Justifying exemptions with disproportionate costs – cost-benefit analysis and alternative methods

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**Background**

**Ongoing study of UFZ contracted by LAWA**

- **Starting point:** no established method for assessing (dis-)proportionality of costs

- **LAWA** (German Working Group on water issues of the Federal States and the Federal Government)
  
  gave contract to

  UFZ – Helmholtz Centre for Environmental Research

- **Duration:** 2/2014-1/2015

- **Goals:**
  1. Overview over existing conceptual studies and case studies on assessment of (dis-)proportionality
  2. Development of a practicable, harmonized approach to assess (dis-)proportionality

- **Case studies:**
  1. Bavaria: passability of dams
  2. Lower Saxony: heavy metal contaminations from historic mining in Harz region
  3. ???
Outline

1. Exemptions – current situation
2. How to understand “disproportional”?
3. The German studies on disproportional costs
4. Conclusions
European situation
% of water bodies currently failing good status (2012)

Percent of classified water bodies in less than good ecological status or potential

- < 10 %
- 10–30 %
- 30–50 %
- 50–70 %
- 70–90 %
- ≥ 90 %
- No data

ETC/ ICM Technical Report 1/2012
Germany situation:
Prognosis for 2015

Surface water bodies

82 % Exemptions

Groundwater bodies

36 % Exemptions
### German situation

#### Justifications for exemptions

<table>
<thead>
<tr>
<th>River basin district</th>
<th>Technically unfeasible</th>
<th>Disproportional costs</th>
<th>Natural conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Art. 4.4</td>
<td>Art. 4.5</td>
<td>Art. 4.4</td>
</tr>
<tr>
<td>Danube</td>
<td>146</td>
<td>0</td>
<td>160</td>
</tr>
<tr>
<td>Rhine</td>
<td>1246</td>
<td>18</td>
<td>277</td>
</tr>
<tr>
<td>Ems</td>
<td>479</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Weser</td>
<td>1204</td>
<td>52</td>
<td>29</td>
</tr>
<tr>
<td>Elbe</td>
<td>2023</td>
<td>0</td>
<td>103</td>
</tr>
<tr>
<td>Oder</td>
<td>307</td>
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<td>0</td>
</tr>
<tr>
<td>Meuse</td>
<td>143</td>
<td>7</td>
<td>61</td>
</tr>
<tr>
<td>Eider</td>
<td>65</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Schlei/Trave</td>
<td>146</td>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>Warnow/Peene</td>
<td>47</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5806</td>
<td>78</td>
<td>692</td>
</tr>
</tbody>
</table>

Source: WISE
Outline

1. Exemptions – current situation
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How to understand “disproportional”?  

Checking disproportionality requires *balancing* costs with something else – a standard of comparison.
Possible standards of comparison

1. Affordability for those who bear the costs
   - Private agents (households, companies)
   - The state (member states, federal states, municipalities)
     → Guiding question: Where is the threshold?

2. Costs compared with (intended) effects of measures
   - 2a) Costs compared with costs of similar measures
   - 2b) Comparison of cost-effectiveness relations
     → Guiding question: What is a “normal”?

3. Costs compared with benefits of measures
   - 3a) Benefits measured in monetary units
     → Economic cost-benefit analysis
   - 3b) Benefits measured by alternative methods
     → e.g. non-monetary benefit assessments, multi-criteria analysis
Outline

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German Studies on disproportionality
Overview

1. Affordability
   - 2007
     Affordability
     UFZ/Univ.
     Leipzig/Ecologic

2. Effectiveness
   - 2008
     "Leipzig Approach"
     Univ. Leipzig/UFZ/Ecologic

3. Cost-benefit assessment
   - 2012
     Master thesis
     Univ. Göttingen
   - 2012
     ESAWADI
     Seeconsult & Intersus
   - 2014
     Cost-benefit analysis
     Wupper, RUFIS
1. Affordability
2007: UFZ, University of Leipzig, Ecologic

Main results

1. Affordability is a *theoretically and legally valid criterion* for disproportionality – *but only* with respect to Art. 4.4 (extension of deadlines).

2. Share of water charges in household income is a practical criterion for disproportionality.

### Thresholds for share of water charges in household income

<table>
<thead>
<tr>
<th>Threshold [%]</th>
<th>Proposed by</th>
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<tbody>
<tr>
<td>2.0</td>
<td>OECD</td>
</tr>
<tr>
<td>2.5</td>
<td>Environmental Protection Agency (USA)</td>
</tr>
<tr>
<td>3.0–5.0</td>
<td>World Bank</td>
</tr>
</tbody>
</table>
2. “Leipzig Approach” – effectiveness
2008: University of Leipzig, UFZ, Ecologic

- “Leipzig Approach” is a hybrid:
  - Cost-effectiveness considerations are supplemented with simple non-monetary benefit assessments

- Basic idea:
  - The main benefit of the programme of measures is the improvement of water status.
  - Compare water bodies by costs → assumption: water bodies/measures are comparable
2. “Leipzig Approach”
2008: University of Leipzig, UFZ, Ecologic

Costs of reaching good status; n = 205

Average costs [€/km²]

Water bodies [ordered by costs]

Threshold
2. “Leipzig Approach”
2008: University of Leipzig, UFZ, Ecologic

Benefits of improving water status

Additional benefits (water and non-water related)
### 2. “Leipzig Approach”
Overview over the procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Rank water bodies by costs.</td>
</tr>
</tbody>
</table>
| Step 2 | Determine preliminary threshold (e.g. 2 x mean)  
→ political statement |
| Step 3 | Investigation of (above-average) additional benefits for individual water body. |
| Step 4 | Adjusting threshold depending on individual additional benefits (e.g. 1.5 x old threshold) |
| Step 5 | Assess (dis-)proportionality |

![Graph showing costs and rank relationship](image)
2. Applications of “Leipzig Approach”
Rhineland-Palatinate, ESAWADI, University of Göttingen

1. 2009: Applied in German federal state “Rhineland-Palatinate”
   • Slight variation of Leipzig Approach

2. 2012: ESAWADI project – Ems River
   • Focus on lateral and linear connectivity
   • No appropriate cost data available
     \( \rightarrow \) comparison of only two sub river basins
   • Result: Leipzig Approach is (to a large extent) sound and applicable

3. 2012: Master thesis L. Jaumann on Lower Saxony
   – Kateminer Mühltenbach
   • Similar findings
**Situation:** specific problem – multiple stress on the Lower Wupper River

- Thermal stress by two combined heat and power plants
- Hydro-morphological alterations in the urban area of Wuppertal
- Contaminations with filterable matter

**Evaluation methods**

- Costs: Detailed planning of measures including cost calculations

**Results of case study**

- No clear decision: costs slightly higher than benefits.

**Methodological reflections**

- Discount rate and time horizon have immense influence on results
- Application of CBA very costly
- Open question: What if single measure is disproportionate but reaching good status of water body is proportionate.
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Economic cost-benefit analysis is suitable for specific cases (cf. Wupper case study) → area-wide application is too costly

Leipzig Approach also sound and suitable, but area-wide application also problematic → no appropriate cost data area-wide available, yet

But without cost data no disproportionality!
References

2007 – UFZ/University of Leipzig/Ecologic
coracted by LAWA (German Working Group on water issues of the Federal States and the Federal Government


2008 – University of Leipzig/UFZ/Ecologic
coracted by Northrhnre-Westfalia, Rhineland-Palatinate, Thuringia


2012 – seeconsult & InterSus

IWRM-net project in co-operation with Lower-Saxony


2012 – LAWA (German Working Group on water issues of the Federal States and the Federal Government)

- LAWA (2012): Handlungsempfehlung für die Ableitung und Begründung weniger strenger Bewirtschaftungsziele, die den Zustand der Wasserkörper betreffen. LAWA-Arbeitsprogramm Flussgebietsbewirtschaftung. Produktdatenblatt 2.4.4

2012 – University of Göttingen. Master thesis in co-operation with Lower-Saxony

- Jaumann, L. (2012): Application of Multicriteria Analysis as justification for disproportionate costs according to the European Water Framework Directive – a case study from Lower Saxony

2014 – Rufis - Ruhr-Forschungsinstitut für Innovations- und Strukturpolitik e.V.
coracted by Northrhine-Westfalia