Ecosystem Service Accounting for Development (ESAforD)

Jessica Alvsilver, Per Strömberg
Swedish EPA
PTEC meeting Washington October 2
PTEC meeting

• “Given the objective, resources and constraint of the program which challenge would you address and research approach would you select for the program”? 
ESAforD

• Four year Sida financed program, started September 2014

• Collaboration between Swedish EPA (Environmental Economics Unit), Environment for Development Initiative (EfD) and WAVES.
RESEARCH TO MANAGE THE ENVIRONMENT FOR DEVELOPMENT

Watch a live stream of the world’s leading climate researchers discussing future paths for climate research

The IPCC 5th Assessment Report is coming to a close. EfD will live stream the world’s leading climate researchers discussing future paths for climate research.

EfD researcher appointed as member of the "National Commission of Lithium" in Chile

EfD researcher, Carlos Chávez, NENRE-Concepcion, has been appointed by the Chilean Government to collaborate as a member of the "National Commission of Lithium" ("Comisión del Litio", by its name in Spanish).

Yonas Alem on Sustainable Development

In less than two minutes research fellow Yonas Alem spreads the word of University of Gothenburg, the Environment for Development initiative, and research related to sustainable development. Check out the video from the IGC Growth Week 2014 at the London School of Economics and Political...
EfD

• Research program in environmental economics that focus on research, policy advice, and teaching

• Centers situated in South Africa, Tanzania, Kenya, Ethiopia, Costa Rica, Chile and China.

• Se http://www.efdinitiative.org/
Empirical work carried out in at least five different countries.

Agreed and well-defined methods and criteria for carrying out the case study and analysis in countries.

Case study designed to answer or resolve methodological question or challenge demanded by the Ecosystem Accounting Framework.

An advancement in methodology for ecosystem accounting.

WAVES are using results from case studies to develop standardized ecosystem service accounting.

WAVES has contributed to the development of internationally agreed guidelines for ecosystem accounting.


Decision making for sustainable policies at national, regional and district level is improved through better means of acquiring information on ecosystem services values.

Outputs

Intermediate outcomes

Outcome

Impact objective

Development Goal

Direct control

Direct influence

Indirect influence
**ESAfD Framework**

- **Output**: Through multicountry empirical work address a challenge or methodological issue identified by the experimental ecosystem accounting framework-methodological progress

- **Resources**: Seven countries, seven economist (postdocs) for three years

- **Constraints**: Four year in total, fieldwork approximate 1.5-2 years, mainly economic competence.
Communication framework includes at least two meetings per year, WAVES and EfD annual meeting.

Co-ordinated by Swedish EPA
How far have we come?

• Produced a background paper addressing challenges
• Presented and discussed in Dar es Salaam last week.
• 20 participants
• Discussed and narrowed down the research question.
Outcomes of the workshop

• Address the challenge of scaling up and comparing different methods for the same ES
• Value Transfer Validity testing in a multisite, multicountry setting
• Restrict analysis to regulating services
• Select service after feasibility study
• Use existing biophysical models, INVEST, SWAT...
• Accept that we should only use valuation methods that are consistent with the accounting principles
Value transfer validity testing in a multi-site multi-country setting

Explorations to reduce transfer errors
• Case study 1: Comparing different methods for same ES

• Case study 2: Scaling up
  – Case study 2.1: Primary studies for scaling up

• The following presentation focuses on two options:
  – Primary studies to derive benefit function (Case study 2.1),
  – Econometrically derived benefit function (Case study 2).
    – Separate or combined across countries
Aim of the study

Explore ways to:
• Reduce the **transfer error** when scaling up.
• Enable value transfer to **countries that lack valuation studies**.

Possible contributions

a) Enhanced understanding of how **choice of parameters** such as valuation method, transfer method, data and scale can be exploited to **reduce transfer errors**, when **scaling up** values of the benefits that ecosystem services provide (intra and cross country)

b) **SNA** consistent

c) **Meta** study of standardized multi-country studies

d) Other?
Choice of ES, and choice of source ecosystem

• Probably **water regulating ES** (quality, erosion control, flow, supply)
• Same ES, **from the same ecosystem** (e.g. forests) or from different ecosystems (mangroves in one country, forests in another).
Approach of the research

Table 1: Illustration of Case study 2.1: value transfer from primary studies.
<table>
<thead>
<tr>
<th>Field site nr.</th>
<th>Field site 1</th>
<th>Field site 2</th>
<th>Field site 3</th>
<th>Field site 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field site characteristics, e.g.:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Ecosystem location</td>
<td>Upland</td>
<td>Upland</td>
<td>Lowland</td>
<td>Lowland</td>
</tr>
<tr>
<td>- Ecosystem type (same?)</td>
<td>Wetland</td>
<td>Wetland</td>
<td>Mangrove</td>
<td>Mangrove</td>
</tr>
<tr>
<td>- Ecosystem service (same)</td>
<td>Sediment control</td>
<td>Sediment control</td>
<td>Sediment control</td>
<td>Sediment control</td>
</tr>
<tr>
<td><strong>Methods</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Best precision method (production function) to derive best available benefit function for each field site (biophysical, socio-ec.).</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2. Second best precision method (e.g. replacement cost).</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3. Value transfer from Method nr. 1 and 2. Assess which parameter values reduces transfer errors (within country).</td>
<td>E.g. from site 1 to sites 2, 3, 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cross country</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. As in 3 above, but cross country.</td>
<td>Between e.g. same ecosystem location, and/or same ecosystem type, between data rich to data poor countries.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Case study countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Chile</td>
<td>China</td>
<td>Costa Rica</td>
<td>Ethiopia</td>
<td>Kenya</td>
<td>Sweden</td>
<td>Tanzania</td>
</tr>
</tbody>
</table>

The diversity of the countries allows to assess impact on transfer errors of different data rich, data poor etc. etc.

Lastly:
5. **Regression meta** study (multi-country).
Parameters (1): choice of parameters

How can the transfer error be reduced by varying:

• **Valuation** method (different cost based methods etc.)
• **Value transfer** method (point value, function, structural?)
• Level of detail of **data** (primary data, secondary data, for reference and for target site of scaling up)
• Level of **scaling**: e.g. sites in different countries but with similar characteristics.
• **Other**?
Parameters (2): Combining parameters

Table 3; **Illustration** of how parameters can be altered in conjunction with other parameters, to explore ways to reduce transfer errors (other examples **data, scale**)

<table>
<thead>
<tr>
<th>Valuation Method</th>
<th>Transfer method</th>
<th>Unit value transfer</th>
<th>Benefit function transfer</th>
<th>Meta-analysis function transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production function</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damage cost avoided</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restoration cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Further thoughts

- **Meta** regression study of 4 field studies/country.
  - Contribution as a controlled experiment?
  - **Risky** (econometrics on small number of observations).
  - => Fall back position other meta approach to use all the case studies.
• If opt for **Biophysical** modelling: strategies for assuring sufficient quality subject to project budget.
  – **Tools** (e.g. Invest?)
  – Choice of **ES**: biophysics more demanding in flooding modelling than water quality/sedimentation?
  – **Other**?
• **Scale** of:
  – **Reference sites** for the value transfer (e.g. small local or small catchment, maybe lower cost with larger scale if enables GIS?),
  – **Target sites** for the value transfer (e.g. local instead of regional level?)

• Explore **twists** to the country studies: CC, gender (especially if if takes little time)

• **Strengths and weaknesses of deriving benefit functions directly**, or, **indirectly**?
Table 4: Comparison of potential research approaches.
<table>
<thead>
<tr>
<th>Country study approach</th>
<th>Interpretation (For country studies and meta study)</th>
<th>Transfer error testing</th>
<th>Doable with the available project resources</th>
<th>Additional human resources (relates to incentives for human resources for academics at EfD centers)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parameters to assess</td>
<td>Precision of transfer error testing</td>
<td>Human resources</td>
<td>Data</td>
</tr>
</tbody>
</table>
Invest non-precise on single ES? | Natural science focused? | **Much primary data** | Publishability of country studies?  
(lowers likelihood to attract permanent staff at EfD centers; MSc students from universities)? |
| 2.1 Field studies      | Low representativity? Lack statistical validity    |                        |               |      |                                                                 |
| (up to 4)              |                                                   |                        |               |      |                                                                 |
| 2. Econometric         | High representativity Statistical validity         |                        |               |      |                                                                 |
| derivation of benefit  |                                                   |                        |               |      |                                                                 |
| function (e.g. Vincent |                                                   |                        |               |      |                                                                 |
| Malaysia)              |                                                   |                        |               |      |                                                                 |
• Option: Combination of approach 2 and 2.1

(e.g. inserting primary study estimates as controls in econometric scaling up) for testing transfer errors across methods.
Which publications?

Explorations to reduce transfer errors in scaling up the value of ecosystem services.

Implications for cost savings.

- 7 country studies (different land characteristics, possibly different methods)
- 1 meta study (cross country)
Best use of the project resources?

A large project: what would you do with such a project?
• Simple optimization model based on meta regression: to guide choice of parameter values in order to minimize transfer error, cost of doing the study, and both (e.g. valuation method, transfer method, data, scaling). As one contribution to guide future scaling up exercises?
Project profile

• Project team: EfD centers in program by Gothenburg University, SEPA Environmental economics in low/middle income countries)

• **Method development** of valuation of ES in a SNA setting.