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Potential and Challenges BIOECOSYS, Lisbon,
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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

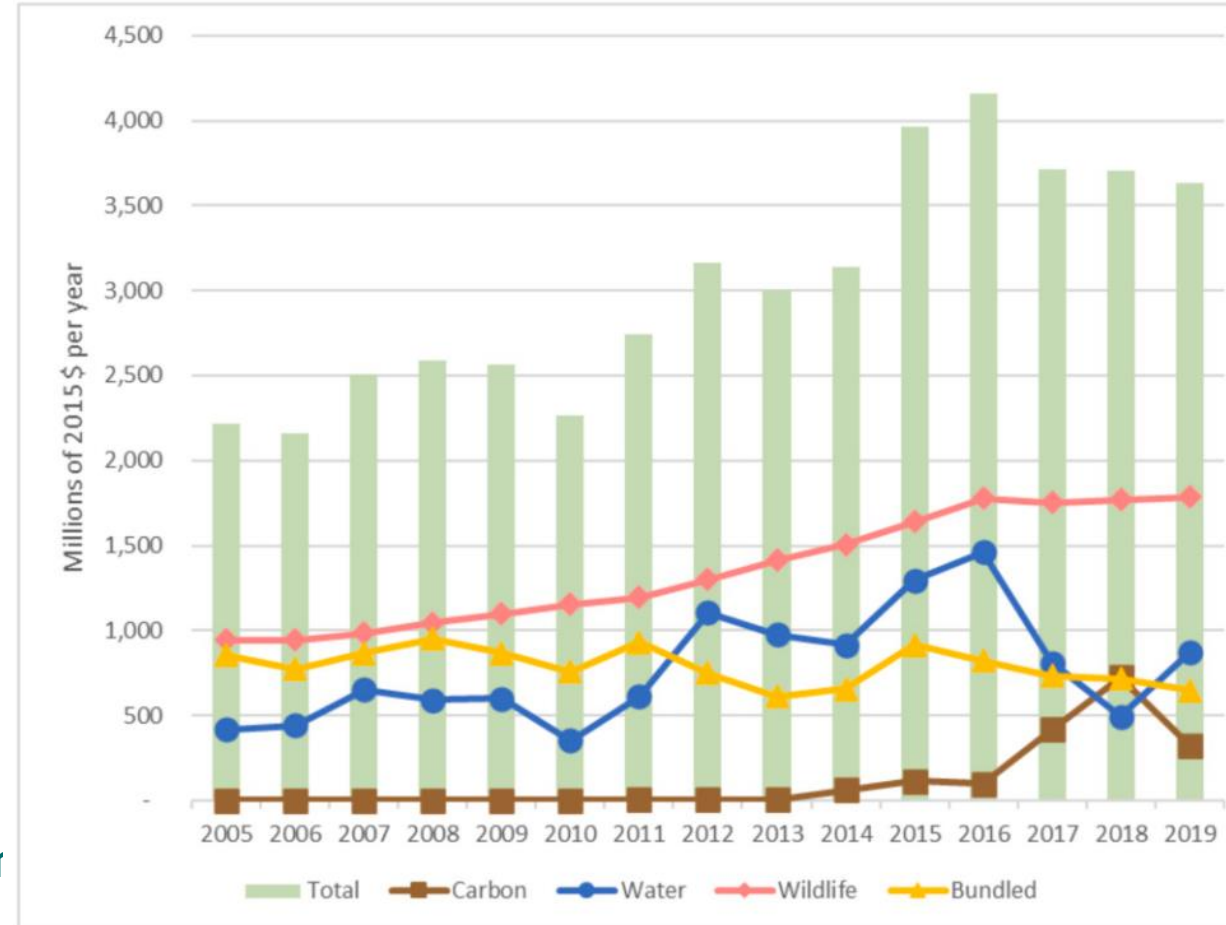
Average annual payments for forest based-ecosystem services in the US 2010 - 2019 (Frey et al. 2021) :

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

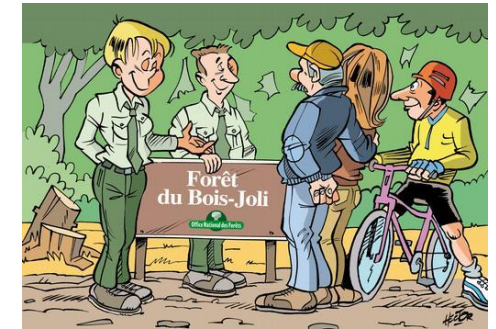
Total annually per ha **\$17,69/ha**



(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

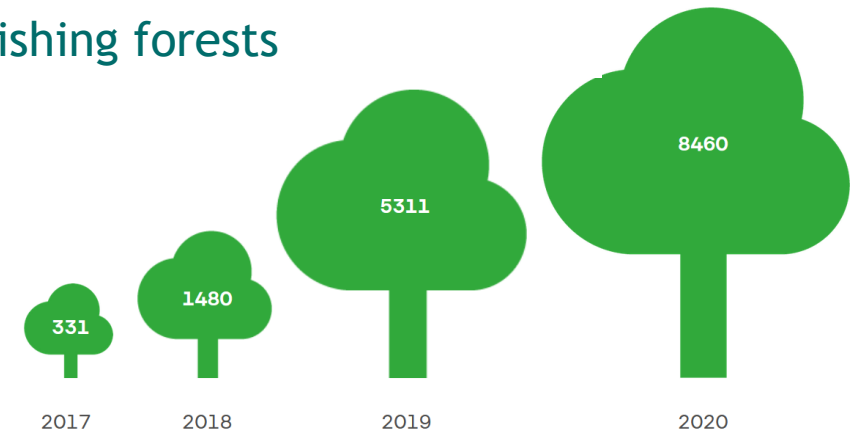
- ▶ Public funding
 - ▶ subsidy schemes (typical afforestation programs)
- ▶ France 2021 : new scheme to help forest owners to restore degraded forest and adapt to climate change - with the objective to :
 - ▶ ***“perpetuate the services it provides and increase its contribution to climate change mitigation”***
 - ▶ 150 million euros 2021-2024 to forest regeneration



The potential: Who buys ? examples

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

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



Kilde: Naturfonden

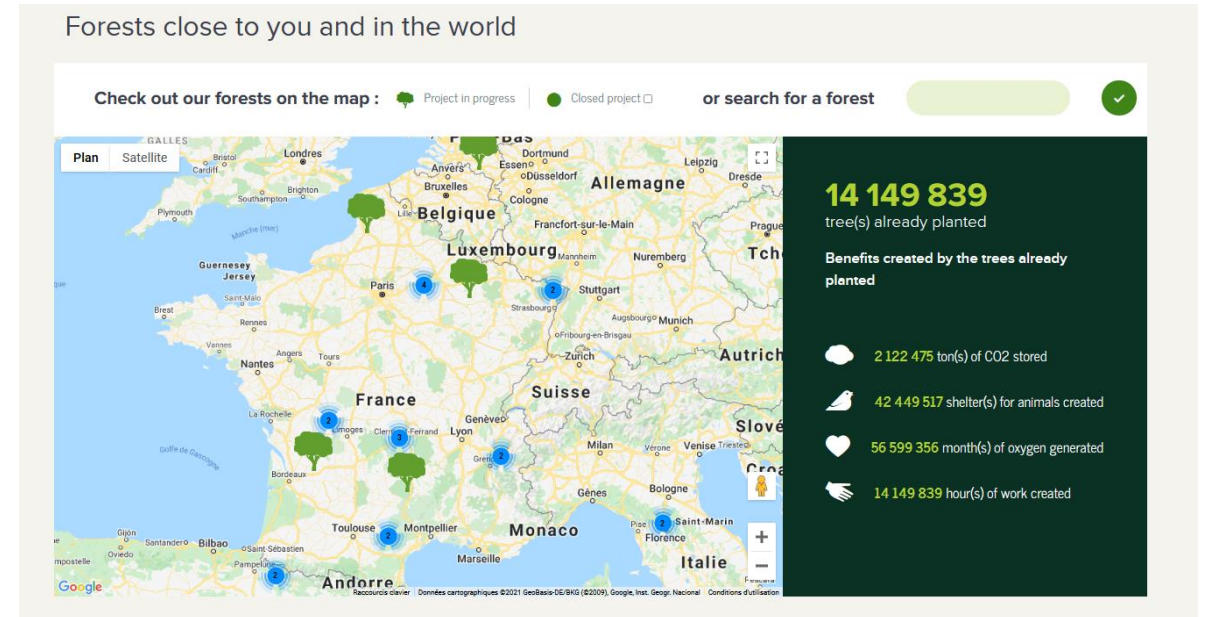
The potential: Who buys ? examples

▶ Private donations

- ▶ Start-ups - intermediaries between consumers/firms and forest owners

▶ Example France :

- ▶ www.reforestaction.com
- ▶ For example the project Dormans
- ▶ Regeneration of a dying ash forest (31 ha): 3 euros per tree



They take part to the projects

Number of Reforest'actors : 708



The potential: Who buys ? examples

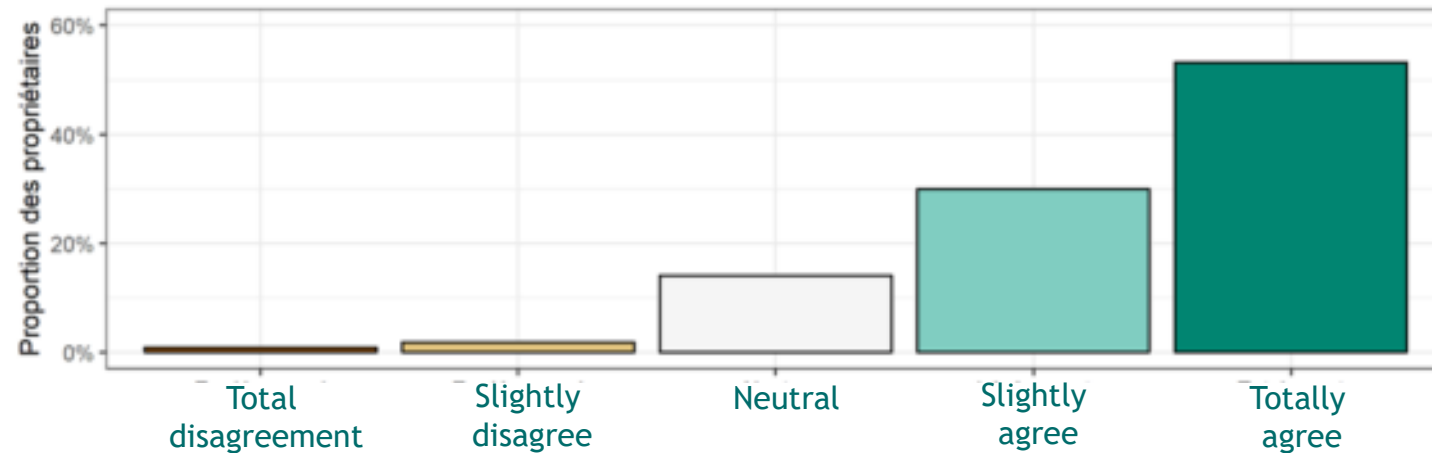
- ▶ **Public-private partnerships**
- ▶ The Danish climate-forest fund (2021) :
 - ▶ 13 Million Euros from the stat
 - ▶ Donations from individuals
 - ▶ Donations from firms
 - ▶ For example contribute to firms' climate neutrality (but not counting in EU ETS), CSR
 - ▶ audits, reporting to, for example, "*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/>)

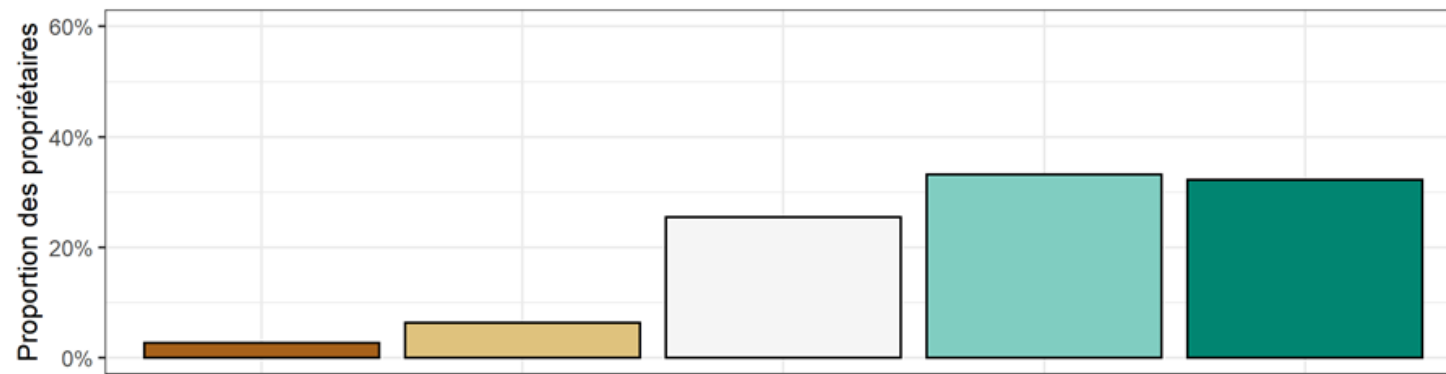
Are there sellers ?

- ▶ Survey of 220 private forest owners in Northeast of France (NOBEL 2020)

- ▶ “I am open to innovations and new markets “

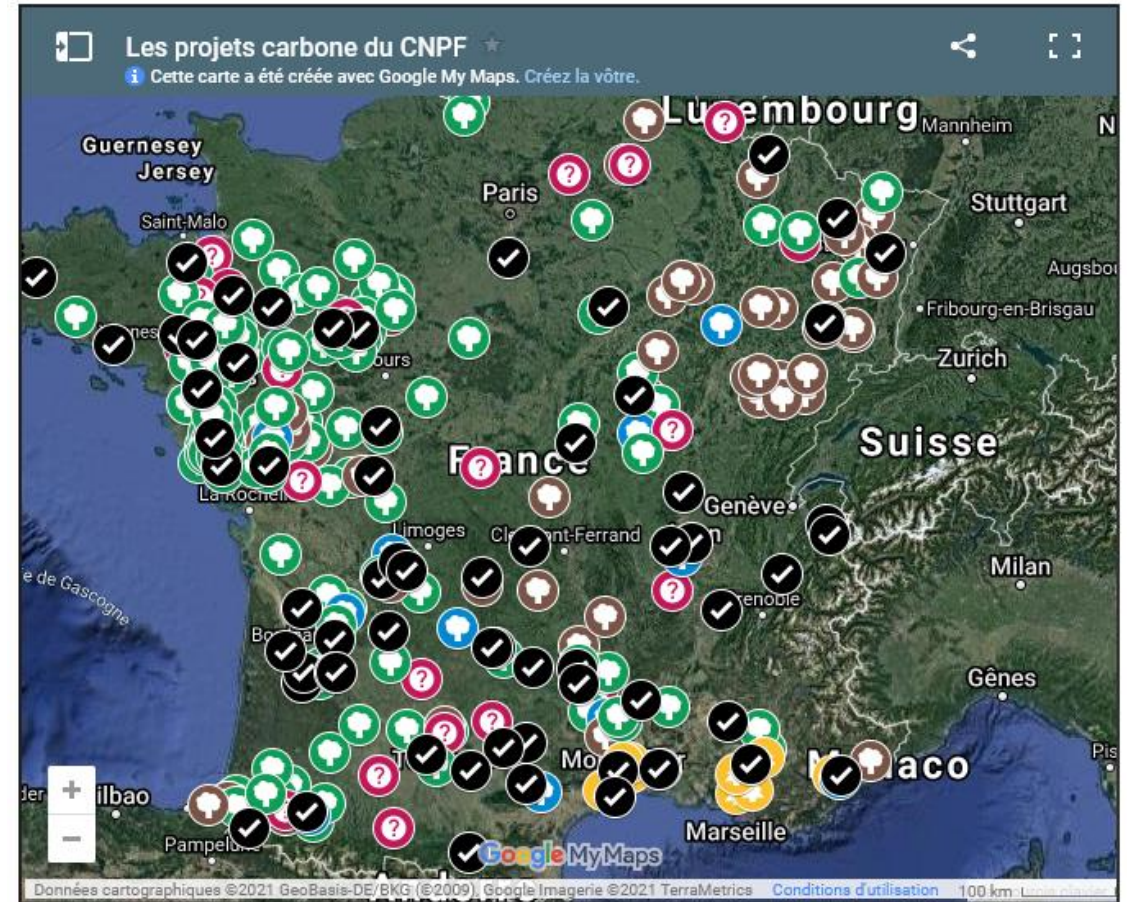


- ▶ “I’m attentive to the expectations of the industry”



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)



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))

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

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.

Negiation type	Number of waterworks	Number of negotiation successes	Number of negotiations failed
Voluntary individual negotiation	12	11	8
First voluntary individual negotiation, later standard agreement	1	Individual: 5 Standard: 51	Individual: 31 Standard: n.a. ^a
Standard agreements	3	8 ^b	3
Agreement without compensation	1	1	0
Individual negotiation with threat of expropriation	1	3–5 ^c	0

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)

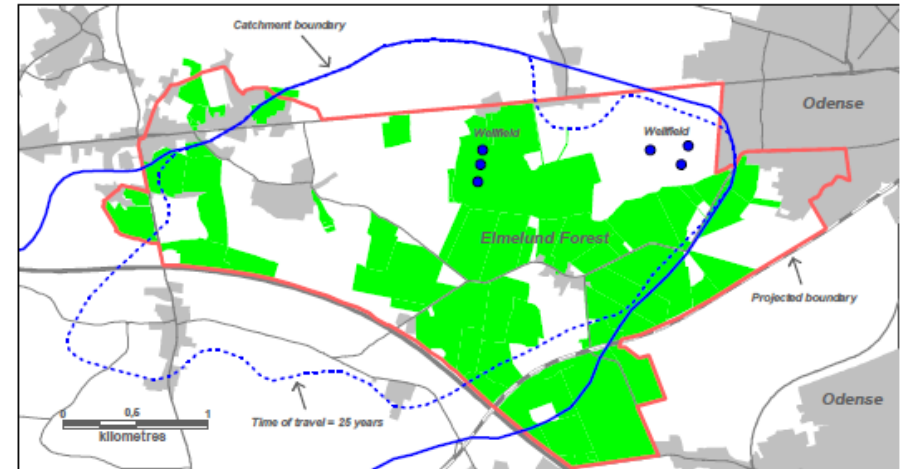
Challenges: Bundles (co-benefits)

- ▶ 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 services (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



The map shows the location of The Elmelund Project. The Elmelund Forest is shown with a green signature and the projected boundary is shown with a red line.

Source: Bjerre and Soendergaard (2016)




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'ation
 - ▶ Services are important in communication
 - ▶ But rather symbolic...



The screenshot shows a crowdfunding interface for a reforestation project. At the top, there is a green button with a shovel icon and the text "I plant here". Below the button, it says "A tree = 3 \$ tax inclusive". The project name is "Dormans" and it has "18 035 tree(s) planted". The description reads "Take part in the rebirth of this forest devastated by a fungus!". There is a link "→ About the project". The "Project benefits" section lists four categories: CLIMATE (2 705 ton(s) of CO2 stored), BIODIVERSITY (54 105 shelter(s) for animals created), HEALTH (72 140 month(s) of oxygen generated), and EMPLOYMENT (18 035 hour(s) of work created).

I plant here





A tree = 3 \$ tax inclusive

Dormans
18 035 tree(s) planted

Take part in the rebirth of this forest devastated by a fungus !

→ About the project

Project benefits










-  **CLIMATE**
2 705 ton(s) of CO2 stored
-  **BIODIVERSITY**
54 105 shelter(s) for animals created
-  **HEALTH**
72 140 month(s) of oxygen generated
-  **EMPLOYMENT**
18 035 hour(s) of work created

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 hypothetical PES scheme (keeping deadwood and old trees) (Abildtrup et al. 2021b)
- ▶ Example of hypothetical choice task in the survey:

Choice 9	No engagement	Engagement 1	Engagement 2	Engagement 3	Engagement 4
Organisation/person to make engagement with		Engagement with forest professionals	Engagement with Administration	Engagement with Local collectives	Engagement with family/civil society
Engagements is public or private	 the engagement of the others are private	 Your engagement is public	 Your engagement is private	 Your engagement is private	 Your engagement is private
Compensation		 free inventory	 free inventory	 free inventory	 No free inventory
Monetary compensation		75 Euros/ha/Yr	100 Euros/ha/Yr	50 Euros/ha/Yr	0 Euros/ha/Yr
Choose →	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

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Thanks for your attention!

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