter-State Water Disputes Act of 1956 as a result of existing inter-states river water disputes among riparian States
- **MoUs** between States as in the case of Upper Yamuna River Board
- **Gazette notification** as in the case of National Ganga River Basin Authority (NGRBA)

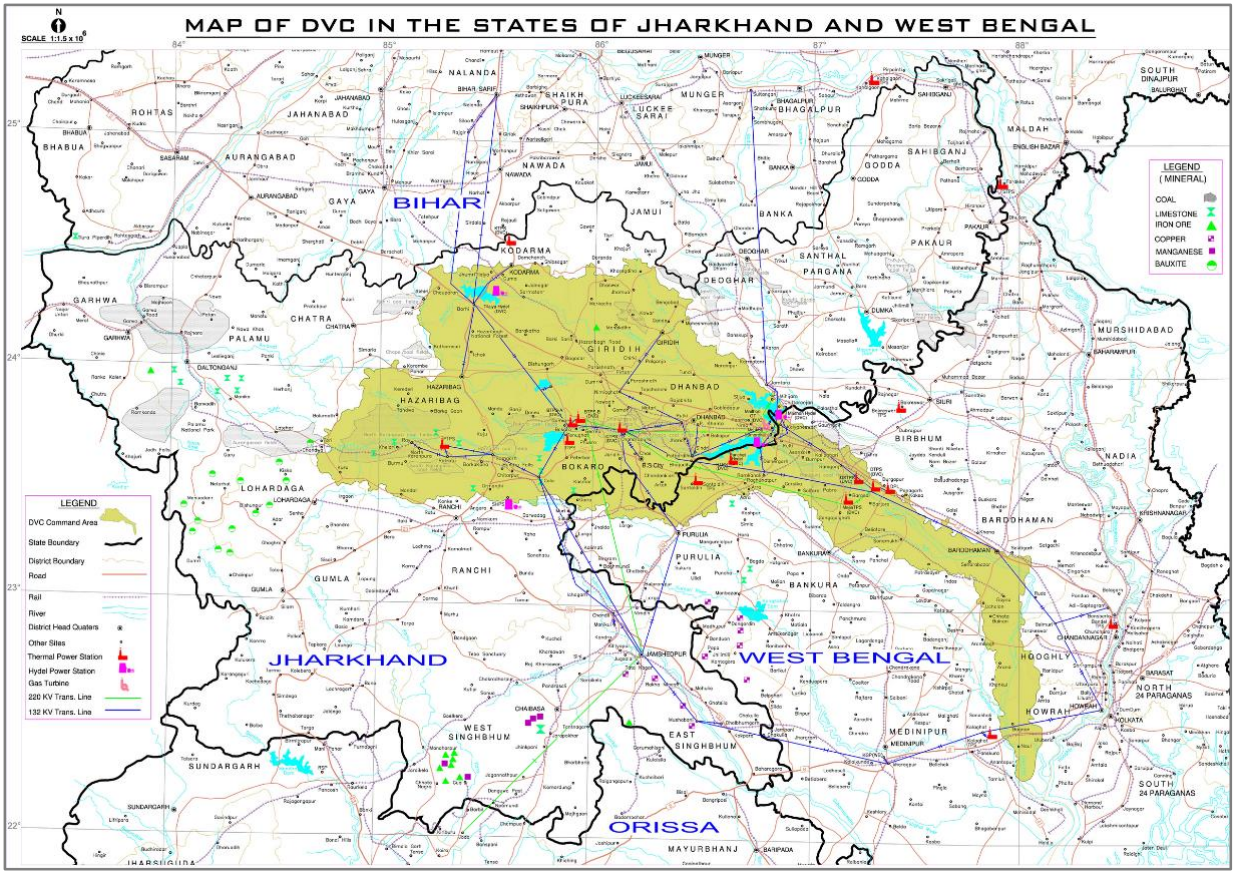
Legal Framework for Basin Management in India

- **2018 draft River Basin Management Bill**, under public consultation, has suggested a two-tier system of management of the River Basin Authority:
  - The Governing Council:
    - Chief Ministers of the basin States & UT.
    - State Ministers in charge of the Water Resources Departments.
    - Chairman of the Executive Board.
    - An Advisory Council assisting the Governing Council.

Legal Framework for Basin Management in India

- **2018 draft River Basin Management Bill**, under public consultation, has suggested a two-tier system of management of the River Basin Authority:
  - The Executive Board:
    - Chairman,
    - Administrative Secretary of the State Water Resources Departments.
    - Administrative Secretaries of various Departments.
    - Sectoral experts in sectors such as
    - Nominees from Central Water Commission (CWC), Central Ground Water Board (CGWB), Financial Advisor etc.

Example RBO in India: the Damodar Valley Corporation (DVC)



Source: https://www.dvc.gov.in/dvcwebsite_new1/dvc-map/

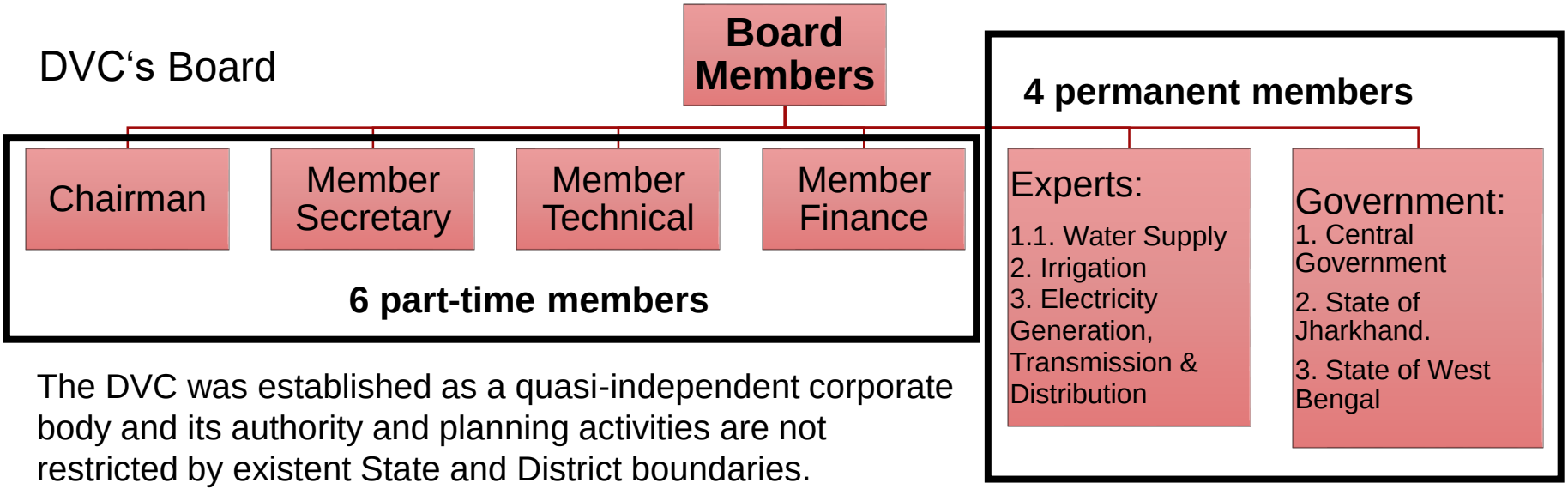
- About 25,000 km².
- Shared by two States:
  - Jharkhand,
  - West Bengal.

Example RBO in India: the Damodar Valley Corporation (DVC)

Legal background

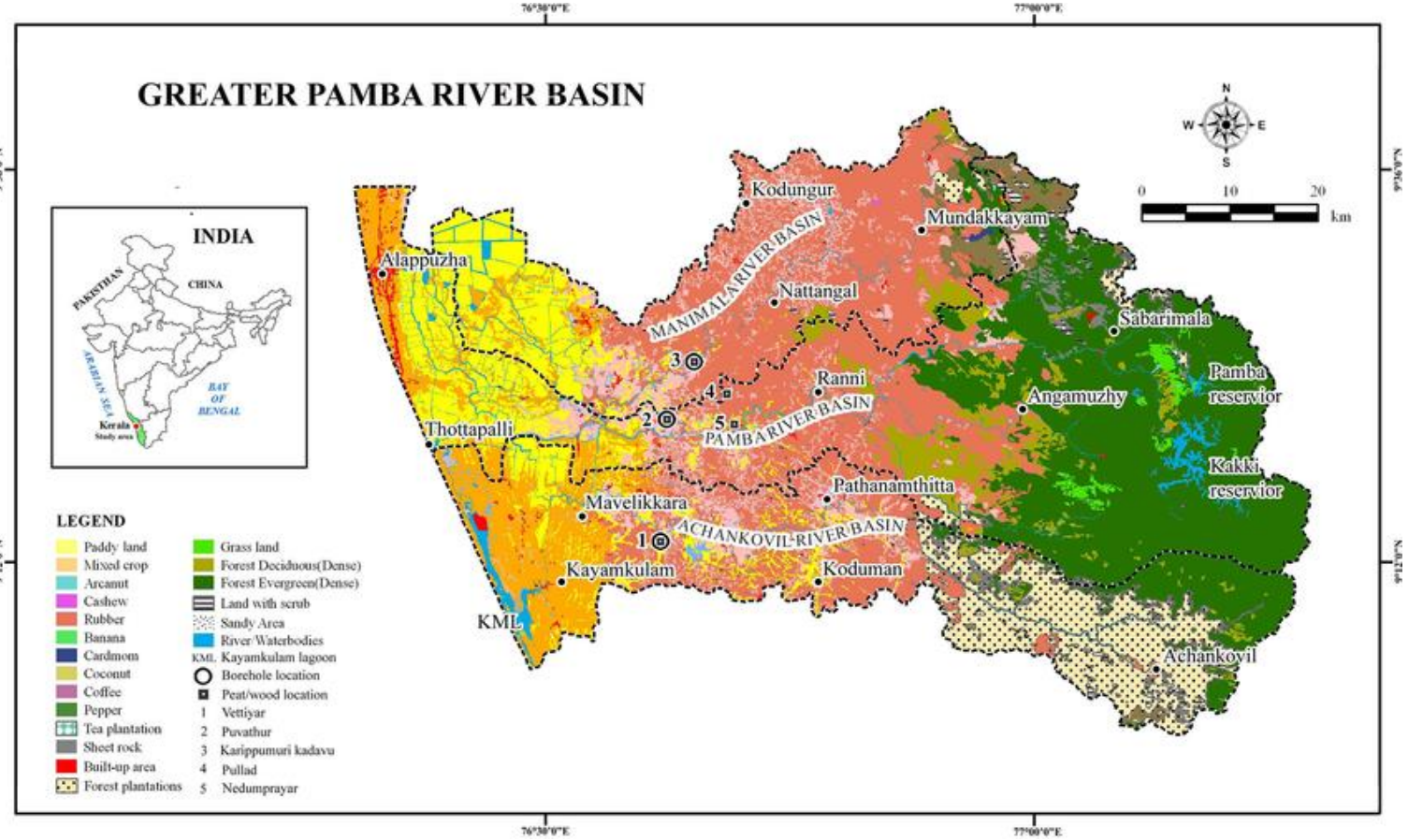
- The DVC (Amendment) Bill, 2007 was introduced in the Lok Sabha on 4th May, 2007.
- The Union Cabinet approved introduction of the DVC (Amendment) Bill 2011 on 16th June 2011 for the reconstitution of the DVC.

DVC‘s Board



The DVC was established as a quasi-independent corporate body and its authority and planning activities are not restricted by existent State and District boundaries.

Example RBO in India: the Pamba River Basin Authority



- About 2,200 km².
- Third largest river in Kerala.

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Example RBO in India: the Pamba River Basin Authority

Pamba River Basin Authority Bill (2009)

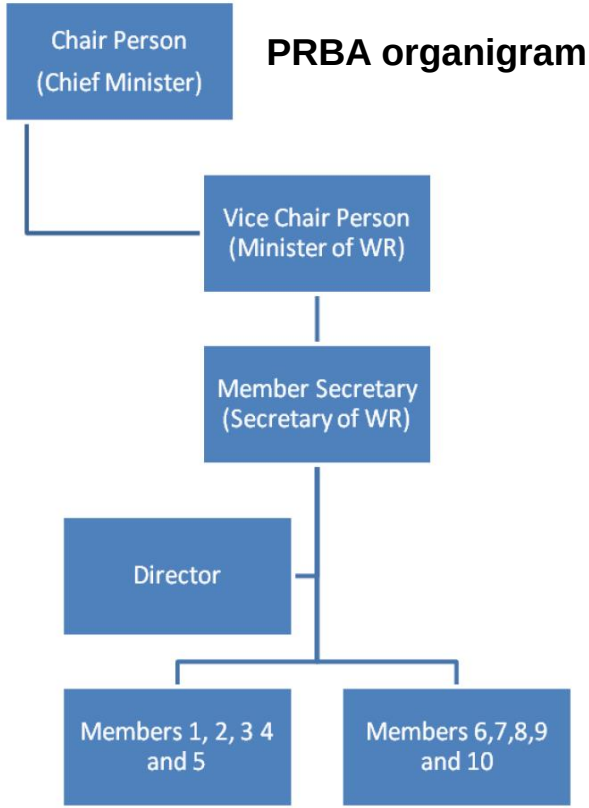
- The bill established the Pamba River Basin Authority as a statutory body for conservation of water resources in the Pamba River Basin.
- Preamble states “the government is bound to ensure the quality of water in the river and to take measures to prevent pollution and to undertake integrated planning, monitoring, management and development of water resources in the river with the **river basin as an integral unit**.”
- It has the power to impose controls or restrictions over the exploitation of natural resources or encroachments that have an impact on the water resources and the basins of the Pamba River.

Example RBO in India: the Pamba River Basin Authority

The Basin Authority is represented by stakeholders from 15 different governmental sectors as well as autonomous representatives:

- Chairman: the chief minister
- Vice-chairman: Kerala's Water Resources Minister
- Member Secretary : Water Resources secretary
- Chairman of the Kerala State Pollution Control Board
- Secretaries of various departments such as Revenue, Forest, Local Self-government, Health, Science and Technology and Environment, Finance, Power and Devaswom.
- Two water sector experts
- Two members of the House of the People, nominated by Government, representing the constituencies
- Two members of the Legislative Assembly, nominated by Government, representing the legislative constituencies
- Presidents of the District Panchayats

PRBA organigram



Pamba River Basin Authority Bill (2009)

Example RBO in India: Actual status of the Pamba River Basin Authority

- As of today, **the PRBA is not operational**. Actions on the ground were not taken to the level to which it should have been undertaken.
- According to the former Director of the PRBA, the reasons are:
  - It was not given priority by the Government
  - Lack of leadership
  - Lack of financial resource allocation
  - Apprehension by the stakeholders that this is not going to be feasible in Kerala/India
  - Frequent transfers of the officials
  - Lack of functioning of the various related departments in an integrated manner, even conflicts
- Departments members of the PRBA have undertaken their respective activities which happen to enable/facilitate the PRBA. But these activities **were not integrated**.
- A strong leadership can make a huge difference as the Chief Minister is the Chairman of PRBA.

Case of RBO in India: the River Basin Authority (RBA) in Kerala

In 2018, Kerala state government announced its plan to establish a River Management Authority for the 44 rivers in the State.

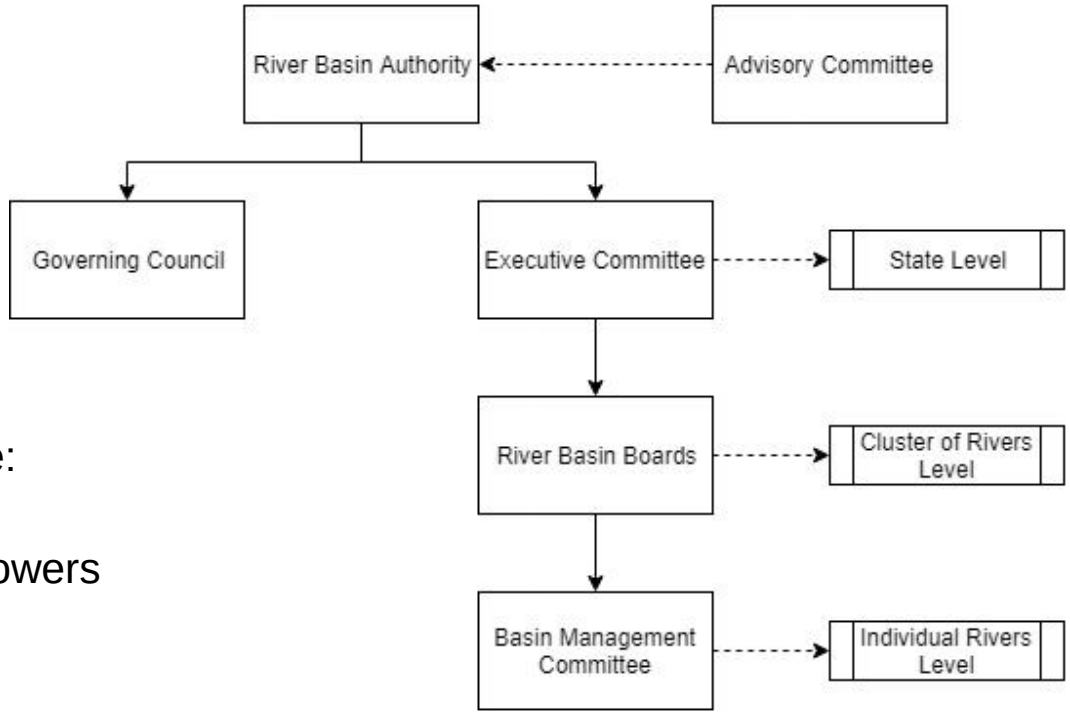
Proposed set-up of the RBA:

- Governing Council
- Executive Committee

Advised by an Advisory Committee:

- Provide technical advices
- Without any decision-making powers

RBA organigram



Source: Note from the Chief Engineer Irrigation & Administration Thiruvananthapuram, dated 25/03/2019

Discussion during Webinar:
Legal Framework for Basin Management in India

IT´S YOUR TURN

The legal framework for RBM in India is being framed with the reviewed 2018 draft River Basin Management Bill.

In your opinion:

What role and responsibility would you see for your organisation with respect to RBM cycle implementation in India?

Is the legal framework supporting this role/ responsibility?

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2 Clear Governance and Coordination Structure

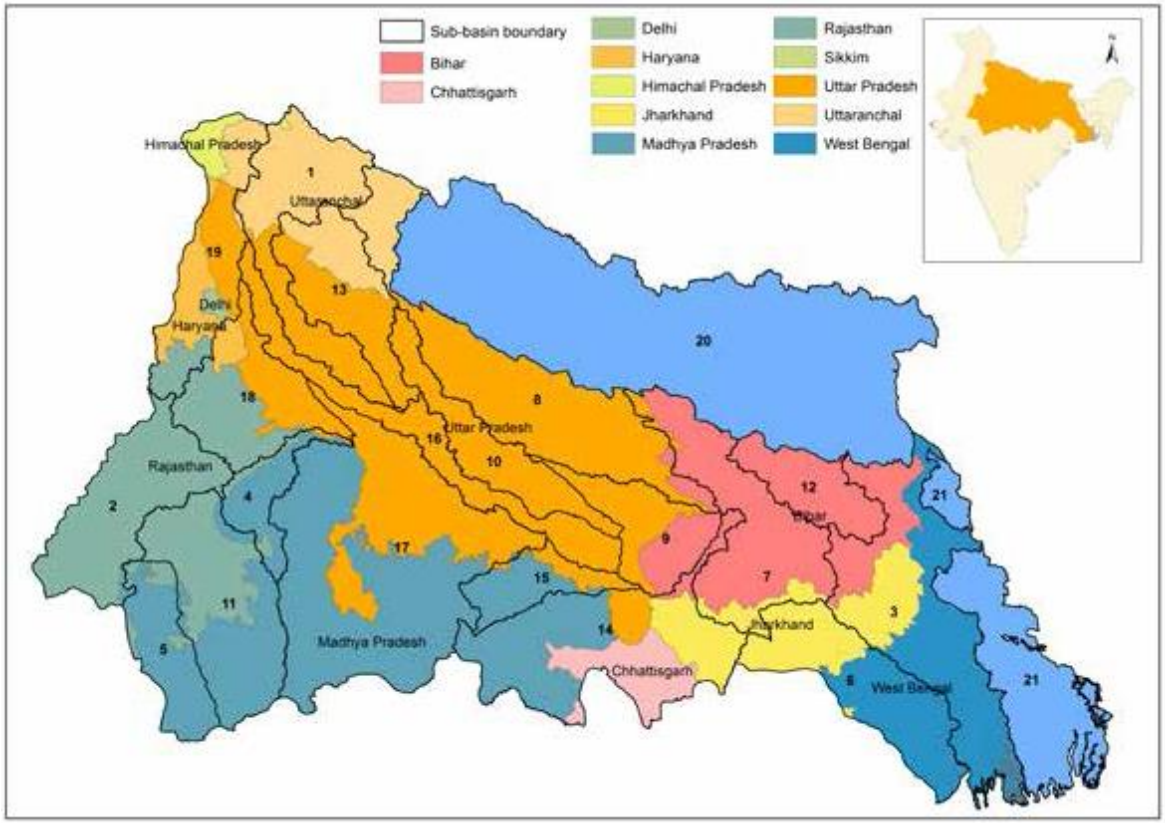
2.1 Governance and Legal Framework

2.2 Basin Coordination Structures

- Institutional set-up
- Stakeholder engagement

Will be discussed in more in detail during Training Module 3!

The Need for Basin Coordination



1. River basins lie across **different administrative boundaries**
2. River basins involve **different sectors** using water, therefore requiring cross-sectoral integration

→ Therefore, coordination across institutions and sectors is necessary

Source: Amarasinghe et al. (2016), Reviving the Ganges water machine: potential and challenges to meet increasing water demand in the Ganges River Basin, IWMI Research Report 167:42

The Need for Basin Management Institutions

A legal framework for basin management does not ensure that the goals, principles and programme measures are being implemented in a continuous manner.

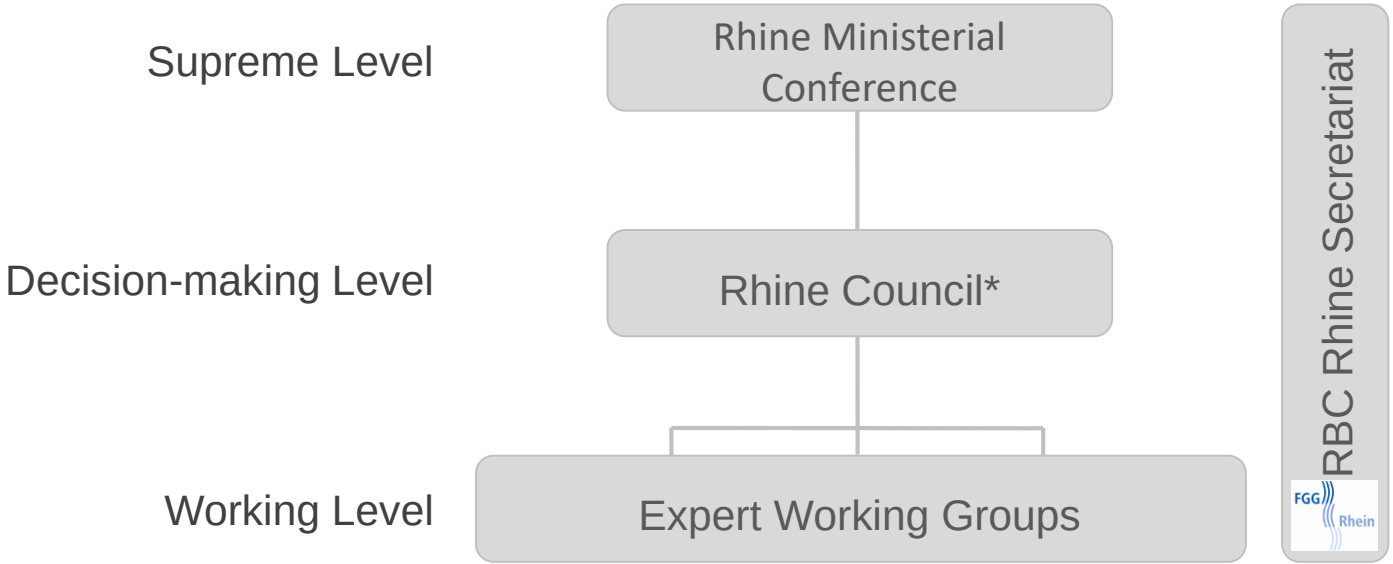
Therefore there is a need to establish **institutions** that

- Ensure regularity of meetings and prepare them
- Raise newly emerging issues to the basin management agenda
- Prepare decisions and organise decision-making processes
- Engage in data and information sharing
- Ensure inclusion of stakeholders

Apart from coordination of implementation, there need to be institutions for legal enforcement (see Governance).

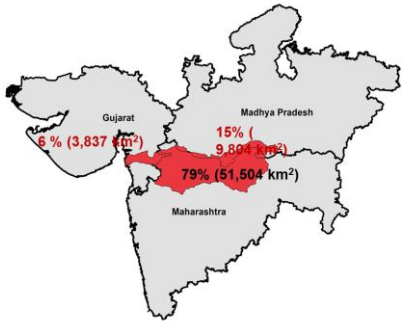
Example: Setup of the (National) “Basin Community” (FGG) Rhine

The Basin Community (FGG) Rhine coordinates basin management in the Rhine River Basin between the different German states. Its organisational set-up reflects the typical two-tiered structure of basin commissions.



* 8 Federal States: Baden-Wurttemberg, Bavaria, Hesse, Lower Saxony, Northrhine Westphalia, Rhineland-Palatinate, Saarland, Thuringia

Example: Tapi River Basin Management Plan



- Ongoing activity under the India-EU Water Partnership.
- Covers the entire **Tapi River Basin**: beyond administrative borders
  - The Tapi RBM Plan covers:
    - Surface waters and groundwater (maybe coastal waters)
    - Water Quality and Water Quantity
- **Tapi RBM Plan** will be fully aligned to RBM Cycle
  - Developing Indian approaches, merging them with EU experiences
- Enabling **JOINT planning and management** of all issues and challenges
  - Combination of all State information into one integrated RBM Plan
  - Overview on entire Tapi basin
  - Development/implementation is steered by each State - **based on joint aims**.

INDIA-EU WATER PARTNERSHIP

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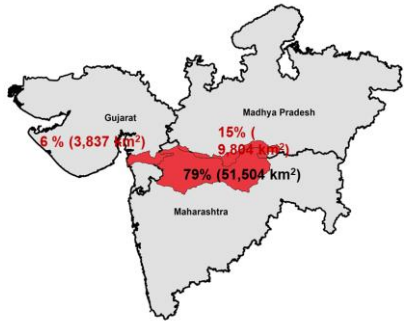
Example: Tapi River Basin Management Plan

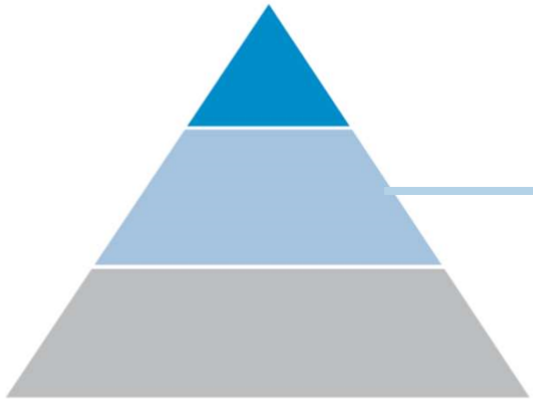


Institutional Set-up across Administrative Borders

Part A
Basin-Wide Level

Part B
State or Sub-Basin Level

Part C
Sub-Unit Level



Tapi River Basin Committee

- Steering the development of the joint Tapi RBM Plan
- With support of CWC, IEWP PMU and EU Experts
- Regular meetings that focus on specific tasks/results

Part A: Basin-wide level = entire river basin: Steered by **ALL** States sharing the river basin

Part B: State level = state or sub-basin authorities

Part C: Sub-unit level = within states: sub-national units

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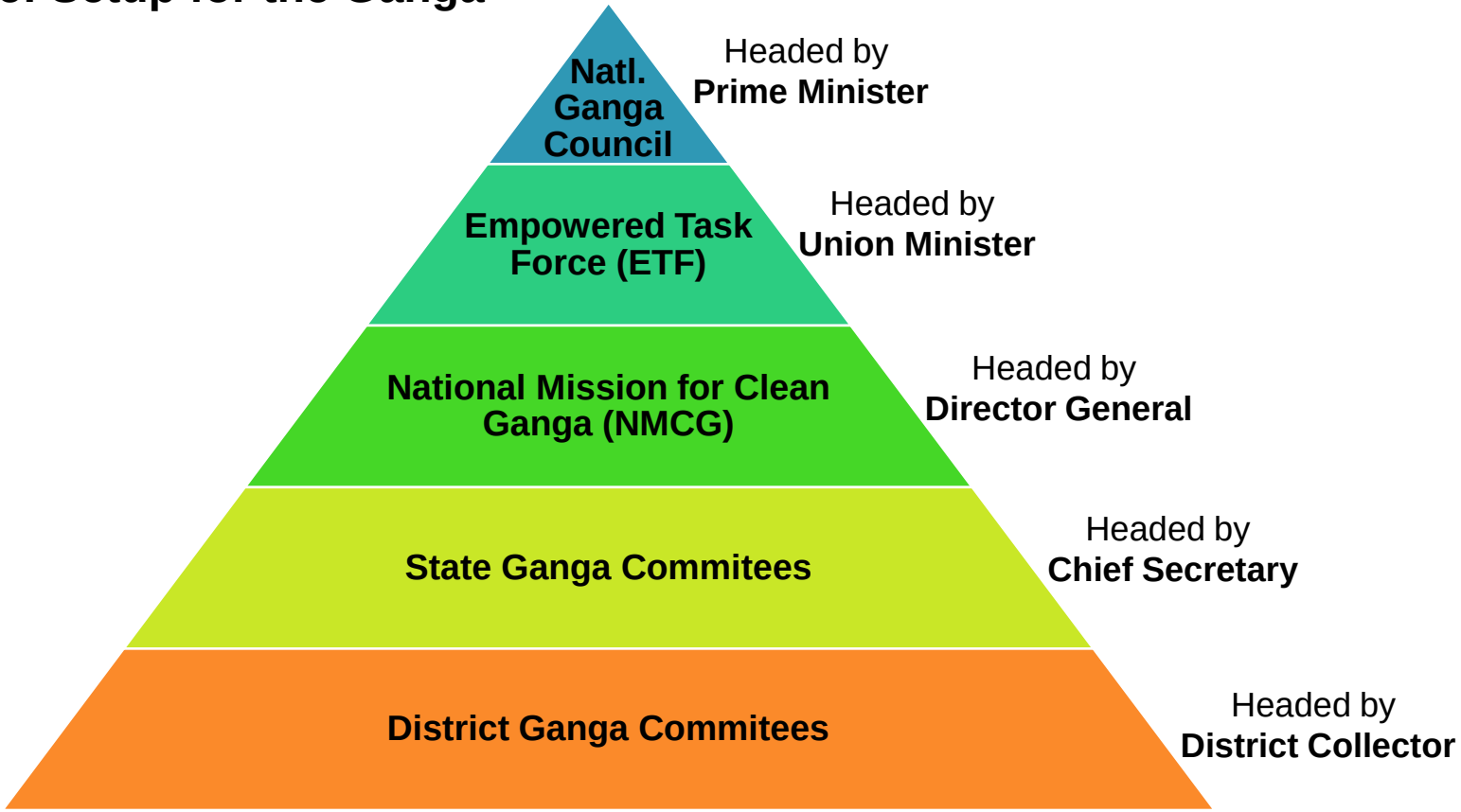
Example: Setup for the Ganga



Source: National Water Academy, Distance Learning Module „Water Governance“.
URL: https://nwa.mah.nic.in/sdmc/governance/index.htm

Discussion during Webinar:
Key Features of Basin Management Organisations

IT´S YOUR TURN

If NMCG moves to become an RBO, what changes in its thematic and institutional set up will be required?

Structural aspects such as:
Ministerial meetings, secretariat, working groups..

Management processes: basin assessments, data exchange, formulation of objectives, discussion and harmonization of implementation plans and measures

Thematic aspects

7 Implementation of RBM

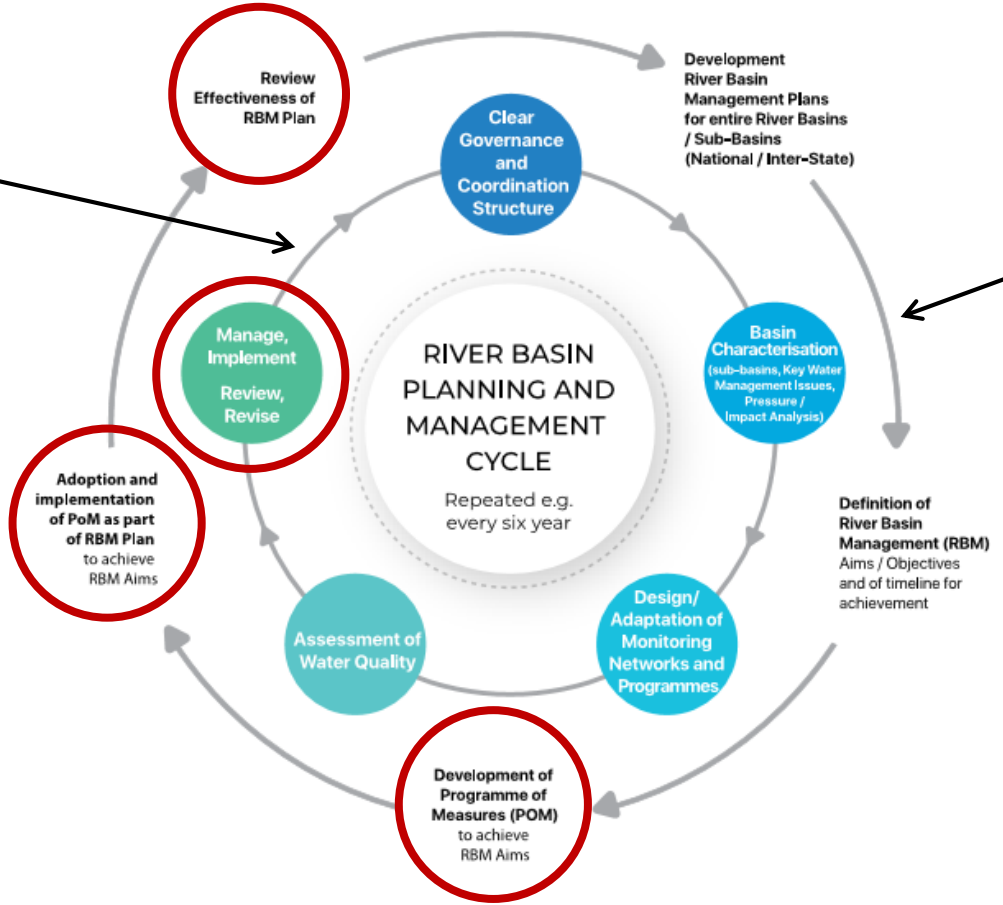
7.1 RBM Plan

7.2 Development of Programme of Measures (PoM)

7.3 Aspects for Implementing PoMs / RBM Plans

The River Basin Planning and Management Cycle

“Inner cycle”
Technical/
operational level“



“Outer cycle”
Planning and
decision making
level

7 Implementation of RBM

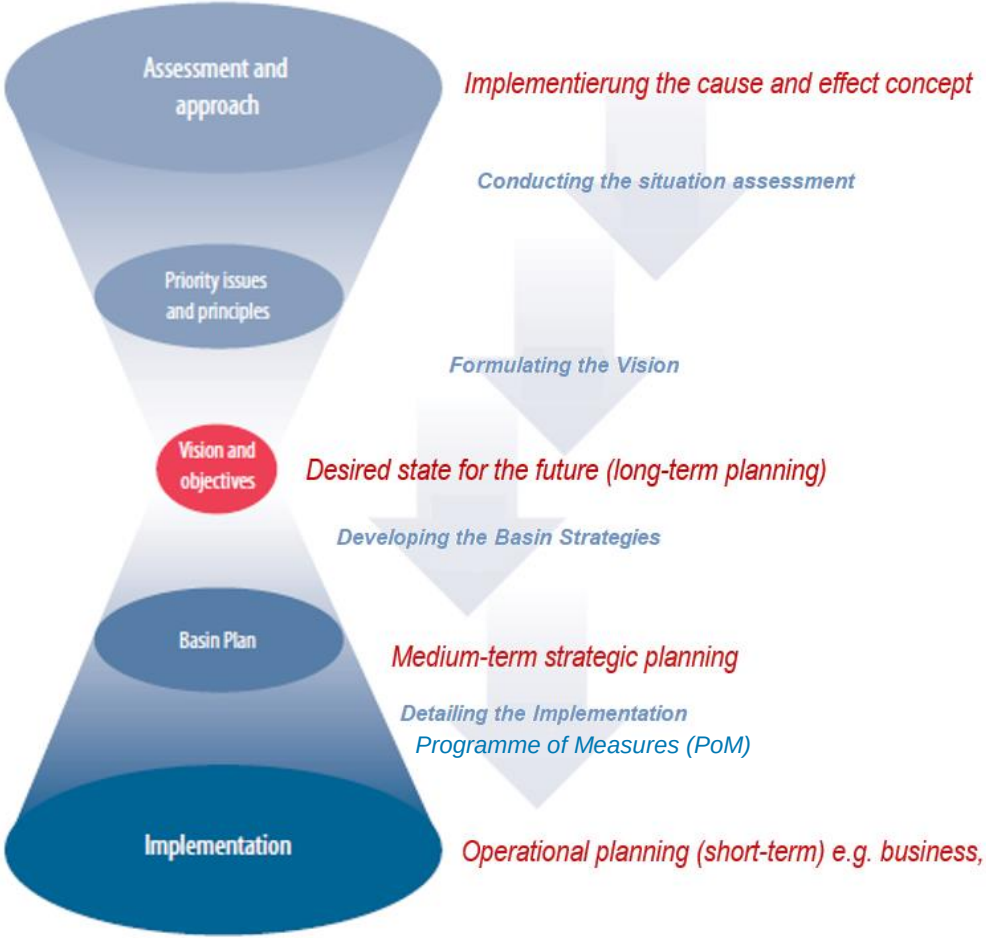
7.1 RBM Plan

7.2 Development of Programme of Measures (PoM)

7.3 Aspects for Implementing PoMs / RBM Plans

7.4 Review and Revise PoM

Moving from Vision and Objectives to a Comprehensive Plan



Adapted from Pegram et al., 2013, p. 83

Overview of the Planning Process

1) Definition of **joint vision**
2) Identification of **objectives**
3) Comparison of **objectives** against **state** of the basin
4) Definition of **measures** in order to move towards objectives
5) Specification of **measures** for implementation
6) Drafting of **management plan**
   - Drafting of outline
   - Consultations
   - Drafting of plan and programme of measures
   - Consultations
   - Finalisation of **plan and programme of measures**
7) **Dissemination** of plan and programme of measures

Structure and Content of a Basin Plan

The structure and content of a plan needs to be adapted to the needs of the basin and those involved in the planning and implementation process → Typically, the structure of a plan includes:

- **Description of the basin**
  - Current status
  - Future trends
  - Key water management issues
- **Basin vision/ aims and objectives**
- **Implementation plan/ Programme of Measures (PoM)**
  - Definition of measures
  - Responsibilities and resources
  - Monitoring mechanisms

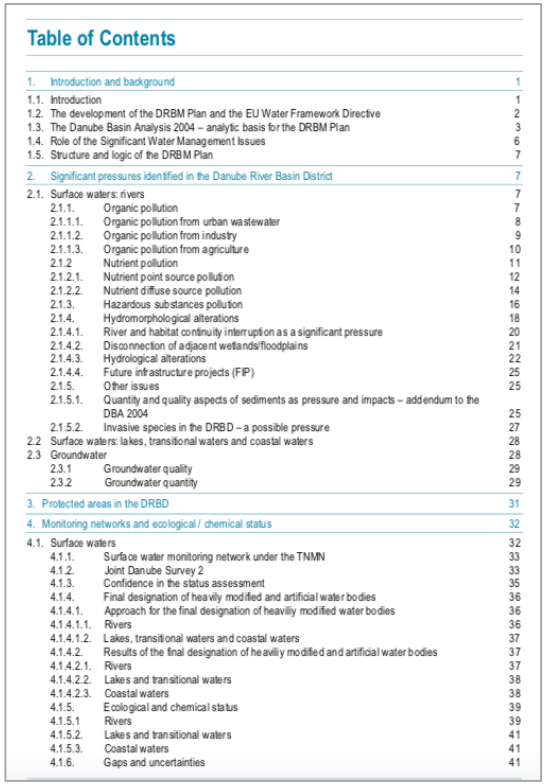
Source: ADB River Basin Planning Principles (https://www.adb.org/publications/river-basin-planning-principles)

Levels of Basin Plans

Internationally-coordinated basin plans	• International river basin commissions
Nationally-coordinated basin plans	• National river basin communities
Sub-basin plans	• Federal water or basin agencies

Examples of Structures of Basin Plans

Danube RMBP



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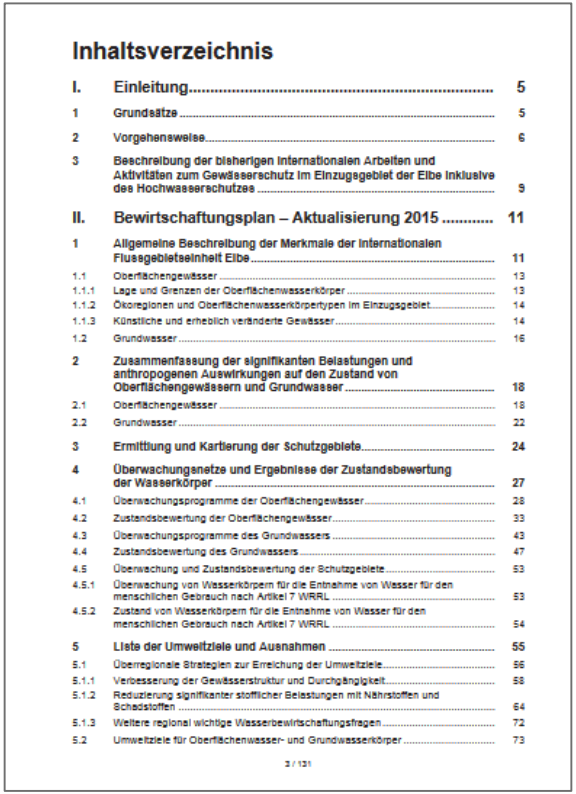
Elbe RBMP



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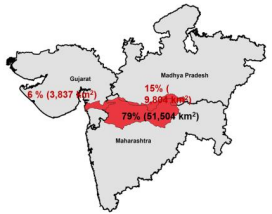
Can be found on the e-learning platform!

Example: in the Danube – The ICPDR Danube River Basin Management Plan (2015)

Pressures	Objectives	Programme of Measures 2015-2021
Pollution by organic substances	Reducing pollution by organic substances	- Access to sewer systems, at least biological treatment - Constructing sewers and treatment plants
Pollution by nutrients	Reducing pollution by nutrients	- Nutrient removal technology for 28 million people equivalents - Phosphate-free detergents - Reduction of nutrient input and losses related to farmland
Pollution by hazardous substances	Reducing pollution by hazardous substances	- Apply best available technologies and treatment in industry - Prevent accidents (Seveso III Directive)
Hydromorphological alterations	Improving the hydromorphological conditions	- Construct 146 fish migration aids until 2021 - Restoration measures for rivers - Reconnect floodplains / wetlands

Source: ICDPR (2015) Danube River Basin Management Plan Update 2015

Example: Tapi River Basin Management Plan



- Five **Key Water Management** Issues agreed on 29 March 2019 between the three Tapi States:

Point Pollution from Urban Settlements & Industries

Area Source Pollution from Agriculture

Alterations of River Hydrology/Water Quantity

Alterations of Groundwater Quality and Quantity

Alteration of Morphology / Sand Mining

For each Key Issues:

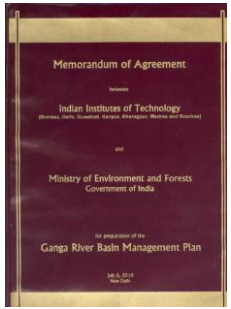
- Visions and management objectives.
- Pressure/Impact Analysis and Risk Assessment including scenarios.
- Programme of Measures.
- Thematic maps are key to Tapi RBM Plan: easy overview on all issues on the basin –wide scale.

Example: Ganga River Basin Management (GRBM)

Milestones and Legal foundation

National Ganga River Basin Authority (NGRBA) constituted

02/2009



06/2010

Memorandum of Agreement between 7 IITs and MoEF for preparation of GRBMP

Interim GRBMP Report

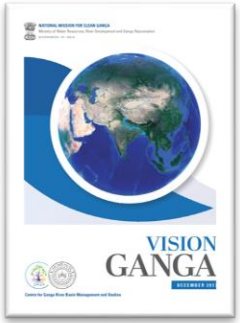
09/2013

01/2015

main plan document
8 mission reports,
73 thematic reports

River Ganga Order:
Dissolution of NGRBA
Constitution of National Ganga Council (NGC)

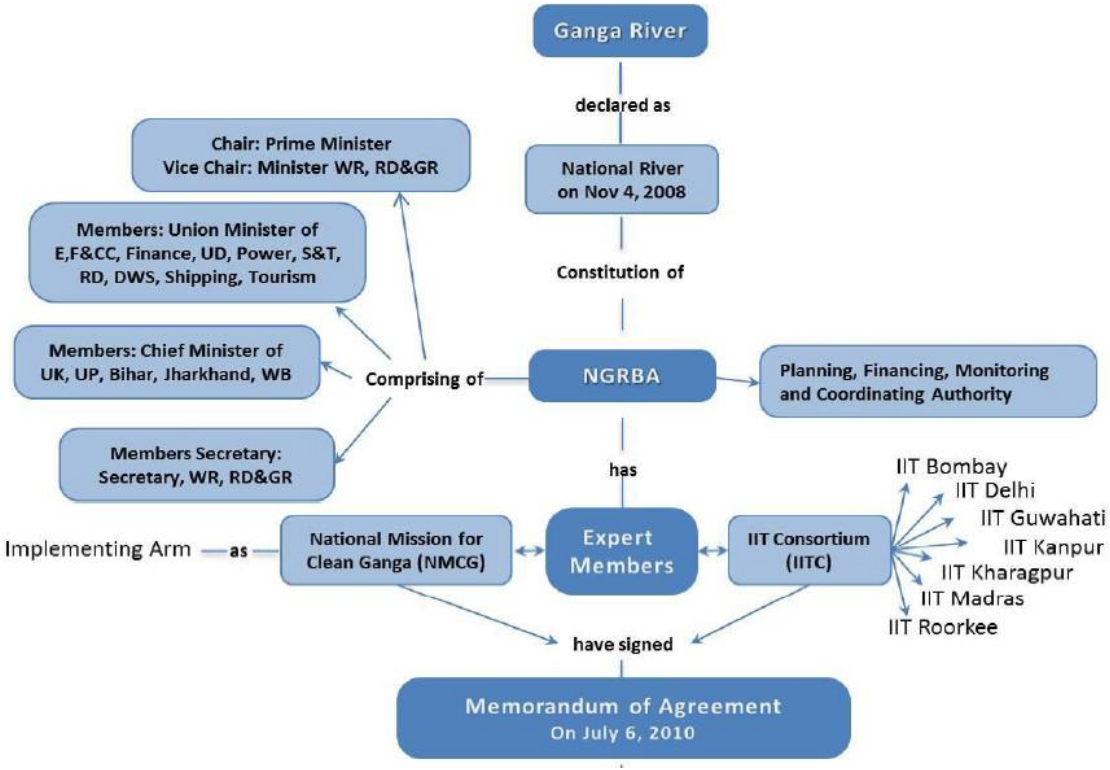
10/2016



12/2017

Vision Ganga

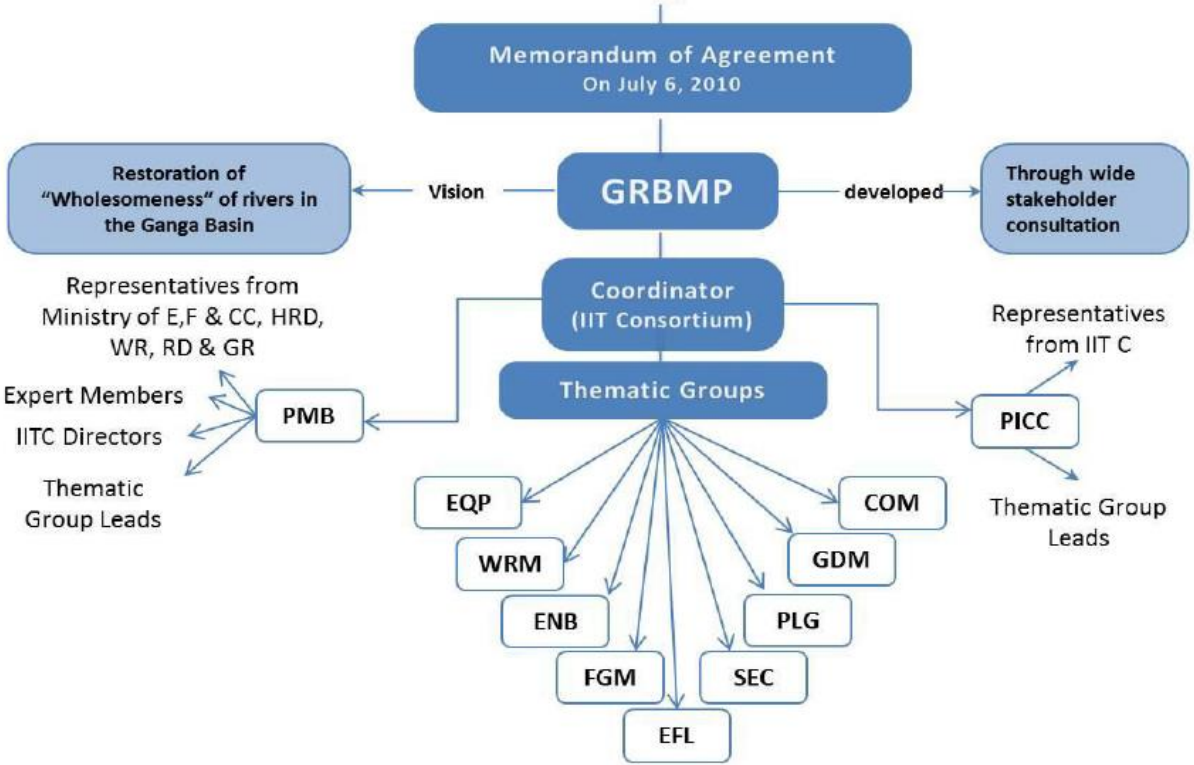
Example: Ganga River Basin Management (GRBM)
Coordination Structure



NGRBA: National Ganga River Basin Authority
NMCG: National Mission for Clean Ganga
MoEF: Ministry of Environment and Forests
MHRD: Ministry of Human Resource and Development
MoWR, RD&GR: Ministry of Water Resources, River Development and Ganga Rejuvenation
GRBMP: Ganga River Basin Management Plan
IITC: IIT Consortium
PMB: Project Management Board
PICC: Project Implementation and Coordination Committee

Source: Ganga River Basin Management Plan (GRBMP)

Example: Ganga River Basin Management (GRBM)
Coordination Structure II



NGRBA: National Ganga River Basin Authority
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Source: Ganga River Basin Management Plan (GRBMP)

Example: Ganga River Basin Management (GRBM)

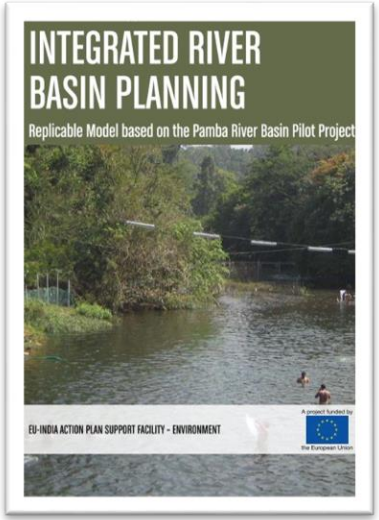
Nine themes

1. Environmental Quality and Pollution
2. Water Resources Management
3. Fluvial Geomorphology
4. Ecology and Biodiversity
5. Socio Economic and Cultural
6. Policy Law and Governance
7. Geo-Spatial Database Management
8. Communication
9. Environmental Flows

Example: Ganga River Basin Management (GRBM)

- The Ganga RBMP has done a very comprehensive **Basin Characterisation**.
- Each assessment report ends with some recommendation actions to improve the wholesomeness of the river:
  - “Aviral Dhara” (Continuous Flow”),
  - “Nirmal Dhara”(“Unpolluted Flow”),
  - Geologic Entity,
  - and Ecological Entity improve the situation.
- However these recommendation actions have not been translated yet into comprehensive Measures.

Example: the Pamba River Basin – IWRM Plan



- The EU-India Action Plan Support Facility conducted in 2010 the project “Developing a Roadmap for the Pamba river”.
- Implemented through targeted training/working sessions and consultations of a broad spectrum of stakeholder.
- It supported the newly set up Pamba River Basin Authority in devising a management plan for future priority actions.
- Objective was to evolve water management in the State to a sustainable water resources management practice that is cross sectoral, decentralized, and at the scale of the basin.
- The main actions identified in the Roadmap were:
  - the immediate need for operationalization of the Pamba River Basin Authority,
  - adequate and thorough capacity building at State and local level in IWRM practices,
  - and the development of a full IWRM Action Plan for the Pamba River.

Example: the Pamba River Basin – IWRM Plan

Development of an IWRM Action Plan

- Involvement of ca 80 representative stakeholders.
- Water resources issues identified and ranked in accordance to their importance.
- Identification of water management constraints and possible solutions.
- Preparation of an IWRM Roadmap, with identification of measures, timeline, responsible organisation and definition of monitoring indicators.

Example: the Pamba River Basin – IWRM Plan

Development of an IWRM Action Plan

Next steps	Milestones	Indicators
Form an operational body for water resources management in the Pamba River Basin	June 2011	Pamba River Authority operational - offices, staff, work plans and budgets identified.
Capacity building in IWRM	December 2011	Capacity need assessment conducted, IWRM training conducted at central and de-centralised level
Development of a communication strategy	September 2011	Communication strategy formulated and being implemented ensuring stakeholder involvement
Enforcement of existing legal framework	Immediately	Identified priority issues addressed e.g. illegal sand mining
Adjustment of existing legal water framework for the Kerala state	January 2012	Enactment of primary water legislation
Full assessment of the water resources situation (quantity & quality) in the Pamba Basin	March 2011	The quantity and quality of the resource assessed based on data from the numerous intuitions involved in monitoring.
Setting-up a sustainable monitoring and evaluation system for water resources management &	August 2011	MIS operational - databases, GIS and modelling tools Collaboration with the World
Establishment of an information system on water resources		Bank supported Hydrology II project for developing Hydrology Information System (HIS)
Initiation of elaboration and adoption of an IWRM Action Plan for the Pamba Basin	August 2011	IWRM action elaborated and endorsed by the Government
Elaboration of DPRs (Detailed Project Reports) for implementation of different actions identified	December 2012	Detailed project reports prepared for the actions identified in the IWRM plan
Elaboration of financing plan and investment strategies	December 2011	Financing strategies and development plans adopted
Implementation of the IWRM Action Plan for the Pamba River Basin	January 2012 – December 2015	Identified actions implemented.
Development of IWRM indicators to monitor the effects from implementing the IWRM plan	June 2012	Set of indicators developed to monitor that the desired effect from the reform process is being achieved. Regular evaluation reports.

Source: Project “Developing a Roadmap for the Pamba river” (EU-India Action Plan Support Facility, 2010)

7 Implementation of RBM

7.1 RBM Plan

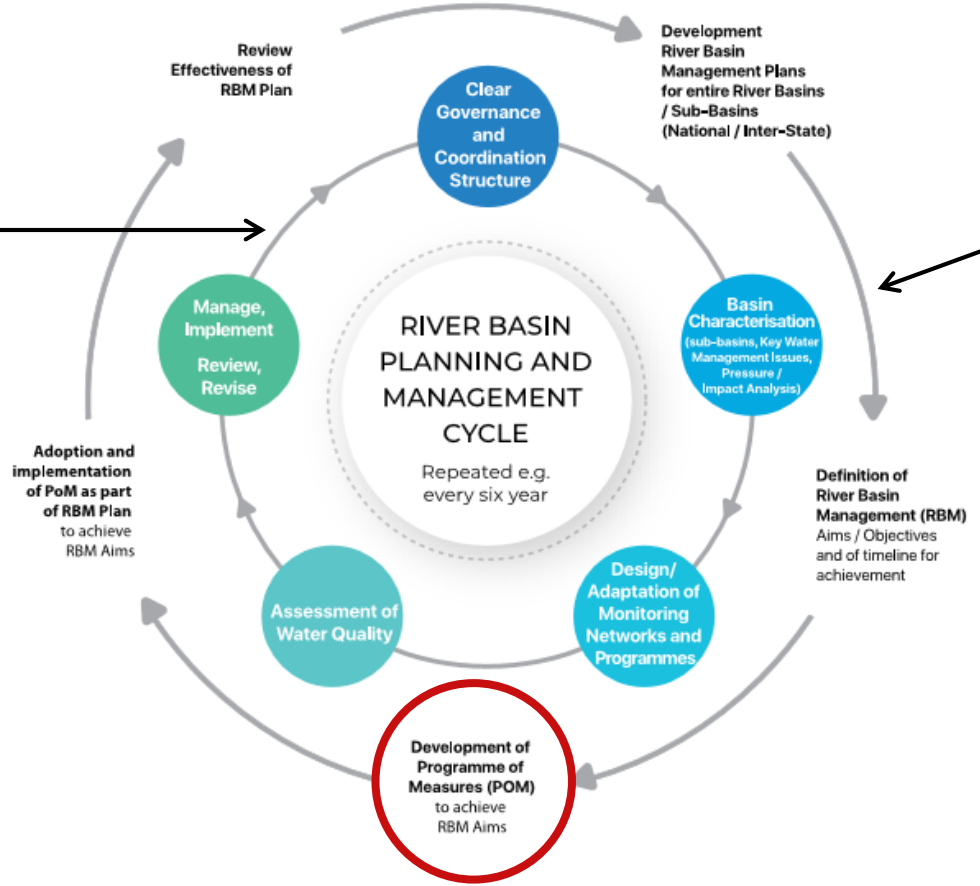
7.2 Development of Programme of Measures (PoM)

7.3 Aspects for Implementing PoMs / RBM Plans

7.4 Review and Revise PoM

The River Basin Planning and Management Cycle

„Inner cycle“
Technical/
operational level“



„Outer cycle“
Planning and
decision making
level

Programme of Measures (PoM)

- Once a joint vision and specific objectives for basin management have been defined, a PoM is needed

- **A PoM**
  - **Summarises all measures** that need to be taken to reach the vision and the objectives
  - Provides a **list of those measures in a systematic manner**
  - Provides **details on their implementation**
  - Attaches **timelines** and implementation plans to the respective measures
  - **Indicates resources needed** for implementation (financial, technical, human)

Theoretical Example: Moving from Water Quality Vision to Specific Measures

Vision: A healthy river free of pollutants that threaten human and ecosystem health
Objectives: reduction of water pollution (by contaminant X) at Y %
Measures:

- Construction of x wastewater treatment plans in area y of the basin
  - Specific aim of measure: reduction of emission of pollutant z by xx%
  - Activities
    - Planning of wastewater treatment plan
    - Acquisition of financial means for wastewater treatment plant
    - Construction of wastewater treatment plan
- Regulation of agricultural pollution run-off
  - Specific aim of the measure: Reduction of agricultural pollution/non-point source pollution
  - Activities
    - New laws and regulation limiting agricultural emissions
    - Introduction of polluter-pays-based wastewater charges for agricultural producers
    - New monitoring network in region x to monitor agricultural run-off

Example: the Elbe basin – Sewage Treatment Prioritisation

How to identify measures of highest effectivity (pollution) and efficiency (finance):

a robust and pragmatic approach from the emergency immediate action programme of the Elbe River 1990.

- **Urban sewage point sources**
  - The amount of sewage water load possible to reduce by treatment at source
  - Discharge points directly on the river
  - Discharge points on tributaries to the Elbe river ranked by distance to confluence with the river
- **Industrial point sources**
  - Industrial point sources which contribute more than 5% of the total load of the river measured at a defined downstream monitoring transect
  - Industrial discharge points sources discharging directly into the river
  - Industrial discharge points on tributaries to the Elbe river ranked by distance to confluence with the river

Example: Elbe Basin – Actions carried out to reduce pollution of point source origin between the years 1990 - 2010

International Commission for the Protection of the Elbe River
Mezinárodní komise pro ochranu Labe

- Concise action plans were formulated and agreed between the Czech Republic and Germany for a time span between 1990 and 2010

Urban sewage water treatment measures:

- Between 1990 and 1995 construction of SWTP with biological treatment for all point sources exceeding a load > 50.000 t/d PE → **Target:** Reduction of load of COD, TOC, N-total, P-total
- Until 2010 finalisation of construction of SWTPs for all point sources exceeding a load > 20 t/d PE and provision of tertiary treatment at all SWTPs
- **247 SWTP were constructed (169 of which were in Germany and 78 of which in the Czech Republic)**
- The investment provided by Germany and the Czech Republic in the time span reached aprox. 3 billion EUR (for SWTP construction alone, without sewer systems)

Example: Elbe Basin – Actions carried out to reduce pollution of point source origin between the years 1990 - 2010

International Commission for the Protection of the Elbe River
Mezinárodní komise pro ochranu Labe

Urban Sewage water treatment measures

- Identification of 27 hazardous substances being subject to reduction or to be phased out in industrial point sources
- Provision of treatment of industrial waste waster y adequate technological solutions at industrial production sites
- Measures to reduce the reduction of the amount of wastewater (volume)
- Application of clean technology and modern (efficient) production technology.
- Closing of inefficient industrial production sites in Germany and Czech Republic
- Between 1995 and 2003 maximum allowable discharge norms for effluents were formulated and enforced by the competent authorities

Benchmarking: Elbe Action Plan – Actions carried out to reduce pollution of point source origin between 1995-2007

International Commission for the Protection of the Elbe River
Mezinárodní komise pro ochranu Labe

Results of implementing the programme of measures (i.e. Elbe Action Plan):

Load reduction (tonnes per year) from urban sewage point sources

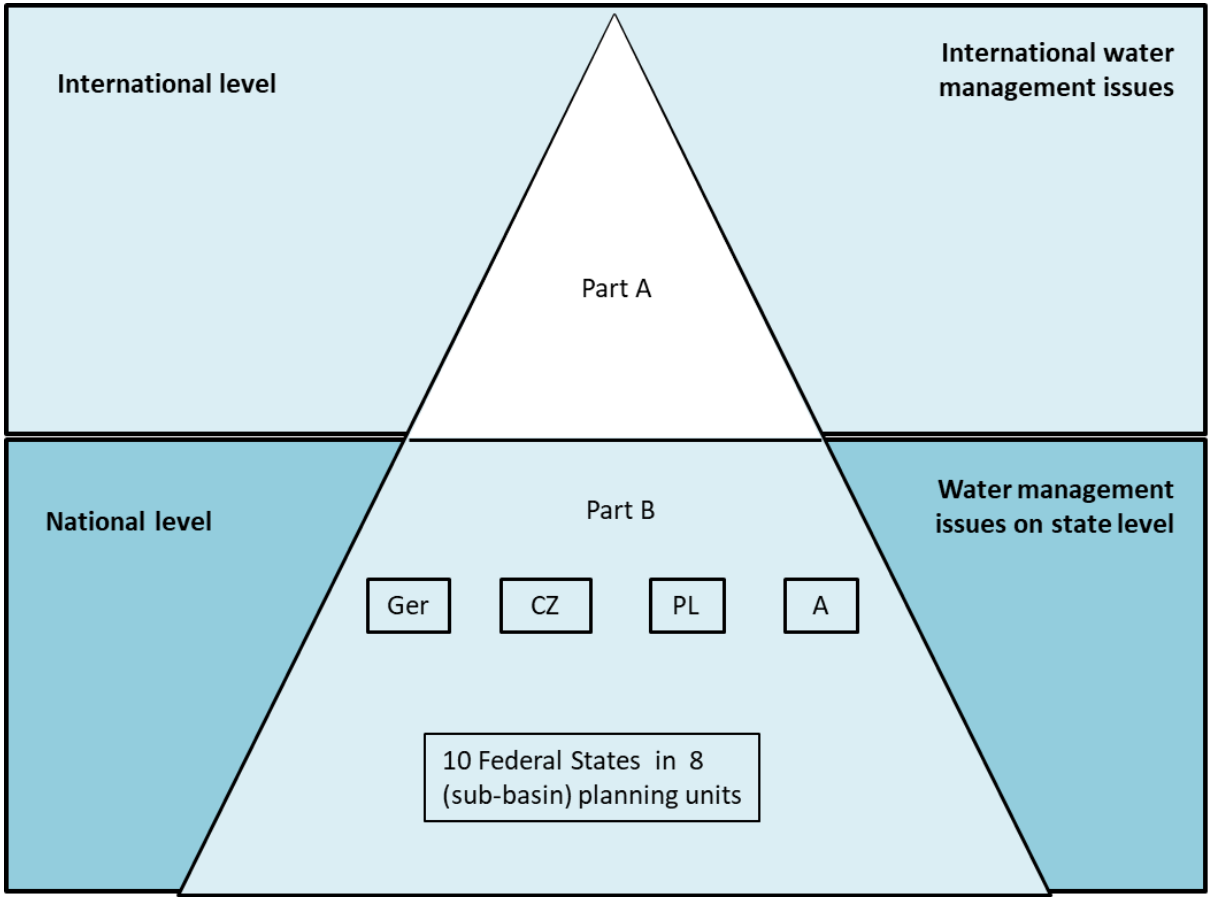
(only SWTP >20 thousand PE, all 69 plants became operational by 2007)

- Biological Oxygen Demand (BOD) (87,000 t)
- Total nitrogen
- Total phosphorous (2,600 t)

Percentage of load reduction of industrial point sources (per year)

- Chemical Oxygen Demand (COD9, 82%
- Total Nitrogen load, 71 %
- Total Phosphorous load, 81%
- Mercury, 96%
- Cadmium, 99%
- Absorbable Organic Halogen (AOX), 93%

Example: the Elbe basin – PoM at different levels



International Commission for the Protection of the Elbe River
Mezinárodní komise pro ochranu Labe

Example: the Elbe basin – Action and Remediation Programmes

International Commission for
the Protection of the Elbe River
Mezinárodní komise pro
ochranu Labe

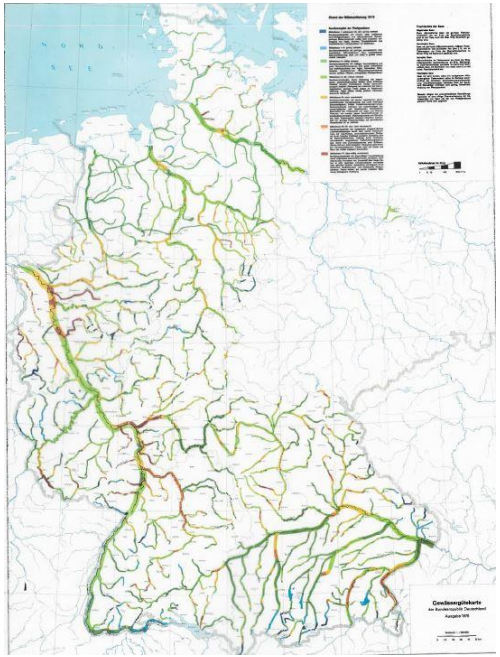
These programmes successful addressed

- solving problems municipal wastewater,
- industrial wastewater,
- reducing the diffuse loads (nutrients and herbicides) from agriculture,
- reducing the diffuse loads from landfills and polluted sites.

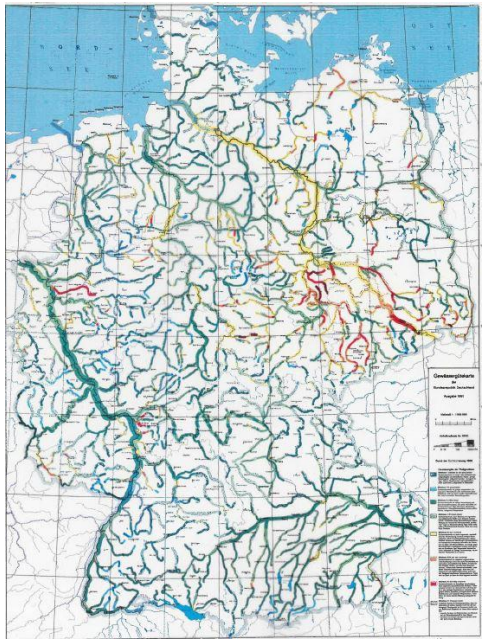
The Elbe Action Programme was completed with a **final report** in 2010.
These programmes were initiated before the WFD came into force.

Example: Improvement of Surface Water Quality in Germany (1975-2000)

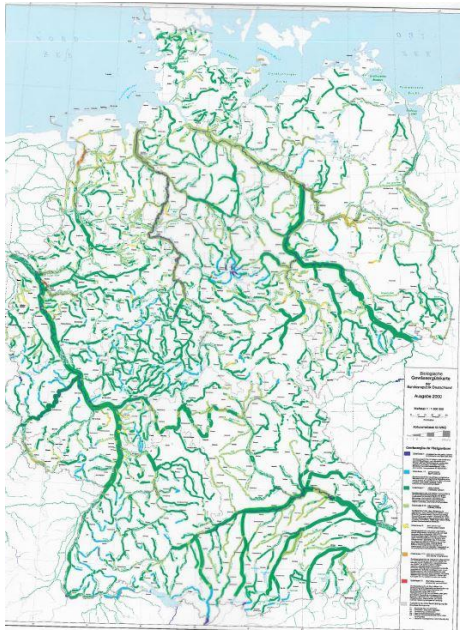
1975



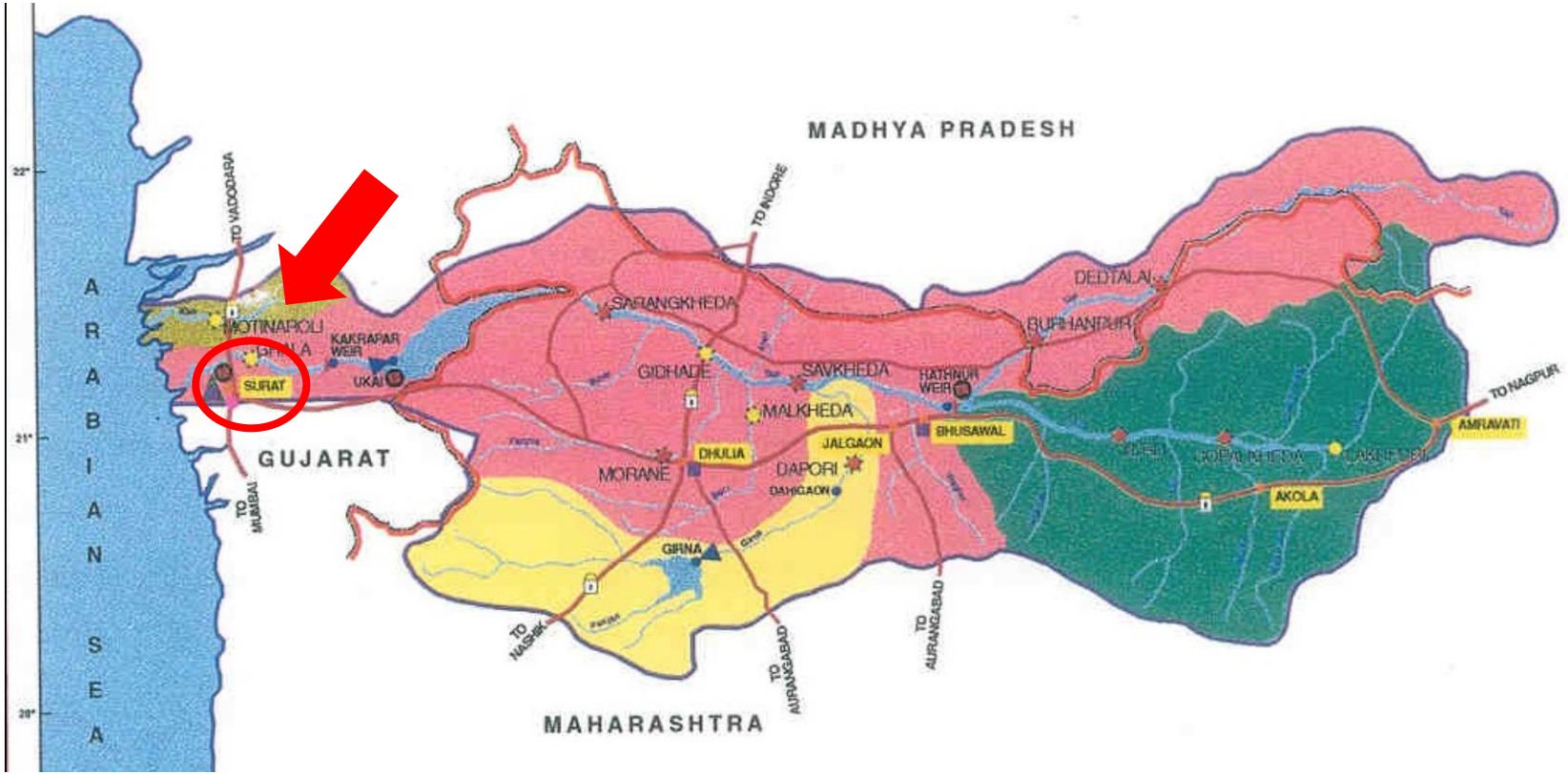
1990



2000



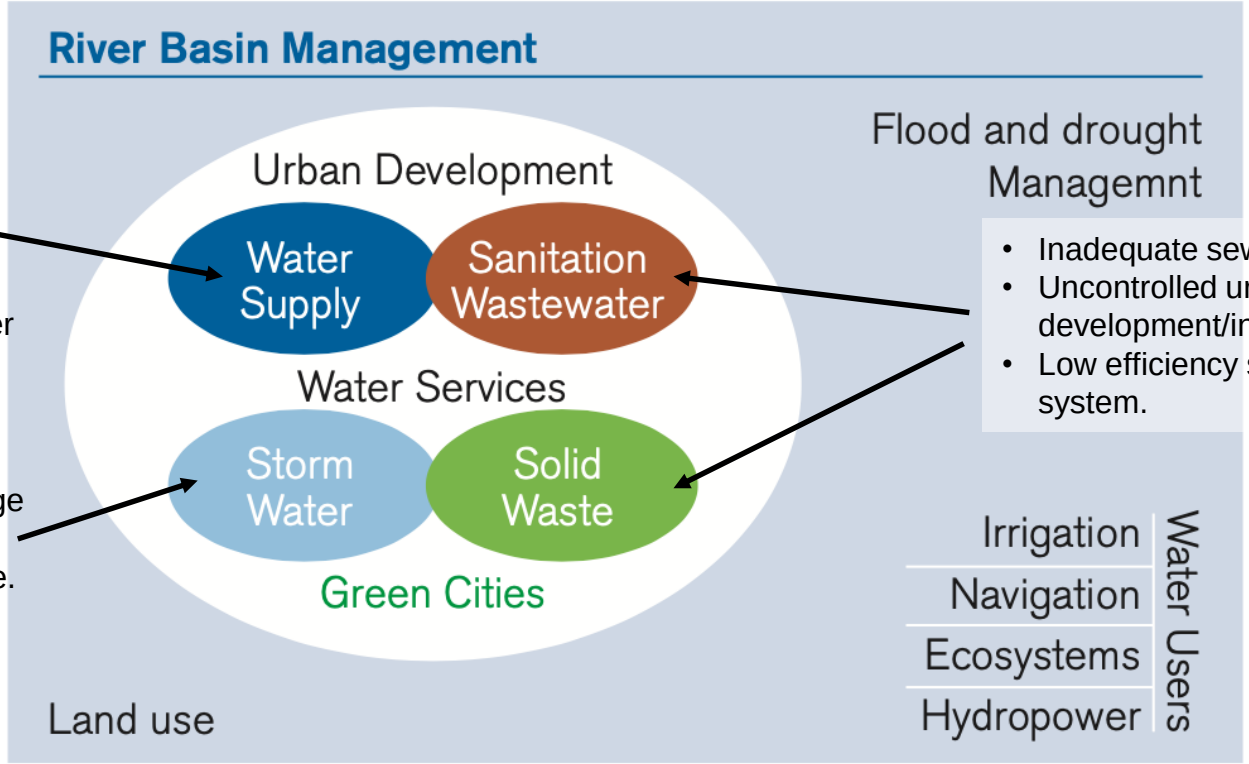
Example: Surat city



Example: Surat city – RBM, an approach for city environment

- Pressure on water resources
- Inefficient water supply systems.
- High values of Non-Revenue Water

- Recurring floods and lacking drainage systems.
- Aging infrastructure.
- Low cost recovery.

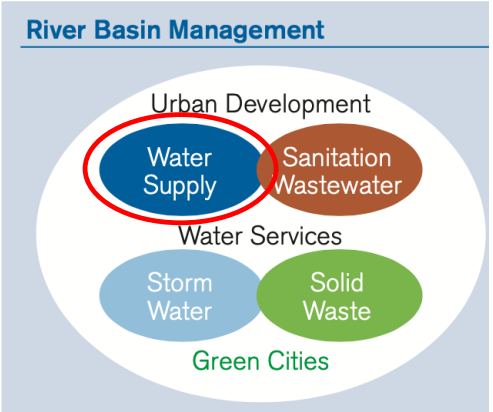


- Inadequate sewerage systems.
- Uncontrolled urban development/informal settlements.
- Low efficiency solid waste collection system.

Source: World Bank (2012) based on Porto and Tucci 2010

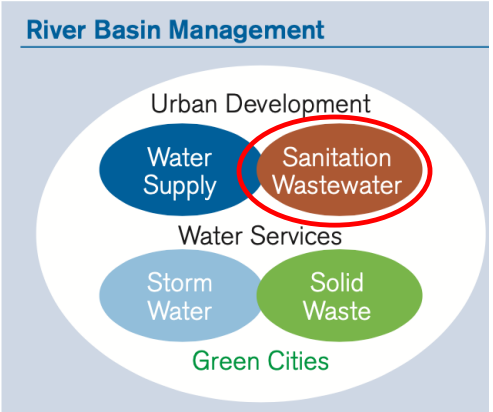
Example: Surat city – Achievements

WATER AVAILABILITY	Actions	Results
Conservation practices	Rainwater harvesting (RWH): Metropolitan Areas have notified rules under which no new building plan is approved without corresponding rainwater harvesting structure.	• 90 RWH completed till date. • 500 RWH structures to be installed by SMC in next three years.
Groundwater management	Building of a weir to increase capacity and decrease salinity intrusions from the sea into the aquifers. Study carried out suggesting management measures such as groundwater recharge	• Increased groundwater rechange and protection from salinity intrusions
Monitoring and information system	Extensive water monitoring system in water works, wastewater system and river water	• Improved decision-making and emergency management processes



Example: Surat city – Achievements

WASTEWATER	Actions	Results
Extension of sewerage system	Building of 10 new STPs in last 25 years with latest technology and sludge dewatering systems	• Capacity treated: 925 MLD • Coverage: 91 % population • 1600 km sewer network
Reuse of treated wastewater	Reuse of 35 MLD treated wastewater from STP (tertiary treatment: ultrafiltration and RO) for textile use in Pandesara industrial park	• Cost fresh water to industry: Rs. 23/KL, cost treated wastewater Rs. 18,2/KL. • Separate network for drinking and reused water in industrial area with different color-codes. • Tertiary water blended with drinking water up to 50%.



Discussion during Webinar:
Way forward to develop PoM for the Ganga basin?

IT´S YOUR TURN

In your opinion:

- How can functioning PoM be developed for the Ganga River Basin to meet the Ganga Vision?

7 Implementation of RBM

7.1 RBM Plan

7.2 Development of Programme of Measures (PoM)

7.3 Aspects for Implementing PoMs / RBM Plans

7.4 Review and Revise PoM

Sources of Financing for Basin Management

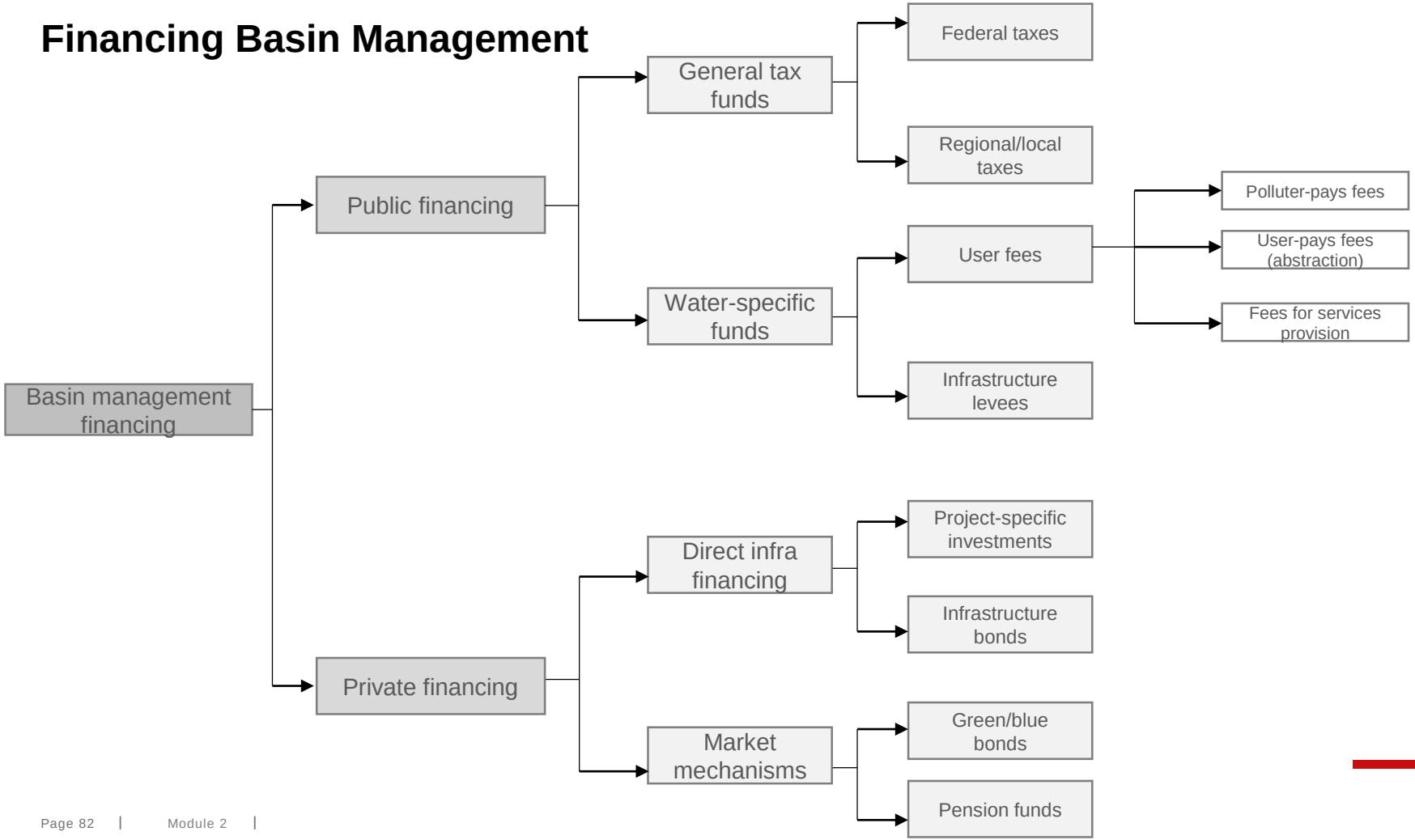
Financing can come from **different sources**, depending on:

- The political and economic situation of a country (including federal states where applicable)
- The fiscal and budgetary system of a country
- The distribution of responsibilities for water management itself and for financing it

They can **include**:

- Government budget (national – state – local)
  - Tax-funded
  - Fee-funded
  - Funded through dedicated government funds derived from e.g. wastewater and/or water abstraction charges
- Private funds/investments
- Public-private partnerships (PPP)
- International contributions e.g. Development cooperation/ Official Development Assistance (ODA) and/or dedicated funds

Financing Basin Management



Water Fees/ Charges as an Option for Financing Water Management Measures

- Charges, fees or market-based instruments such as permits provide an **incentive** for cost-effective investment in pollution clean-up
- Charges or fees will tend to be a lower cost method of achieving a given standard
- Public authorities levy fees and user-charges for services provided (e.g. effluent or refuse disposal), or where the revenue is used for a specific purpose (e.g. funding clean-up or abatement measures)
- They are collected from businesses as well as from private consumers

Similar to taxes, fees and charges are implemented with a triple objective:

- Setting a price to promote more efficient resource use and to limit the demand
- Finance government services or pay for the protection of the environmental good provided ("full cost recovery") → Revenue collection by public authorities
- Promote accountability in the public sector → Price as important source information, awareness of the costs of the public services

Source of Financing for Basin Management at Federal State Level

German Law for Wastewater Fees (“Abwasserabgaben-Gesetz” 1976, 2005, 2014)

- The wastewater fee is paid for pollution loads e.g. by wastewater treatment plants
- Per pollution unit the polluter has to pay 35.79 €
- Pollution units are 50 kg CSB, 25 kg Nitrogen, 3 kg Phosphorous, 2 kg Chlorine of AOX, heavy metals, and fish toxicity
- The fee/ charges received from polluters are reinvested in improving the quality of surface waters

Water abstraction charge (“Wasserentnahmenentgelt”)

- Charge for abstracting groundwater and surface water introduce in 13 out of 16 German federal states during the period 2008-2013
- About 4-12 cent/m^3 for groundwater, partly surface water
- ≤ 1 cent/ m^3 for cooling in power plants

Example: the Damodar Valley Corporation (DVC) – Financing

Financing of activities

- Electricity generation: capital expenditures (CAPEX) for power generation are shared equally between the three Governments (Central, Jharkhand, West Bengal).
- Irrigation: divided between the two State Governments (Jharkhand, West Bengal) in proportion to their water withdrawal for irrigation.
- Flood control: borne by the West Bengal Government, except for an annual contribution by the Central Government.

RBM Role Game during Webinar

IT´S YOUR TURN

Objective of the exercise:

The RBM Role Game is an interactive activity that helps to:

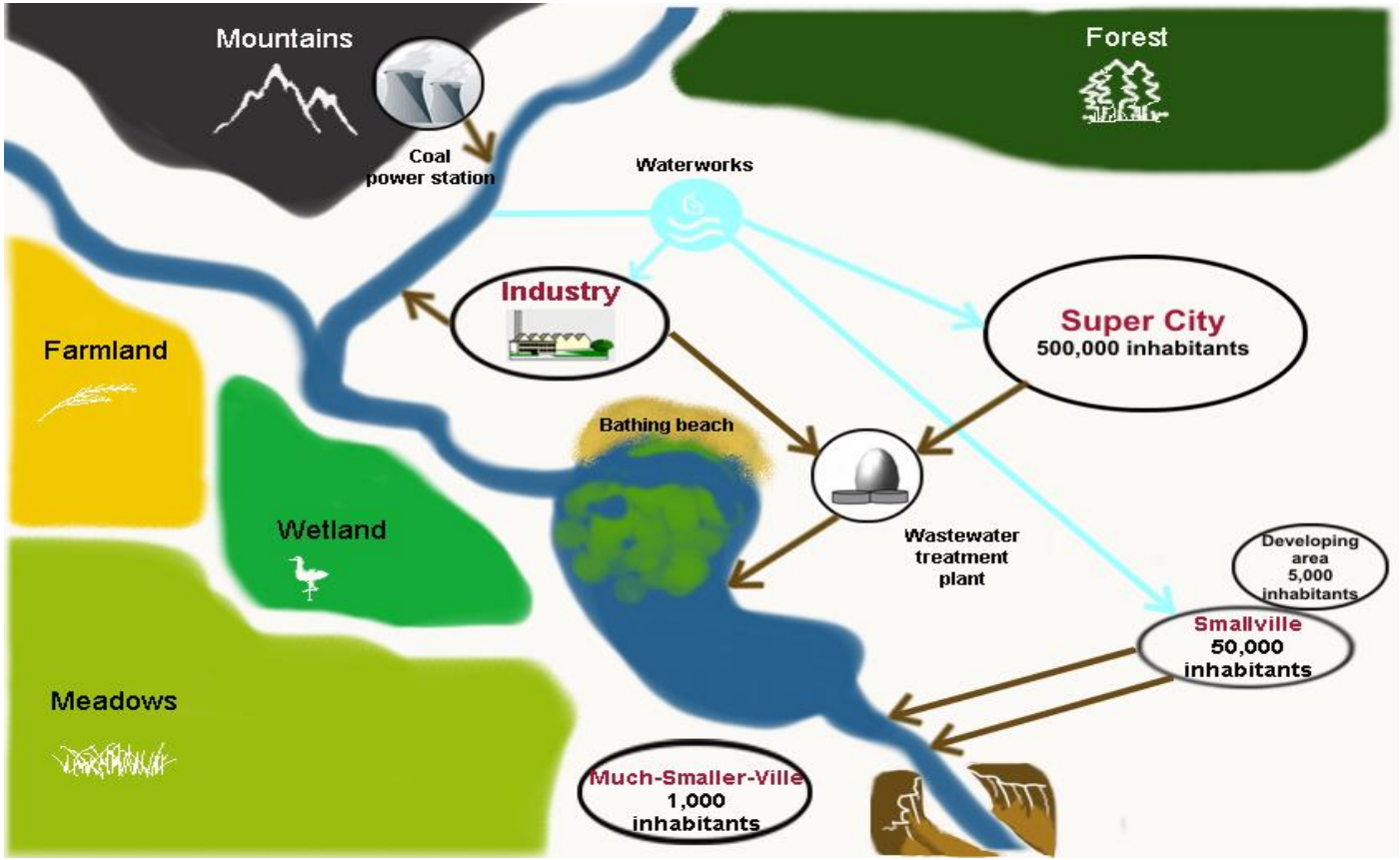
- Comprehend the different interests from stakeholders.
- Identify objectives for RBM.
- Prioritise measures to be implemented basin to achieve the objectives.

There will be 2 groups. They will have to:

- Read the information about the basin
- Each group-participant will have to take a role
- The group has to start discussion to develop the Basin Master Plan

RBM Role Game - DWA World University Challenge, 2014

IT´S YOUR TURN



RBM Role Game - DWA World University Challenge, 2014

IT´S YOUR TURN

Some facts and figures (1)

- **Water quality and quantity** of Lake Super-City is getting worse from day to day. A lot of algae is growing, O_2 concentration is low, water is getting turbid and residents are complaining about the odor, and temperature is too warm due to the cooling water from the power plant. Unfortunately, Much-Smaller-Ville will not be able to grow any further as the meadows will become a groundwater-protection-area. During drought season water scarcity is becoming more of a problem, especially for agriculture.
- **Water** supply of the “Much Smaller Ville” comes from the lake. This has to be stopped immediately because of the water quality problems. You want a sustainable drinking water system for the green province with high quality water and a buffer capacity during drought season. Water is taken directly from the river at the moment. More water is needed every year, as the number of inhabitants is increasing and the industry growing. Non-revenue water is 45%. The meadows have a very large aquifer which until now has only been used for agricultural irrigation.
- **Wastewater treatment** in the whole region has to be improved. Super City‘s wastewater treatment plant is old and only has a carbon-elimination (secondary treatment). Additionally, final clarifiers are hydraulically overloaded and flushing out suspended solids. There is no space for expansion. Smallville only has septic tanks. The outflow goes via public sewer system to the lake. Smallville is growing rapidly. Much-Smaller-Ville also uses septic tanks. There is no sewer system. Sludge of septic tanks is transported by trucks. The disposal of sewage sludge on farmland is not allowed any longer, because of high heavy metals concentrations.

RBM Role Game - DWA World University Challenge, 2014

IT´S YOUR TURN

Some facts and figures (2)

- **Industry** wants to expand, but water removal permit doesn't allow further water extraction from river and effluent concentration limits have been increased. You want to attract more industry and commerce to improve the region's financial situation and create more jobs. The existing industry has a very intensive water usage (process water and cooling water). Furthermore, all wastewater treatment technologies are end of pipe solutions. The wastewater streams are characterised by high COD, Ammonia and Phosphorus loads. All water production streams are above 25°C.
- **Waste Management** is old and has to be improved. The old landfill is full. Industry and city are looking for new alternatives. Industry and cities do operate together in waste collection.
- **Electricity** blackouts in the province are occurring more and more. Green activists always talk about waste-to-energy and biomass-to-energy. Find answers to their slogans. You are wondering whether you should still invest in the old coal power plant. The old coal power plant doesn't meet emission guidelines anymore. Too much water from the coal power plant is being led to the river, warming it up. There is a lot of wind in the mountains. However, wind alone might not be enough for the region. The effluent of the lake flows into a canyon. The geological conditions would allow the construction of a dam.

RBM Role Game - DWA World University Challenge, 2014

IT´S YOUR TURN

Your common vision is:
Is to make the Green Province more attractive for new residents, new industries while also promoting ecofriendly tourism.

Your team (3-6 people) consists of the following:

- Government official(s) of the Green Province:
  - 1 representative from the towns majors: s/he wants to improve to solid waste problem.
  - 1 representative from the Ministry of Environment: concerned by the quality of the Lake.
  - 1 representative from the Ministry of Industry: s/he wants to develop further the industries in the region.
- 1 Representative of the water supply and wastewater utility: concerned by water supply and waste water treatment.
- 1 Representative of the energy supply utility: want to improve electricity generation.
- 1 Consultant whose role is to provide innovative ideas and facilitate the discussion.

RBM Role Game - DWA World University Challenge, 2014

IT´S YOUR TURN

Webinar version

You will get a map of the Green Province basin as PowerPoint file
In this PowerPoint file, there are little cards with measures that might be implemented in the basin.

You may change the basin to an Indian basin or Ganga region if the group has sufficient information about the challenges in that basin. You may then insert a map in our ppt file.

Your tasks:

1. Read the context (10 min).
2. Form a group with two other participants of your group.
   You will then be grouped in webinar sub-groups.
3. Each participant chooses a role (5 min), and also please define a “speaker” or moderator.
4. Identify up to 3 objectives to carry out the Vision for your basin (10 min).
5. Look at the measures, and then choose up to **6 measures** to achieve the objectives (40 min).
   Place them on your map in the powerpoint file.

7 Implementation of RBM

7.1 RBM Plan

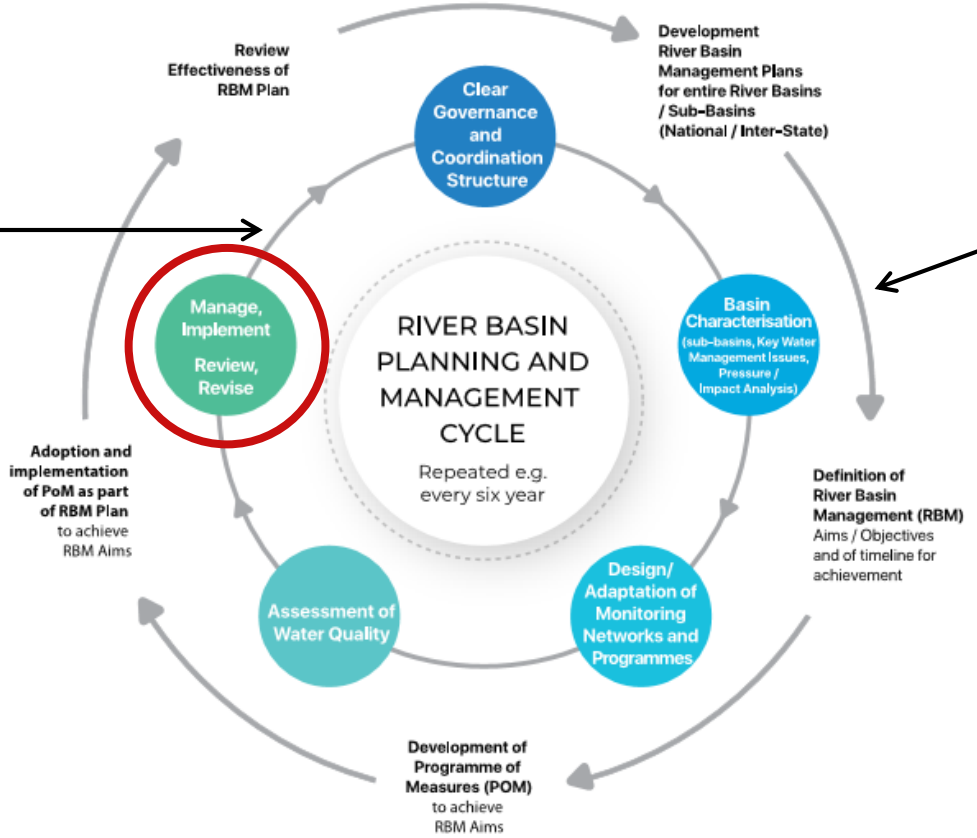
7.2 Development of Programme of Measures (PoM)

7.3 Aspects for Implementing PoMs / RBM Plans

7.4 Review and Revise PoM

The River Basin Planning and Management Cycle

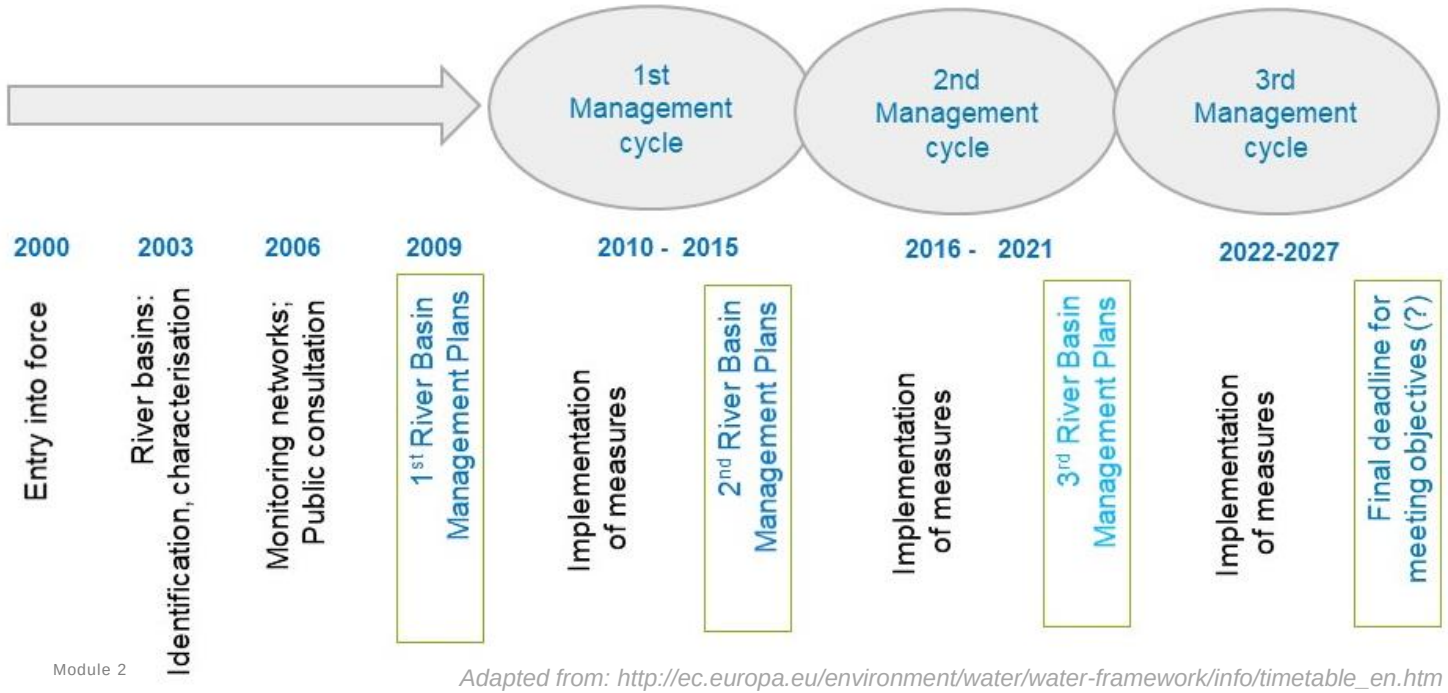
„Inner cycle“
Technical/
operational level“



„Outer cycle“
Planning and
decision making
level

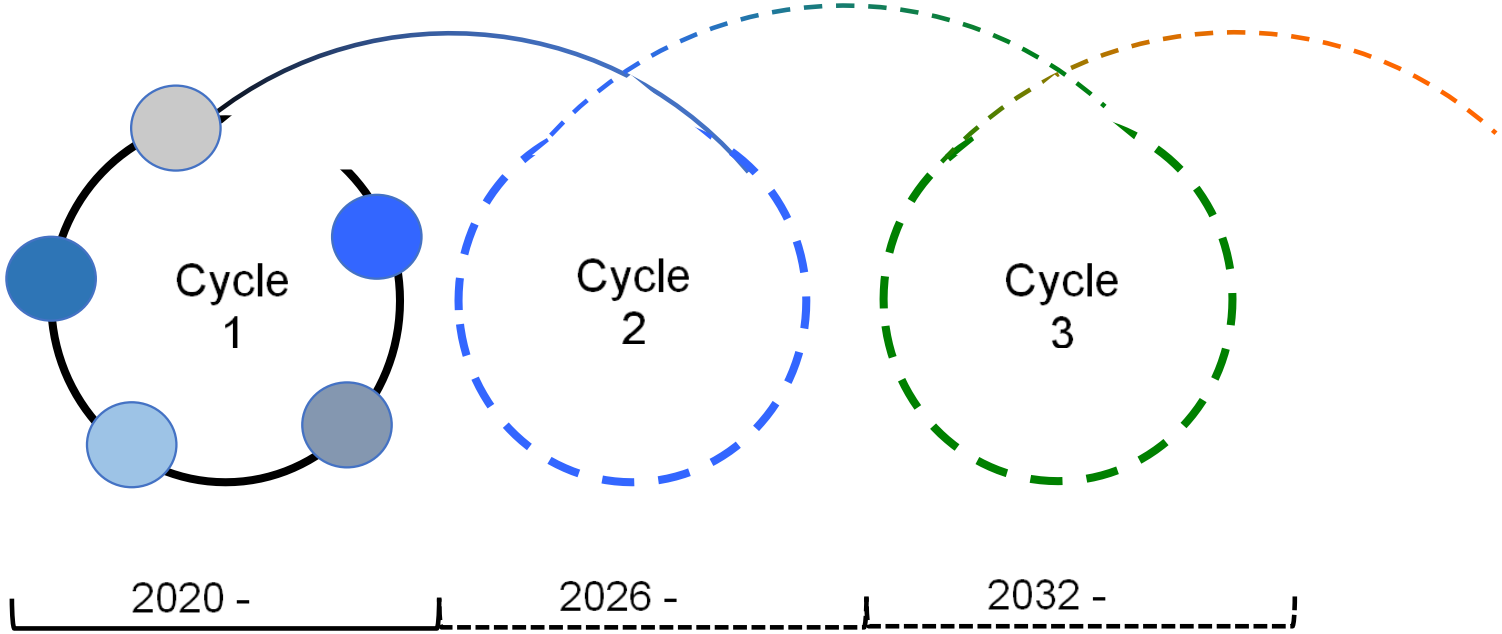
Manage, Implement, Revise, and Review the PoM

- Implementation of PoM is followed by the revision and verification of the success of the PoM within the RBMP timeline
- In Europe: Years 2015, 2021,2027 → Cycle length 6 years



Adapted from: http://ec.europa.eu/environment/water/water-framework/info/timetable_en.htm

The River Basin Planning and Management Cycle



- RBM process requires planning over several years and implementation cycles that are to be repeated in a certain frequency (e.g. 6 years).
- Each Cycle is a revision to adjust to new conditions in the basin and to addresses new challenges.


Thank you for giving us the opportunity
to share our experiences with you!

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