AIEAA
ASSOCIAZIONE ITALIANA DI ECONOMIA AGRARIA E APPLICATA

The economic value of forest externalities from the mountain forests in Veneto

Paola Gatto, Enrico Vidale, Davide Pettenella and Laura Secco
Dipartimento Territorio e Sistemi Agro-forestali
Università di Padova

Context

1. Forests produce a large array of ecosystem services, most of which are externalities, therefore no remuneration is provided for producers
2. If producers are not remunerated, their forest management regimes do not achieve social optimum
3. The development of appropriate remuneration tools (such as Payment for Ecosystem Services) requires good knowledge of values at stake
4. Very little is known as regards Veneto Region forest externalities values on a comprehensive large scale
5. Evaluation needs to be undertaken
6. Connections with possible promotion tools (MBMs) can then be identified

The importance of forest ecosystem services in Europe

Forest areas devoted to provision of **Ecosystem Services** in Europe

	Austria	Finland	France	Germany	Italy	Poland	Portugal	Spain	Sweden	Switzerland	Turkey
1990	654	-	758	-	***6816***	1356	-	3260	-	-	932
2000	679	654	872	2981	***7375***	1757	216	4329	-	-	1121
2005	697	497	961	3737	***7654***	1938	232	4407	4344	18	1693
2010	706	466	964	4616	***7933***	1950	232	4631	4514	18	1787

Source: FOREST EUROPE/UNECE/FAO enquiry on Pan-European Quantitative Indicators (2011)

Studies on forest externalities values/1

Average biodiversity and recreational values in European Forests (B*enefit Transfer*; TEEB, 2009)
(Values per hectare– methodology: value transfer)

	Mediterranean EU Latitude 45-65	Northern and Central-Northern EU Latitude 65-71	Scandinavian EU Latitude 35-45
Range US$ (2000)	356-615	123-182	123-255
Average $ (2000)	485.5	152.5	189.0
€ (2000)	379,3	119,1	147.7
€ (2008)	467.1	146.7	181.9

Source: TEEB Report; CLIBIO project cit. in Den Brink et al. (2009); ha/year

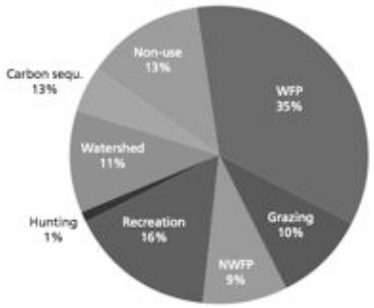
→ **3.706 M € = 9,5 times** the value of market production of Italian forestry

Studies on forest externalities values/2

The Total Economic Value of Mediterranean Forests (Merlo and Croitoru, 2005)

133 €/ha in average

North. M.: **173 €/ha**
South. M.: 70 €/ha
East. M.: 43 €/ha



Source: Merlo and Croitoru, 2005; Palahi *et al.*, 2008

Studies on forest externalities values/3

Total Economic Value of Italian forests
(Contingent Valuation; Tempesta and Marangon, 2008)

Values of Forest Environmental Services:
- WTP: 208,8 € per household/year
- WTP: 4.507 M €/year for all forest area
- WTP: 665,8 €/year/hectare of forest

Including the value of market products (according to ISTAT):
TEV= 722,6 €/hectare

Values at a Regional scale:
With other methods: Gios and Goio (2003) **166 €/ha** for Trentino's forests;
Marangon and Gottardo (2001) for Friuli VG: **373,7 €/ha**

Studies on forest externalities values/4

And what about the Veneto Region ?

- Large and important forest area nearly 450 thous. hectares, 80% in mountain areas
- Areas of outstanding natural beauty, Dolomiti UNESCO Heritage
- Important turistic destination:

Compartment	Arrivals	%	Presence	%
Sea	3847307	26.10	26383732	42.90
Art Cities	7152640	48.53	16178486	26.31
Lake	2174750	14.75	10668950	17.35
Mountain	951620	6.46	5314057	8.64
Thermal springs	612895	4.16	2957012	4.81
Total	14739212	100	61502237	100

Note: daily tourism is not recorded
Source: Regione Veneto, 2011

Studies on forest externalities values/5

- Valuation of ecosystem services by mountain areas exist, but at a more local scale or based on single externalities (e.g. Scarpa and Thiene, 2005; Scarpa et al., 2007)
- No comprehensive valuation of forest services at a regional scale

… plus, from methodological point of view:

- Methodological shift to Choice Experiment for overcoming the limits of Contingent Valuation

(see , amongst other: Bliemer and Rose, 2005; Jacobsen, 2009; Scarpa, Thiene and Hensher, 2010)

…. and the NEWFOREX project …

The NEWFOREX Project

7° FP
New Ways to Value and Market Forest Externalities

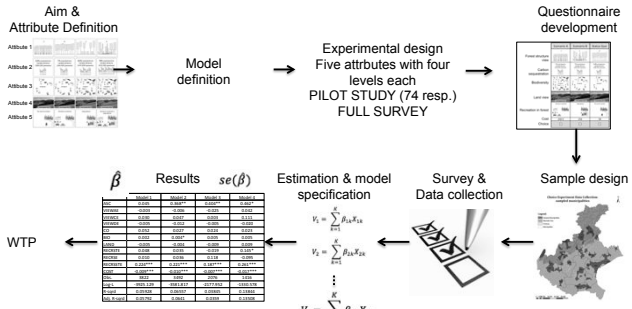
6 case studies, amongst which Veneto Region, as a representation of mountainous areas of Europe

www.newforex.org

Aims of presentation

1. Describe the methodology used to determine the value of four forest externalities in the Veneto Region, namely:
   - Landscape and aesthetic values
   - Carbon sequestration and climate change
   - Biodiversity conservation
   - Recreation
2. Present the results
3. Discuss their implication in the light of developing Market-Based Mechanisms for creating income opportunities for forest owners/managers

Logical framework of metodology and CE model

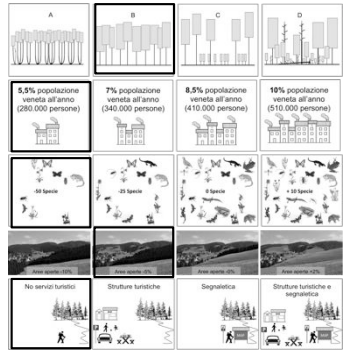


(Rose & Bliemer 2005)

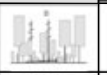
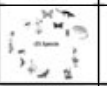
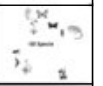
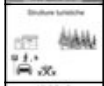
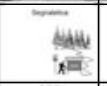
U= utility β= coefficient vector X = vector of attributes ε = error term n = respondent i = chosen alternative t = n. of choice tasks j = n. of alternatives k = attribute number Z = socio-demographic parameters

The five attributes and their levels

1. Forest structure view
2. Carbon sequestration
3. Biodiversity (rate of extinction)
4. Land view
5. Recreation in forest



Example of one choice card

	Scenario A	Scenario B	Status Quo
Forest structure view			
Carbon sequestration			
Biodiversity			
Land view			
Recreation in forest			
Cost	200 €	25€	0€
Choice	☐	☐	☐

Sample design

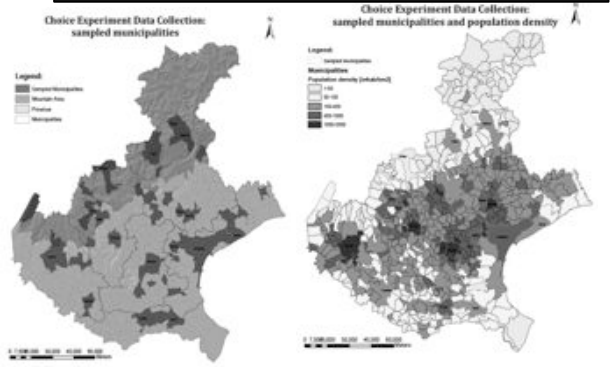
10% of the municipalities in the Veneto Region have been sampled
Three strata:

- Mountain-Plain
- Municipality size (number of residents)
- Class age of interviewed

WTP in terms of annual regional tax per household

Size of municipal population	PROVINCE							Number of interviews
	VR	VI	BL	TV	VE	PD	RO	
0-5,000	**21**	**27**	**12**	**19**	4	21	13	117
5,000-10,000	27	**30**	**5**	21	14	33	3	156
10,000-100,000	47	52	**6**	56	71	51	11	294
Capital town	35	17	**5**	12	37	31	7	144
Total	130	126	28	131	126	136	34	711

Sample design



The models

Linear utility function

$$U_n = b_{0n} + b_{1n}viewA_n + b_{2n}viewC_n + b_{3n}viewD_n + b_{4n}CO2_n + b_{5n}bio_n + b_{6n}land_n + b_{7n}recrST_n + b_{8n}recrS_n + b_{9n}recrSST_n + b_{10n}cost_n$$

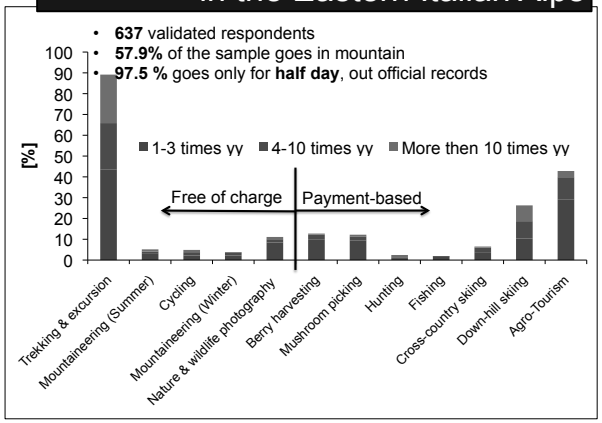
Estimated through Multi-Nominal Logit

Latent Classes based on education, income, place

U_n= utility β= coefficient vector X = vector of attributes ε = error term n = respondent i = chosen alternative t = n. of choice tasks j = n. of alternatives k = attribute number Z = socio-demographic parameters s_{nb} = probability to belong to segment b = [1,2,…,B]

Results: forest recreational uses in the Eastern Italian Alps

- **637** validated respondents
- **57.9%** of the sample goes in mountain
- **97.5 %** goes only for **half day**, out official records

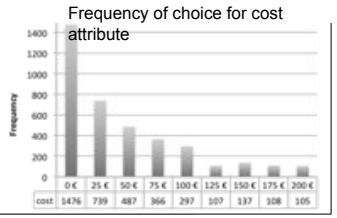


MNL preliminary results

	Model 1
ASC	0.045
VIEWA	-0.003
VIEWC	0.030
VIEWD	-0.005
CO2	0.052
BIODIVERSITY	0.002
LANDSCAPE	-0.005
RECRST	0.048
RECRS	0.010
RECRSST	0.224***
COST	-0.009***
Obs.	3822
Log-L	-3925.129
R-sqrd	0.05928
Adj. R-sqrd	0.05792

	Number of respondents	[%] of protesters	[%] of the sample
it is too costly	55	90.2	8.6
have no enough money	58	95.1	9.1
pay enough taxes	61	100.0	9.6
prefer to spend my money in other things	56	91.8	8.8
The program is not important	35	57.4	5.5
I don't believe it'll be implemented	38	62.3	6.0
Other programs could be better	29	48.3	4.6
I want to leave things like they are now	31	50.8	4.9

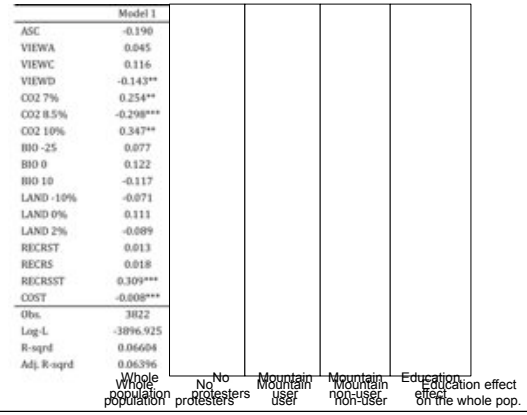
Frequency of choice for cost attribute



Note: starred values represent the p-value : * = 0.10, ** = 0.05, *** = 0.01.

MNL preliminary results: effect of re-coded variables

	Model 1
ASC	-0.190
VIEWA	0.045
VIEWC	0.116
VIEWD	-0.143**
CO2 7%	0.254**
CO2 8.5%	-0.298***
CO2 10%	0.347**
BIO -25	0.077
BIO 0	0.122
BIO 10	-0.117
LAND -10%	-0.071
LAND 0%	0.111
LAND 2%	-0.089
RECRST	0.013
RECRS	0.018
RECRSST	0.309***
COST	-0.008***
Obs.	3822
Log-L	-3896.925
R-sqrd	0.06604
Adj. R-sqrd	0.06396



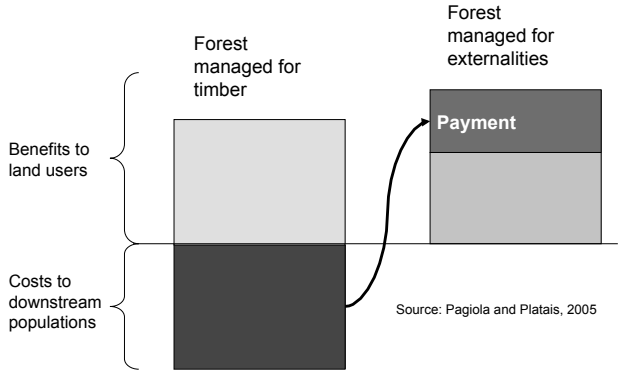
Willingness To Pay (WTP)

	Model 1	Model 2	Model 3	Model 4	Model 5
ASC	0	0	0	0	0
VIEWA	0	0	0	0	0
VIEWC	0	0	0	0	31.77
VIEWD	0	0	0	0	0
CO7	59.11	71.47	0	85.02	40.74
CO85	0	0	0	0	0
CO10	80.88	0	191.61	96.18	0
BIO25	0	0	0	75.82	0
BIO0	0	36.42	0	0	28.95
BIO10	0	0	0	0	23.00
LAND10	0	0	0	0	0
LAND0	0	0	0	0	0
LAND2	0	0	0	0	0
RECRST	0	0	0	0	0
RECRS	0	0	0	0	207.34
RECRSS	71.90	63.70	113.33	95.75	242.54
	Whole population	No protesters	Mountain user	Mountain non-user	Education effect on the whole pop.

Evidences from CE

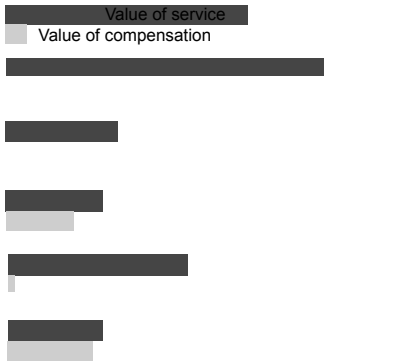
- High number of **protest answers**
- WTP about **50-60 €/year** per household
- Forest aesthetic view and landscape are not perceived as relavant; biodiversity conservation should be a 'public good' (no payment)
- Amongst the four externalities analysed:
- **WTP= 40** € for C sequestration/climate changes
- **WTP= 9-10** € for structured recreational services
- WTP strongly linked to education levels

Conclusions: how to remunerate the service providers in a PES context ?



Conclusions: how to remunerate the service providers in a PES context ?

service	tool
biodiversity	Natura 2000
Erosion prevention	Hydrogeological constraint
C-sequestration	Kyoto P. National Plan
Mushrooms and truffles	Licences and permits
Supply of drinking water	Galli Act
Energy power generation	L. 959/1953



"An issue that can not be clearly measured will be difficult to improve"