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Attitudes towards forest ecosystem services provision: what drives the choices of private forest owners in the Veneto region, Italy?

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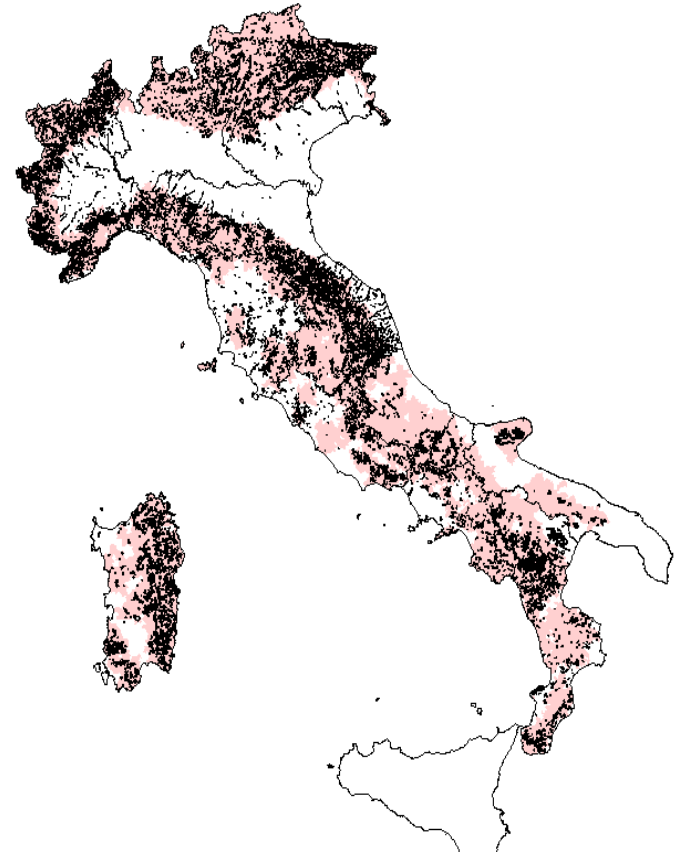
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Forests and forest ownership in Italy

- **Forests: 10.4 M ha**
- **Many different forest ecosystems**
(from Boreal forests in the Alps to Mediterranean shrubs in the Islands; Italian flora: 5,800 species)
→ many different ES!
- **95% in the mountains/hills** (i.e. marginalised, less developed areas)
- **Forest area increasing vs. removals and active management decreasing** → 2-3 M ha under natural conversion to forests, disuse (removals < 1/3 NAI)
- **Only 34% public forests** (mostly Municipalities), **66% (small) private forests** (mostly farms with some forest land; average size: 3 ha/holding + Commons) → **very high fragmentation!**



*Pink areas = mountain
Black spots = land under conversion*

Forests and forest ownership in Italy

Italian forest owners have to cope with:

- Strong international competition for traditional forest production
- Declining local timber markets
- Rapidly **increasing** domestic and international **demand for local and global public goods**



Source: CM Cadore-Longaronese_Zoldano, 2001

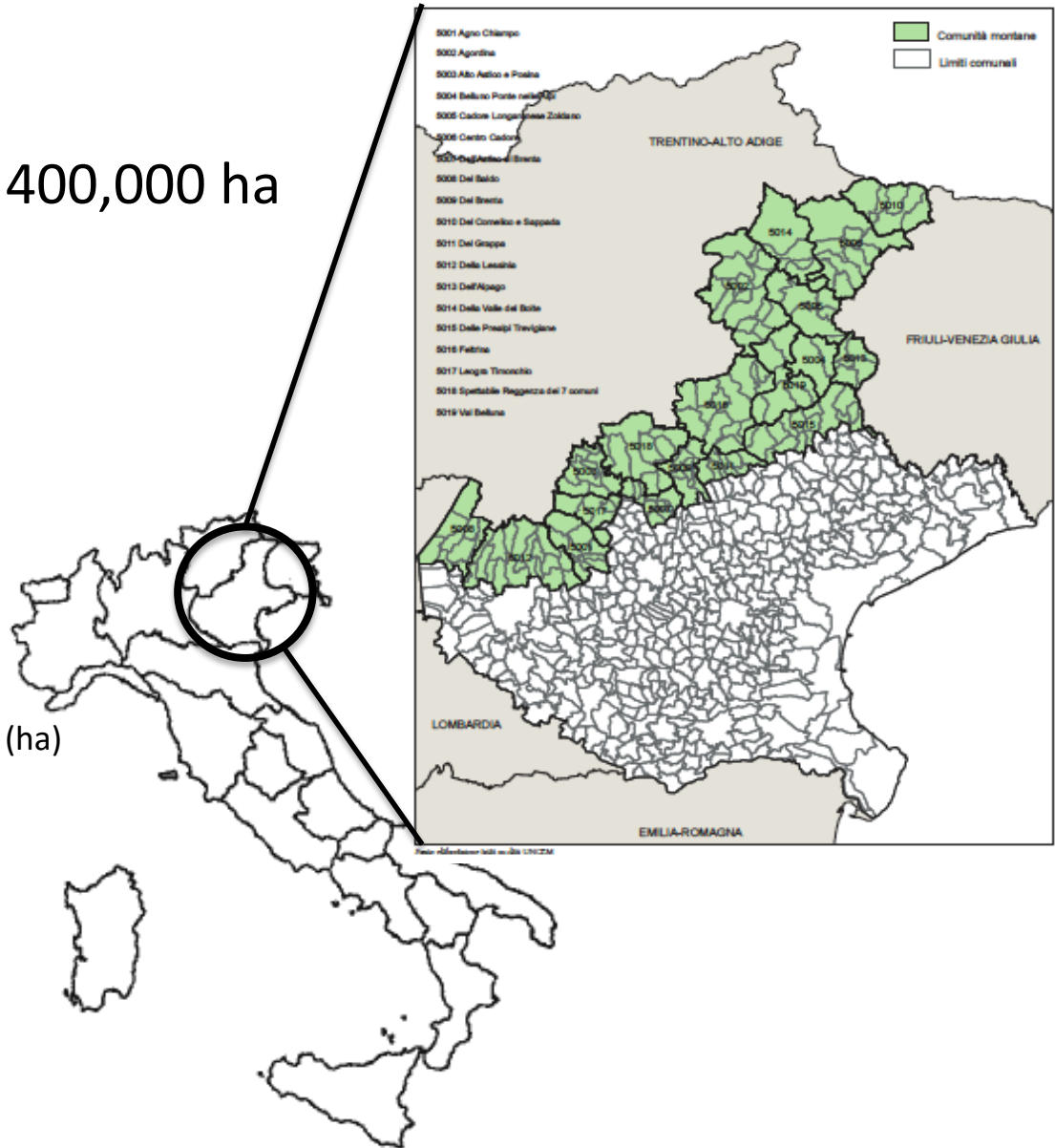
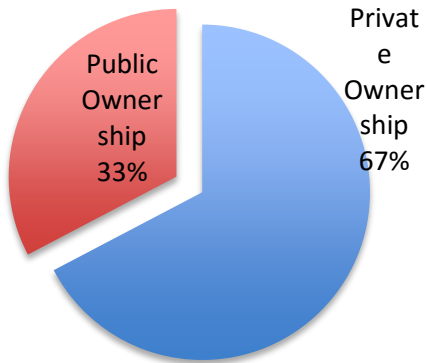
- In agriculture:
 - Long-tradition of literature in agro-environment analysing farmers' attitude to participate into agro-environmental measures (e.g., amongst others: Gasson and Potter, 1973, Morris and Potter, 1995; Beedel and Rehman, 2000; Wilson and Hart, 2001; Wynn et al., 2001,, Vanslebrouck et al., 2002; Defrancesco et al., 2008,, Pascucci et al., 2011; Whitten et al., 2013)
- In forestry:
 - Tradition towards considering forest-owners' values and management objectives (Karpinnen, 1998; Jokinen et al., 1997; Lidestav, 2005; Horne, 2006 Nì Dhubhàin et al, 2007; amongst others)
 - Only more recently, attention towards public policies supporting afforestation to provide public goods (e.g. Vedel et al, 2013 studied contract attributes)

In general, in Southern Europe

- Literature in Spain and Portugal (Campos et al., 2009; Martínez-Jauregui et al., 2016) points out that private consumption objectives related to family privacy, experience of rural lifestyle and self-consumption of recreation, hunting or amenity are important determinants of choices towards nature-oriented forest management
- Otherwise, motivations and attitudes of Southern European owners are scarcely known or documented - Italy practically absent

The Veneto Region

Forest area (2013): nearly 400,000 ha



Veneto Region Forest area by ownership type (ha)

Private Ownership	267.590
Individual forest owners	223.095
Companies	4.078
Other private bodies	31.856
Private Ownership	129.960
State	28.577
Municipalities	97.648
Other public bodies	3.735

The Veneto Region

- **Forest cover almost all in mountain areas**
- **Strict regulations** for any forest operation (clearcut area < 2 ha, natural regeneration, ...) to prevent loss of environmental values → **forestland abandonment**
- Wood harvesting: **1.2 m³/ha/yr (22% of NAI)**
- **1/3 public land**; private land **fragmentation**
- almost no forest owners' association

Forestland ownership fragmentation in Northern Italy (Veneto)



Average parcel size: **800 m²** (parcel = one landowner and one land use)

Given that:

- Studies on Southern European and Mediterranean can add novel and original insights to the body of literature
 - inaction of forest management is associated to high environmental risks (forest fires, land erosion, vulnerability to biotic and abiotic factors): to contrast land abandonment, active silvicultural practices need to be implemented, possibly including ESs
- understanding what motivates forest owners to provide ESs in Italy is urged by the need of increasing resilience of forest ecosystems and integrate such objectives into policy making.

Sampling and surveying

A) Lists of forest owners (FOs) who applied for felling permit at the Forest Authority in the last 10 years (the only available database of forest owners in the Region)

B) FOs were chosen using a nested sampling based on based on the number of felling permit applications in target municipalities

C) Sample then widened through a snowball approach to reach 'absentee owners'

In total, **106 private FOs have been interviewed (semi-structured interviews) during fall 2012** collecting data on:

1. Forest estate characteristics (number of owners, years of ownership, fragmentation, forest/pasture area, assets and infrastructures)
2. Forest management objectives, practices and actions. Role of timber production and costs of forest management.
3. Knowledge of the most important ES (recreation; biodiversity; water and soil erosion prevention; C-sequestration), willingness to implement a ES-oriented management.
4. Owner's socio-demographic characteristics.

The Model

Three ES-specific multinomial logit models (Greene, 2000) have been estimated on the sample data-set:

- biodiversity improvement (BIO)
- hydrogeological protection (HYDRO)
- carbon sequestration (CO2).

$$\eta_{ij} = \ln\left(\frac{P_{ij}}{P_{i0}}\right) = \alpha_j + X_i' \beta_j$$

- where:
- J=1: the forest owner is willing to provide additional ES (over the prescribed baseline) only in return of a payment;
- J=2: the forest owner is willing to provide additional ES (over the prescribed baseline) without any payment;
- J=0 : the baseline: the forest owner is unwilling to provide the ES.

Results: Forest owners' willingness to provide ES by type of provision (observed outcomes - %)

Owners' answer	Ecosystem Services		
	Forest biodiversity	Averted soil erosion ^a	Carbon sequestration
Unwillingness to provide the ES, regardless of payment =0	26.4	29.5	59.4
Willingness to provide the service only in return of a payment=1	22.6	34.3	30.2
Willingness to provide the service without any payment=2	50.9	36.2	10.4

^a For this ES, n=105, due to one refusal to provide an answer.

Results: forest biodiversity model

Compared with the baseline, forest owners willing to provide the ES in return of a payment were found to have a higher perception of the economic value of their property

Those willing to provide the ES without payment were found to :

- have owned the property for a longer time
- have a higher number of children
- attach to their forest estate a sentimental value
- be more inclined towards self-consumption of their wood products rather than market oriented

Compared with the baseline, in both cases forest owners have

- a lower level of education
- perceive that their forest management already protects biodiversity

% of cases correctly classified: 67%.

McFadden pseudo R^2 : = 0,185

Results: averted erosion model

Compared with the baseline, forest owners willing to provide the ES in return of a payment were found:

- to be more oriented towards self-consumption
- to own a forest where conifers predominate

Those willing to provide the ES without payment were found to :

- to own a forest where broadleaves predominate or a mixed forest

Compared with the baseline, in both cases forest owners have:

- the perception that their forest management is already targeted towards averting erosion
- already experienced problems of landslides and soil erosion in the property
- lower education levels

% of cases correctly classified: 64,8%.

McFadden pseudo R^2 : = 0,236

Results: Carbon sequestration model

Compared with the baseline, forest owners willing to provide the ES in return of a payment were found to:

- have a forest where conifers predominate
- perceive that they are already contributing, through forest management, to such service

Those willing to provide the ES without payment were found to :

- have mostly broadleaved forest
- having owned the property for a lower number of years
- be generally older

% of cases correctly classified: 68,9%.

McFadden pseudo R^2 : = 0,256

Discussion

Do findings concur with the existing literature ?
(although not always specific on ES provision)

Biodiversity model: Beach et al. (2005) highlighted that ES provision is positively affected by a certain level of biodiversity already existing in the forest. Campos et al. (2009) pinpoint for Spain how the perception that the property has a value, both economic or sentimental, supports the acceptance of opportunity costs oriented towards production of amenity values for owners and its family

Averted erosion model: low education levels are consistent with Beach et al. (2005) who found similar features for multi-objective owners

Carbon sequestration model: Overall, the less satisfactory results of this model compared con the previous ones can be perhaps explained with the still scarce knowledge by FO of the whole issue of C-sequestration and related markets

Conclusions

The models seem to indicate that motivations to provide ES are very diverse and positively affected by :

1. the **perception by the FOs** that they **are already doing it** (providing the service)
2. The forest composition (broadleaved less market opportunities)
3. the **perception of potential risks**, as those FO who have undergone damages linked to natural hazards are more inclined towards changing their management towards ES provision (*ES as a safety-net, or as a factor of production rather than an outcome*)
4. The orientation towards self-consumption (*ES as amenity values*)
5. Are older and with lower education level and (for biodiversity) have a higher number of children and attach to their forest estate a sentimental value (legacy, bequest values + *ES as an asset*)

Conclusions: policy implications

Rather high proportion of willingness to provide the service even without the payment:

1. public ES spillovers from ES production for private consumption ?
2. For how long ? (old, less educated owners, risks ?)
3. Responsiveness to policy action ?
4. Scope for PES ?



Questions ?

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