Cost-effectiveness of measures
- proceedings and findings
in Lower Saxony

Dr. Ann Kathrin Buchs
AnnKathrin.Buchs@mu.niedersachsen.de
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Theoretical foundations meet practical water management experiences

**Theoretical foundation:**
What is required and how can it be classified within the methodical context?

- Several questions concerning the frame, e.g.: Which costs are referred to?
- How can economics support the achievement of the Directive's objectives?

Which methods exist to fulfill the requirement?

- Subordinated concept: cost-benefit-analysis
- A range of methods for valuation:
  » Cost-effectiveness-analysis, value-benefit-analysis, cost-benefit-analysis, cost comparison method, multi-criteria-analysis

**Water management in practice, focus on surface waters:**
By 2008 there were already more than 2000 potential measures identified in an iterative process, a first expert based selection led to a prioritization of about 700 measures that present the programmatic approach up to 2015.

What kind of verification for cost-effectiveness/cost-efficiency do we want to follow?

- Itemized approach?
- Approach for overall social cost-benefit?
- Etc.?

→ And which approach will be the best in terms of practicability and efficiency?
Project on cost-effectiveness

Study with following structure:

1. Performance of cost-effectiveness-analysis in line with the guidance documents and economic literature
   → Selection of two case studies (for surface waters)
   → Performance of cost-effectiveness-analysis for each considered site

2. Identification and analysis of existing institutions (structures and processes) that lead to selection and prioritization of measures:
   → In order to seek further mechanisms that ensure the efficient achievement of the Directive‘s objectives
   → To assure the use of existing institutions and identification of potentials for optimization
   → Application of organizational efficiency as a meta criterion
## Case study 1 (measure for passability)

**Location:** community in the RBD Rhine  
**Objective:** passability in the river Dinkel: comparison of 4 alternative measures with the aim of the re-establishment  
**Method:** cost-effectiveness-analysis  
**Basis:** feasibility study

<table>
<thead>
<tr>
<th>Measure</th>
<th>Passability fishfauna</th>
<th>Passability benthos</th>
<th>Appealing design</th>
<th>Possibility for canoe passing</th>
<th>Time frame</th>
<th>Average (business) cost [€]</th>
<th>Economic costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>I: installation of small steps</td>
<td>-</td>
<td>+</td>
<td>o</td>
<td>-</td>
<td>Short term</td>
<td>No cost estimation</td>
<td>Marginal</td>
</tr>
<tr>
<td>II: „Riegelbauweise“</td>
<td>-</td>
<td>+</td>
<td>o</td>
<td>-</td>
<td>Short term</td>
<td>No cost estimation</td>
<td>Marginal</td>
</tr>
<tr>
<td>III: roughened spillway</td>
<td>+</td>
<td>+</td>
<td>o</td>
<td>-</td>
<td>Short term</td>
<td>~177,000</td>
<td>Marginal</td>
</tr>
<tr>
<td>IV: bypass channel</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>Short term</td>
<td>~193,000</td>
<td>Marginal</td>
</tr>
</tbody>
</table>
Case study 2: fruit growing sector as a water user

- **Location:** largest fruit-growing area in northern Lower Saxony („Altes Land“)
- **Objective:** combination of securement of water provision for water users and improvement of hydromorphology
- **Method:** cost-effectiveness-analysis
- **Basis:** feasibility study, **Identification of measures:**
  1. Establishment of a tributory (add. water body)
  2. Embankment widening
  3. Re-establishment of the old tidal creek
  4. Installing disturbing elements (dead wood or rocks)

→ precondition for performing a CEA is the existence of comparable measures that have the same objective, in this case only one potential measure was feasible
## Case study 2: effectiveness

<table>
<thead>
<tr>
<th>measure</th>
<th>Add. Water supply [in m³]</th>
<th>Ecological quality elements</th>
<th>Ecological effectiveness</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>I: Seitengewässer</td>
<td>56.700</td>
<td>+++</td>
<td>+</td>
<td>+++</td>
</tr>
</tbody>
</table>
## Case study 2: cost-effectiveness

<table>
<thead>
<tr>
<th>measure</th>
<th>Ecological effectiveness</th>
<th>add. water supply [m³]</th>
<th>Time</th>
<th>Investment costs [€]</th>
<th>Cost of maintance [€/year]</th>
<th>Macro-economic costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tributory</td>
<td>12</td>
<td>56.700</td>
<td>Short term</td>
<td>1.500.000</td>
<td>650</td>
<td>low</td>
</tr>
</tbody>
</table>
Procedural approach: analysis of existing institutions

How are measures identified and prioritized? Where do we find economic mechanisms?

Schematic and simplified scheme of the iterative bottom-up process

1. Identification of potential measures via stakeholders
2. Cooperation within the regional cooperations
3. Prioritization of measures and coordination of measures within comprehensive RBM by administrative divisions

Institutionalized expert knowledge and consultation

Feedback

Set of instruments for categorized situations, Expert knowledge on all aspects of Water management (from the federal states and LAWA), Case studies including economic assessments

Expert and on-site knowledge, feasibility studies

Merged on-site expert knowledge, use of cost-benefit-analysis, use of guidelines and regional prioritization schemes

Budget code, impact assessment, prioritization schemes
Conclusions from the CEA project

- In Lower Saxony the identification process for measures varies between water type (ground and surface waters). The study shows:
  - Measures for ground water bodies have been identified and selected through other institutions and mechanisms as those for surface waters.
  - Explicit CEA for single sites shows that the existing institutions provide mechanisms that assure an efficient outcome (cost-effective measures).
  - **But there is no golden standard:** cost-effectiveness of measures can not be identified with standardized criteria within the different categories of waters nor for different sites.

- Concerning the method:
  - Proof of cost-effectiveness can be fulfilled
  - Precondition for performing a CEA is the existence of comparable measures that have the same objective (e.g. passability), this is not the case in most areas.
  - An itemized analysis of all single sites/regions is not a practical solution

- Findings:
  - Cost-effectiveness is not the single nor the ultimate criteria for the selection or prioritization of a measure.
  - Institutions play a significant role in the process of identification and prioritization of measures
Lessons learned and ideas for further procedure

Lessons learned:
• experience show the strength of the proposed method, but also the limitations when it comes to practical water management challenges.
• time-consuming and cost-intensive for bottom up processes with very limited additional information
→ so far fulfilling the economic requirement only provided little extra information for decision making

Further procedure:
• Scheme for requirement of explicit CEA for measures
• The advanced procedures of WFD water management are linked with the procedural approach
• Methodic substantiation of the procedural approach

What are the needs:
• focus on practical needs: what are the problems, where can economics help and how?
• consideration of water management procedures and structures → therefore maybe new methodologies? Example I-Five

First ideas:
• further integration of economics into the planning process?
• not only customizable but also standardizable economic based systems for decision support?
• look into other economic disciplines, e.g. organizational efficiency, adapted controlling of public authorities (water management administration)
Scheme for requirement of CEA

As part of the latest guidance document

1. Anwendung der fachlichen Vorgaben des vorliegenden Leitfadens
2. Deskriptive Ausführungen
3. Kostenwirksamkeitsanalyse