Paying Forest Owners for Environmental Services: Potential and Challenges BIOECOSYS, Lisbon, December 6 2021
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Paying Forest Owners for Environmental Services: Potential and Challenges

BIOECOSYS, Lisbon, December 6 2021

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Introduction: Paying forest owners for environmental services

- **Why an important issue?**
  1. Increasing demand for non-marketed services provided by forests:
     - Forest role in climate change mitigation
     - Habitats for plant and animal species
     - Recreational use
     - Etc.
  2. Creating new markets for non-marketed services
     - Increase profitability of forest management
     - An instrument to ensure a socially optimal provision of services from our forests

Water protection forest, Elmelund, Odense, Denmark

Valatin et al. (2022)
Introduction: Paying forest owners for environmental services

A growing market! - an example

Average annual payments for forest based-ecosystem services in the US 2010 - 2019 (Frey et al. 2021):

- Carbon: $176 million
- Water: $889 million
- Wildlife: $1,529 million
- Bundled: $754 million

Types of payment included:
- Public funding: $605 million
- Compliance (e.g. offsets): $1,077 million
- Voluntary (including hunting licenses): $1,667 million
- Total annually: $3,140 million

Total annually per ha: $17,69/ha

(Frey et al. 2021)
Introduction: The social demand for non-market ecosystem services

- French forest
  - Public access to public forest
  - 85% of private forest owners does not close their forest for public access (72% private forest)

- Average adult French citizen: 22 visits in the forest /year

- No entry fee, but an economic value of **16-35 billion Euros/year** (private and public forests). The French populations willingness to pay for having access to forests (Abildtrup et al. 2021a)
Introduction: Paying forest owners for environmental services - the economics

- Why is “paying forest owners for environmental services” an issue - the economist perspective

- Because markets are missing
  - Many environmental services can be considered public goods (or positive externalities)
    - Lacking property rights or costly to enforce property rights.
      - In Sweden forest owners don’t own the recreational service
      - In France, it is, in general, too costly to enforce their property rights
    - Services are often non-consumptive (that I enjoy a service does not exclude other from enjoying the same service)
  - Missing markets => forest owners are not remunerated for their service provision and have no economic incentive to provide these services

- This talk will be about how can we establish markets or other mechanisms to pay forest owners for provision of environmental services.
The potential: Who buys?

examples

- Public funding
  - subsidy schemes (typical afforestation programs)

- France 2021: new scheme to help forest owners to restore degraded forest and adapt to climate change - with the objective to:
  - “perpetuate the services it provides and increase its contribution to climate change mitigation”

- 150 million euros 2021-2024 to forest regeneration
The potential: Who buys?

Examples

- Private donations
  - The Danish Nature Foundation (naturfonden.dk)
  - 4 years: 8460 donations to new forests

Number of private donations to the Danish nature foundation for establishing forests

![Graph showing number of donations from 2017 to 2020](image)
The potential: Who buys?

Examples

- **Private donations**
  - Start-ups - intermediaries between consumers/firms and forest owners

- **Example France:**
  - [www.reforestaction.com](http://www.reforestaction.com)
  - For example the project Dormans
  - Regeneration of a dying ash forest (31 ha): 3 euros per tree
The potential: Who buys?

examples

- **Public-private partnerships**
- The Danish climate-forest fund (2021):
  - 13 Million Euros from the stat
  - Donations from individuals
  - Donations from firms
    - For example contribute to firms’ climate neutrality (but not counting in EU ETS), CSR audits, reporting to, for example, “Carbon disclosure Project”
    - Carbon storage count in national reductions
  - Private owners keep ownership but forest management by the fund

(https://mim.dk/natur/faq-den-danske-klimaskovfond/)
Are there sellers?

- Survey of 220 private forest owners in Northeast of France (NOBEL 2020)
  - “I am open to innovations and new markets“

- “I’m attentive to the expectations of the industry”
Are there sellers?

- CNPF (public forest extension service) platform

- Carbon project in private or municipality forest in France

- 25 realized forest projects: Carbon label “label bas carbon”

- Afforestation, reforestation, restoration, conversion from coppice to high forest

https://www.cnpf.fr/n/nos-partenariats-carbone/n:2493
New institutions supporting payment

- **Label Bas Carbone** (France):
  - A label of carbon emission reduction projects
  - Supported by the French ministry of the environment
  - Development of “methodologies” for documentation and auditing of projects
  - Not exclusively, but first methodologies were forest related:
    - Conversion of coppice forest
    - Afforestation
    - Restoration of degraded forests
  - Defines how carbon is calculated, time horizon (30 years), how risk is treated etc.
  - Documentation of additionality, qualitative description of co-benefits (biodiversity, water,...)
- 152 projects labelled (not all have got funding yet)

https://www.ecologie.gouv.fr/label-bas-carbone
The potential - Forests are competitive!

- The value of forest for drinking water quality protection in Denmark (against agricultural pollution)

- Results based on 50 case study areas (DOERS (2015), in Valatin et al. (2022))

<table>
<thead>
<tr>
<th></th>
<th>Afforestation (Euros/ha/year)</th>
<th>Nature areas (Euros/ha/year)</th>
<th>Agriculture without pesticides (Euros/ha/year)</th>
<th>Organic farming (Euros/ha/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total direct cost</td>
<td>507</td>
<td>320</td>
<td>80</td>
<td>227</td>
</tr>
<tr>
<td>Co-benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 reduction</td>
<td>333</td>
<td>120</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>(189-468)</td>
<td>(90-150)</td>
<td>(30-50)</td>
<td></td>
</tr>
<tr>
<td>Recreative benefits</td>
<td>1,493</td>
<td>1,387</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(133-4,667)</td>
<td>(124-4,340)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrate reduction to surface water</td>
<td>173</td>
<td>173</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(16-902)</td>
<td>(16-902)</td>
<td>(0-255)</td>
<td></td>
</tr>
<tr>
<td>Total co-benefits</td>
<td>2,000</td>
<td>1,680</td>
<td>0</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>(338-6,037)</td>
<td>(230-5,392)</td>
<td></td>
<td>(30-305)</td>
</tr>
</tbody>
</table>

Account for the multiple services from forest!
Challenges

Here focus on three challenges:

- Asymmetric information
- Quantification of services
- Additionality - or economic efficiency versus fairness?

Other challenges: important recent reviews and discussions:

- Simple versus complex (Wunder et al. 2018, Wells et al 2020)
- Performance (Wunder et al. 2020 not many evaluations of European cases)
Challenges: Asymmetric information

- Based on a survey in 2010 of 45 water utilities (Abildtrup et al. 2012):
- **Background:**
  - Danish Water Supply Act in 1998: Water utilities could increase water fees to pay land owners to change land management

### Overview of negotiation types.

<table>
<thead>
<tr>
<th>Negotiation type</th>
<th>Number of waterworks</th>
<th>Number of negotiation successes</th>
<th>Number of negotiations failed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary individual negotiation</td>
<td>12</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>First voluntary individual negotiation, later standard agreement</td>
<td>1</td>
<td>Individual: 5</td>
<td>Individual: 31</td>
</tr>
<tr>
<td>Standard agreements</td>
<td>3</td>
<td>8&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>Agreement without compensation</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Individual negotiation with threat of expropriation</td>
<td>1</td>
<td>3—5&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0</td>
</tr>
</tbody>
</table>
Challenges: Asymmetric information

- Based on a survey in 2010 of 45 water utilities (Abildtrup et al. 2012):
  - Why often failed negotiations with landowners

  - Asymmetric information - How is the gain going to be shared between seller and buyer?
    - Spatial targeting - local monopoly
  - Non-profit-maximising farmers - non-economic reasons for not making a contract

  - Water services were not cost-minimising

  - High transaction costs including enforcement costs
Challenges: Asymmetric information

- Remedies to asymmetric information
  - Flat rate schemes - (but does not work if narrow spatially targeting)
  - Mechanisms design (offering different contract types where forest owners can self-select into (e.g. Jensen et al. 2022)
  - Auctions - with agglomeration bonuses if spatial targeting (Bingham et al. 2021)
Challenges: Bundles (co-benefits)

- Payment for forest environmental services are multi-dimensional
  - Often a payment targeted one type of environmental service but changes in management influence provision of other services (Robert and Stenger 2013)
  - and often different users of different services

- Solutions:
  - Paying the marginal willingness-to-pay for each service (several schemes)
    - But not realistic in practice (potential “over compensation”, difficult to assess functions for marginal willingness-to-pay
  - Partnerships between beneficiaries
Elmelund case - a partnership

- Groundwater protection of Bolbro and Eksercermarken wellfields against pesticide leaking
  - Approximately 380 ha acquired for afforestation through land consolidation
  - Voluntary participation of landowners

- Partnership
  - VCS Denmark (water utility) : water quality
  - Odense Municipality : important recreation value
  - The Nature Agency : carbon sequestration, biodiversity

- Costly : Direct cost 1316 Euros/year/ha (annuity)

Source: Valatin et al. 2022, Hartvigsen (2014) and T. Baekgaard, workshop Odense 2019
Challenges: Quantifying services

- The missing link between complex ecosystem models and market reality
- => payment for forest management actions and not services

- The “methodologies” of Label Bas Carbon:
  - Carbon is estimated based on production tables, standard conversion factors or average numbers.
  - To account for risk, lack of data or models: standard discounts on carbon included in credit applies
  - The time horizon: 30 year?
  - Companies ask documentation of impact on other services - afraid of having negative impact on biodiversity as carbon credit is used in marketing

- Source: CNPF (2020)
Challenges: Quantifying services

- Not all crowdfunding companies are that ambitious:
  - Reforest’action
  - Services are important in communication
  - But rather symbolic…
Challenges: Additionality

- If payment does not make a change in provision then not additional and not cost-effective

- However, some forest owners provide (high level of) services without being paid
  - Soil, climate, or other circumstances make high level of service provision optimal
  - The forest owner is benefiting from environmental services
  - Some forest owners have prosocial preferences: They provide environmental services based on intrinsic motivation or social norms (Abildtrup et al. 2021b)

- Risk of crowding out. That introducing a payment will undermine intrinsic motivations (Primmer et al. 2014)

- Fairness: only paying forest owners changing management would punish owners who already manage their forest according to public preferences?
Challenges: Additionality

- Survey of French forest owners participation in an hypothetic PES scheme (keeping deadwood and old trees) (Abildtrup et al. 2021b)
- Example of hypothetical choice task in the survey:

<table>
<thead>
<tr>
<th>Choice 9</th>
<th>No engagement</th>
<th>Engagement 1</th>
<th>Engagement 2</th>
<th>Engagement 3</th>
<th>Engagement 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation/person to make engagement with</td>
<td>Engagement with forest professionals</td>
<td>Engagement with administration</td>
<td>Engagement with local collectives</td>
<td>Engagement with family/civil society</td>
<td></td>
</tr>
<tr>
<td>Engagements is public or private</td>
<td>Your engagement is public</td>
<td>Your engagement is private</td>
<td>Your engagement is private</td>
<td>Your engagement is private</td>
<td></td>
</tr>
<tr>
<td>Compensation</td>
<td>free inventory</td>
<td>free inventory</td>
<td>free inventory</td>
<td>free inventory</td>
<td></td>
</tr>
<tr>
<td>Monetary compensation</td>
<td>75 Euros/ha/Yr</td>
<td>100 Euros/ha/Yr</td>
<td>50 Euros/ha/Yr</td>
<td>0 Euros/ha/Yr</td>
<td></td>
</tr>
</tbody>
</table>

Testing factors influencing the Willingness to accept participating in a contract:

- Institutions are the most important.
  - Many will not need a compensation if contract is with forest professionals
- If forest owners were told that they were the first in municipality to have a contract they prefer the contract is public
- Value of non-monetary compensation decreases with introduction of monetary compensation
Conclusion

- Paying forest owners for environmental services

- Potential
  - Many new initiatives are developed - often public private partnerships and linked to climate mitigation
  - Forest owners are positive to participate in new markets

- Challenges
  - The complexity and multi-dimensionality of forest management increase the transaction costs - could institutional innovations reduce transaction costs? Online trade, auctions?
  - Operationalize ecosystem service provision models - or standard values - to be used as market support
  - Acceptability of payments - additionality versus fairness - should be addressed
Used literature


CNPF (2020). Méthode reconstitution de peuplements forestiers dégradés. https://www.ecologie.gouv.fr/sites/default/files/2019-10/M%C3%A9thode%20reconstitution%20de%20peuplements%20forestiers%20d%C3%A9grad%C3%A9es.pdf


Thanks for your attention!

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