Simulated Exchange Values and Ecosystem Accounting: Total Social Income in RECAMAN

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Precedents

• First steps done by researchers

• The Agroforestry Accounting System, an accounting framework that allows to estimate total income, had been applied at farm scale:
  • Campos et al. (2001 and 2008); Caparrós, Campos and Montero (2003); Campos and Caparrós (2006)

• The Simulated Exchange Method, a methodology designed to integrate market and non-market goods and services in a consistent manner, had been applied at farm scale:
  • Caparrós (2001); Caparrós, Campos and Montero (2003); Caparrós et al. (2014)
The role of policy makers

• In 2007, José Guirado, a policy maker in Andalusia, and Pablo Campos, a researcher at CSIC, agreed on the convenience of developing ecosystem accounting

• Policy maker’s motivation:
  • Justify large public spending in the forest, mainly fire fighting, biodiversity protection and wardens
  • Explore the possibility to implement Payments for Ecosystem Services

• In 2008, the Andalusian Government commissioned CSIC the task of developing and applying ecosystem accounting at a large scale in Andalusia -> RECAMAN:
  • intended for practical use,
  • financial crisis has prevented continuous application.
RECAMAN: Highlights

- Integrates commercial and environmental outputs and costs
- Spatially explicit results
- Macro (regional) and micro (estates) scales
- Covers 4.7 million hectares
- Main methodological features:
  - Simulated Exchange Values (SEV)
  - Agroforestry Accounting System (AAS)
Andalusian *montes* cover 4.6 million ha, 54% of total surface

*Montes* include: forests (61%), shrublands (21%), natural grassland (10%) and other forestlands (8%).

Ownership: 28% public and 72% private (typically >300ha).

Andalusian *montes* have high environmental values (biodiversity hotspot).
Manufactured and environmental values

Accounting for

- Flows: price x quantity
- Capital: market prices or future discounted capital income flows

Commercial values:
- Timber growth and felling (age structure)
- Cork growth and stripping
- Natural grass and acorn fodder
- Game
- Mushrooms
- Livestock and crops (at micro scale)
- Others

Environmental values:
- Public recreation
- Private owner’s amenities
- Forest landscape
- Threatened biodiversity
- Carbon sequestration
- Others
Agroforestry Accounting System

• **Production account**
  – Total output
    • *SNA outputs*
    • *Non-SNA forest outputs*
  – Total cost
    • *SNA costs*
    • *Non-SNA costs*

• **Capital balance**
  – Work in progress (inventories)
  – Fixed capital
    • *Land*
    • *Biological resources*
Values are obtained …

• Directly from markets:
  – Timber, cork, …
• From other existing markets:
  – Carbon sequestration
  – Private amenities
  – Forest water
  – Mushrooms gathering
• By simulating markets (SEV):
  – Public recreation
  – Threatened biodiversity
  – Landscape conservation
Simulated Exchange Value (SEV)

\[ q(sim) \quad q \]

Simulated price

Hipotetical market
Simulated Exchange Value (SEV)

- **Simulated MARKET**: demand and cost functions
  - Monopolistic competition (short term)

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<table>
<thead>
<tr>
<th>Number of visits (q)</th>
<th>Euros per hectare</th>
<th>Final output (euros per hectare)</th>
<th>Total cost (euros per hectare)</th>
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<td>80.715</td>
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![Graph showing the relationship between number of visits and costs](image)
Free access recreation

- Contingent valuation
  - Visitors to 10 areas
  - Payment vehicles:
    - Entrance fee
    - Increase in travel cost
  - Site-specific demand functions
Landscape and threatened biodiversity

- Choice experiment
  - Andalusian households
  - Joint payment for:
    - Landscape conservation
    - Threatened biodiversity
  - Mixed logit and simulations
SEV and different accounting systems

• The SEV has been used in RECAMAN together with the Agroforestry Accounting System (AAS).
  – AAS: production account and capital balance
  – AAS focuses on the economic activities and products generated on the territory
  – It allows the estimation of net value added and total social income for each activity
  – Private and public outputs and costs are considered

• The SEV method could also be applied with the System of Economic and Environmental Accounts - Experimental Ecosystem Accounting (SEEA-EEA)
Main differences with SEEA

- We use the AAS, which does not follow institutional sectors.
  - This allows income estimations for each activity in the forests.
  - Facilitates the design of efficient Payment for Ecosystem Services
- We use the SEV method for non marketed goods and services
  - It allows estimation of what would be the income if all the ecosystems services were internalized
  - If one country charges visitors to the forest and another not, with the SEV the value in the accounts would be similar (not in SNA-SEEA)
Primary Data

- Forest National Inventory for forests and woodlands (age structure)
- Land cover and land use data GIS
- Prices of over 4,000 transactions per year on forest products
- 58 revenues and costs in depth analysis of montes estates (including crops and livestock)
- 800 interviews to montes non-industrial landowners
- 4,000 interviews to free access visitors (CV and choice exp)
- 5,600 interviews to households (CV and choice exp)
- 800 interviews to hunters
- 800 interviews to montes hunting estates
- 4,000 interviews to mushroom gatherers
- Public expenditures on montes disaggregated by montes activities
- Threatened biodiversity index by vegetation type
- Green water consumption by vegetation type
Results
(for 2010)
Total social income distribution

- Forestry private
- Forestry public
- Game
- Private amenities
- Public recreation
- Mushrooms
- Carbon
- Landscape
- Biodiversity
- Forest water

- Labour cost
- Manufactured capital income
- Environmental income
- Total social income
Private and public incomes

<table>
<thead>
<tr>
<th>Total social income (€/ha)</th>
<th>Labour Cost</th>
<th>Manufactured capital income</th>
<th>Environmental income</th>
<th>Total social income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
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<td>Public</td>
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<tr>
<td>Social</td>
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</table>
Maps: “Kyoto” carbon in 2010

- Analyzed surface: 4,229,772 ha
- Map code: 01-01-13-000
- Date: 02/04/2014
- Region: Andalusia

Map title:
Environmental income from net carbon sequestration under the Kioto protocol in Andalusian forests (2010: €/ha).
RECAMAN Project

Project coordinator: Pablo Campos (IPP-CCHS-CSIC).
Project managers: Francisca de la Hoz, J. Ramón Guzman-Alvarez and Rafael Cadenas (Andalusian Government).
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References


Thank you for your attention.

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