



***Methodologies for establishing programs of  
measures and prioritization in Germany***

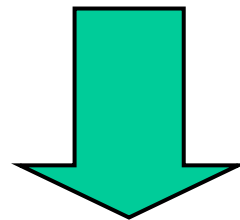
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## Characteristics of measures according to WFD:

### ANNEX III - ECONOMIC ANALYSIS:

„The economic analysis shall contain enough information in sufficient detail in order to: ...(b) make judgements about the **most cost-effective combination of measures in respect of water uses** to be included in the programme of measures...“



Several research projects were carried out  
in Germany  
to develop a method to identify cost-effective measure  
combinations.



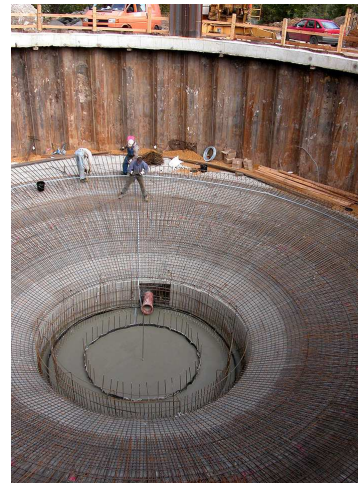
## Implementation of Measures is already going on !

- Administrative, legal and economical measures



**§§ff.**

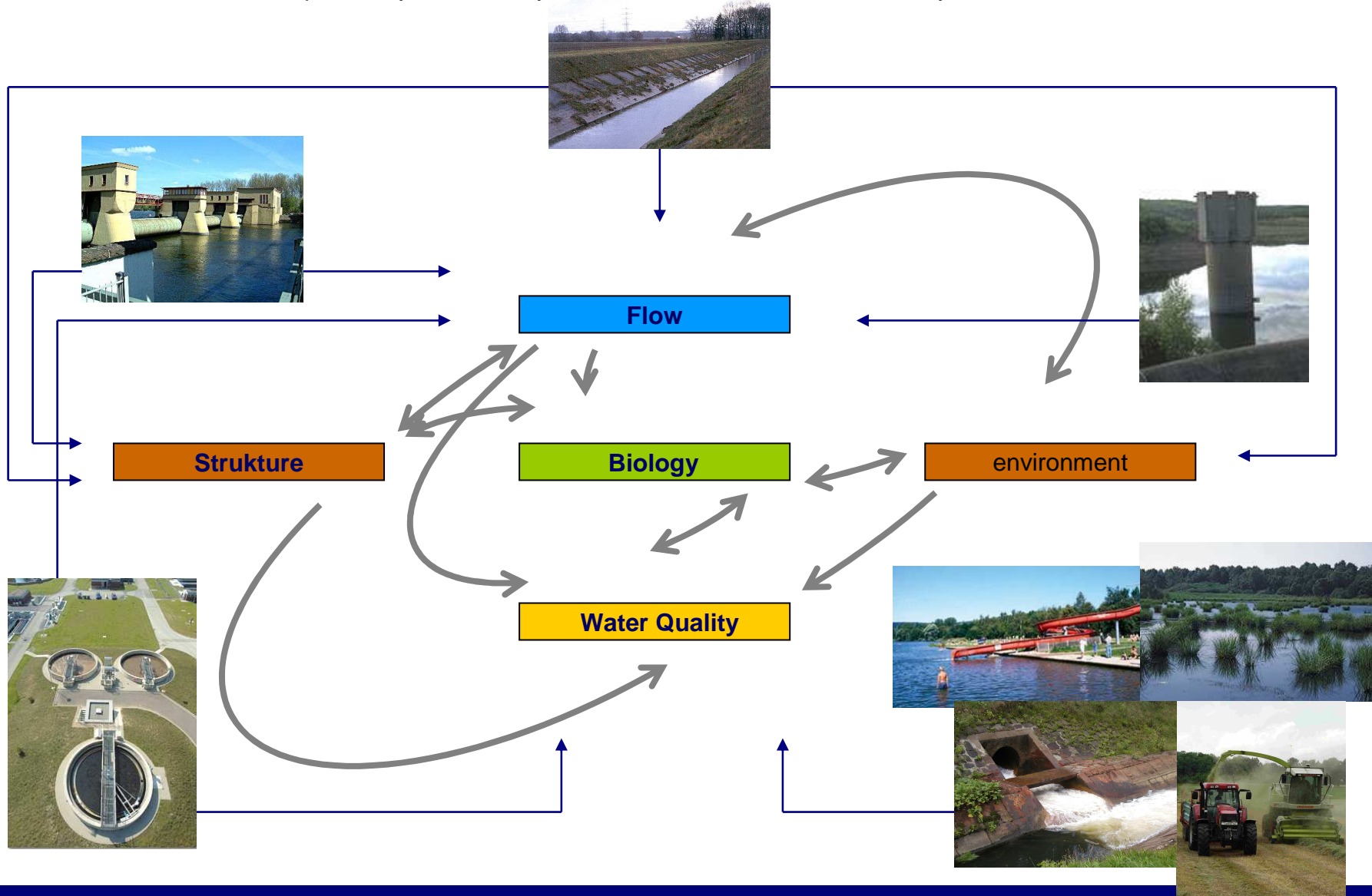
- Technical measures

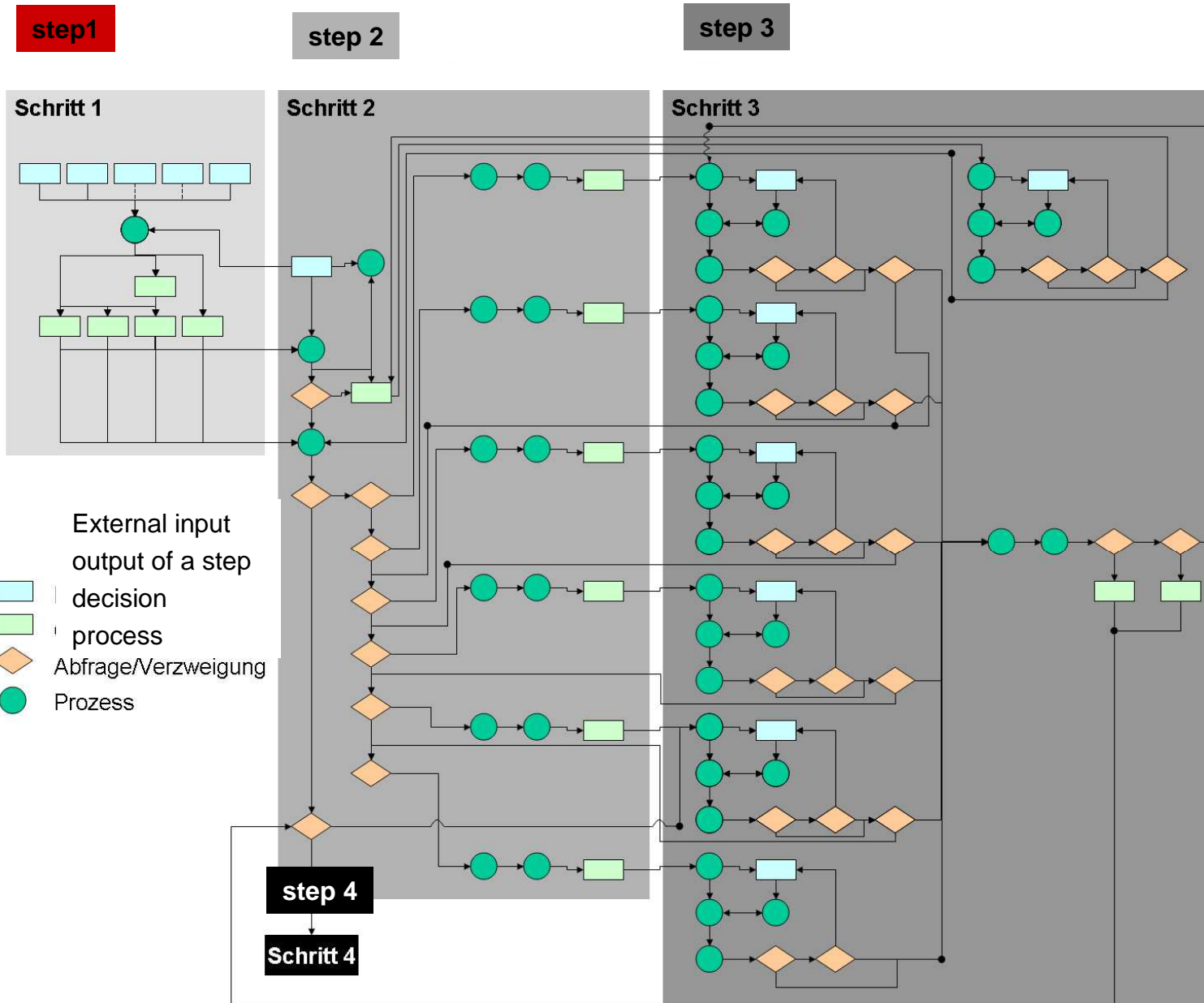


F.e. construction of  
treatment plants and  
storm water storage  
basis



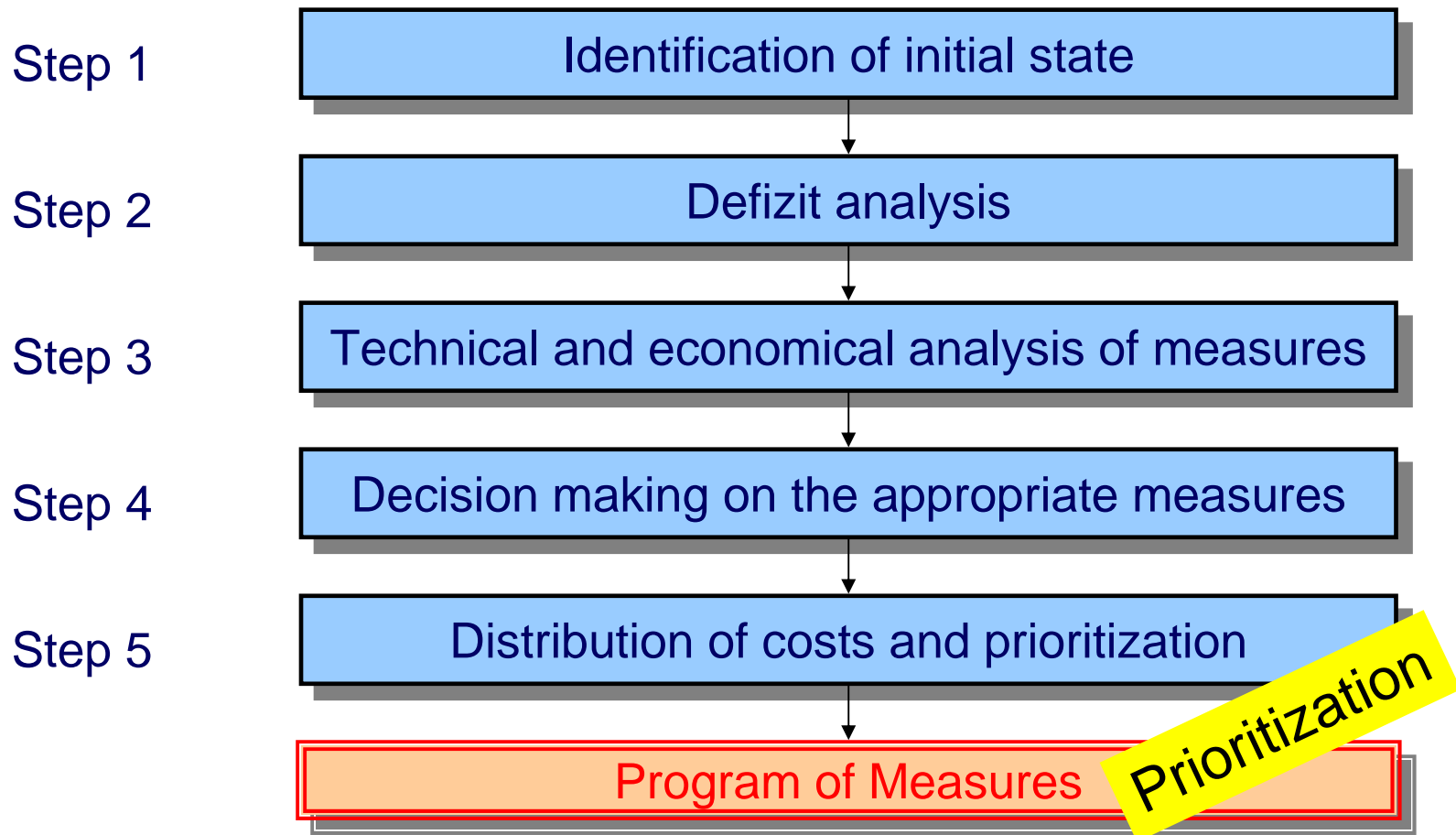
interdependency in the subsystem river makes it difficult to identify effective measures







## General steps to set up a program of measures





## **Conceptual thoughts for prioritization of measures of urban drainage and sewage treatment during the implementation process of WFD in Croatia by Dietrich Borchardt and Jörg Londong**

- Economical, ecological and political aspects will play a role in prioritization. We propose to grade measures concerning its cost-benefit-ratio in a first step.
- Benefits would be primarily the contribution to a predictable improvement of the status of the water(body) (WFD). Costs would be the total annual costs, which include capital cost and operational costs.
- Costs should also include follow up costs, e. g. if a bundle of measures is implemented in a stepwise procedure. Costs should be calculated as cash values.
- If a measure has a high uncertainty in costs or effects, uncertainty factors may be used to adjust the costs.



## Principles of prioritization 1

1. preference for focal points of pollution loads
2. most important focus is drinking water supply and its deterioration by deficient wastewater collection and treatment
3. measures must contribute to achieve the objectives of WFD and UWWTD
4. standards which exceed the requirements of UWWTD must be justified by immission orientated calculations
5. no waste water concept without waste sludge and residual material utilization concept, fecal sludge of decentralized solutions have to be implemented in this concept





## Principles of prioritization 2

7. centralized and decentralized options of collection and treatment of waste water have to be concerned, adapted solutions of collection, e. g. vacuum or pressure sewerage and new resource orientated sanitation technologies have to be integrated into concepts under investigation
8. stepwise development of systems with minimized reserves eventually as interim solutions
9. construction of treatment plants and sewerage in parallel, it is one operational unit
10. industrial wastewater must be pretreated onsite, avoid dilution (as it is no solution for pollution), pollution control must be integral part of production



## Principles of prioritization 3





11. measures at source have priority over end-of-pipe-solutions
12. storm water has to be managed, combined sewerage has to be avoided, general and advanced requirements for combined sewage and storm water treatment may have a overwhelming influence on costs especially for sensitive (small) waters
13. in many cases elimination of oxygen consuming compounds (BOD, COD,  $\text{NH}_4$ ) has priority
14. advanced nitrification and denitrification will improve waters only if there is no significant influence of CSOs
15. with regard to slowly flowing and stagnant waters phosphorus elimination at medium and large treatment plants may have the most significant contribution



## Principles of prioritization 4

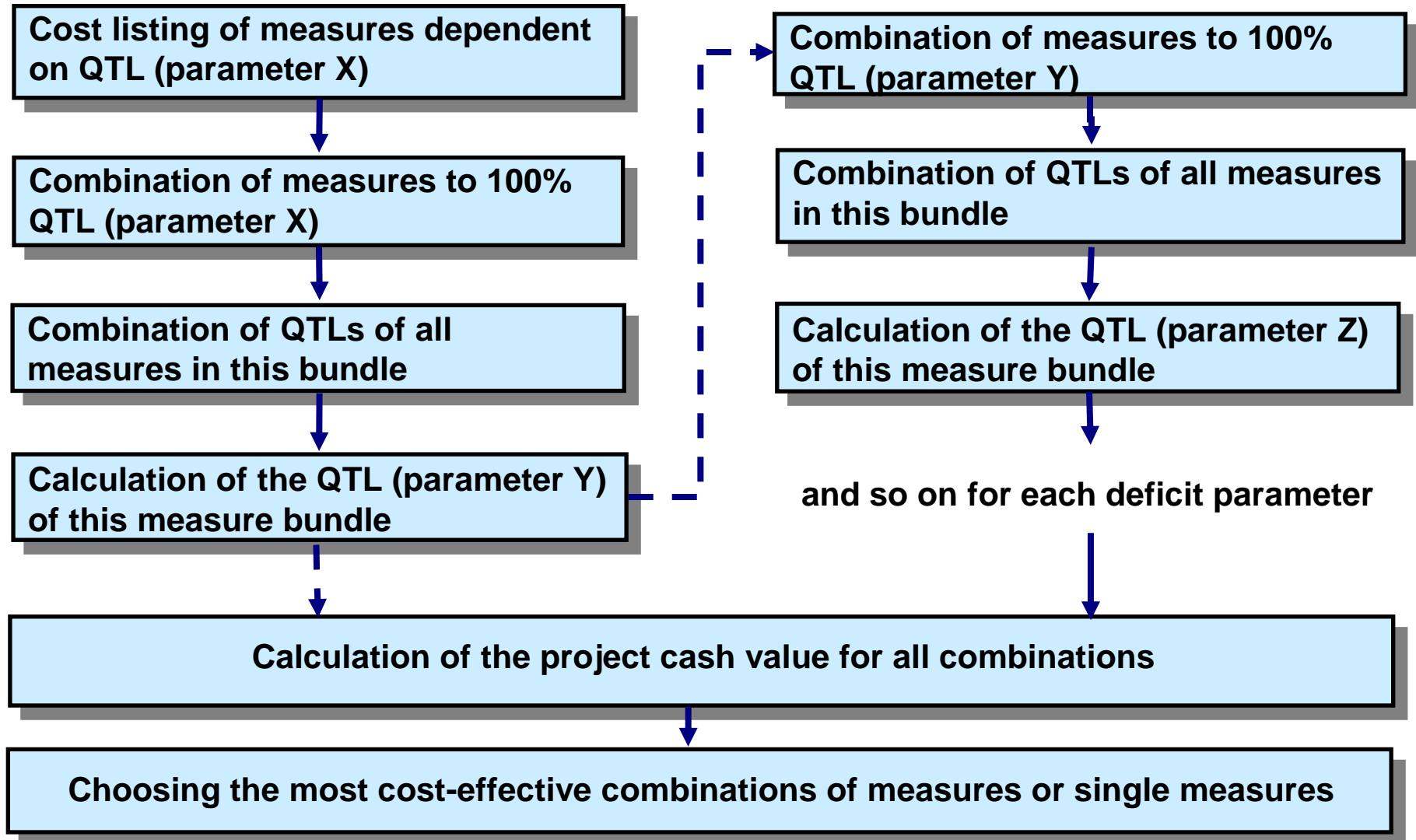
16. from river ecological demands it is not possible to formulate requirements for nitrogen elimination at sewage treatment plants, the role of nitrogen from sewage for the black sea has to be discussed
17. for an efficient waste water management and a coordinated rehabilitation of river catchments regional or superior forms of organizations are advisable  
(define establishing of an appropriate organization as a measure)
18. The focus in this presentation on point sources from waste- and stormwater must not be understood as a prioritization. Without measures in agriculture - esp. if it will be intensified - the good status will not be reached.



-  a procedure was developed in order to identify cost-effective measure combinations within the scope of EC Water Framework Directive.
-  The described identification based on water bodies of the catchment area (Bottom Up-approach).
-  Prioritization will play an important role
-  I propose to discuss prioritization early in the process of setting up a program of measures. Possible criteria were presented.



### Combination of measures





## Further needs

- **Determination of environmental costs in order to assess the proportionality of measure costs and to apply a polluter-pays-principle**
- Verification of quality-related resource costs and a model for cost distribution
- Measure catalogue that includes all possible measures with their effectiveness to all WFD-related element groups
- Support for a well-structured deficit analysis including the needs or no needs of several computer models (e.g. in order to determine diffuse sources)