

# Strategic Discussion on River Basin Planning and Management Cycle

## Module 1: Understanding the River Basin Management Cycle

2 December 2019, New Delhi

RBM Training Programme

Support to Ganga Rejuvenation Project | December 2019



Prepared by



# Outline

Unit	Topic	Content
1	Introduction	
2	Water Resources Management	Refreshments on Water Resources Management and discussion on its application in India.
3	River Basin Management	Refreshments on River Basin Management and discussion on its application in India. Links with the EU Water Framework Directive. Discussion on its application in India
4	The River Basin Planning and Management Cycle	Detailed presentation of the RBM Cycle and its steps. Discussions on its steps.
5	Example of implementation in the EU Context	Examples of application in EU. Discussion on application in India

# 1. Introduction

# 1. Introduction

According to Nikolai Kondratjev, every 50-60 years technological development and the use of natural resources were so successful that they had a positive impact on the (global) production chain thus, generating noticeable economic progress. The so-called Kondratjev cycles in the past were:

- Development of steam engines, facilitating industrial power (1800)
- Development of steel and railway, facilitating transport and construction
- Electricity and chemistry, facilitating energy (1900)
- The automobile and petro-chemical industry facilitating individual mass transport
- Information technology facilitating added value to information

## Introduction (cont.)

The actual challenges for the society, their stakeholders and decision takers on the global scale are reflected in:

- Increasing life expectancy and continuous human population growth.
- New technologies (e.g. connectivity)
- Health and recreation
- Knowledge as key factor to success
- Globalisation
- Shortage and competition of/for natural resources in conjunction with irreversible degradation/ destruction of the environment

## Introduction (cont.)

*“It is impossible to forecast the future from the past. This is due to the unfortunate fact that the economic and social development is not strictly linear instead somewhat chaotic. The future seems to be embedded in a matrix of possibilities/opportunities that surrounds the present.”*

*Nikolai Kondratjev, Russian Economist, (1892-1938)*

## Introduction (cont.)

*“There is a **water crisis** today. But the crisis is not about having **too little water** to satisfy our needs. It is a crisis of **managing water so badly** that billions of people – and the environment – suffer badly.”*

*World Water Vision Report*

- While the world's population tripled in the 20th century, the use of renewable water resources has grown six-fold
- Within the next 50 years, the world population will increase by another 40 to 50%
- This population growth coupled with industrialisation and urbanisation will result in an increasing demand for water → Will thus have serious consequences on the environment

# 2. Water Resources Management



# Water Resources Management Principles

## Dublin Statement 1994, International Conference on Water and the Environment:

- **Principle 1:** Fresh water is a *finite and vulnerable* resource essential to sustain development and the environment
- **Principle 2:** Water development and management should be based on a *participatory approach* involving users, planners and policy makers at *all* levels
- **Principle 3:** *Women* play a central part in provision, management and safeguarding water.
- **Principle 4:** Water has *an economic value* in all its competing uses and should be organised as an economic good as well as as social good

# Water Resources Management in the Context of the SDGs and WFD

**Sustainable Development Goals SDG 5.6 Target** → *“By 2030, implement integrated water resources management at all levels, including through transboundary cooperation.”*

**European Water Framework Directive (WFD) (Directive 2000/60EC)** → *“Water is not a commercial product like any other, but rather a heritage which must be protected, defended and treated as such.”*

# Water Resources Management Principles

“(Integrated) water resources management is a process which promotes the *coordinated* development and management of water, land and related resources, in order to *maximise* the resultant economic and social welfare in an *equitable* manner *without compromising the sustainability* of vital ecosystems.”

Modified from Integrated Water Resources Management in Action, DHI Water Policy, UNEP DHI Centre for Water and Environment 2009

# Water Resources Management for Conflict Mitigation

**Many sectors use water; the most important are:**

- Drinking water (health, municipal water supply)
- Food (irrigation water, but also fish/ aquaculture)
- Energy (hydropower)
- Transport (shipping)
- Industry (cooling, mining, other industries)
- Tourism and recreation (ships and ecology)
- Ecosystems (maintaining other indirect uses/ E-flows)

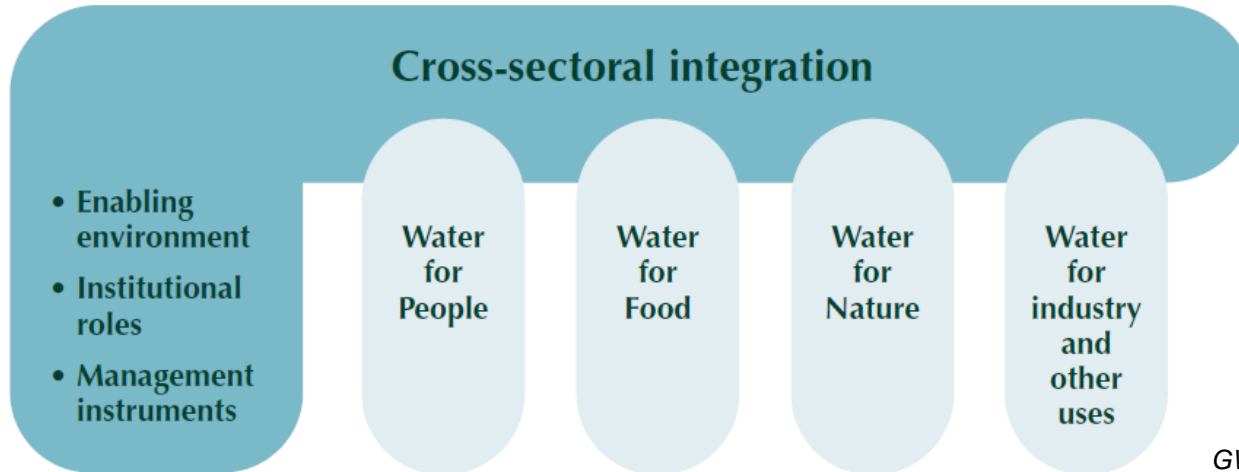
# Water Resources Management for Conflict Mitigation (cont.)

- Conflicts are the rule not the exception when discussing water use
- Integration means that all sectors need to *consult* with each other over their water needs
- Consultation avoids misguided investments → Needs to be problem-based so that processes are not unnecessarily slowed down
- Consultation through RBM processes mitigates conflicts and identifies solutions

# Cross-Sectoral Integration for Water Resource Management

Water Resource Management is “a **process** which promotes the **co-ordinated** development and **management** of water, land and related resources in order to maximise **economic and social** welfare in an **equitable manner** without compromising the sustainability of vital ecosystems and the environment.”

*GWP, 2000*



*GWP, TAC Background  
Paper No. 4*

# 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

# Application of Water Resources Management in India

*What is your experience:*

- Has Water Resources Management been implemented in India?
- Where/when?
- What were the achievements and difficulties?



# 3. River Basin Management

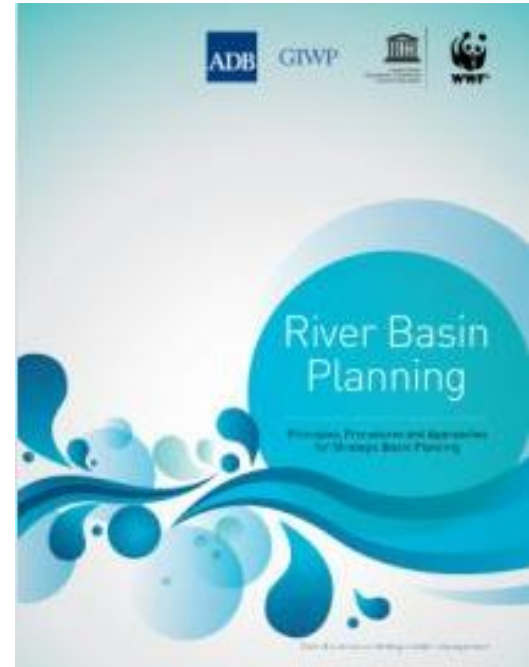
# River Basin Management Principles

- River Basin Management (RBM) is a **practical** approach which includes **measures** necessary to achieve set goals and objectives
- In 2000, the European Union (EU) adopted the **Water Framework Directive (WFD)**
  - Examples for best practice benchmarks from Europe could be found at the corresponding River Basin Commissions e.g. Danube, Rhine, Elbe, Odra
- From the requirements of the WFD, and the principles and needs of water resources management, a **River Basin Planning and Management Cycle** was developed
- The structure, the processes and steps of this scheme are subject of this seminar we present today

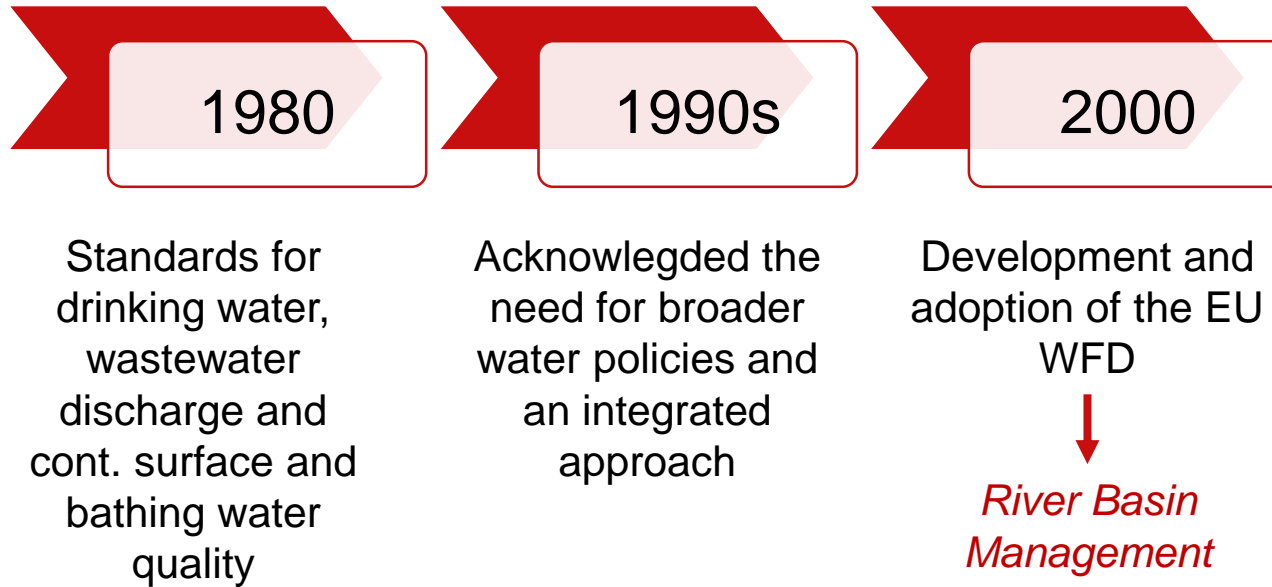
# River Basin Management to Solve Water Problems

- “It is precisely because **water resources** provide so many functions that **planning** for their use is so **complex**”
- The **demands on rivers increasingly exceed their natural capabilities**, resulting in over-abstraction, pollution, alien infestation, floodplain alteration and habitat destruction
- These **failures** are usually the consequence of poor decision-making, inadequate management and **inappropriate planning**
- **Effective basin planning** is the starting point for **sustainable management of river basins.**”

Pegram et al. (2013): Basin Management. Principles, Procedures and Approaches for Strategic Basin Planning. UNESCO, Paris.



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

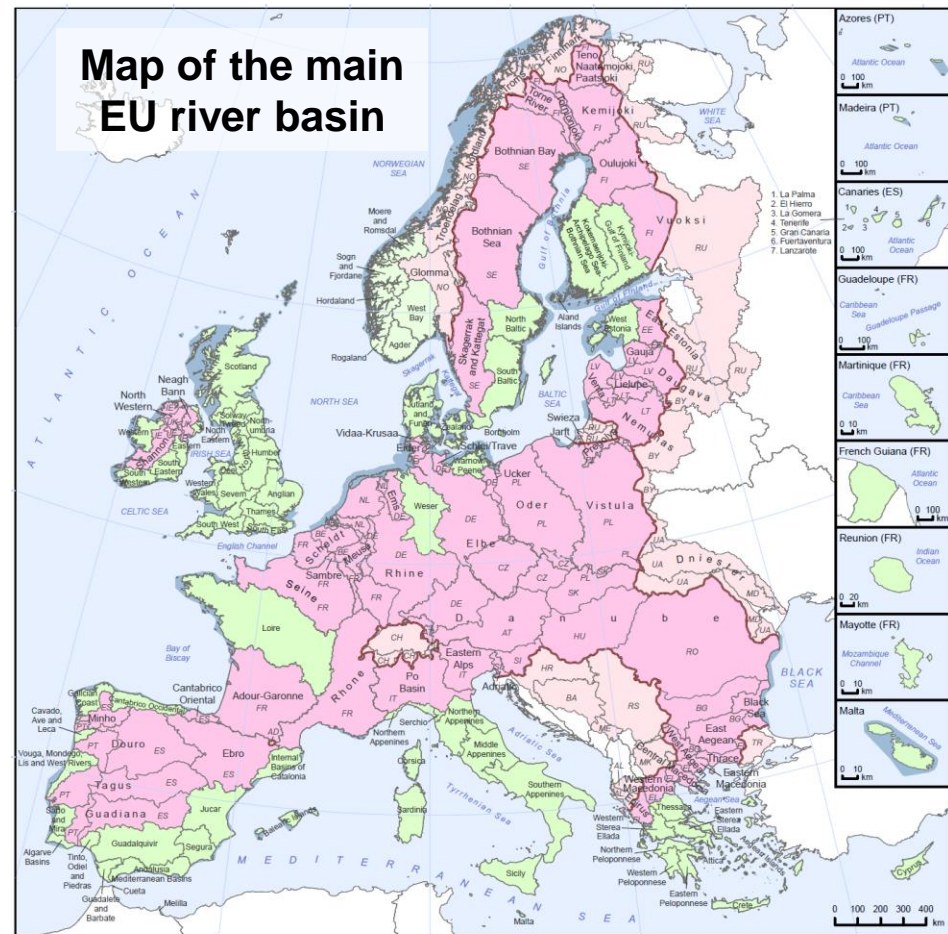


# RBM in Europe: A Long Journey with the EU Water Framework Directive

- River Basin Management was acknowledged to be the best model **i.e.** water **management by natural geographical and hydrological units** instead of according to administrative or political boundaries
- The overall goal is to achieve **cleaner rivers and lakes** and groundwater, i.e. a “**good status**” of **all water bodies** in the EU
- Positive examples were the rivers **Maas, Schelde or Rhine** river basins, with their cooperation and joint objective-setting across Member State borders, or in the case of the Rhine even beyond the EU territory

# EU Water Framework Directive

- Commitment: achieve a “good status” for all waters by 2015
- EU member states are obliged to:
  - Regularly assess the state of the water bodies and develop monitoring programmes
  - Develop plans of measures to achieve the required good status
  - Develop RBM plans (40 river basins) including basin-wide management plans for transboundary rivers
- By 2015, approx. 53% had achieved good ecological status



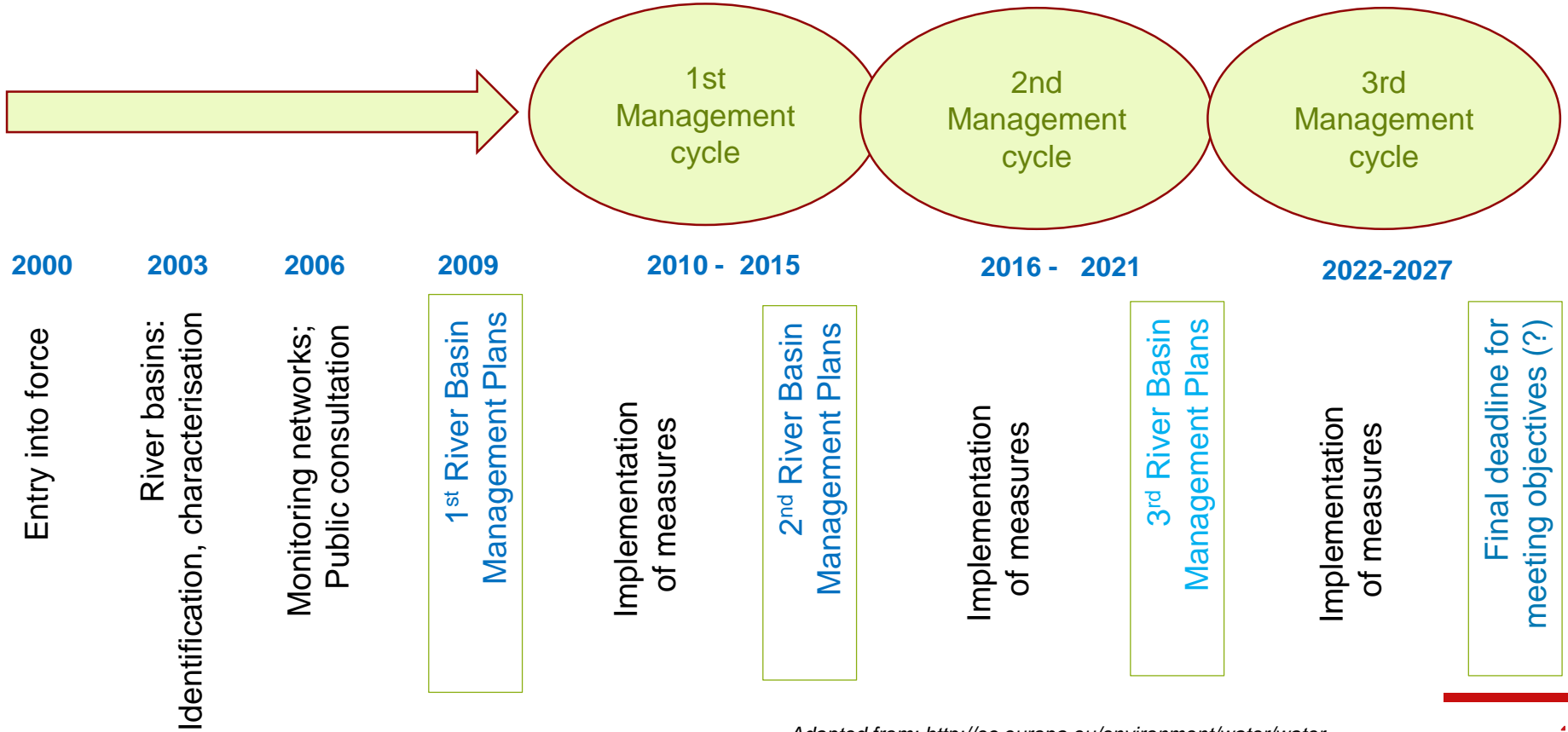
[http://ec.europa.eu/environment/water/water-framework/facts\\_figures/pdf/River%20Basin%20Districts-2012.pdf](http://ec.europa.eu/environment/water/water-framework/facts_figures/pdf/River%20Basin%20Districts-2012.pdf)

# RBM Plans in Europe

A number of **International River Basin** Districts have published River Basin Management Plans:

- Danube
- Rhine
- Elbe
- Ems
- Finnish-Norwegian International River Basin District
- Meuse
- Scheldt / l'Escaut
- Odra
- Sava Commission (ISRBC)

# EU WFD Time-Table





# Information Required by the RBM Plans

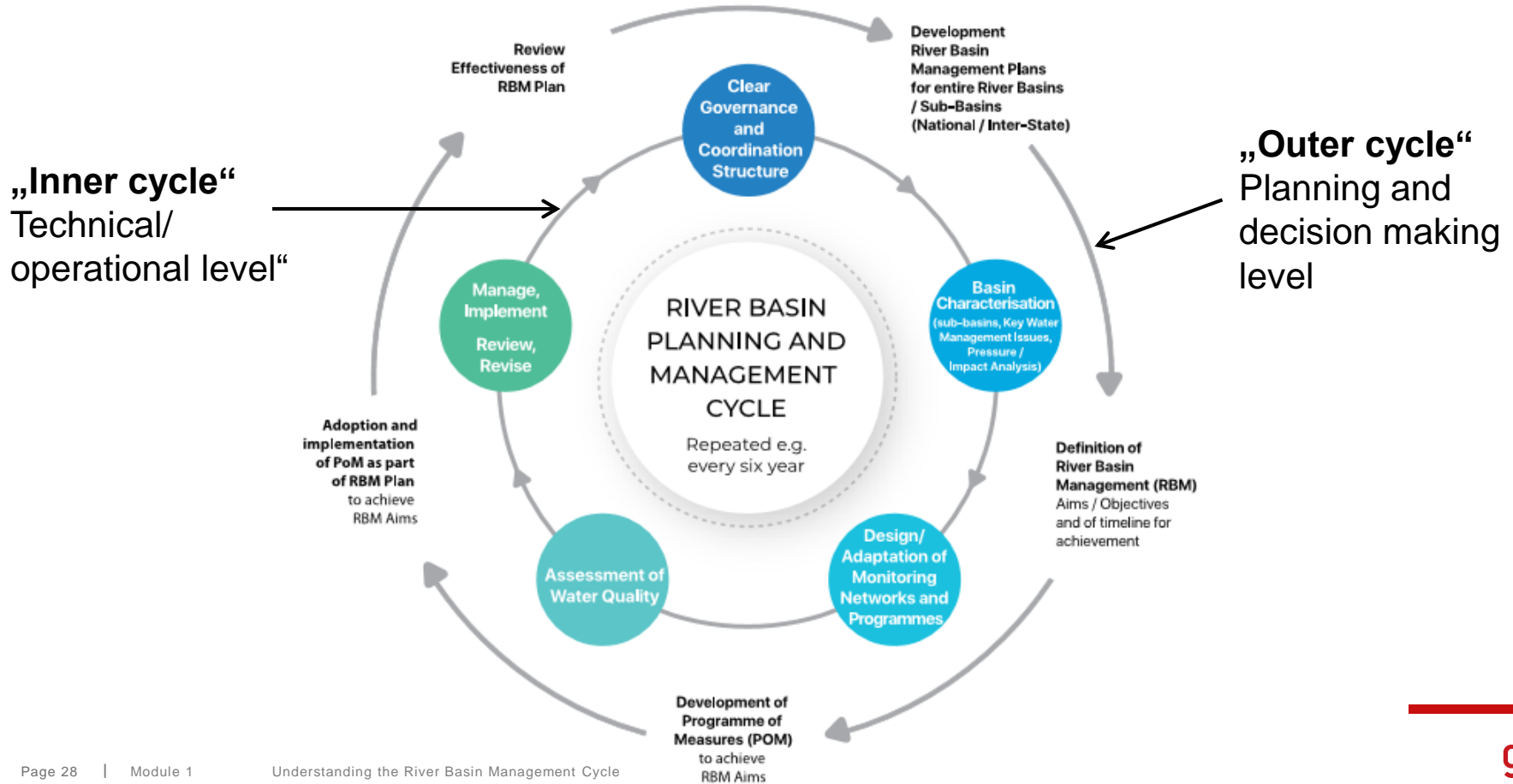
- Characterisation of the basin
  - Summary of significant pressures and impacts of human activity
  - Protected areas
  - Monitoring programmes and status of water
  - Environmental objectives
  - Economic analysis of water use
  - **Programme of measures** (to improve the environmental and socio-economic situations and achieve the objectives set)
  - Summary of the public information and consultation measures taken, their results and the changes to the plan made as a consequence
- The list above is incomplete but reflects the main issues addressed by WFD

# Application of RBM Plans in India

- *Please share your experience:*
  - Have RBM Plans been drafted?
  - How do you set and implement your measures?
  - Where/when?
  - What were the achievements and difficulties?

# 4. The River Basin Planning and Management Cycle

# The River Basin Planning and Management Cycle



# Element 1 (Step 1)



## Clear Governance and Coordination Structure:

### The United Nations recommends:

- Enabling the environment
- Clear administrative structures and competence distribution
- Management instruments
- Infrastructure development
- Capacity Building

### Infrastructure Europe, provisions of Directive 2000/60/EC in force:

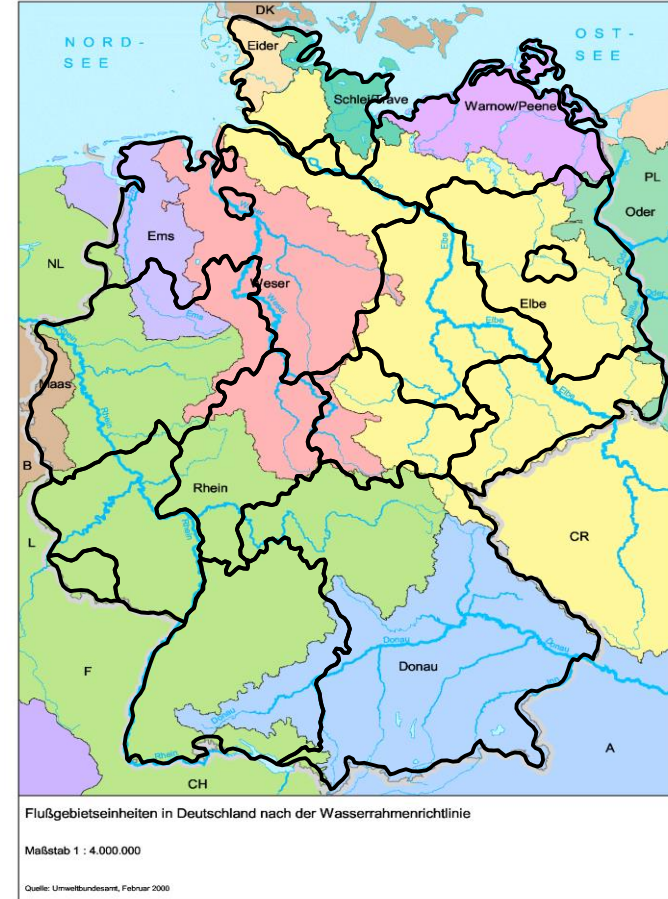
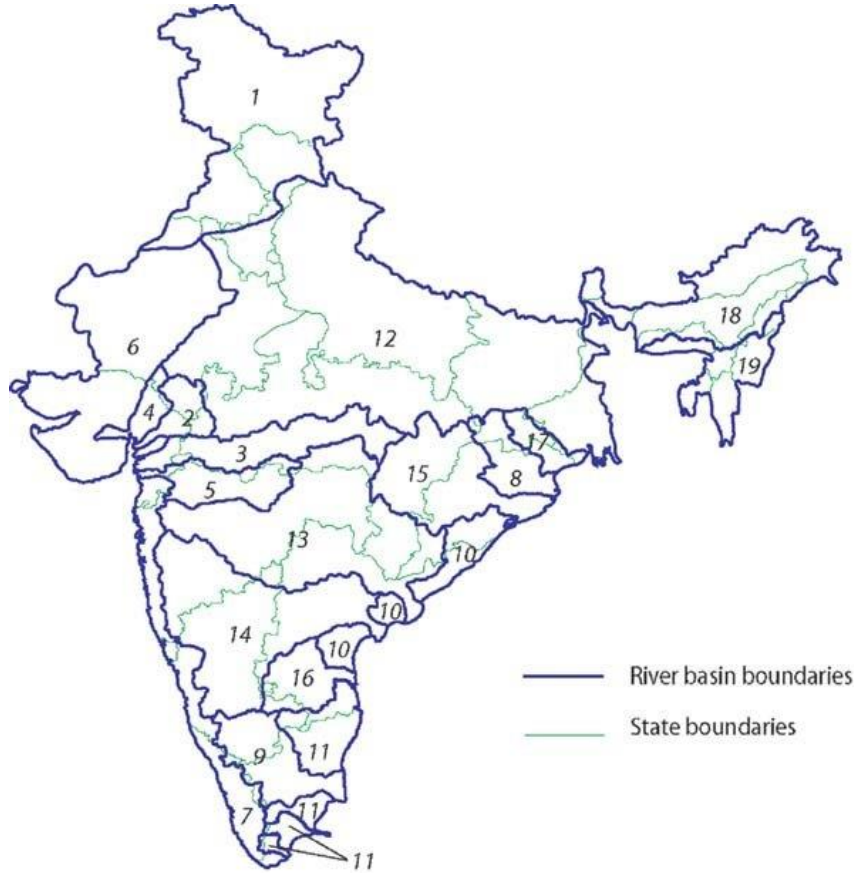
- River basin as management unit determined and water body as the smallest subunit in the basin
- Concept of a „competent authority“ was introduced
- Quality status goals for coastal waters, rivers, lakes and Groundwater are set

# Governance and RBM in Germany

- Different entities for managing the environment and water resources
- River basins (at the national and the international level) - based on hydrological consideration
- Federal states (16) with own water legislation and institutions – based on legal and political considerations
- Requires complex governance mechanisms that balance different geographical, political and other dimensions

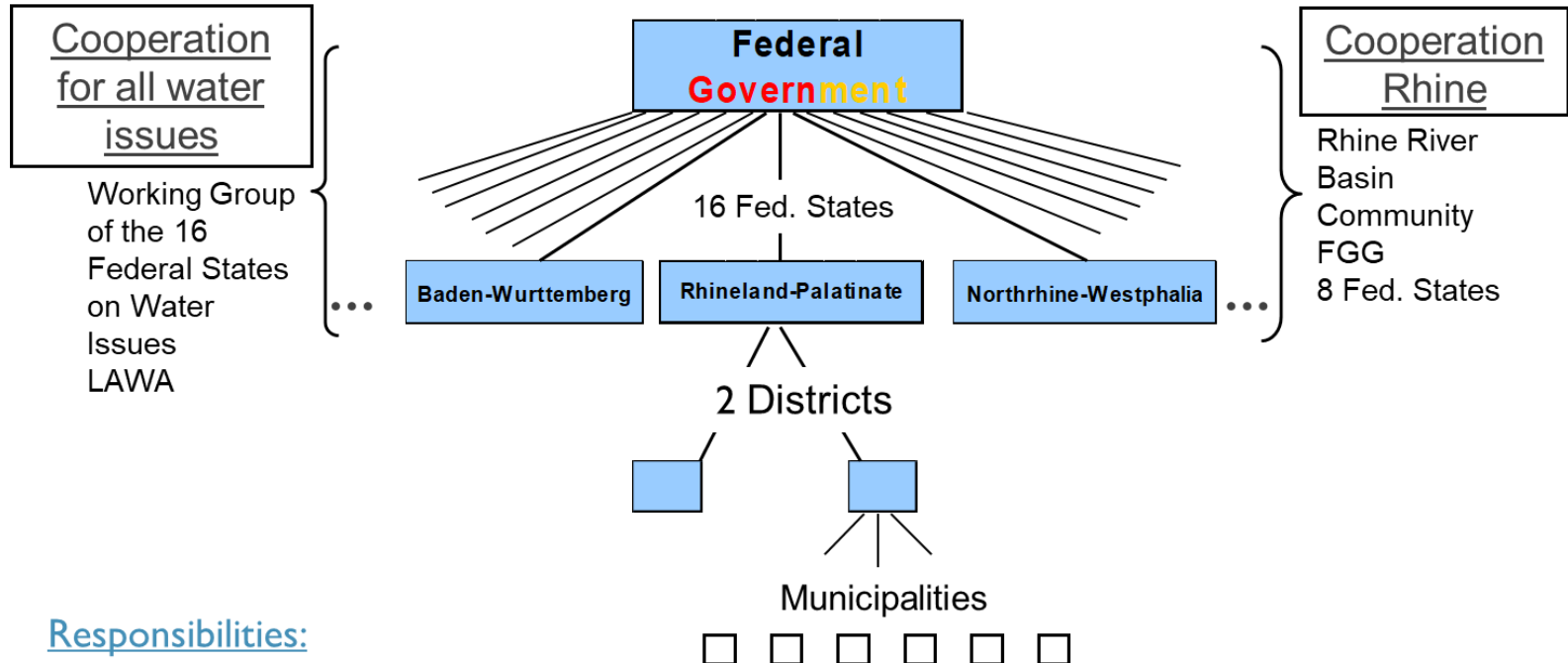


# Sub-basins of the Ganga



# The structure of river basin management in Germany

- The overall governance structure for basin management reflects the complex set-up of water management issues in Germany (federal state, different competences across states, subsidiarity principle, etc.)



## Responsibilities:

Federal States: Management of Surface Water Bodies

States/Municipalities: Management of Wastewater



# Institutions for Water Management in Germany

Due to the political nature (federalism) of the German governance system, water management (and thus basin management) is undertaken by a number of different institutions:

- **National level**

- Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- Federal Agency for the Environment

- **State level (16 States)**

- State Ministry for the Environment (or similar ministry)
- Regional councils

- **Local level**

- Communities
- Districts
- Cities

# Exchange on Governance and basin management in the Ganga basin

Let have a look at the stakeholders operating in the Ganga basin by doing the following:

1. List the different organisations working in the Ganga basin and list their mission(s).
  2. Try to identify the role(s) they could have in Ganga RBM.
- 
1. List of organisations working in the Ganga basin:
    - Please identify the different organisations (Governmental, Non-governmental and Private Organisations).
    - Please mention their level of operation (Central, State or District levels).
  2. Using the Metaplan, let attempt to identify their role(s) in RBM.

## Element 2 (Step 2)



## Basin Characterisation:

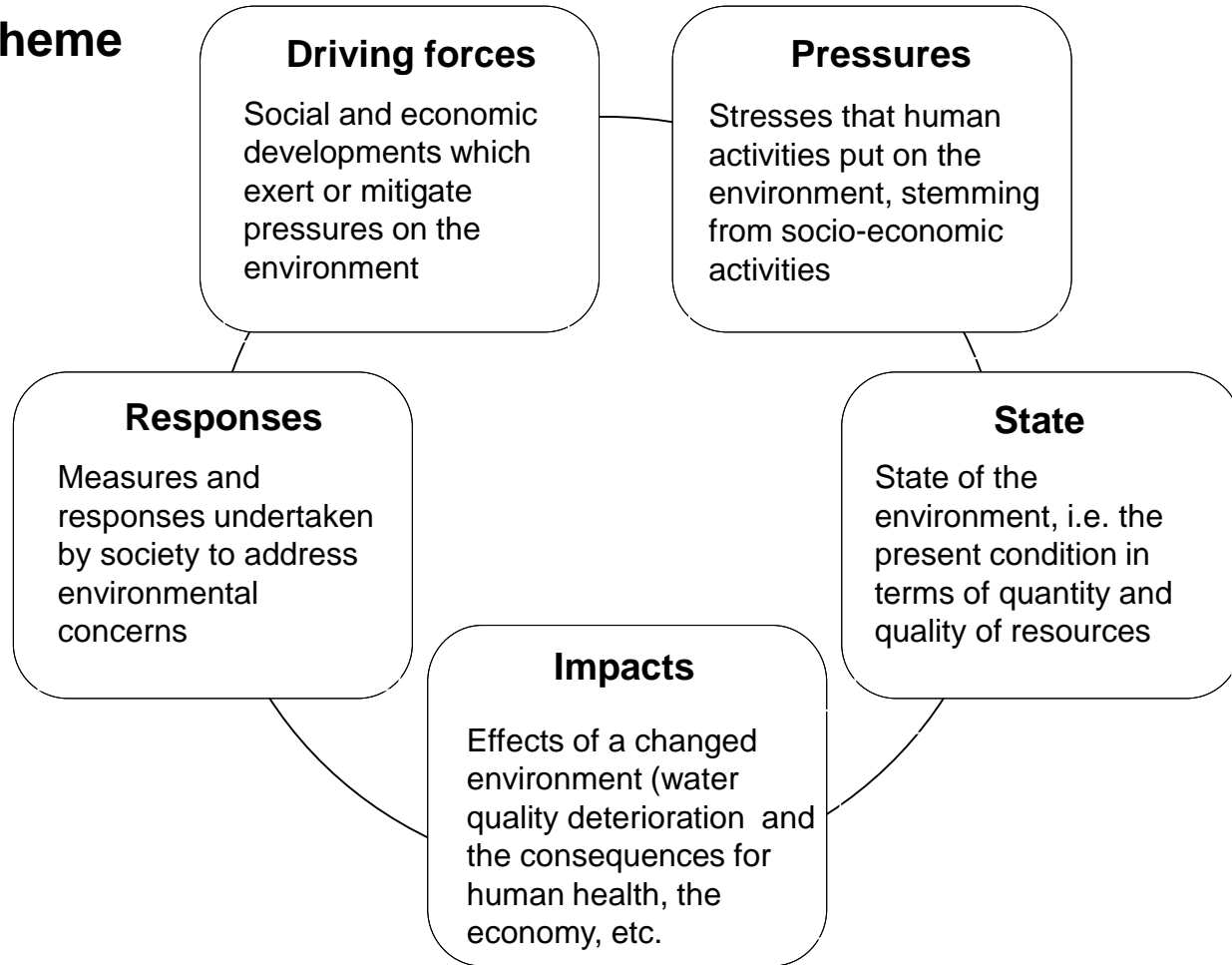
### Detailed description/characterisation of the basin

- Identification of significant water management issues
- Pressures and impact analysis of the human activities on the surface and groundwater bodies

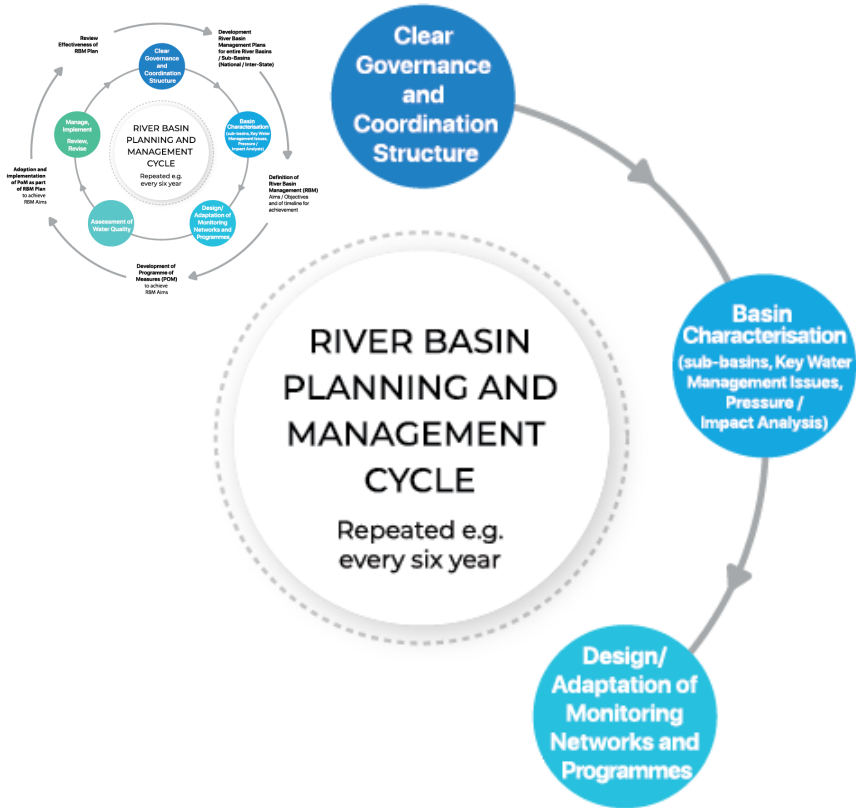
### The DPSIR scheme

- The scheme was adopted by the European Environment Agency
- Identifying driving forces (**D**), pressures (**P**), states (**S**), impacts (**I**), responses (**R**)

# The DPSIR Scheme



## Element 3 (Step 3)



## Design and adaptation of monitoring programmes:

- Development of a monitoring programme and observation grid within the river basin
- Assessment of the current water quality
- Assessing options of environmental remediation
- Identify shortcomings of regulations and protection provisions
- Data to calibrate and run models

# Environmental Monitoring - Programmes

Biological Elements



Chemical Elements



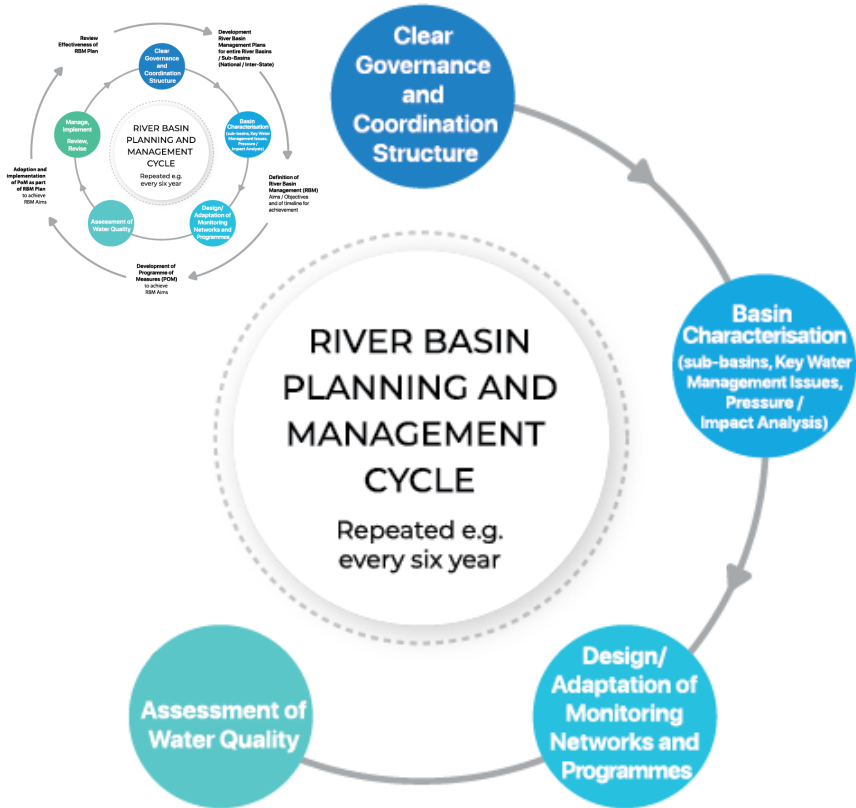
Hydromorphological Elements



Physico-chem Elements



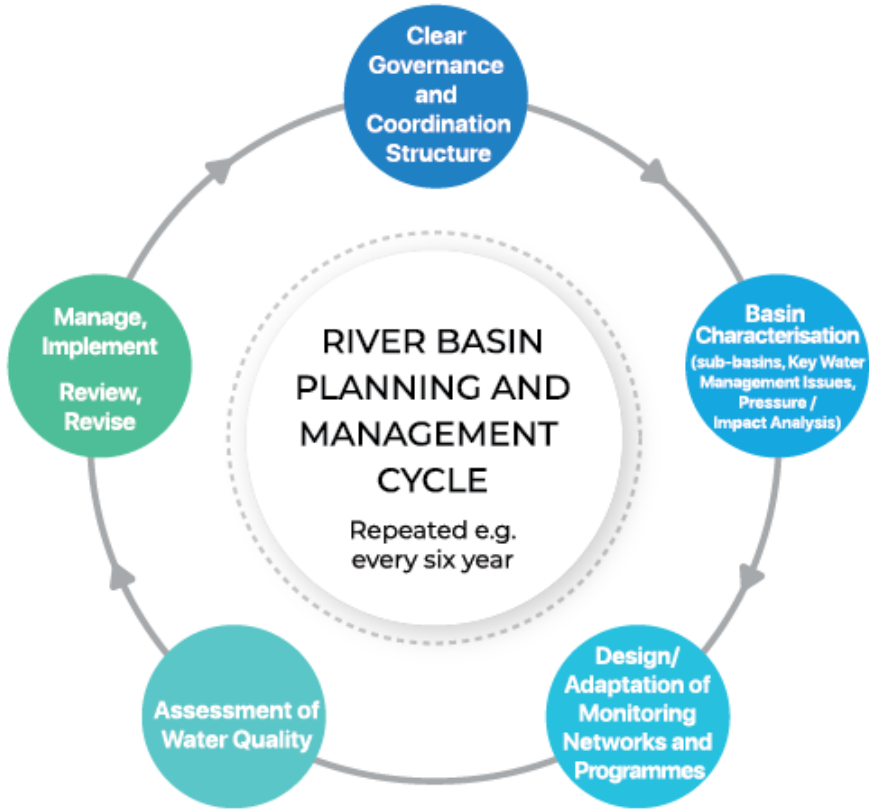
## Element 4 (Step 4)



## Assessment of Water Quantity and Quality:

- Assess current water quantity and quality
- Delineate interventions by authorities
- Feed models
- Develop remediation programmes
- Verify the effectivity of the programme of measures directed to assure the adequacy of water quantity and quality
- Identification of unknown environmental pressures
- Have cost-effective monitoring programme

## Element 5 (Step 5)

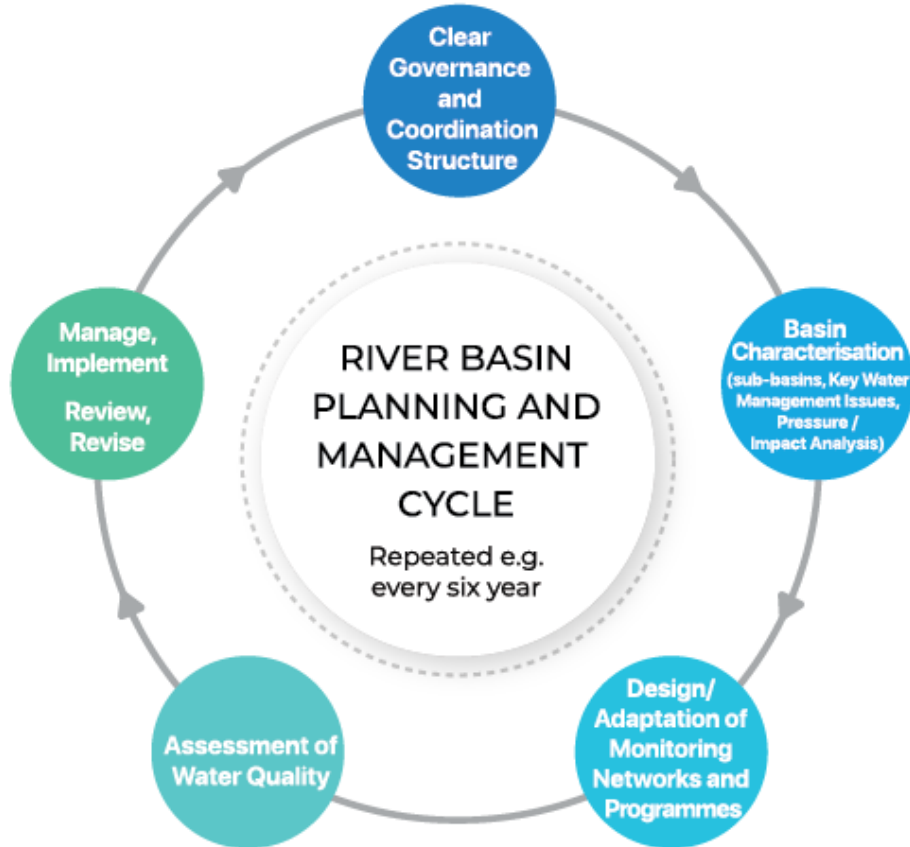


## Manage, Implement, Revise, Review:

- Implementation of the first RBM Management Plan namely its Programme of Measure (POM)
- Revision and verification of the success of the program of measures within the River Basin Management plan timeline
- In Europe: Years 2015, 2021, 2027 → Cycle length 6 years

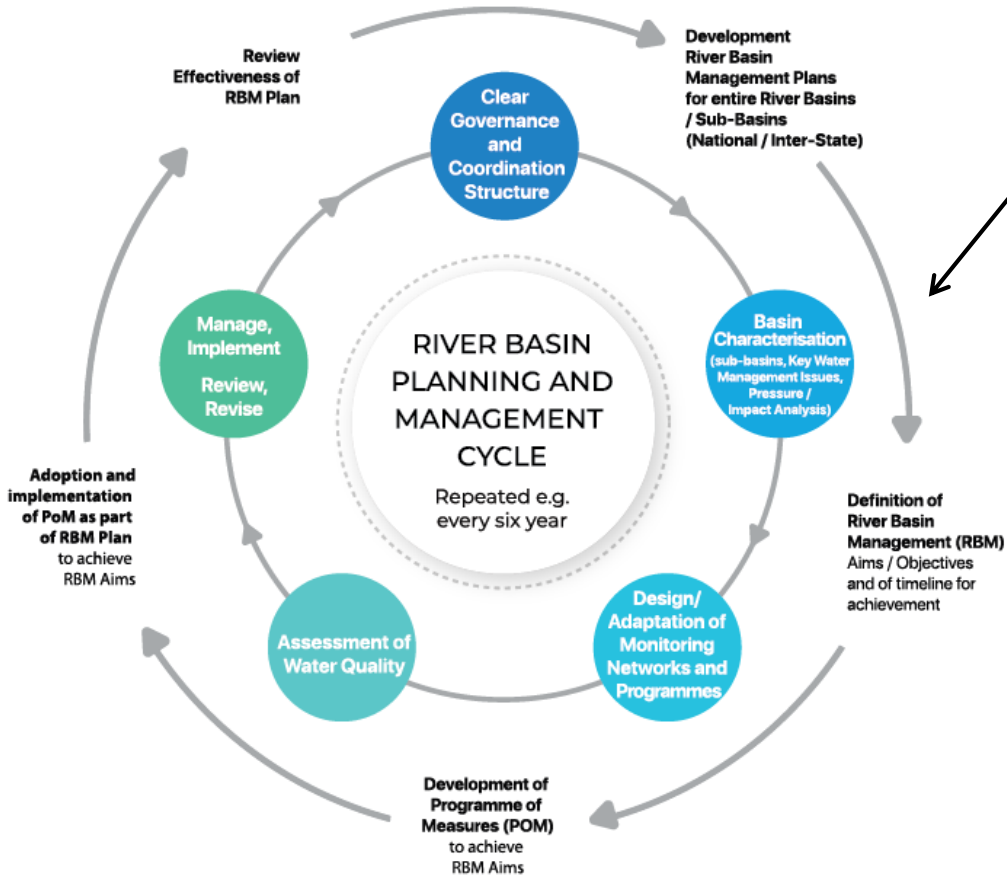


# River Basin Planning and Management Cycle



**Inner Cycle** → Technical process of planning and setting objectives (*operative level*)

# River Basin Planning and Management Cycle



**Outer cycle** → Planning and decision taking level.

Finalisation of the RBM Action Plan 2009 (WFD Provision):

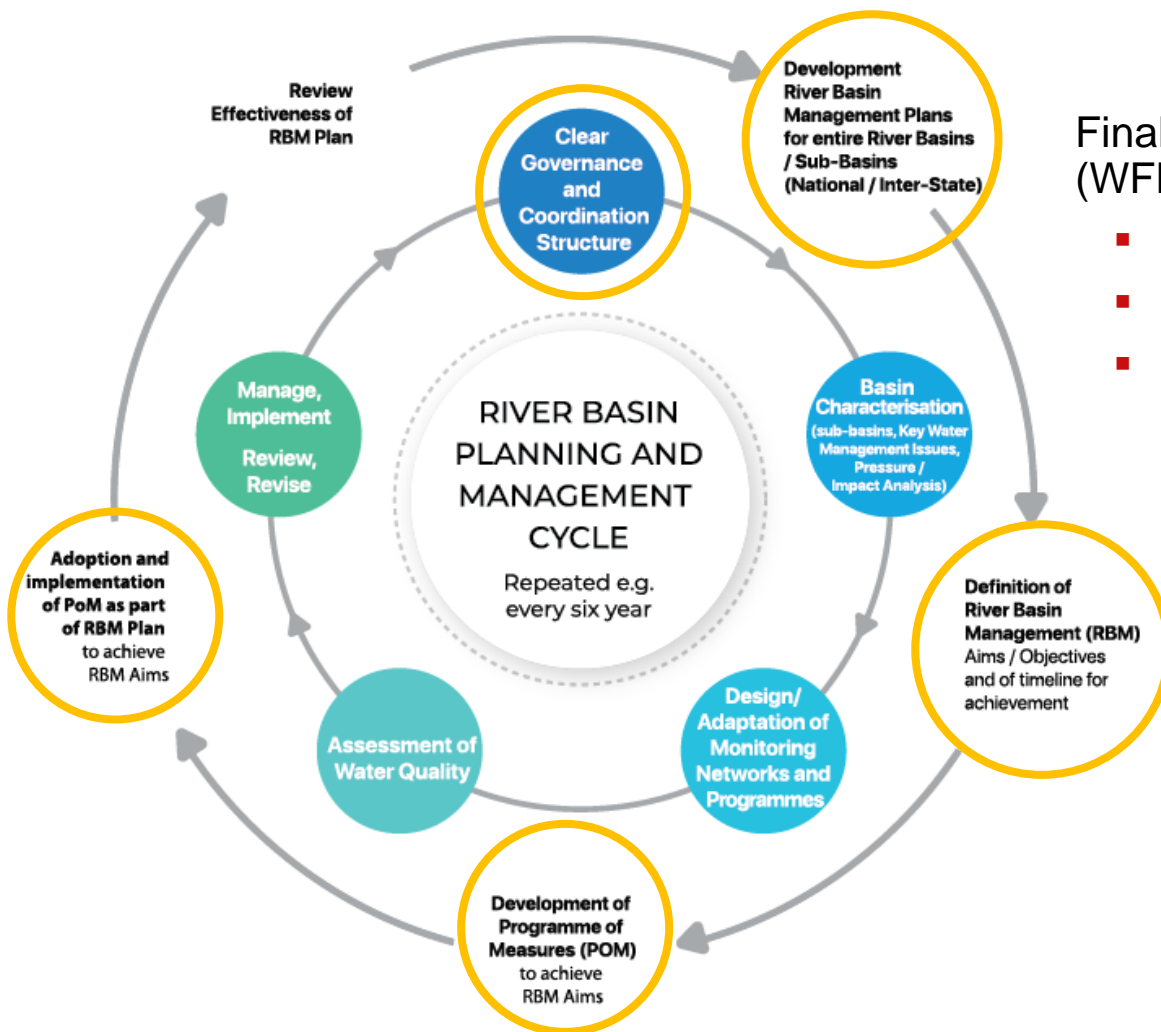
- Cycle 2015
- Cycle 2021
- Cycle 2027

# Elements of the River Basin Management Plan and its Programme of Measures (WFD, Conceptual Approach)

- Environmental quality standards
- Best available technology
- No further deterioration but restoration
- Combined approach
- Best practicable environmental option
- Enforcement of permits




# 5. Example of Implementation in the EU Context

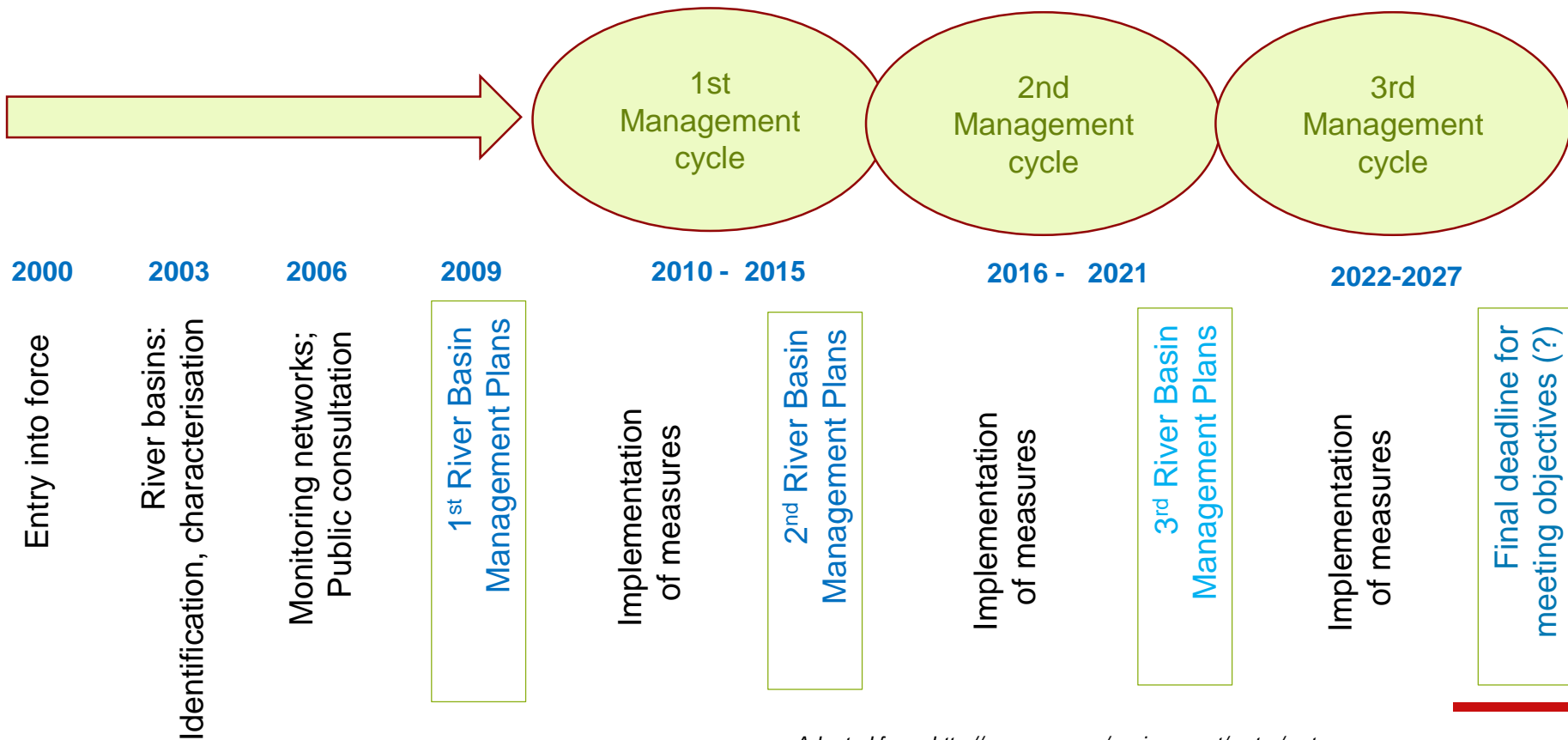


## Finalisation of the RBM Action Plan 2009 (WFD Provision):

- Cycle 2015
- Cycle 2021
- Cycle 2027

 *Tasks important for the decision makers*

# EU WFD Time-Table to develop RBM Plans



# Examples of Results from the Elbe River Basin Management Plan

River Basin Management Plan 2009 Maps

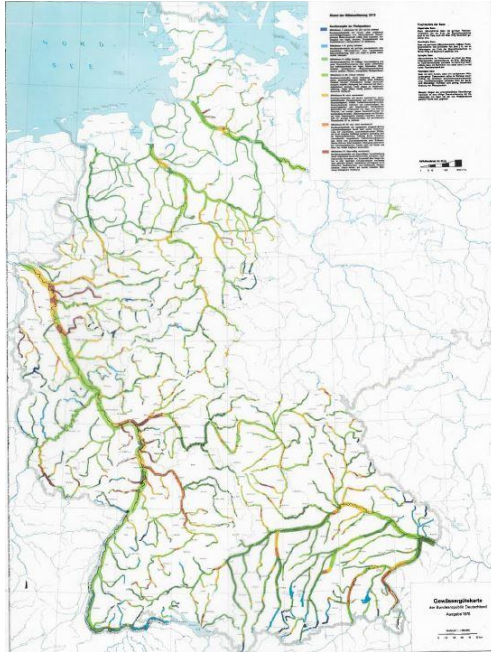
<https://www.fgg-elbe.de/interaktiver-bericht.133/berichte-nach-art-13/karten-des-bewirtschaftungsplanes.html>

River Basin Management Plan 2015 Maps

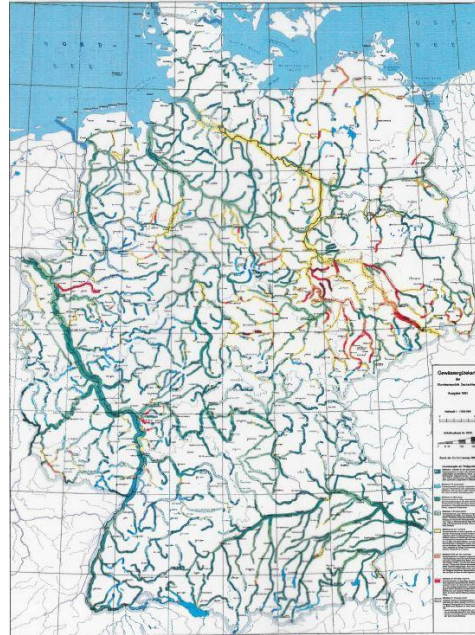
<https://geoportal.bafg.de/mapsfggelbe/>

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

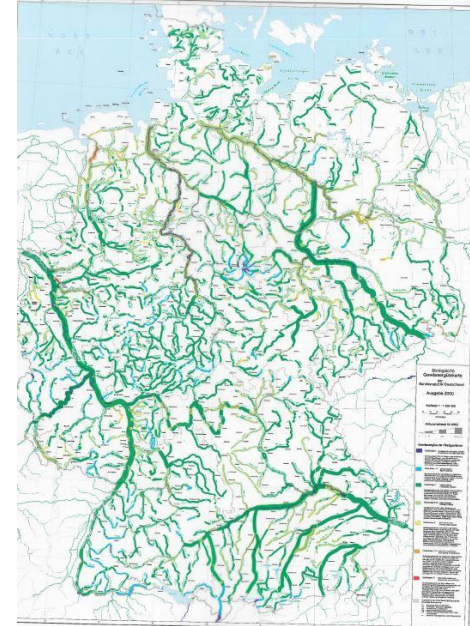
1975



1990

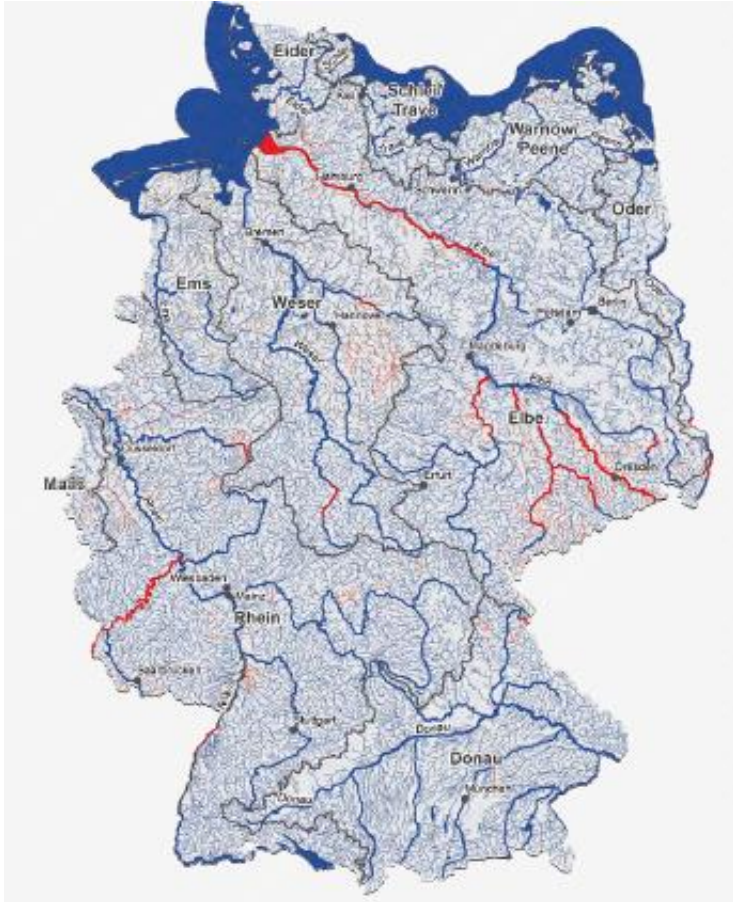


2000





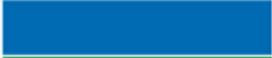




## ... but not everything is solved, improvement is still required!



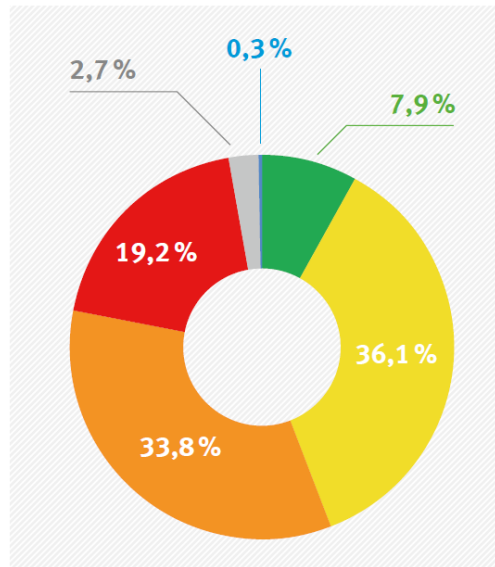
- Assessment of **Environmental Quality Standards (EQS)** of priority substances
- **Good (blue)** or **not good (red)**
- Assessment of 2016, without mercury (Hg), polyaromatic hydrocarbons (PAH), polybrominated biphenyls (PBB), and tributyltin (TBT)
- **Mercury (Hg)** results from coal fired power plants, and from industry
- **PAH** result for example from industry and any burning processes
- **PBB** are flame-retardants
- **TBT** is used on ships against biofouling (pesticide)

For more information, see UBA (2017) Waters in Germany: Status and Assessment. Pdf File, Literature LU4.

## ... but not everything is solved, improvement is still required!

	High status or reference conditions (RC)
	Good status (slight deviation from RC)
	Moderate status (moderate deviation)
	Poor status
	Bad status

### EU Water Assessment - Colour codes

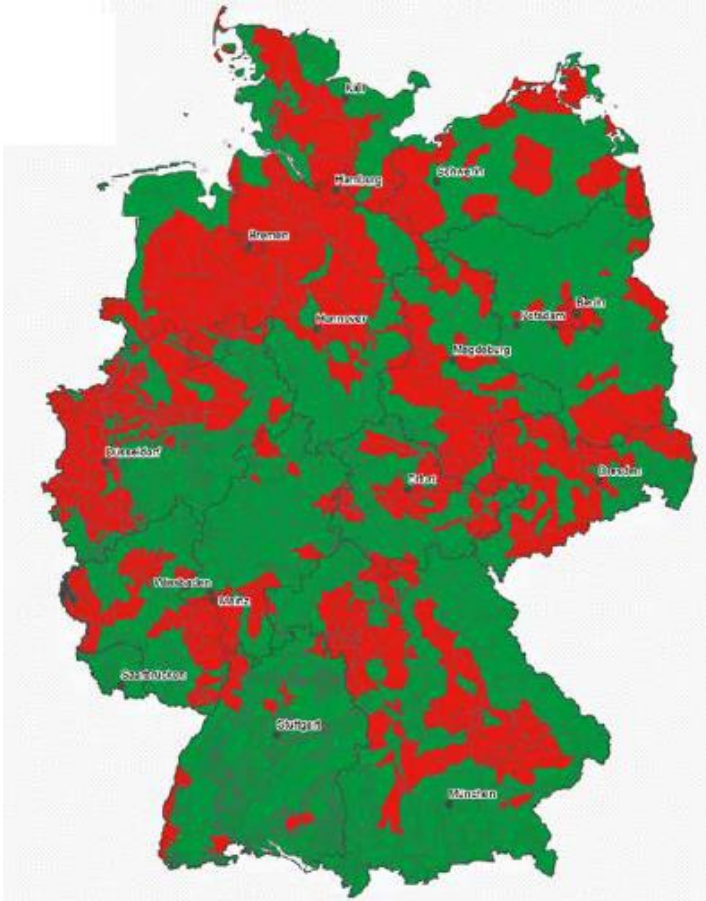


### Example Germany, 2015

89% of Germany's water bodies are in a moderate, poor or bad ecological status.

(UBA 2017: Waters in Germany)

## ... but not everything is solved, improvement is still required!



- Regarding groundwater quantity, the large pumping areas of lignite mining are a challenge for Germany.
- Regarding **groundwater quality**, there are areas with pollution from **agricultural activities**, mainly **nitrate**, but also **pesticides**.
- Groundwater resources have a long memory, so these problems will accompany Germany for the next decades.

**Chemical status of groundwater bodies in Germany.**  
UBA (2017): Waters in Germany. Status and Assessment.

# Factors and Ingredients of Success with Surface Water Protection *(personal view of the presenter)*

1. Perception/awareness of the problem from the general public
2. Social and political commitment and consensus to tackle the challenge
3. Solid laws and legal security
4. Stable public administrative structures and professional capacity
5. Clear aims and targets to reach
6. Permitting system and thorough controls
7. Fees for the use of water, polluter pays principle
8. Adequate monitoring systems
9. Financial resources according to the necessary measures
10. Time, persistence and institutional stability

**Based on my professional experience, I conclude:**

Large scale water quality issues cannot be solved within few years ... It is a long-term process

The positive turnaround is a function of time and persistence

Do not fall into frustration or despair

# Applying the RBM Cycle in India

In your opinion, how relevant is the RBM Cycle to:

- Develop a River Basin Management Plan for the Ganga.
- Develop a Programme of Measures?
- Adopt and Implement the Programme of Measures?



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

# References



As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.

**Published by:**

Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices  
Bonn and Eschborn

**Address**

GIZ Office New Delhi

110057 New Delhi

India

T +91

F +91

E [info@giz.de](mailto:info@giz.de)

I [www.giz.de/india](http://www.giz.de/india)

**Author/Responsible/Editor, etc.:**

Name, town

**Design/layout, etc.:**

Adapted template of the GIZ

**Photo credits/sources:**

Photographer, photo agency or GIZ staff member (GIZ/name)

**URL links:**

Responsibility for the content of external websites linked in this publication always lies with their respective publishers. GIZ expressly dissociates itself from such content.

On behalf of  
German Federal Ministry for Economic Cooperation and Development (BMZ)

Name of responsible division

Contact person at the ministry

town

The content has been prepared by AHT GROUP AG in cooperation with the Energy and Resources Institute (TERI) in the framework of the GIZ-funded Support the Ganga Rejuvenation (SGR) project

