Ecosystem services – indicators and mapping in Germany

Ralf-Uwe Syrbe (IOER)

German-Ukrainian Meeting on Ecosystem Services
September 28th 2015
Structure

1. EU Background
2. Ecosystem services: Selection and priorities
3. National indicators
4. Examples of assessment

But we just create jobs!
Background: EU Biodiversity strategy

Structure and Deadlines
- halt the loss of biodiversity and ES in the EU by 2020
- 6 main targets + 20 actions to reach the goal

Target 2
- By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems

Action 5
- Member States ... map and assess the state of ecosystems ... in their national territory by 2014, assess the economic value of such services ... into accounting and reporting systems by 2020
Background: EU Biodiversity strategy

Recent situation
- 1st national indicators and cartographic representations proposed (Marzelli et al. 2014)
- Today: mapping in progress using indicators for monitoring
- Further need for indicators benefiting EU reports and strategic decisions in Germany
MAES-framework 2013: 6 dimensions of biodiversity

Evaluation schedule
- Mapping of ecosystems
- Assessment of ecosystem health
- Assessment of ecosystem services
- Integrated ecosystem assessment
Ecosystem services: Selection and priorities

**CICES V4.3 (2013):** 48 ecosystem services classes

44 ES relevant for Germany (Marzelli et al. 2014)

Prioritization regarding

- Territorial/spatial importance
- Importance of the ES for people
- Position of the ES in the scheme
- Communicability of the ES-concept
- Data regularly available (for monitoring!)

**16 ES to be processed in Germany**

+ 5 in discussion
## Indicators for nationwide ES assessment

<table>
<thead>
<tr>
<th>Section / Division</th>
<th>ES-Group / Class</th>
<th>ES indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provisioning:</strong> Nutrition</td>
<td>1 Cultivated crops</td>
<td>Agricultural crop productivity</td>
</tr>
<tr>
<td></td>
<td>2 Reared animals</td>
<td>Grassland fertility, livestock</td>
</tr>
<tr>
<td>Materials</td>
<td>3 Raw materials</td>
<td>Timber productivity</td>
</tr>
<tr>
<td>Energy</td>
<td>4 Biomass-based sources</td>
<td>Plant based energy production</td>
</tr>
<tr>
<td><strong>Regulation and maintenance:</strong> Waste mediation</td>
<td>5 Filtration/sequestration/storage by ecosystems</td>
<td>Ground water protection</td>
</tr>
<tr>
<td></td>
<td>6 Dilution by freshwater</td>
<td>Purification ability of streams</td>
</tr>
<tr>
<td>Mediation of flows</td>
<td>7 Erosion control</td>
<td>Prevention rate by vegetation</td>
</tr>
<tr>
<td></td>
<td>8 Flood protection</td>
<td>Discharges coefficient of veg.</td>
</tr>
<tr>
<td>Maintenance of live conditions</td>
<td>9 Pollination</td>
<td>Small landscape structures</td>
</tr>
<tr>
<td></td>
<td>10 Pest control</td>
<td>Small landscape structures</td>
</tr>
<tr>
<td></td>
<td>11 Climate protection</td>
<td>Carbon sequestration</td>
</tr>
<tr>
<td></td>
<td>12 Local climate regulation</td>
<td>Green volume in cities</td>
</tr>
</tbody>
</table>
### Indicators for nationwide ES assessment

<table>
<thead>
<tr>
<th>Section Division</th>
<th>ES-Group / Class</th>
<th>ES indicator(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural: Physical and intellectual interactions</td>
<td>13 Experience of animals, plants and landscape</td>
<td>Rare species index</td>
</tr>
<tr>
<td>Cultural: Spiritual or symbolic interactions</td>
<td>14 Usability of ecosystems</td>
<td>Access to urban green</td>
</tr>
<tr>
<td></td>
<td>15 Aesthetics</td>
<td>Cultural heritage elements</td>
</tr>
<tr>
<td></td>
<td>16 Existence value</td>
<td>Rare species index</td>
</tr>
</tbody>
</table>

- **Access to urban green**
  - Leipzig, Photo: Syrbe

- **Cultural heritage elements**
  - Potsdam, Photo: Syrbe
Example for the provisional service: Sustainable wood usage

Regional wood stock + grow (supply) in Germany  Timber logging (demand)
Example: Biomass carbon sequestration

I 1 Annual carbon sequestration
I 2 Biomass carbon storage
I 3 LULUCF-greenhouse gas balance (National inventory report)

Biomass carbon storage

- 62 – 788 t
- 788 – 1422 t
- 1423 – 2482 t
- 2483 – 3559 t
- 3560 – 6370 t
- no data
Example: Retention area in active floodplains

Spatial structure:
Municipalities

Potenzielle Auenretention (2013)
Anteil rezenter (überflutbarer) Aue abzügl. baulich geprägter Siedlungsflächen bezogen auf morphologische (gesamte) Aue in %

Deutschland: 35,7

0 - 33
>33 - 66
>66 - 100

Datengrundlagen:
Flussauen in Deutschland ©Bundesamt für Naturschutz (2009)
ATKIS Basis-DLM; VG25 ©GeoBasis-DE / Bundesamt für Kartographie und Geodäsie (2014)
Gebietsstand: VG25 2013;

1km-Raster

Potenzielle Auenretention (2013)
Verfügbarkeit der Flussauen (78. größten Ströme Deutschlands)
für Hochwasserretention

0 - 33
>33 - 66
>66 - 100

Datengrundlagen:
Flussauen in Deutschland ©Bundesamt für Naturschutz (2009)
ATKIS Basis-DLM ©GeoBasis-DE / Bundesamt für Kartographie und Geodäsie (2014)
Gebietsstand: Rastergrundgeometrien (INSPIRE Grid 1 km);
### Example: Prevention of soil erosion (water)

**Parameters**
- **E**: Erosion (USLE: \(R \times K \times S \times C\))
- **H**: hypothet. erosion
- **P**: prevented soil erosion by the ecosystems
  \[ P = H - E \]

<table>
<thead>
<tr>
<th>Federal state 2009</th>
<th>Recent erosion (t/ha*y)</th>
<th>Prevented erosion (t/ha*y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berlin</td>
<td>0.01</td>
<td>0.16</td>
</tr>
<tr>
<td>Brandenburg</td>
<td>0.07</td>
<td>0.48</td>
</tr>
<tr>
<td>Sachsen-Anhalt</td>
<td>0.34</td>
<td>2.12</td>
</tr>
<tr>
<td>Sachsen</td>
<td>0.88</td>
<td>5.53</td>
</tr>
<tr>
<td>Thüringen</td>
<td>0.88</td>
<td>10.58</td>
</tr>
</tbody>
</table>
Example: Access to urban green space

Calculation the percentage of supplied households from the whole city

Spatial relevance:
Cities >50,000 inhabitants

Result: 85,2 % of inhabitants (=27 Mio.) have access to public green area close (< 300 m to their house

Target value: 100% access
Conclusions and outlook

- Contribute to the fulfillment of the obligation to report to the EU; Comparisons with other EU countries
- Basis for the first national systematic recording of ecosystems and ES (initially mainly physical / ordinal)
- Visualization of spatial priorities and temporal changes of ES
- Basis for ES Monitoring (Monitor of Settlement and Open Space Development)
Thank you for your attention!

Ralf-Uwe Syrbe        IOER Dresden