The economic perspective on urban green infrastructure: results from TEEB Germany

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ECBCC Conference
19/11/2015, Bonn, Germany
Natural Capital – making societal advantages of nature-based solutions visible
Backgrounds of the 194 national leaders (Fig 3 from Moss, 2012).

Deal with nature-based solutions and ecosystem services from an economic perspective.
Major question: How can an economic perspective support urban green infrastructure decisions?

- What does „economic perspective“ mean? – The TEEB Perspective
- How can economic impacts be demonstrated?
- How can economic perspective support decision-making?
TEEB – The Economics of Ecosystems and Biodiversity

• Initiated by EU ministers and conducted by UNEP

• Scientific Coordination Team at UFZ

• Several Reports …

• Several follow-up activities, e.g., country studies
TEEB Germany

• Make visible the relationships between the manifold services of nature and human well-being

• Deliver impulses for determining nature’s services

• Develop proposals for including natural capital in decision-making

• Several reports: also a City Report – due in May 2016
An Economic Perspective on Urban Green Infrastructure: The TEEB approach

1. **Recognizing values**: a feature of all human societies and communities

2. **Demonstrating values**: in economic terms, to support decision making

3. **Capturing values**: introduce mechanisms that incorporate the values of ecosystems into decision making
Valuations, Operating Spaces, Responses...

- Norms, Regulations & Policies
- Economic Mechanisms
- Markets

- Recognizing value
- Demonstrating value
- Capturing value

- Regional Plans
- Legislations
- Certification
- PA Evaluation
- PES
“Biased” decisions lead to inefficient resource use and high societal costs

Based on: Schröter-Schlaack / Hansjürgens (2014)
The concept of Total Economic Value

use values

- direct values
- indirect values
- option values

non-use values

- existence values
- other non-use values (e.g. bequest values)

production or consumption values: services for production or consumption purposes
symbolic values: religious or spiritual values
functional values: values derived from ecosystem functions
future, potential utilization of direct or indirect values
utility from the knowledge of the existence of a species

utility from the knowledge of the existence of a species
Values of Nature

- Anthropocentric View – preference-based values
- Physiocentric View „as an end in itself“

Individual Values
- Economic cost-benefit-analyses – based on preferences

„Social“ Values
- Deliberative Approaches – based on discussions and consesus

Intrinsic Value of Nature „Nature’s Own Value“
- Approaches of the ethics of nature, e.g. theology, philosophy

• Values aren’t prices… and prices aren’t values
• There are no objective values – Values are always subjective… and they differ
• Values always depend on the context (norms, rules, customs) → values are a „social construct“

→ It is absolutely decisive to consider all affected people, all impacts, all kinds of values…. holistic perspective !!!
In the TEEB Germany Cities Report we take the broad perspective

Nature in Cities...

1. **Promotes Good Living Conditions** – good climate, clean air, less noise, healthy soils and stable water balance
2. **Promotes Health**
3. **Promotes Social Cohesion and Integration**
4. **Promotes the Experience** of Nature and Environmental Education
5. **Provides** – drinking water, food, material
6. **As Location Factor** – value of property, economy, tourism
7. **Instruments and Implementation** – Information, Communication, Participation, Planning, Incentivising
8. **Synthesis** and Recommendations for Action
Example: Floodplains:
More space for water

Current situation:
• About 70% of natural flood plain areas in Germany have been lost
• Climate change may lead to increases in intensive rainfall events and flooding
• High societal costs of flooding events because of floodplain loss as retention area. Elbe river flood:
  2002 ≈ 11 Billion Euro
  2013 ≈ 7-8 Billion Euro
Case study: Floodplains and flood protection at the river Elbe

Options:
• Maximum dyke relocation (new retention areas ca. 35.000 ha)
• Controlled polders (3.248 ha)
• Combination of both measures: dyke relocation (3.402 ha) and controlled polders (4.143 ha)

Assessment of the options:
Comparison of costs and benefits:
• Project costs
• Flood protection
• Nutrient retention
• Biodiversity

Case study: Floodplains and flood protection at the river Elbe

Example 2: Inselplatz, Jena (Germany)

Economic assessments for climate change adaptation in urban planning – considering nature-based-solutions

Inselplatz, Jena:
Current situation

(photo: Oliver Gebhardt, UFZ)
(case study: Gebhardt, O., Meyer, V., forthcoming)
Inselplatz, Jena: Future university campus

(Source: City of Jena)
(case study: Gebhardt, O., Meyer, V., forthcoming)
Alternative options to implement the land development plan

<table>
<thead>
<tr>
<th></th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of trees</td>
<td>Existing trees: 14</td>
<td>Existing trees: 14</td>
<td>Existing trees: 14</td>
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<tr>
<td></td>
<td>New trees: 25</td>
<td>New trees: 29</td>
<td>New trees: 31</td>
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<tr>
<td>Species of newly</td>
<td>25 small-crowned trees</td>
<td>15 large-crowned trees</td>
<td>27 large-crowned trees</td>
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<tr>
<td>planted trees</td>
<td></td>
<td>14 small-crowned trees</td>
<td>4 small-crowned trees</td>
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<td>Colour schemes of</td>
<td>Entire area: ordinary</td>
<td>Inner area: light-coloured</td>
<td>Entire area: light-coloured</td>
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<tr>
<td>pavements</td>
<td>pavements</td>
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<tr>
<td></td>
<td></td>
<td>Outer area: ordinary</td>
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<tr>
<td></td>
<td></td>
<td>pavements</td>
<td></td>
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<tr>
<td>Roof greening of new</td>
<td>69% tar-gravel-roof</td>
<td>48% tar-gravel-roof</td>
<td>30% tar-gravel-roof</td>
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<tr>
<td>flat roofs</td>
<td>31% extensive green roof</td>
<td>52% extensive green roof</td>
<td>70% extensive green roof</td>
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<tr>
<td>Artificial water course</td>
<td>None</td>
<td>40m²</td>
<td>80m²</td>
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(case study: Gebhardt, O., Meyer, V., forthcoming)
Evaluation criteria & weighting

- **Heat stress potential** (2021-2050, 2021-2100)
- **Net present costs** (2021-2050, 2021-2100, discount rate 1.5%):
- **Amenity value** (2021-2050, 2021-2100, 5-point Likert scale)
- **Architectural quality** (2021-2050, 2021-2100, 5-point Likert scale)

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<th>Criteria</th>
<th>Weights in %</th>
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<td>Urban Planner 1</td>
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<td>Heat stress potential</td>
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<td>Amenity value</td>
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<tr>
<td>Architectural quality</td>
<td>25</td>
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</table>

(case study: Gebhardt, O., Meyer, V., forthcoming)
Overall ranking of the alternatives for the period 2021-2050

- “Alternative 3” ranks first, “Alternative 2” second and “Alternative 1” third in the medium (2021-2050) as well as in the long-term period (2021-2100)

(case study: Gebhardt, O., Meyer, V., forthcoming)
Five concluding remarks

1. Economics is more than monetization

2. „Economic Perspective“ means: explicitly considering trade-offs; recognizing, demonstrating and capturing the values of green infrastructure

3. Economic valuation methods are only useful, if a holistic perspective is taken

4. Urban decision-makers heavily focus (and rely) on economic arguments

5. Economics can provide decision support, but there are huge knowledge gaps
Thank you!

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