



UFZ-Umweltforschungszentrum  
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# **BASINFORM**

**Method for setting up a Programme of Measures  
according to EU Water Framework Directive**

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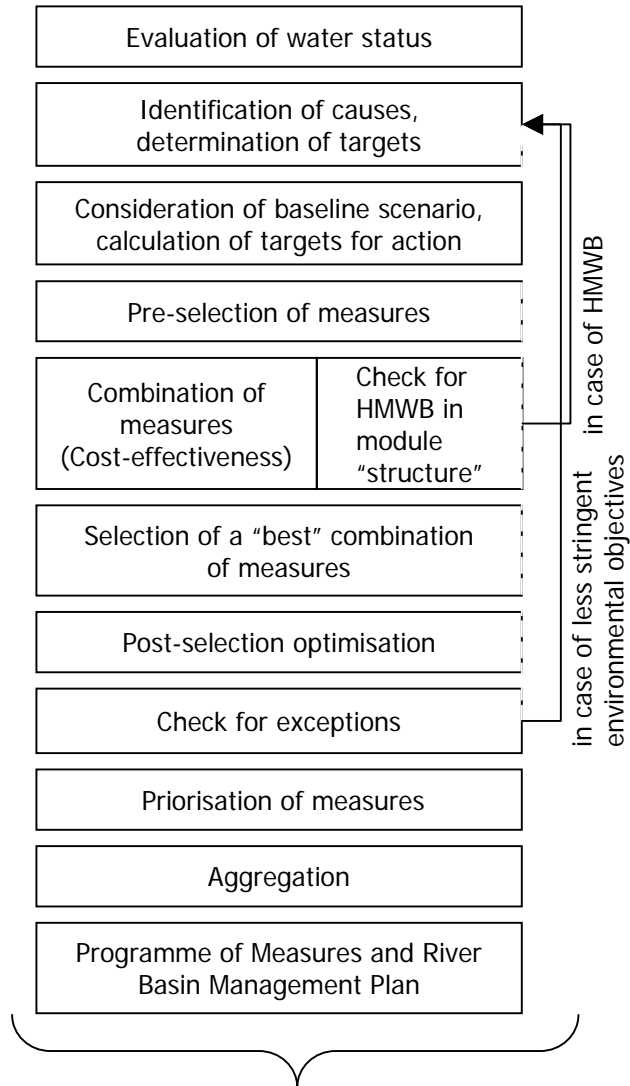
# Objectives



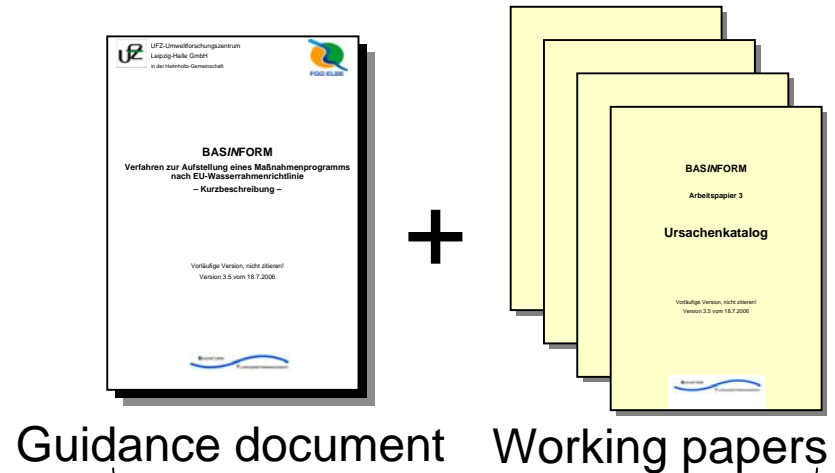
## BAS/MFORM ...

- ... **structures** the decision processes for the selection of measures by a management scheme,
- ... describes the different steps and provides the necessary **evaluation methods**,
- ... does not replace but **supports decisions**,
- ... makes decisions **transparent** and creates a basis for supervision and public participation
- ... can be **flexibly** adjusted to the needs of other Bundesländer and Member States,
- ... supports a **coherent** planning,
- ... is **transferable** for the entire Elbe River basin and beyond.

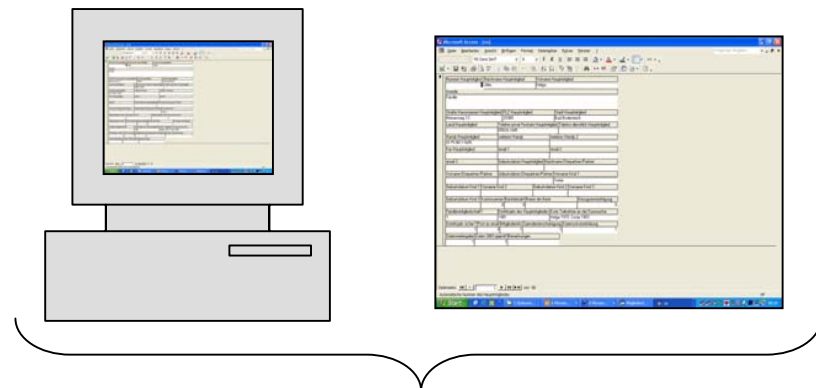
# Elements of BAS/IFORM



Concepts und methods



Handbook

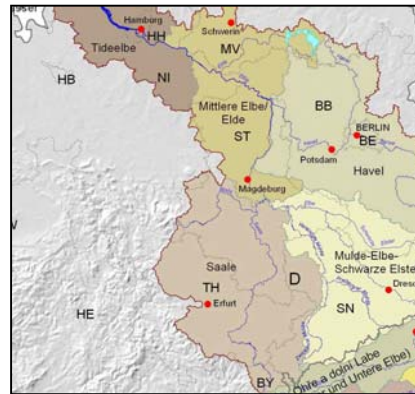


Databank

# Spatial units of river basin management according to WFD



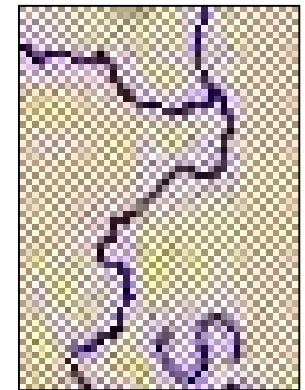
Elbe River basin



German part



Thuringian part



Water body or group of water bodies

## Basic spatial unit of selection of measures:

Water body or a group of water bodies.

## Co-operation between Bundesländer and Member States:

BAS/MFORM makes proposals for organisation of necessary co-ordinated actions of the different Bundesländer and Member States within the national and international river basin organisations.

- Set up of reduction targets for pollutants for up-stream and down-stream riparian states.

# Five decision modules

The causes for failing the good water status are divided in five modules in order to simplify the decision making:

→ In each module measures can be selected independently of the selection in other modules.

## ***Groundwater***

- Module 1: Nutrients and Pesticides in groundwater
- Module 2: Other pressures on groundwater

## ***Surface waters***

- Module 3: Nutrients, organic matter and pesticides in surface waters
- Module 4: Structure and hydro morphology of surface waters
- Module 5: Other pressures on surface waters

# Identification of causes and determination of targets

- **Causes**

Based on the results of the monitoring and other data the causes are classified with respect to their relevance.

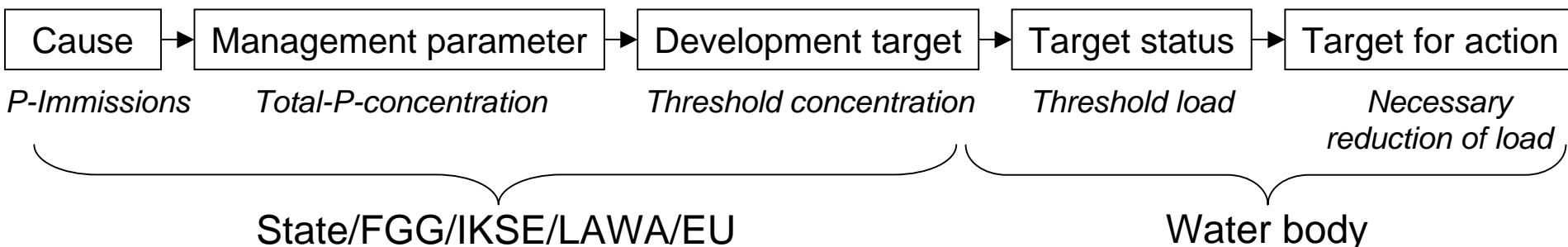
- **Catalogue of causes**

To simplify the work a standardised catalogue of causes is used.

- **Targets**

The environmental objective “good status” and particularly the biological components of the objective are translated for each water body into quantitative target.

→ Necessary for cost-effectiveness analysis



# Example for catalogue of causes

Causes	Management parameter	Unit	Development target
<b>Module 1: Nutrients and pesticides in groundwater</b>			
Nitrate immissions	Concentration Total N (90 percentile)	mg/l	50
Pesticide immissions	...	...	...
<b>Module 2: Other pressures of groundwater</b>			
Groundwater abstraction	Amount of abstraction or GW-recharge minus abstraction	m <sup>3</sup> /a	regional
Salt immissions	Concentrations of different salts	...	...
Priority substances	Concentration of the different priority substances	...	...
<b>Module 3: Nutrients, organic matter and pesticides in surface waters</b>			
Immissions of organic matter	BSB <sub>5</sub>	mg/l	4 or 6
	NH <sub>4</sub> -N	mg/l	0,3
Phosphate immissions	Concentration (90 Percentile)	mg/l	0,15
Nitrate immissions	Concentration (90 Percentile)	mg/l	3
Immissions of pesticides	Concentration different pesticides	...	...
<b>Module 4: Structure and hydro morphology of surface waters</b>			
Deficits of the river floor	...	...	ØSK 3,3
Barrier-freeness for migratory fish	...	...	individual
...	...	...	...
<b>Module 5: Other pressures of surface waters</b>			
Immissions of Salts	Concentrations of different salts	...	...
...	...	...	...

# Determination of targets

## Surface water body Zwieselbach

### ***Determination of target status***

	Cause	Immissions of organic matter		Nitrate immissions	Phosphorus immissions
	Relevance of cause with respect to the current status	Significant (B)		Signifc. (B)	Signific. (2)
	Management parameter	BSB <sub>5</sub>	NH <sub>4</sub> -N	NO <sub>3</sub> -N	Total-P
	Development target	4 mg/l	0,3 mg/l	3 mg/l	0,15 mg/l
	Target – character	Load	Load	Load	Load
	Target – unit	[t/a]	[t/a]	[t/a]	[t/a]
	Target – value	50	0,8	100	4
	Status quo value	500	25,5	250	10,4

### ***Consideration of baseline scenario etc.***

A 1	Baseline scenario				
	- Expected investments	120	9,0	30	1
	- Impacts of future developments	30	1,5	10	0,5
A 2	Impacts of decided groundwater measures	<i>Results of the selection of measures for connected groundwater bodies</i>			
	- Groundwater body Zwieselbach	0	0	50	0
A 3	Impacts of derivation from target for action at upstream water bodies	<i>Results from selection of measures at the upstream water bodies</i>			
	(no upstream water body existing)	-	-	-	-

### ***Calculation of target for action***

	Target for action = Status quo-A1-A2-A3-target value	300	7,0	60	4,9
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# Pre-selection of measures

## Pre-selection of measures

1. Step: Select those measures from the catalogue of measures that in principle mitigate the pressures and support reaching the good status.
2. Step: Specify these measures.

### Datenblatt Nr.1.1

Belastungsbereich nach WRRL, Anhang II: Punktquellen  
Verursacherbereich: Kommunen/Haushalte -> Kläranlagen

#### Beschreibung der Maßnahme

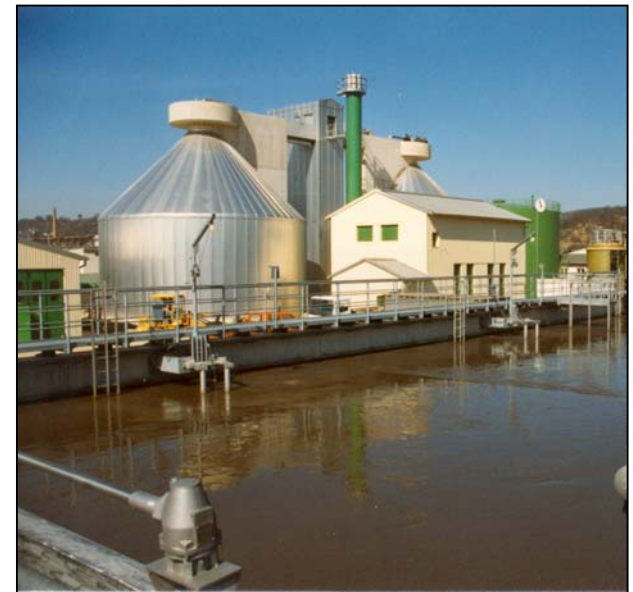
Nr. 1.1: Ertüchtigung einer Kläranlage hinsichtlich der Parameter  
BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.

#### Kurzbeschreibung / Spezifikation der Maßnahme

Durch Einleitung des Ablaufstromes einer Kläranlage in einen leistungsschwachen Vorfluter kann durch hohe BSB<sub>5</sub>-, CSB-, NH<sub>4</sub>-N- oder P<sub>org</sub>-Frachten oder -Konzentrationen das aquatische System negativ beeinflusst werden. Somit müssen im Einzelfall erhöhte Anforderungen an die Kläranlage gestellt werden. Hinsichtlich des Parameters N<sub>org</sub> ist zu berücksichtigen, dass die einem Fließgewässer zugeführten Nährstofffrachten von relevanter Bedeutung für den Schutz der Küstennähe sind. Zwar gelangen etwa 70 % der Gesamtfracht von 819 kt N aus diffusen Quellen, insbesondere aus der Landwirtschaft (Beversdorf et al., 1999), in die Nordsee, dennoch kann durch eine entsprechende Stickstoffelimination bei Kläranlagen (auch bei Kläranlagen < 10.000 EW) eine weitere Verminderung der N-Emissionen erzielt werden (s. auch Wirkungsanalyse). Zudem kann die Einleitung von N<sub>org</sub> im Einzelfall einen Beitrag zur Eutrophierung insbesondere in langsam fließenden Gewässern leisten.

Zur Verminderung der Schadstofffrachten aus Kläranlagen können somit die folgend aufgeführten Einzelmaßnahmen ergriffen werden:

- a) Ertüchtigung der Kläranlage hinsichtlich der Parameter BSB<sub>5</sub> und CSB: Ausbau der Vor-Nachklärung (Absetzbecken) oder der Belebung bzw. Anwendung weitergehender Reinigungsverfahren (z.B. Membranfiltration). Grundsätzlich muss jede kommunale Kläranlage eine mechanisch-biologische Reinigungsstufe aufweisen, d.h. Vor- oder Nachklärung und Belebung (oder vergleichbare biologische



# Impact assessment

The impact of all pre-selected measures is estimated with respect to target for action, costs, and other criteria.

→ Results from modelling and expert judgements

## Simplified impact table (scheme)

Measure	Impact on target for action			Costs			Cost-effectiveness relation			Other impacts
	Target 1	...	Target n	Total costs	For state	Investment costs	Target 1	...	Target n	
	[unit]	...	[unit]	[€/a]	[€/a]	[€/a]	[unit]	...	[unit]	
M1										
M2										
...										
Mn										

The impact table contains further columns, where e.g. information can be given about:

- conflicts with other measures,
- conflicts with other water uses (relevant for HMWB),
- conflicts with Flora-Fauna-Habitat Framework Directive and Strategic Environmental Planning,
- exceptions.

# Support from third parties

**Example:** Integration of Water sewage treatment concepts

*Responsible sewage treatment organisation ...*

- is requested to set up or update their plans according to the identified causes for the failing of the good status and the determined targets.
- supports justification of disproportional costs - if relevant.

*Competent authority ...*

- uses their proposed measures and cost estimations.
- estimates impacts of measures and compares them with targets.
- gives feed-back to sewage treatment organisation.

Co-operation during the selection process rises acceptance for final decisions.

# Selection of measures (1)

## Combining measures to bundles

Using a cost efficiency tool the single measures are combined to cost-effective bundles.  
If there are trade-offs between objectives or conflicts between interests, several cost-effective combinations will be proposed.

Measure	Impacts	Reduction of organic matter (BSB <sub>5</sub> ) [t/a]	Organic matter cost effectiveness [T€/t]	N-Reduction [t/a]	N-cost-effectiveness [T€/t]	P-Reduction [t/a]	P-cost-effectiveness [T€/t]	Costs [T€/a]
Sewage treatment 1		40	2,5	20	5,0	1,5	66,7	100
Sewage treatment 2		0	-	15	4,7	1,6	43,8	70
Canal system 1		20	3,5	10	7,0	0,6	116,7	70
Canal system 2		40	1,5	20	3,0	1,4	42,9	60
Riparian buffer strips		0	-	5	8,0	0,8	50,0	40
Intermediate crops		0	-	20	6,0	2,2	54,5	120
Total impact		80	-	40	-	2,9	-	160
Target		70	-	60	-	4,9	-	-



### Liste Maßnahmenkombinationen

#### Maßnahmenkombination A

- Nr. 1.1: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
  - Nr. 1.2: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
  - Nr. 1.3: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
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- Nr. 2.1: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
  - Nr. 2.2: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
  - Nr. 2.3: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
  - Nr. 2.4: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
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- Nr. 3.1: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
  - Nr. 3.2: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
  - Nr. 3.3: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.
  - Nr. 3.4: Entüchtung einer Kläranlage hinsichtlich der Parameter BSB<sub>5</sub>, CSB, NH<sub>4</sub>-N, N<sub>org</sub> oder P<sub>org</sub>.

# Selection of measures (2)

## Selection of a “best” combination of measures

- From the list of cost-effective combinations a “best” combination is selected.
- Criteria for the final selection may be among others
  - total costs,
  - distribution of costs,
  - available budget,
  - conflicts with other measures or water uses,
  - easiness of implementation.

→ **This combination describes the best way to reach the good status.**

## Exceptions, Heavily Modified Water Bodies etc.

- Based on the “best” combination (its costs and conflicts) the concrete environmental objective for a water body will be determined.
- Different approaches to the check for HMWB are possible.
- If a less stringent environmental objective is determined the selection of measures will be modified (by modifying or omitting certain measures)
- If deadlines are extended the measures that will be realised until 2015 are selected (priorisation).
- First assessment whether problems with FFH-Framework Directive or Strategic Environmental Planning will occur.

# Aggregation



## **Last step: Aggregation**

### **→ Use of data and databank**

- Data may be used for internal planning.
- Appropriate aggregation of the selected measures and reached environmental objectives in lists and maps for the Programme of Measures and the River Basin Management Plan (lots of details can be omitted)
- Further aggregation for other reporting and communication with politicians, stakeholders and public.

# Summary

## BAS/IFORM ...

- ... offers a **framework concept** for selecting measures and setting up a Programme of measures.
- ... is **not a completed tool**, ready to start.
- ... is a **flexible concept** open for adjustments and modifications.

