Proceedings from the international seminar
20-21 February 2009, Warsaw, Poland:

Countries and forests in transition: Research seminar on the benefits of multi-functional forest policy

Organised by

Warsaw Ecological Economics Centre (WEEC), University of Warsaw, Poland

Econ Pöyry, Oslo, Norway

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Table of Contents

Plenary session III: Environmental valuation & forest policy

3.1 Keynote II: Paula Horne (Research Director, Forest Economics Research Group, PTT, Finland), "Forest valuation and policy: Experiences from Finland".

3.2 Julien Fiquepron, Serge Garcia, Anne Stenger (INFRA & IDF, Institut pour le Développement Forestier, France), "Forests adding value to water quality in a land use perspective"

3.3 Jakub Kronenberg and Joanna Mieszkowicz (University of Lodz & The Aeris Futuro Foundation), "How much is a forest worth for a PR department?"

3.4 Henrik Lindhjem and Eirik Romstad (Econ Pöyry & Norwegian University of Life Sciences) "Eliciting forest owner compensation levels for biodiversity protection: A comparison of two mechanisms"

Annex 1: Program for seminar

Annex 2: Participants list

PREFACE

The use of and attitudes towards forests are undergoing change in Europe. From once being conceived as mainly sources of timber, the wider functions of forests are currently being acknowledged as more important. These functions include the ecosystem services of forest (e.g. uptake of carbon, erosion control, water purification etc), biodiversity, recreation benefits and a range of non-timber forest products (such as berries and mushrooms).

These proceedings report from an international seminar held in Warsaw 20-21. February 2009 on this topic: "Countries & forests in transition: Research seminar on the benefits of multifunctional forest policy".

The proceedings consist of presentations held by seminar participants, organised under three themes:

- Plenary session I: The social value of forests
- Plenary session II: Multi-functional forest policy
- Plenary session III: Environmental valuation & forest policy

There was also a fourth session in connection with the seminar[1]: an open workshop for interested seminar participants on research design for biodiversity and recreation valuation surveys. These surveys are planned as part of an ongoing collaboration project – POLFOREX[2] – between Polish and Norwegian researchers.[3] The project will survey the general population of Poland and recreationists at specific forest sites, to investigate their attitudes, their uses of forests, and their priorities and willingness to pay for multifunctional forest policies. The workshop participants discussed how best to collect data, choose

[1] The presentations from this workshop has not been included with theses proceedings.
[2] "Forests as a public good. Evaluation of social and environmental benefits of forests in Poland to improve management efficiency"
[3] WEEC, Econ Poÿry, Warsaw Forest Research Institute and Norwegian University of Life Sciences.

sites, design surveys and methodological improvements and other technical issues, and stimulated to research cooperation between researchers in this field from different countries.

The seminar and workshop were organised by Warsaw Ecological Economics Center, Faculty of Economic Sciences, Warsaw University and Econ Pöyry of Oslo, Norway. The seminar was financially supported by the Polish Norwegian Research Fund.

We would like to thank the people who participated in the seminar and contributed to the proceedings. Special thanks go to Paula Horne[4] and Jeff Englin[5], our honourable keynote speakers.

Warsaw Ecological Economics Center
Econ Pöyry

Warsaw & Oslo, March 2009

[4] Research Director, Forest Economics Research Group, PTT, Finland.
[5] Professor, Department of Resource Economics, University of Nevada, USA.

Welcome speech

Warsaw University
Warsaw Ecological Economics Center

Public *versus* private benefits in forestry

Tomasz Zylicz
University of Warsaw
http://www.woee.pl/

Faustmann-Clark model

- X – timber stock of economically optimal density and age
- g – annual regeneration rate (corresponding to X)
- i – market discount rate
- e – annual non-timber benefits
- p – price of timber

Sustainable 'logging'

- Harvest only gX
- Timber-related revenues: gXp
- Sustainable logging is efficient if and only if: $gXp/(Xp) \geq i$, i.e. if and only if $g \geq i$

Private value of a forest

- Under sustainability assumption:
- Net Present Value of the annual flow of gXp, i.e. gXp/i
- Without sustainability assumption: Xp

Is sustainability privately efficient?

- Yes, if $gXp/i \geq Xp$, i.e. if $g \geq i$
- Otherwise, there is an incentive to use the forest unsustainably

Introducing non-timber benefits

- Net Present Value of non-timber benefits: e/i
- Total (timber and non-timber) value of the forest: $gXp/i + e/i$
- Total rate of return $TRR(e)=(gXp+e)/(gXp/i+e/i)$

Two propositions

- Proposition I:
  If g<i then TRR(e)<i
- Proposition II:
  If g<i then TRR is monotonically increasing

Corollary

- Adding non-timber benefits helps achieve sustainability
- No matter how large are non-timber benefits, there is an incentive to use the forest unsustainably

Plenary session I – The social value of forests

Valuation of forest recreation in the US

Professor Jeffrey Englin
University of Nevada, Reno

Countries and Forests in Transition

- Topics
  - Biodiversity
  - Stated preferences
  - Scenic beauty
  - Policy
  - Ecological services
  - Social values

Overview

- Old Problems and New Problems
- Data and Methods
  - Behavioral Data
  - Forest Cover Data
- Benefits transfer
- And what about the Bayesians?

Observed vs Stated Preferences

- Used to be the key difference
- Stated Preferences
  - Scope issues
  - Consistency
- Observed Preferences
  - Limited to observable characteristics
  - Bt, based on real behavior
- Recent work has focused on the properties of data collected in different ways and linking stated and observed preference data

Old problems

- What's a trip worth?
- What are forest ecosystems/biodiversity worth?
- What are "improvements " worth?
- How much value does forest fire destroy
  - How about "good" fires
- *And always "worth to whom?"*

What's a trip worth?

- Still a standard
- Easy to incorporate into planning models
- Easy to explain
- Standard Travel Cost
- Count models

What are forest ecosystems/biodiversity worth?

- Needed in many planning contexts
- Lots of models
- Big question: How do you measure a forest eco-system/diversity?
  - Hectares ?
  - Kilometers ?
  - Age ?
  - Species/area unit ?
  - Charismatic species success?
  - Most endangered species success?

What are “improvements “ worth?

- Constant policy question
- Needed in many planning contexts
- Lots of models
- Usually easy to measure

How much value does forest fire destroy ?

- Huge North American problem
- Intensity of modern fires the result of a century of suppression
- Cost is hundreds of millions of dollars per year
- Yet, lower intensity fires are a needed natural element of the eco-system
- Lots of models

New Problems

- How do forestry values evolve through time as the forest changes?
  - Invasive species
  - Climate change
- How do social values evolve – do different generations value things differently?
- What about sudden forest death?
  - Invasive species
  - Climate change

How do forestry values evolve through time as the forest changes?

- The old question was a static one
- New management asks how these values will change as the forest goes through succession and how that affects management
- Especially important when catastrophic change could happen
  - Fire
  - Climate change
  - Invasive species

How do social values evolve?

- Traditional models assume static utility functions
- An awareness that recreational use of nature, including forests, is steadily declining
- Ya-Wen Pang, Tom Holmes and I are looking at cost and cohort effects
  - New generations systematically take fewer forestry related recreation trips

What about sudden forest death?

- Invasive species
  - Chestnut blight was believed to have killed every Chestnut tree in North America
  - Sudden Oak death potentially threatens every oak tree in North America
- Climate change
  - Appears to be systematically changing forest succession

Data

- Behavioral Data
  - Convenience data sets
  - General population data sets
  - On-site sample
- Forest Cover Data
  - On-site sampling
  - Forest surveys
  - Satellite imaging

Convenience data sets

- Usually blind luck
- Often result of pro-active forest managers
- Often find them because of other problems
- Usually are in the middle of great natural experiment
- Pose special challenges using them

Convenience data sets

- There is rarely any demographic data
  - Add demographic data from another source
  - Or, use a fixed effects type model
    - Multinomial logit comes to mind
- There is often incomplete coverage
  - Limits the direct applicability of the parameters
  - Simulate using data from another source

General population data sets

- Great demographic characteristics
- Easy to simulate for any desired population
- Notoriously rotten at being tied to a site
- Rarely have enough specificity to do too much with them
  - Unless they are gathered with specific analyses in mind

A winning example, however

- National Acidic Precipitation Program
- Focus was on finding the specifics on every water based recreation trip for four panels
- Total of ~3000 people were interviewed
  - ~900 anglers
  - ~600 boaters
  - ~600 swimmers
  - rest were non-users

Survey format

- Three tiered survey
  - Screener with demographics and non-use value questions
  - For users questions about themselves and which sites they visited
  - For each site visited the dates and what happened on every trip every site visited. Sites were located by water body name and nearest town
- Used a paper form
- Administered twice (July and September)

Costs and Benefits of General Population Surveys

- Using paper instead of a computer system cut costs in 1989 from $1 million to $200,000
- Study supported national clean air legislation perfectly
- By the late1990's several dozen refereed journal publications had used the data somehow
- *The key was knowing what sites people had actually visited*

On-Site Surveys

- Best way to get good data in a hurry!
- Usually done after something has happened
- Have unfortunate, but understood statistical properties
  - Endogenous stratification
  - Truncation

On-Site Surveys

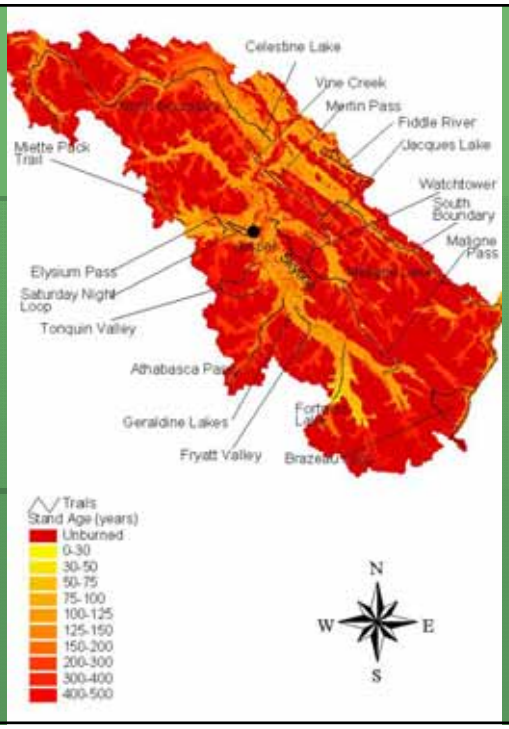
- With stated preference questions making things worse makes the most sense
  - Improving a site should bring in people who not observed in the sample
- Lots of distributions and models to use now
  - Count (Poisson, negative binomial)
  - RUM (logistic)
  - Continuous (exponential, Gamma, log-normal)

Forest Cover Data

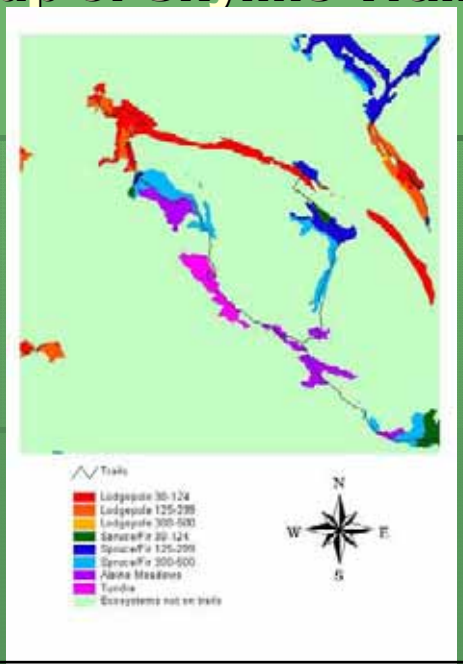
- What does real physical data look like ?
- What does it miss ?
- An example from
  - Englin, J., J. McDonald and K. Moeltner. 2006. "Valuing Ancient Forest Ecosystems: An Analysis of Backcountry Hiking in Jasper National Park." *Ecological Economics*. 57: 665-678.

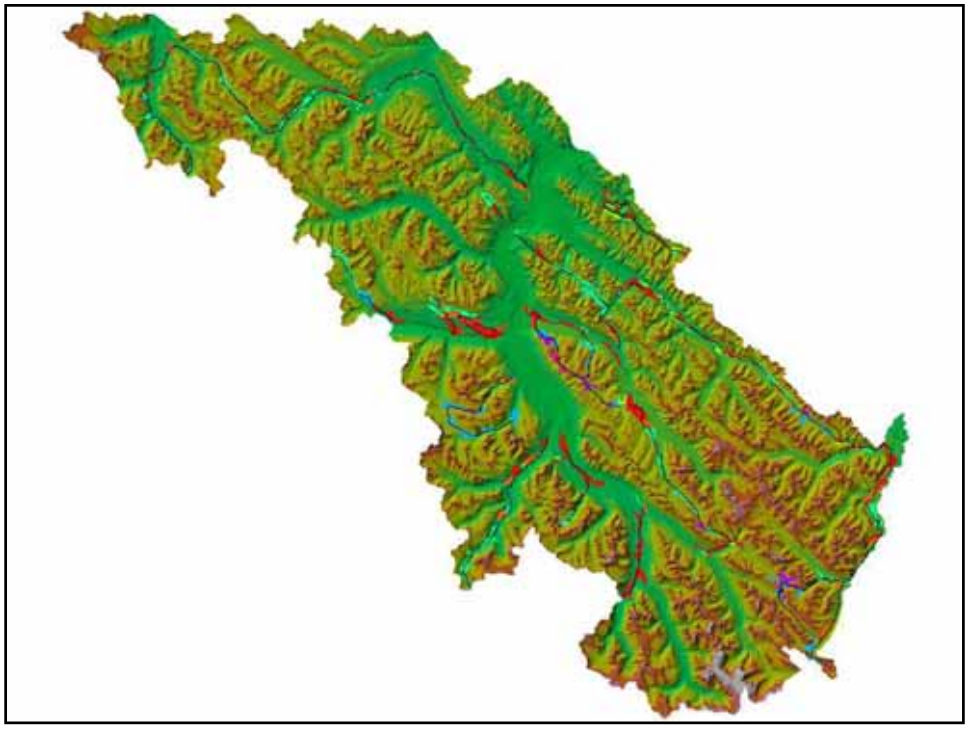
Trail Map

Fire Profile for Jasper National Park



Close up of Skyline Trail

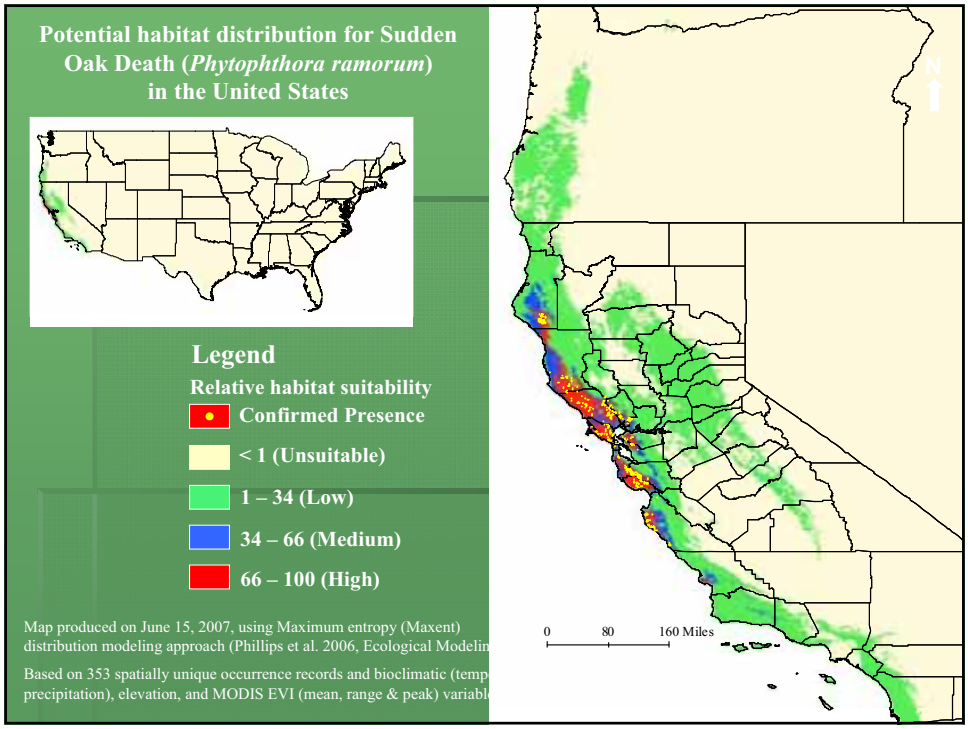




Sudden Oak Death

- A pathogen that showed up in late 1990's in Northern California
  - Don't know for sure where it came from but probably from nursery stock
- Lethal to Oak trees
- Spotty effects on mixed forests
  - Clear affect on residential values
  - How do you value random tree death
  - "If a tree dies in the forest and no one sees is there lost value worth worrying about?"


Sudden Oak Death


Potential habitat distribution for Sudden Oak Death (*Phytophthora ramorum*) in the United States
Legend
Relative habitat suitability
Confirmed Presence
< 1 (Unsuitable)
1 – 34 (Low)
34 – 66 (Medium)
66 – 100 (High)
Map produced on June 15, 2007, using Maximum entropy (Maxent) distribution modeling approach (Phillips et al. 2006, Ecological Modelin
Based on 353 spatially unique occurrence records and bioclimatic (temp precipitation), elevation, and MODIS EVI (mean, range & peak) variabl
N
0
80
160 Miles

Preliminary Results

- Hedonic property value study
- After an infection property values begin to drop
- Affected properties drop 2-5% in value
- Those near affected properties drop 5-8% until oaks are removed
- After 2-4 years housing values return
  - It appears that once a substitute tree is put in all value returns

Bayesian Estimation

- Small sample size easily accommodated – no need to rely on asymptotics.
- Estimation advantages:
  - Complex likelihood functions – MLE is tough, but a Gibbs Sampler pretty much always works.
- Ability to combine a data set with additional information.
- Ease of model comparison – nested or not
- Option to model-average estimation results.

Coming Here Now

- Modern Micro-Econometric Methods (Dept. of Economics, University of Innsbruck, Austria)
- Intensive 3 week course
- https://orawww.uibk.ac.at/public_prod/owa/lfuonline_lv.details?sem_id_in=08S&lvnr_id_in=432164

Conclusion

- Data and methods are tightly linked
- Different data/methods result in values that can be used for different analyses
- The new questions are no longer static
- Dynamic changes are now needed and few exist

Countries & Forests in Transition: Research Seminar on the Benefits of Multi-Functional Forest Policy. 20. /21. Februar 09, Warszawa

Mapping heterogeneous preferences for forest biodiversity using latent class choice models

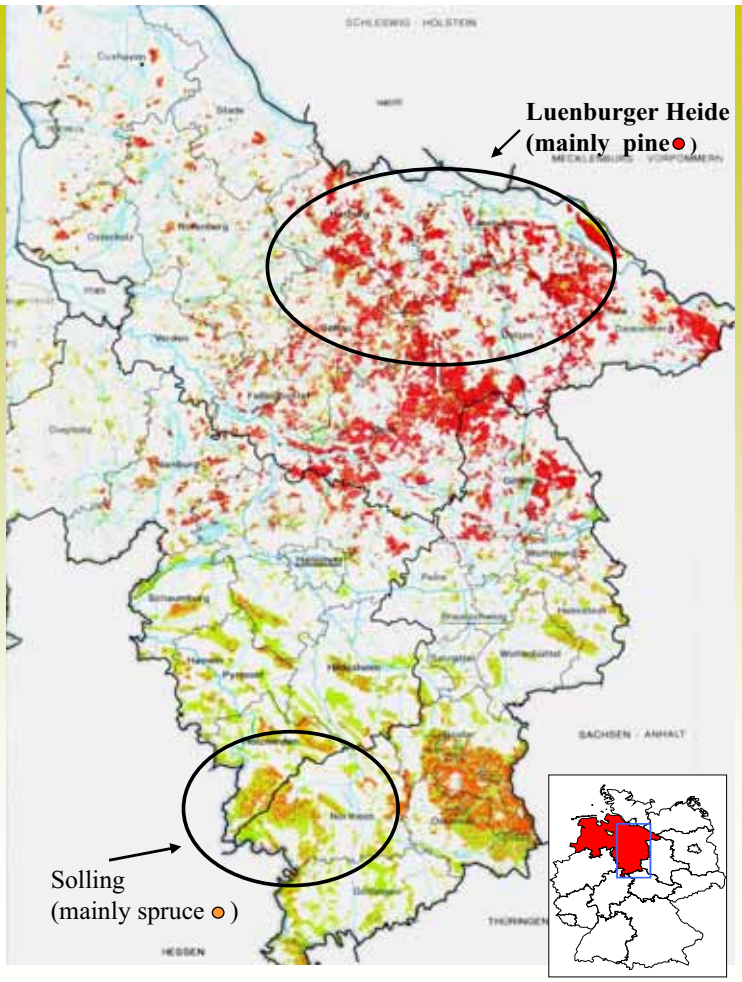
Jürgen Meyerhoff
Technische Universität Berlin

Choice experiment on forest biodiversity (2004)

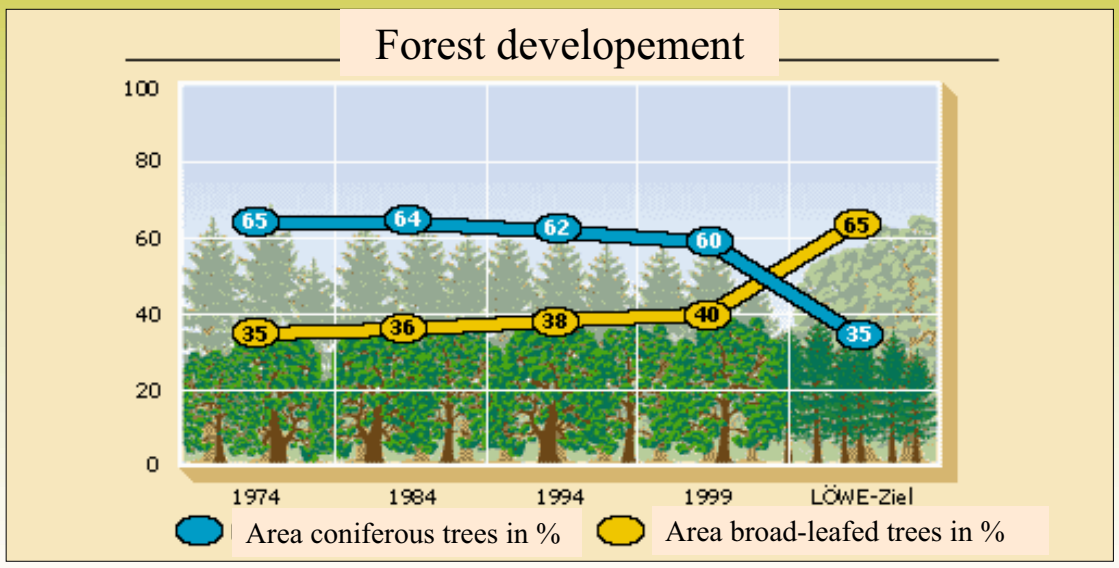
http://www.landschaftsoekonomie.tu-berlin.de/196.html?&L=0

Potential conversion areas

Afforestation was until 1980 mainly done with faster growing coniferous trees.



Changing share of trees -> broad-leaved



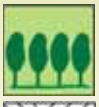
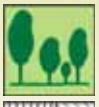
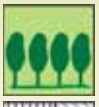
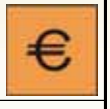
=> Changes will influence forest biodiversity.

Attributes and attribute levels

Attribute	Solling & Harz
Habitat for endangered and protected species (HAB)	low, medium, high
Species diversity (SPD)	medium, high
Forest stand structure (FSS)	low, medium, high
Landscape diversity (LCD)	low, medium, high
Contribution to fund Forest conversion in € per year	5, 10, 20, 35, 50, 75

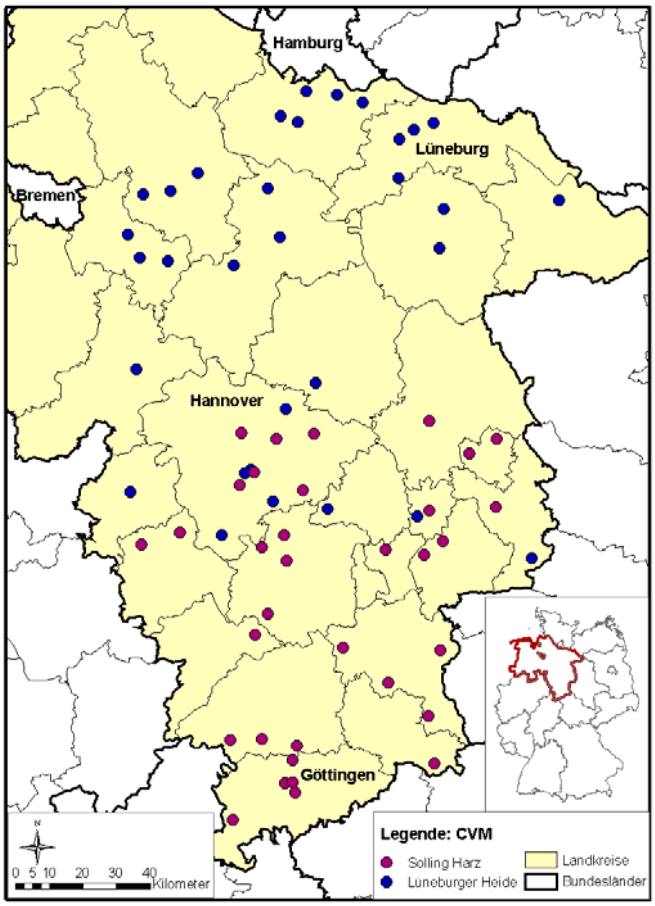
D-efficient design, 36 alternatives -> six subgroups with six choice sets

Example choice set

	without forest conversion 40 % broad-leaved	Program A 70 % broad-leaved	Program B 70 % broad-leaved
Habitat for endangered and protected species	low 	high 	low 
Species diversity	medium 	medium 	medium 
Forest stand structure	low 	high 	low 
Landscape diversity	low 	high 	high 
Contribution to fund "forest conversion"	0 	35 	20 
I choose ☑	☐	☐	☐

Interviews choice experiments

-> in each region ca. 300 interviews
-> face-to-face by survey company
-> on average 30 minutes



Conditional logit

Solling & Harz Region			
	parameter	Sig.	mWTP
ASC_{SQ}	1.01	***	
HAB	0.22	***	9.95 (4.91 – 14.99)
SPD	0.24	***	10.94 (18.54 – 3.29)
FSS	0.05		
LCD	0.09		
PRICE	-0.02	***	
LL_0	-1.712		
LL_{Model}	-1.639		
Pseudo-R^2	0.042		
Observations	1.854		

*** $p < 0.01$

Latent class model of choice

(Unobserved) Preference heterogeneity

1. *Observed*: interactions between attributes, ASCsq, socio-demographics …
   -> do we know the sources?
2. *Unobserved*: Mixed logit estimates individual-specific departures from mean value of utility parameter.
   -> which distribution?
3. *Unobserved*: Latent class models assume that a number of a priori unknown classes exist in a population.
   -> how many segments?

Latent class model (LCM)

- Preferences are homogeneous within latent (unobserved) class, thus heterogeneity is across classes.
- Each individual is member of only one class.
- Class assignment is probabilistic.
- Within class choice is characterised by the IIA property (MNL).

LCM - unconditional joint probability

$$Pr(T(n)) = \sum_{c=1}^{C} \left[\left(\frac{exp(\theta_c z_n)}{\sum_{c=1}^{C} exp(\theta_c z_i)} \right) x \left(\prod_{t(n)}^{T(n)} \frac{exp(\beta_c X_{int})}{\sum_{j=1}^{J} exp(\beta_c X_{jnt})} \right) \right]$$

Class Model

Choice Model

T = total number of choices

C = number of a priori unknown classes

z_n = individual covariats of individual n

X_i = attributes of alternative i

θ_s and β_s are class specific vectors of estimable parameters

Number of classes

- Determination of the number of classes *C* is **not part of the estimation**.
- Thus, standard procedure is to **sequentially estimate models** with increasing *C* and use information theoretic criteria such as AIC or BIC.
- But, **criteria often not clear** thus additional information such as parameter signs or significance — or common sense / guideline of parsimony.

Goodness of fit statistics

Class	Log-L	BIC	AIC	AIC3	CAIC	Npar
1	-1611.02	3256.36	3234.04	3240.04	3262.36	6
2	-1018.57	2145.83	2075.14	2094.14	2164.83	19
3	-949.39	**2081.83**	1962.77	1994.78	**2113.83**	32
4	-914.86	2087.14	1919.73	1964.72	2132.14	45
5	-882.25	2096.28	1880.51	1938.51	2154.29	58
6	-862.23	2130.61	**1866.46**	**1937.46**	2201.60	71

Choice and class model

Choices Model		CL	C1	C2	C3	C4		
	Class size		53%	20%	19%	9%	Set equals zero	Across classes
	HAB	**0,18**	**1,13**	**0,29**	-0,17	**2,81**	0.01	0.01
	SPD	**0,22**	-0,90	**0,52**	-0,07	**3,08**	0.01	0.01
	FSS	0,04	-0,83	0,01	**0,24**	-0,37	0,05	0,04
	LCD	0,10	-0,29	0,10	0,17	**1,09**	0.01	0,04
	PRICE	**-0,02**	**-0,15**	**-0,06**	**-0,03**	**-0,04**	0.01	0,01
	ASCsq	**2,52**	**3,13**	-0,43	**-4,03**	1,06	0.01	0.01
Class Model	**Intercept**		1,21	0,94	-2,24	0,09	**0,02**	
	Age	**0,01**	**0,02**	-0,01	0,01	-0,03	0,06	
	Women	**-0,12**	**0,48**	**0,66**	0,29	**-1,43**	**0,03**	
	Education	**0,28**	**-0,09**	-0,053	0,04	0,10	**0,05**	
	User	**-0,88**	**-0,92**	-0,29	0,15	**1,07**	**0,01**	
	Protest	**0,18**	**0,23**	0,04	0,12	**-0,38**	**0,02**	
	Attitude	**-0,21**	**-0,16**	-0,08	**0,15**	0,09	**0,01**	

Log-L_0: -1712; Log-L_{Model}: -915; Pseudo R^2: 0.47

Bold figures are significant at 5% level

Marginal willingness to pay

	C1	C2	C3	C4
Class size	53%	20%	19%	9%
HAB	**7,53**	**4,83**	**-5,67**	**70,25**
SPD	**-6.00**	**8,67**	**-2,33**	**77.00**
FSS	**-5,53**	**0,17**	**8,00**	**-9,25**
LCD	**-1,93**	**1,67**	**5,67**	**27,25**

Red figures are significant at 5% level

Process heterogeneity

- Choice experiments assume that all respondents consider all attributes — but not all actually do so? (see David Hensher et al., Riccardo Scarpa et al.)
- So what: Ask respondents or define rules.
- Rule based LCM model => certain parameter values are set to zero
- Example: 7 classes
  - 1 class all attributes attended
  - 5 classes one attribute each time not attended
  - 1 class no attribute attended

Process heterogeneity - model

	Classes						
	C1	C2	C3	C4	C5	C6	C7
HAB	β_{11}	$\beta_{12}=0$	β_{13}	β_{14}	β_{15}	β_{16}	$\beta_{17}=0$
SPD	β_{21}	β_{22}	$\beta_{23}=0$	β_{24}	β_{25}	β_{26}	$\beta_{27}=0$
FSS	β_{31}	β_{32}	β_{33}	$\beta_{34}=0$	β_{35}	β_{36}	$\beta_{37}=0$
LCD	β_{41}	β_{42}	β_{43}	β_{44}	$\beta_{45}=0$	β_{46}	$\beta_{47}=0$
PRICE	β_{51}	β_{52}	β_{53}	β_{54}	β_{55}	$\beta_{56}=0$	$\beta_{57}=0$
ASCsq	β_{61}	β_{62}	β_{63}	β_{64}	β_{65}	β_{66}	β_{67}

Process heterogeneity

	C1 7.3%	C2 18.0%	C3 53.0%	C4 10.0%	C5 7.8%	C6 1.8%	C7 1.9%	Set equals zero	Across classes
HAB	**4.38**	—	**1.12**	-0.09	**1.52**	**-4.26**	—	**0.01**	**0.01**
SPD	**5.07**	-0.19	—	0.11	**1.41**	2.55	—	**0.01**	**0.01**
FSS	-0.86	**0.24**	-0.87	—	0.47	**-2.69**	—	**0.01**	**0.01**
LCD	**2.16**	0.15	-0.23	0.50	—	0.29	—	0.09	0.09
PRICE	**-0.08**	**-0.03**	-0.15	-0.18	**-0.06**	—	—	**0.01**	**0.01**
ASCsq	1.18	**-4.29**	**3.51**	**-2.73**	**0.82**	-0.96	0.39	**0.01**	**0.01**
Intercept	-0.08	**-0.83**	**1.91**	0.25	-0.01	**-1.49**	**-1.42**		

Log-L_0: -1712; Log-L_{Model}: -944; R^2: 0.45

Bold figures are significant at 5% level

Conclusions

- LCM shows that preference heterogeneity is present
- Model **fit improves significantly** compared to CL
- Problem is to determine number of classes -> sometimes **between art and science** (at the moment)
- Several studies have shown that LCM outperforms other approaches (e.g., Colombo et al.)
  -> **but: it's not a magic wand** (e.g., constant scale)
- Promising for modelling, e.g., **process heterogeneity**; **serial non-participation** (Burton & Rigby) or **choice task complexity** (Adamowicz & Swait)

Conclusions

- LCM also used for **revealed preference** data
- Results that may be **easier to communicate** to decision makers/policy makers.
- Question for policy action is, however, **whether classes reflect spatial pattern** in the landscape: Where do people live who want a certain forest?
- Respondents could be **located using GIS**
  -> we try to do this at the moment with respect to wind power generation

How to 'Sell' an Environmental Good: Using Labels to Investigate Scope Effects

Mikołaj Czajkowski & Nick Hanley

miq@wne.uw.edu.pl

Outline of the presentation

- Stated preference methods
  - The only source of estimates for non-use values
  - Mainstream economics
- *Scope test*
  - Alternative explanation
  - Value drivers of environmental goods
  - Respondents' WTP might depend not only on physical characteristics of a good being valued, but partly also on the 'label' under which the good is being 'sold'

Explaining Scope Effects, or their absence

- Scope tests
  - Choice Experiment
    - Parameters of 'scope' variables statistically different from 0
    - Explicit test of scope sensitivity
  - Contingent Valuation Method:
    - Internal
      - The same respondents asked about different levels
      - Easier to pass
      - Controls for heterogeneity of respondents
    - External
      - Different levels valued using split sample
  - Evidence of scope sensitivity is mixed …

Explaining Scope Effects, or their absence

- Possible reasons for scope tests failures:
  - Insufficient power of the test
  - Embedding
  - Unclearly defined goods or changes in the levels of their provision
  - Invalid construction of hypothetical market
  - *Warm glow*
    - 'Purchasing moral satisfaction'
    - Problem: the magnitude of warm glow should depend on bid level

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Labels – new approach to thinking about scope effects

- Hypothesis:
  - Elicited value of an environmental good depends not necessarily only on the physical characteristics of the good in question, but also on the 'label' under which it is 'sold'
  - Label
    - Attribute in itself
    - Independent from all the physical (quantifiable) characteristics of the good
    - Depends instead on the respondent's perception regarding the brand
- Alternative explanation of scope test problems

Labels – new approach to thinking about scope effects

- Value of an environmental good:
  - Partly a function of its physical characteristics
  - Partly a function of a label under which it is presented
  - its physical characteristics elicited using stated preference methods

WTPs for two different levels of environmental change
+
the same label
=
'insufficient' sensitivity to scope

Design of the Empirical Study

- Empirical study
  - Labeled choice experiment
  - Biodiversity protection
    - Multi-level biodiversity description
    - Communicate its importance to the respondents
    - Elicit preferences
  - Białowieża Forest (Poland)
    - One of the most important remaining temperate natural lowland forests in Europe
    - Policy context

Biodiversity – the attributes used

- 1. *Natural ecological processes* – natural dynamics, increased area of passive protection
  - *Status quo* – 16% of the area passively protected
  - *Partial improvement* – 30% passively protected
  - *Substantial improvement* – 60% of the area passively protected
- 2. *Rare species of fauna and flora* – known, and yet-unknown species, examples, importance to ecosystem, active protection
  - *Status quo* – a decline threatening total extinction
  - *Partial improvement* – maintaining current populations
  - *Substantial improvement* – maintaining and expanding current populations

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Biodiversity – the attributes used

- 3. *Ecosystem components* – existence of biotopes and ecological niches (dead wood, natural ponds, streams, clearings)
  - *Status quo* – the lack of some components and decrease in the quality of the existing ones
  - *Minor improvement* – regeneration of deteriorating components across 10% of the forest area
  - *Partial improvement* – regeneration and protection across 30%
  - *Substantial improvement* – regeneration and protection across 60%
- 4. Cost
  - Additional compulsory tax to be paid for the following 10 years

The label

- National park in the Bialowieża Forest
  - Currently 16% of the area
  - Extending the national park
  - Association with other characteristics
    - Focus groups
    - National parks in Poland
    - No change in probability / quality of provision
- Other form of protection
- *Status quo*

Experimental design

- Experimental design
  - 32 choice sets
  - 8 questionnaire versions
  - L^{MA} factorial design
- 400 questionnaires
  - 4 choice sets / respondent
  - 1600 choice observations

	Option A:	Option B:	Option C:
	Status Quo	Extension of the National Park	Other Form of Protection
Natural Ecological Proceses	**no change –** protection of natural ecological proceses at 16% of the forest area	**no change –** protection of natural ecological proceses at 16% of the forest area	**no change –** protection of natural ecological proceses at 16% of the forest area
Rare Species of Fauna and Flora	**no change –** decline threatening extinction	**substantial improvement –** better condition of current standings and their expansion	**partial improvement –** maintaining and better condition of current standings
Ecosystem Components	**no change –** lack of some components and decrease in quality of the existing ones	**minor improvement –** regeneration of deteriorated components on 10% of the forest area	**partial improvement –** regeneration of deteriorated components on 30% of the forest area
Cost – your tax increase (yearly)	0 zł	50 zł	10 zł
CHOICE	☐	☐	☐

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Modeling

- Multiple modeling approaches tried
- Final – Covariance Heterogeneity Nested Logit
  - Preference heterogeneity
  - Non-constant error variances

Results – the model

Variable	**Coefficient**	**s.e.**	***p-value***
Natural Ecological Processes (1-level improvement)	0.29**	0.1151	0.0117
Natural Ecological Processes (2-level improvement)	0.50***	0.1472	0.0006
Rare Species (improvement)	0.31***	0.1101	0.0045
Ecosystem Components (1-level improvement)	0.33**	0.1321	0.0135
Ecosystem Components (2-level improvement)	0.39***	0.1413	0.0062
Ecosystem Components (3-level improvement)	0.44***	0.1486	0.0032
PARK (alternative specific constant)	0.94***	0.1507	0.0000
Cost	– 0.03***	0.0044	0.0000
Inclusive value parameter	0.68***	0.1284	0.0000
Covariates in Inclusive Value Parameter			
Household income	– 1.26**	0.6573	0.0546
Previous visit to the site	– 1.95**	0.8883	0.0278
Future visit to the site	– 1.17**	0.5145	0.0229

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Results – implicit prices [EUR]

Attribute	Implicit price	s.e.	*p-value*
Natural Ecological Processes (1-level improvement)	2.47	0.9828	0.0120
Natural Ecological Processes (2-level improvement)	4.28	1.1921	0.0003
Rare Species (improvement)	2.66	0.9603	0.0056
Ecosystem Components (1-level improvement)	2.78	1.1310	0.0140
Ecosystem Components (2-level improvement)	3.30	1.1614	0.0046
Ecosystem Components (3-level improvement)	3.73	1.2104	0.0021
PARK (alternative specific constant)	7.97	1.2417	0.0000

Welfare measures – policy scenarios [EUR]

- Scenarios:

Attributes	Policy scenario 'LO'	Policy scenario 'HI'
Natural Ecological Processes	1-level improvement	2-level improvement
Rare Species	improvement	improvement
Ecosystem Components	1-level improvement	3-level improvement

- Welfare measures including the label:

Policy	Welfare estimate	90% C. I.	Standard error
LO	15.49	11.28 – 22.21	1.5367
HI	18.25	13.86 – 25.03	1.6348

- Welfare measures excluding the label:

Policy	Welfare estimate	90% C. I.	Standard error
LO	7.52	5.58 – 10.74	1.4903
HI	10.28	7.97 – 13.80	1.7034

Scope sensitivity

- Are the welfare measures of the two policy scenarios different?
  - Non-overlapping confidence intervals method:
    - With the label: *p-value* = 0.33
    - Without the label: *p-value* = 0.19
  - Convolutions method:
    - With the label: *p-value* = 0.27
    - Without the label: *p-value* = 0.12

Conclusions

- Controlling for labels – presence of scope effects
- Label – significant share of elicited welfare measure
  - Even if not associated with any physical attributes
  - Include / exclude in welfare measures for CBA?
- Results extendable to CV
- Identifying labels

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Composite Approach of Forest Scenic Beauty Model and Choice Experiment

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Charles University Environment Center

University of Warsaw
20-21 February, 2009

Aim of presentation

- To analyze the individuals' **aesthetical perceptions** of the appearance of mountain forest stands using **scenic beauty estimation** method
- To estimate the **preferences of recreationists** for alternative forest sites as a function of site characteristics using choice experiment
- To estimate **welfare measures** of different attributes of forest recreation, including the aesthetical functions

Scenic beauty estimation

- Seminal work of **Daniel and Boster** (1976) – introduction of the Scenic Beauty Estimation method
- Impacts on scenic beauty of various timber harvest procedures assessed in many studies
- Perceptual and aesthetic judgments of observer panels → yields unbiased indices of perceived scenic beauty
- Observers are shown color slides representing different quality of forest stands → rating from a Likert-type (1 to 10) scenic beauty scale
- 1 to 10 scale ratings are transformed to standardized *z* score → thus the difference in the evaluation criteria among different observers avoided

Literature on economic valuation of aesthetical functions of forests stands

- **Walsh, Olienyk (1981)**
- Reduction from the aesthetic beauty of the forests in the Colorado Front Range
- Mountain pine beetles attack on ponderosa pine trees
- CVM – iterative bidding technique
- Change in several quality attributes depicted by color photos
- 1 % decrease in number of trees reduces WTP per day by $4.1 (1980)

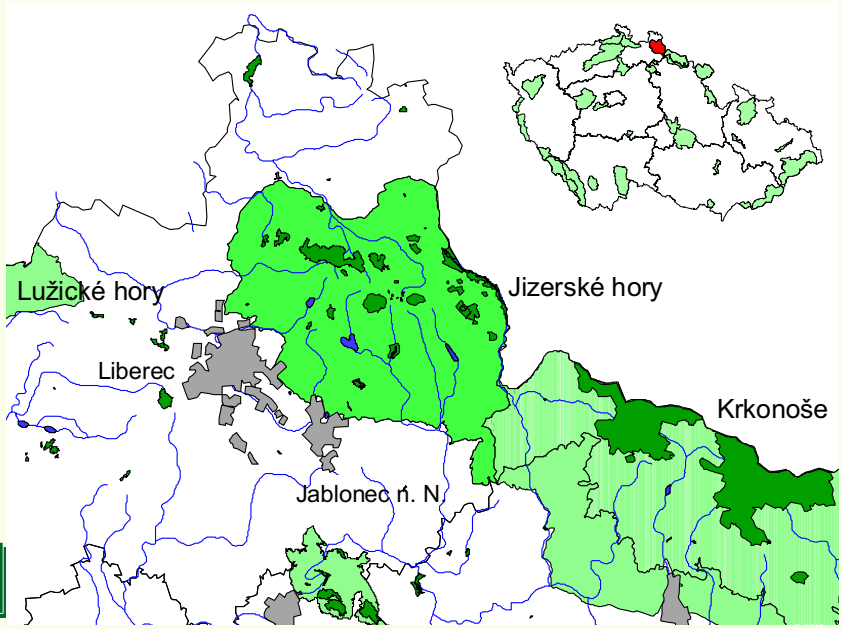
Economic valuation, con 't

- **Daniel et al. (1989)**
- Comparison of campers' photo-based scenic beauty judgments with the judgments of their WTP to camp at the forest sites
- Perfect linear relationship between the scenic beauty and WTP judgments
- CVM and SBE valuation in 11 Forest Service campground in the northern Arizona
- Positive effects on scenic beauty
  - Large trees
  - Openness in the forest stand
  - The lack of downed wood

Economic valuation, con 't

- **Fanariotte, Skures (2004)**
- Preserving alepo pines from forest fires in Greece
- CVM - dichotomous choice
- Scenario: to protect forests from fires and achieve over 50 % reduction of forest fires
- Indicators of individuals' aesthetic perception were included as explanatory variables
- Omission of SB variables overestimated the results
- The higher probability of bid acceptance:
  - The lower the aesthetic indicator assigned to burned forests
  - The higher the scenic beauty assigned to unburned forest sites

Study area – Jizerske hory Mts.



Changes in recreational and aesthetical values

- Protected Landscape Area in 1968
- Most of forest ecosystems damaged and deforested since the 70's
  - air pollution, insect infestation, changes in forestry composition
- Nowadays 68% of the spruce wood is defoliated and damaged
- Forestry management practice and protection measures:
  - afforestation of the central part
  - changes in tree composition, planting broad-leave trees
  - Natura 2000 preservation areas, bird area: black grouse & little owl

Scenic beauty estimation procedure

- Different forest stands inventoried in the area
- Photo-sampling during summer 2005
- Sampling procedure (Daniel, Boster 1976)
- „near view“ scenes without dominant objects
- Color-slides were shot
- 4 broad types of forest stands: spruce forest, broad leaved, immature spruce forest, dead forest
- 80 slides selected from 240 photos
- Panel of observers: students, recreationist
- 12 representative photos selected

Example from SBE rating

Not appealing	1	2	3	4	5	6	7	8	9	10	Appealing

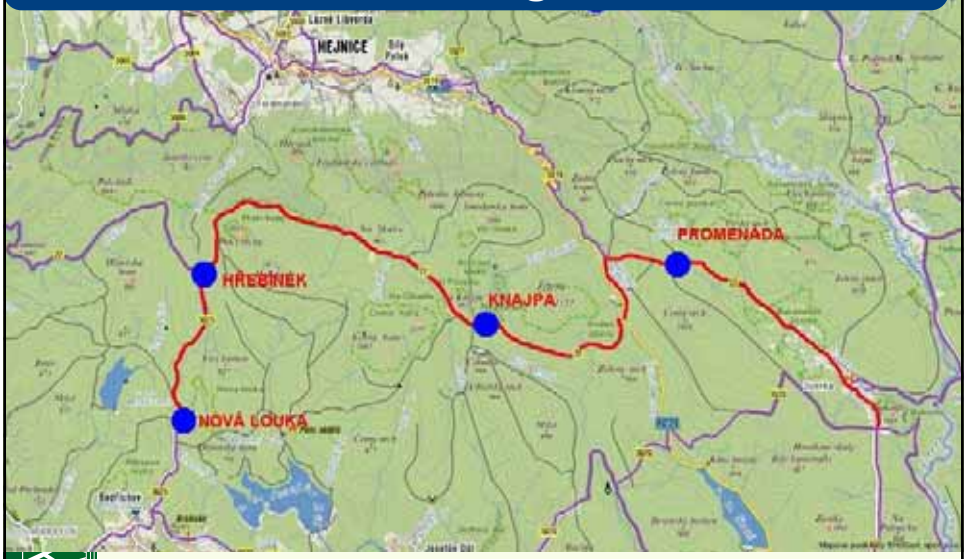
Results from SBE study

Photo	Forest type	MEAN	Z	STDDEV	SBE
1	high spruce forest	6.79	0.21	0.61	28.69
2	immature forest	6.45	0.08	0.66	7.17
3	dead forest	2.63	-1.23	0.71	-151.62
4	immature forest	8.25	0.74	0.6	86.89
5	high spruce forest	7.1	0.3	0.55	42.89
6	broad-leaved trees	8.14	0.67	0.55	88.67
7	high spruce forest	7.18	0.32	0.53	47.29
8	broad-leaved trees	7.96	0.61	0.53	74.49
9	dead forest	2.61	-1.25	0.54	-166.43
10	broad-leaved trees	7.83	0.55	0.55	73.5
11	immature forest	7.04	0.31	0.69	32.61
12	dead forest	2.44	-1.3	0.58	-164.13

Sampling procedure

- **Summer** activities ⇒ target population
  - hiking
  - mountain biking
- **On-site sampling**:
  - users intercepted at the site
  - In-person survey (14 minutes)
- **Representativeness of sample** ⇒ 2 stage selection of recreation users
  1. Selection of interviewing sites by judgment ⇒ refreshment points and intersection of tourists trails
  2. Systematic sampling: interviewing every e. g. 3rd person entering the site
- **Final surveys (7 - 10/2007)**
  - total of 722 completed questionnaires

Interviewing sites



Attributes in choice experiment

- Surface type of hiking trail
  - Panel, Asphalt, Sandy stabilized, Forest trail
- Type of forest stand visually displayed
  - High spruce forest, Broad-leaved forest, Immature spruce forest, Dead forest
- Crowdedness by hikers
  - Low, middle, high
- Travel distance to the recreation area
  - 15, 30, 60 and 120 km

Forest type attribute

Dead forest

Immature of spruce

Broad-leaved

Spruce forest

recreation area 1

recreation area 2

Econometric model used

- Random utility theory
- Discrete choice modeling
- Conditional logit with fixed effects applied
  - Model 1 without SBE interactions
  - Model 2 with SBE interactions

Model 1 (without SBE interactions)

Conditional (fixed-effects) logistic regression

Number of observation = 10412 Log likelihood = -3134

LR chi2(9) = 948.56 Pseudo R2 = 0.1314

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
price	-0.004	0.00	-15.56	0.00	0.00	0.00
not crowded	0.83	0.05	16.82	0.00	0.73	0.93
very crowded	-1.02	0.06	-16.67	0.00	-1.15	-0.90
trail_panel	-0.39	0.06	-7.00	0.00	-0.51	-0.28
trail_stabilized	0.37	0.04	8.50	0.00	0.28	0.45
trail_forest	0.11	0.04	2.39	0.02	0.02	0.19
trees_dead	-0.97	0.06	-16.94	0.00	-1.08	-0.85
trees_beech	0.19	0.06	3.15	0.00	0.07	0.32
trees_immature	0.18	0.04	4.85	0.00	0.11	0.25

Model 2 (with SBE interactions)

Conditional (fixed-effects) logistic regression

Number of observation = 10412 Log likelihood = -3103

LR chi2(15) = 1010.12 Pseudo R2 = 0.14

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
price	-0.005	0.00	-15.86	0.00	-0.01	0.00
not crowded	0.99	0.06	17.61	0.00	0.88	1.10
very crowded	-1.17	0.07	-16.98	0.00	-1.31	-1.04
trail_panel	-0.40	0.06	-7.07	0.00	-0.51	-0.29
trail_stabilized	0.44	0.05	8.97	0.00	0.34	0.53
trail_forest	0.11	0.05	2.51	0.01	0.02	0.20
trees_dead	-0.98	0.06	-17.08	0.00	-1.09	-0.87
trees_beech	0.20	0.06	3.19	0.00	0.08	0.32
trees_immature	0.18	0.04	4.91	0.00	0.11	0.26
forest trail_immature	-0.09	0.04	-2.03	0.04	-0.18	0.00
price_spruce	0.001	0.00	4.53	0.00	0.00	0.00
not crowded_spruce	-0.40	0.06	-6.77	0.00	-0.52	-0.29
very crowded_spruce	0.41	0.08	4.81	0.00	0.24	0.57
stabilized trail_spruce	-0.19	0.06	-2.86	0.00	-0.31	-0.06
not crowded_immature	-0.07	0.04	-1.78	0.08	-0.14	0.01

Likelihood-ratio test: Model 1 nested in model 2
LR chi2(6) = 61.56 Prob > chi2 = 0.0000

Implicit price in CZK and € of 2007

Implicit price	CZK	€
not crowded	218	7.8
very crowded	-258	-9.2
trail_panel	-88	-3.2
trail_stabilized	96	3.4
trail_forest	25	0.9
trees_dead	-216	-7.7
trees_beech	44	1.6
trees_immature	40	1.4

Conclusions

- Surface type of hiking trail, type of forest stand, crowdedness by hikers, travel distance to the recreation area are **significant explanatory** variables influencing recreationist's utility
- **High disutility** is associated with high crowdedness in the are and visible dead trees scenes
- **SBE** and **CE** regarding to the individuals' **aesthetical perceptions** bring same results
- **Further work** – application of nested logit for opt-out option and to test IIA

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Plenary session II – Multi-functional forest policy

Multifunctional Forestry Instruments-- Potential Efficiency in Albania-

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Anesti Postoli Professor, Agriculture Univerity of Tirana

Introduction

- Background: Albania's economy, accession to the EU and its natural resources base
- Albania Forestry Strategy
- Forestry Instruments Proposed in the Strategy
- General Classification of Forestry Instruments
- Efficiency of Forestry Instruments
- Albanian Instruments Efficiency
- Conclusions

Albania's Economy

- Before 1990: communist regime living in autarchy with 65% of the active population working in Agriculture and 25 % in polluting heavy industry
- Transition: in 1992 GDP dropped by 65%, the budget deficit was half the GDP, imports soared resulting in high inflation of more than 10%/month

Albania's Economy (cont'd)

- 1993-1997: 70% of the economy is privatized, drastic liberalization of prices, trade and the currency, tight fiscal and monetary policies, brought down inflation to 7% a year, the budget deficit to 10% of GDP, stabilize the currency and brought the highest GDP growth (9.5%) in EE transition economies
- 1997: Ponti scheme brought the economy down, inspired Madoff, and governance problems provoked the Albanian diasporas throughout Europe

Albania's Economy (cont'd)

- 2000 decade: economic growth of 5% is one of the highest in EE and decreased poverty from 25 to 19% of the population
- but the country stays one of the poorest in Europe with a GDP/ capita of around €2500, trade deficit continues at over 2 billion a year, and social services delivery are problematic.
- Governance bar investments but growth is sustained by remittances

EU Accession

- Albania signed a Stabilization and Association Agreement (SAA) with the EU in June 2006 and is moving ahead in the implementation of its interim agreement
- Constraints for candidate status: governance and weak institutions to implement the *Acquis Communautaires*
- Albania's National Strategy for Socio-Economic Development (NSSED, 2003) took stock of the problem since the two overall objectives are to improve governance and economic growth to reduce poverty.

Natural Resources Base

- 28,750 km2 of which sixty percent is above 600m elevation with prevailing steep slope of around 30% on average.
- The three main ecological zones are the coastal plain, the hilly sub-mountainous and mountainous zones
- Albania has over one million hectares of *forests* (37% of the territory) half of which is high forest, and the rest is equally divided among coppicing forest (mining and fuelwood for 90% of the population) and shrub or maquis

Natural Resources Base (Cont'd)

- *Biodiversity* exists in a diversity of landscape home of 3,200 species of vascular plants or 30% of all Europeans flora, and 756 vertebrate species including in the high forests wolves, bears, lynx, wild goats and birds communities associated with virgin forests

Natural Resources Base (Cont'd)

- *Water* is strategically important to irrigate agriculture land but also for hydroelectric production, the main source of electricity in Albania; watershed management is strategic
- One third of the territory is used for *grazing* (1 M hectares) on pasture, forest and agriculture land. Half the population is involved to some degree with transhumance herding mainly of sheep and goats. The tragedy of the common brings fire and erosion problems

Natural Resources Base (Cont'd)

- Marine and aquaculture *fishery* resources have good potential but are barely managed with serious over-harvesting in the Adriatic.
- The main overlying issue in the management of the natural resources is the clarity of land ownership bringing illegal logging, overgrazing and overfishing

Natural Resources Base (Cont'd)

- Albania was part of the Ottoman Empire until 1912, land administration and a cadastre had never existed formally in the country prior to its independence. Land was on clan (*fis*) ownership and responded to customary laws contained in various rules (*Kanun*). Villages were distinguised by clans and extended families. The clan is organized around the *pater familias.* He has official ownership of the land and distributes its use to the family male members. Inheritance is patrilineal

Albania Forestry Strategy

- Five strategic goals are proposed:
- (1) to maintain ecosystems and biodiversity;
- (2) to manage sustainably forests and pastures; (3) to foster private economic growth of the sector;
- (4) to devolve ownerships to communes and individuals who have titles from before the communist system; and
- (5) to prepare a new forest law and reform, decentralize, the relevant institutions.

Forestry Instruments Proposed in the Strategy

- The instruments proposed to translate these goals into realities distinguished for each goal, some strategic lines with several objectives for each lines and a series of actions or instruments for each objective.

General Classification of Forestry Instruments

- Traditional instruments
- New Instruments
- Mix of Instruments

Efficiency of Forestry Instruments

- Dual Financial-Economic analysis
- Financial analysis: private analysis
- Economic analysis: shadow pricing
- If NPW_f greater than 0 no instrument required
- If NPW_f negative and $MNPW_e$ is positive some instruments could be needed on efficiency ground

Albanian Instruments Efficiency

- Prerequisite: rule of law, market economy in place, clear property rights
- Efficiency comes from careful implementation: anticipation of the proper with/without scenarios
- Community Forest Management: distinguish: *Powerless spectator* , *Coping actor* and *Adaptive manager* communities

Albanian Instruments Efficiency (Cont'd)

- Rule of law: illegal logging
- Market economy: policy and institutional failures need to be redressed before tackling market failures: get the prices right
- Settle the land law, survey the land, organize the cadastre
- Rank the communes for priority actions and capacity building

Albanian Instruments Efficiency

- When these prerequisites are done: focus on building institutions, with due importance given to knowledge institutions
- Then study each instruments passing the efficiency test to establish priorities between instruments but also within a particular instrument

Conclusions

- Important prerequisite for efficiency of forestry instruments in Albania
- Good mix of instruments
- Devil is in the details: proper with :without analysis and sociological studies of the instruments
- Accession to EU: the state of the Forestry Resources reflects on the country good governance

Countries & Forest in Transition:
Research seminar on the benefits of multifunctional forest policy

BIODIVERSITY CONSERVATION THROUGH PRIVATE SECTOR

Zenon Tederko
Polish Society for the Protection of Birds
&
Pro-Biodiversity Service

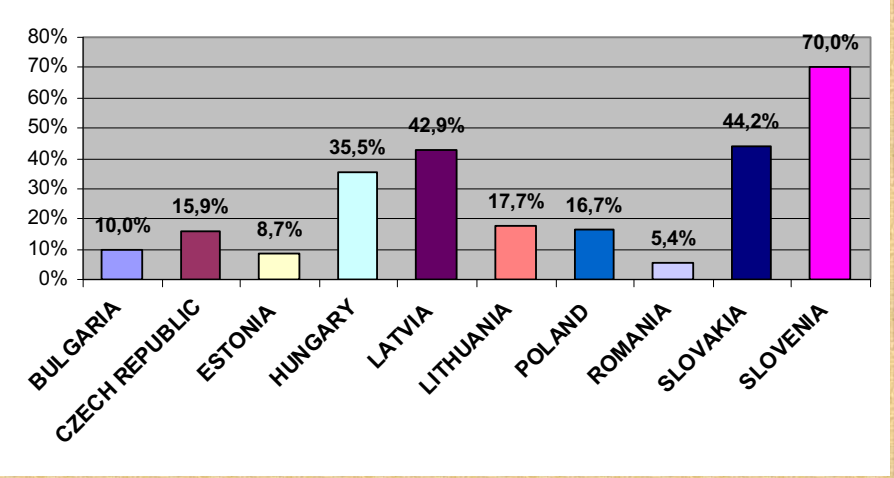
PRIVATE FORESTS IN CEE

- The drastic political, economic and social transformation process in CEE had an effect on the forest sector as well.
- The most important transformation to take place in the forest sector was the change in ownership patterns.
- After World War II, almost all private forest holdings in the region were nationalized and collectivized.

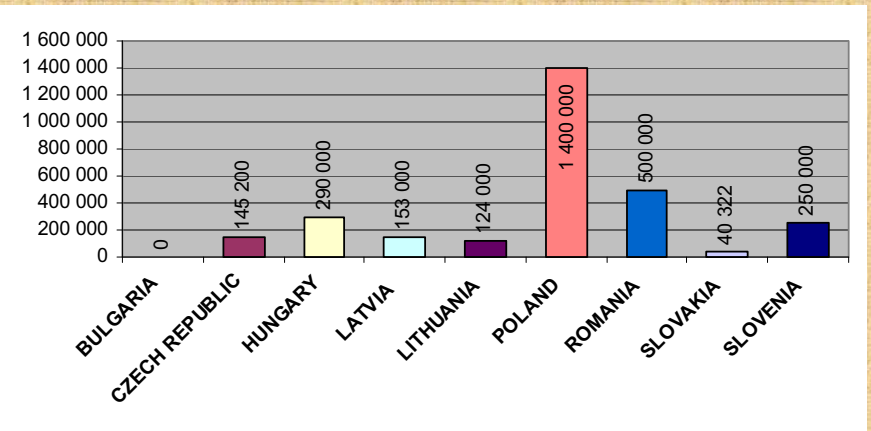
  The exceptions were:

  – Slovenia (only 20% of private forests were nationalized while 2/3 of the forest area remained private throughout the socialist period), and
  – Poland (only large and medium-sized properties were nationalized; 16% of the total forest area remained private throughout the socialist period).

SHARE OF PRIVATE FOREST AREA IN TOTAL FOREST AREA



NUMBER OF PRIVATE FOREST OWNERS

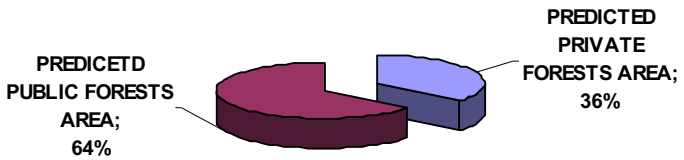


PRIVATE FOREST OWNERSHIP

- At the beginning of the 1990s, governments started to privatize (restitution, compensation) forest resources
- In the middle of the 1990s, in the ten ACs as a region, 20% of the total forests or almost 7 million ha of forests are privately owned.
- In 2000 the privatization process of forest resources was not yet finalized in most countries, the predicted share of private forests was calculated on level of 36%

PREDICTED SHARE OF PRIVATE FORESTS IN THE NEW MEMBER STATES

(DATA CALCULATED FROM TBFRA 2000 AND PHARE, 1999)



AVERAGE SIZE OF FOREST PROPERTY

- According to statistics, the average size of forest property per owner is somewhat more than 2ha.
- With the exception of Slovakia, where more than 60% of the private forest area belongs to forest estates larger than 100 ha (in the Czech Republic more than 30%), the size class <5ha dominates.

PERCENTAGE OF PRIVATE FOREST AREA BELONGING TO SIZE CLASS <5 HA

Country	Percentage of forest area in <5 ha
Bulgaria	No data
Czech Republic	27%
Estonia	No data
Hungary	36%
Latvia	No data
Lithuania	Calculated average property size between 6-7 ha
Poland	100%
Romania	100%
Slovakia	0.1%
Slovenia	44%

PERCENTAGE OF PRIVATE FOREST AREA BELONGING TO SIZE CLASS <5 HA

- In France, 75% of the area in private ownership is in tracts larger than 4 ha.
- In the former Federal Republic of Germany, 58% of the private forest holdings are under 5 ha (2% under 1 ha) and 15% over 1,000 ha.
- In Sweden, 87% of forests that are privately owned are in holdings of 25 ha or more
- Overall the structure of private forest ownership in many places in the CEE does not appear favorable for sustainable and efficient forest management, especially if the lack of private forest management tradition in most CEE countries is taken into account.
- Forest tracts divided in many small individual properties require the association of forest owners to form larger management units irrespective of individual property boundaries.
- However, there are psychological barriers with new forest owners, because association brings up memories of expropriation and forced collectivization

PRIVATE FORESTS IN POLAND

Total area of non-state forests (ha)	**1 607 219**
% of country area	**5,2**
% of total forest area	**17,8**

Ownership structure (2006):

1 509 768 ha	**Forests of natural persons**
16,7%	of total forest area, The real area of private forests can amount 1,9 mln ha due to area of natural succession – not reflected in land use evidence.
+	
67 179 ha	forests of land communities,
6 806 ha	forests of agricultural co-operatives,
23 466 ha	other forests (churches, unions, organizations, private companies, etc.

PRIVATE FORESTS IN POLAND
BASIC DATA - 1

- Uneven regional distribution – above 60% of non-state forest area concentrated in 4 provinces (out of 16) in Southern, Central and Eastern Poland.
- Forests are in hands of 28% of farm owners.
- Average size of forest on a farm – 1,43 ha, but often divided for smaller plots.
- About 30% of forest owners live in towns and this number slowly grows, mainly as the result of buying land and afforestation.

PRIVATE FORESTS IN POLAND
BASIC DATA - 2

Forest holding size structure:

- in **81,5%** of farms - forests area **up to 2 ha**,
- in **14,0%** - forests area **between 2 - 5 ha**,
- in **3,9%** - forests area **above 5 ha**.

Livelihood:

- Wood sale creates only 15% of income in farms (according to the Forest Research Institute explorations).

GDP contribution:

- Share of non-state forestry in national GDP does not exceed 0,02% (estimated). Much higher value of non-wood functions was not taken into account!

MAIN PROBLEMS OF PRIVATE FORESTS IN POLAND

- Insufficient financing of supervision tasks (e.g. for elaboration of forest working plans & management plans) and for direct support for the forest owners.
- Limited measures in Polish Programme of Rural Development for 2007-2013 directly improving the state of private forests – postponed forest-environmental measures
- Lack of dedicated training and advisory system for forest owners.
- Lack of comprehensive support for promotion of establishing and development of FOAs, particularly on the level of communities

FOREST OWNERS ASSOCIATIONS IN POLAND

- 9 FOAs established in Poland and 1 is in progress of registration at the court.
- First 4 FOAs established in 2002 as the result of PHARE programme realized by IUCN Poland and Beltra Resources from Ireland.
- The next 5 established spontaneously or on initiative and with support of regional administration officers, prefects of districts and their staff, mayors of communities, as well as head foresters and forest rangers of the State Forest enterprise.

FOREST OWNERS ASSOCIATIONS IN POLAND

Main obstacles in promotion of foundation of FOAs:

- small scale of most of forest ownership;
- reluctance conditioned historically;
- reluctance conditioned by tradition and mentality;
- ageing of rural population.

NON TIMBER FORESTS PRODUCTS IN POLAND

ACCORDING TO STATISTICAL DATA PUBLISHED BY GUS

WHAT AREA NTFP?

COMMERCIAL PRODUCTS AND SERVICES ONLY

OR

ALL ECOSYSTEM PRODUCTS AND SERVICES

PROCUREMENT OF FOREST BERRIES BY SPECIES

2000	2001	2002	2003	2004	2005	
					Total	In which: Blueberry (Vaccinium myrtillus)
In tons						
6 832	6 106	9 723	5 597	9 965	11 834	11 600

PROCUREMENT OF FOREST FRUITS, BERRIES AND MUSHROOMS IN QUANTITY AND VALUE

	Blueberry		Forest fruits		Mushrooms	
	in tons	thou. PLN	in tons	thou. PLN	in tons	thou. PLN
2000	6 832	51 532,8	3 295	2 573,1	1 705	17 649,0
2001	6 106	21 660,9	2 639	2 106,2	3 276	29 161,1
2002	9 723	34 494,9	5 339	4 889,9	2 379	28 242,7
2003	5 597	31 195,1	8 354	7 579,3	2 764	44 730,6
2004	9 965	46 867,2	6 519	6 827,3	5 187	58 038,1
2005	11 834	86 413,8	7 304	7 193,6	4 186	39 112,9

PROCUREMENT OF FOREST FRUITS BY SPECIES

2000	2001	2002	2003	2004	2005			
Total						in which species:		
						black lilac	wild rose	rowan-berry
in tons								
3 295	2 639	5 339	8 354	6 519	7 304	5 754	591	420

PROCUREMENT OF FOREST MUSHROOMS BY SPECIES

2000	2001	2002	2003	2004	2005			
Total						in which species:		
						Bay Bolete	King Bolete	Chant erelle
in tons								
1 705	3 276	2 379	2 764	5 187	4 186	2 096	1 368	539

THE SHOT OF MAIN BEASTS OF CHASE

	1995 / 1996	1996 / 1997	1997 / 1998	1998 / 1999	1999 / 2000	2000 / 2001	2001 / 2002	2002 / 2003	2003 / 2004	2004 / 2005	2005 / 2006
	THOU INDIVIDUALS										
ELK	0,5	0,3	0,3	0,3	0,2	0,3	–	–	–	–	–
DEER	49	43	42	40	41	41	39	39	38	39	41
FALLOW DEER	2,5	2,5	2,2	2,3	2,3	2,5	2,6	2,8	3	3,0	3,3
ROE DEER	151	135	142	144	155	158	149	146	149	151	147
WILD BOAR	76	67	66	81	92	93	105	130	122	136	138
FOX	38	47	52	85	92	101	107	133	129	145	175
HARE	189	112	88	104	94	65	91	67	39	31	30
PHEASANT	103	68	67	88	94	95	96	110	101	97	102
PATRIGDE	186	71	34	30	28	23	22	23	20	16	18

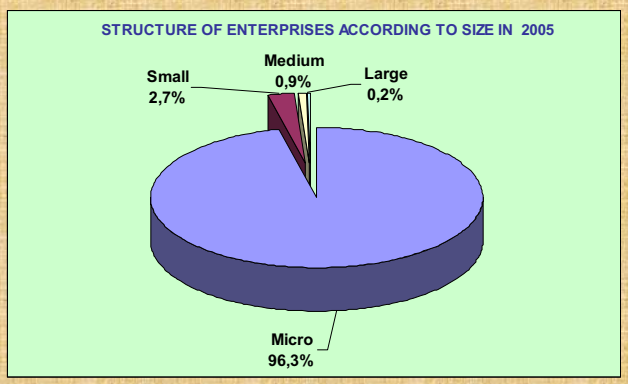
THE CATCH OF BEASTS OF THE CHASE

	1995 / 1996	1996 / 1997	1997 / 1998	1998 / 1999	1999 / 2000	2000 / 2001	2001 / 2002	2002 / 2003	2003 / 2004	2004 / 2005	2005 / 2006
	INDIVIDUALS										
FALLOW DEER	–	–	20	49	4	–	45	34	10	40	–
WILD BOAR	–	–	31	–	–	–	150	–	–	–	–
PATRIDGE	655	242	50	52	125	282	59	763	45	168	–
	THOU INDIVIDUALS										
HARE	24	11	14	17	8	6	2	3	4	0,6	1,2
PHEASANT	72,3	85,6	62,0	64,7	60,4	62,0	67,0	83,4	86,4	99,4	98,8

FORESTRY BASED ENTERPRISES AS PARTNER IN BIODIVERSITY CONSERVATION

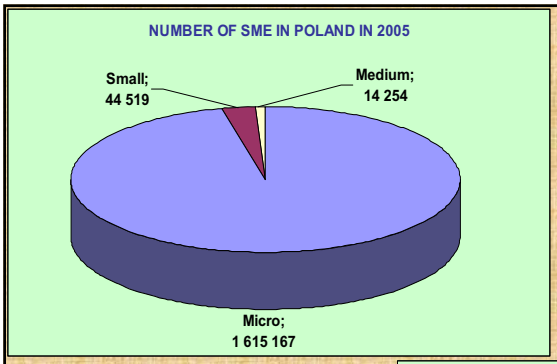
Based on EC project
„Supporting business for biodiversity"
run by OTOP

SIZE STRUCTURE OF ENTERPRISES IN POLAND IN 2005

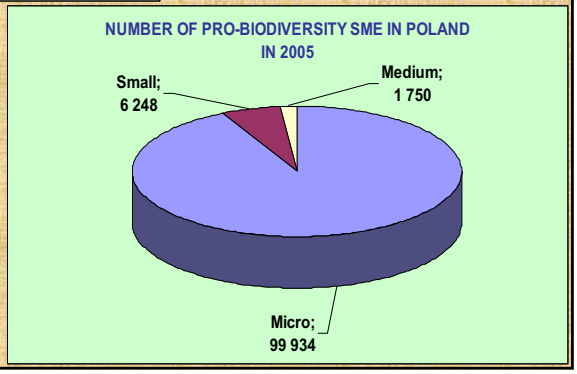


PRO-BIODIVERSITY SECTORS BASED ON NATIONAL NACE

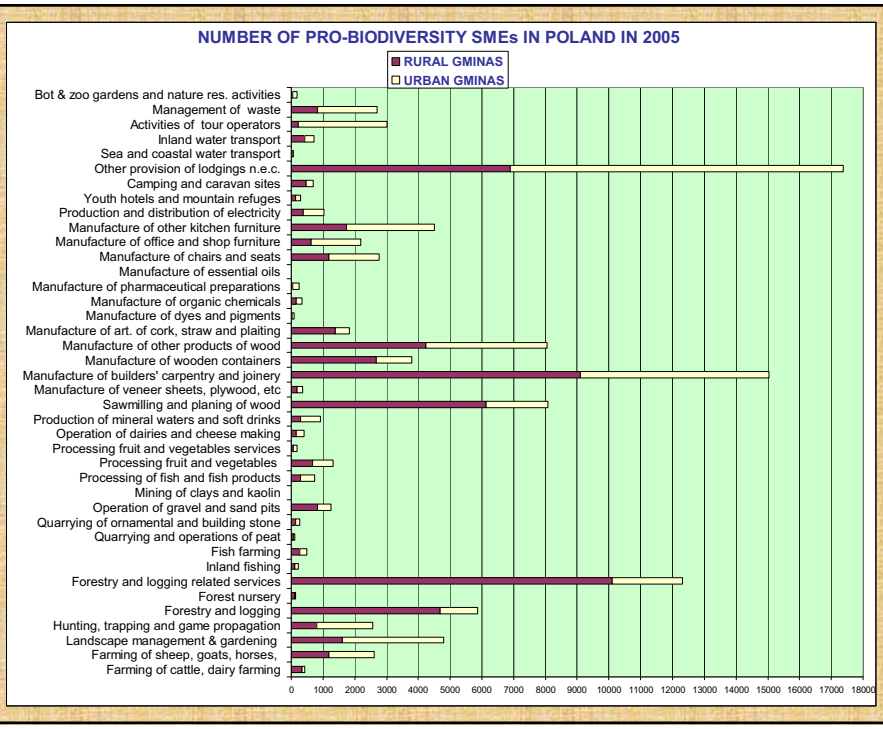
- agriculture, hunting and related service activities
- forestry, logging and related service activities
- fishing, fish farming and related service activities
- other mining and quarrying
- manufacture of food products and beverages
- manufacture of wood and of products of wood, except furniture; manufacture of articles of straw and plaiting materials
- electricity, gas, steam and hot water supply
- camping sites and short-stay accommodation
- water transport
- supporting transport activities;
- sewage and refuse disposal, sanitation and similar activities



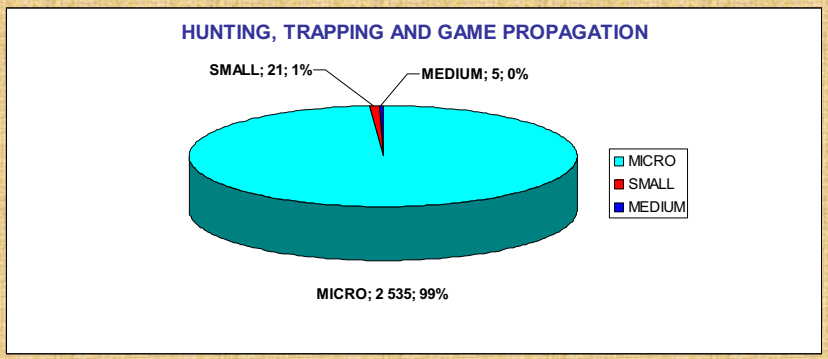
1 673 940 SMEs



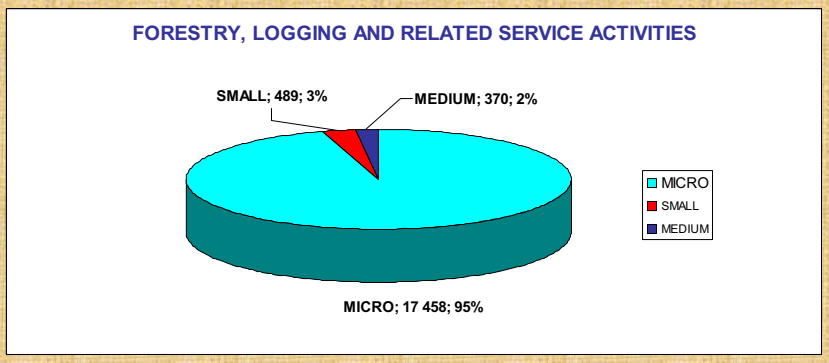
107 932 PBBs



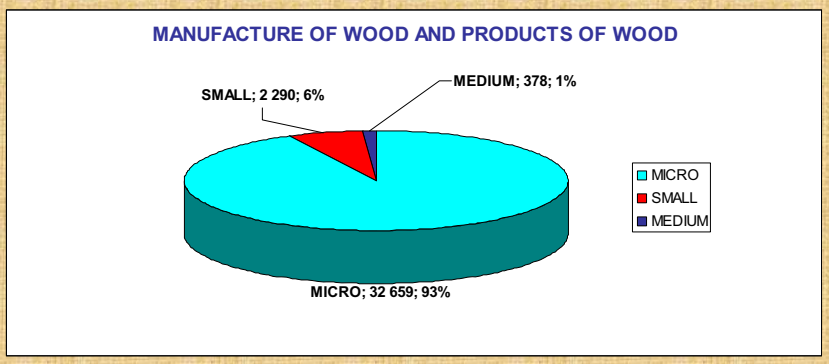
SIZE STRUCTRE OF PBBs IN FORESTRY BASED SECTORS - 1



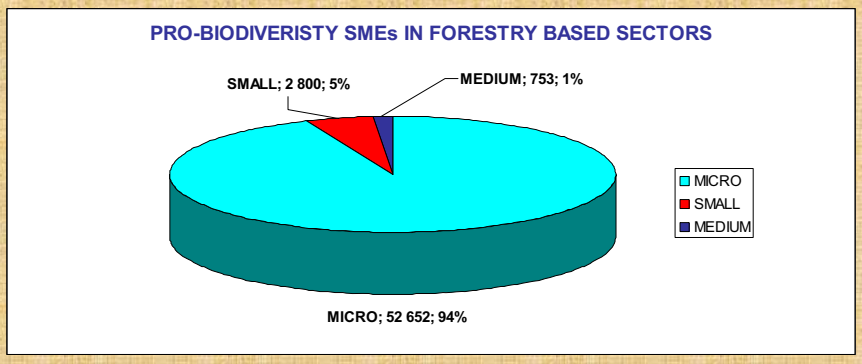
SIZE STRUCTRE OF PBBs IN FORESTRY BASED SECTORS - 2



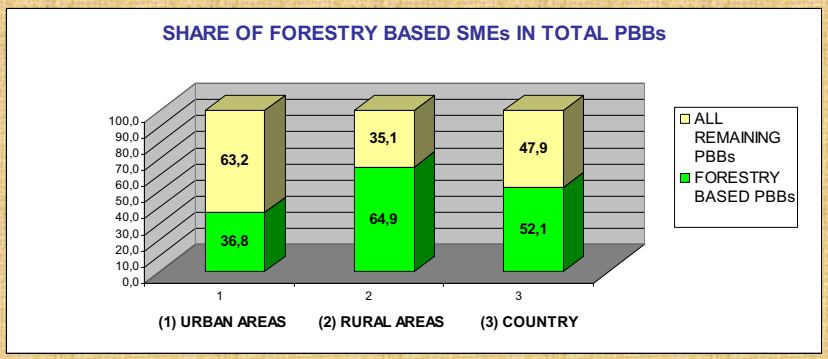
SIZE STRUCTRE OF PBBs IN FORESTRY BASED SECTORS - 3



SIZE STRUCTRE OF PBBs IN FORESTRY BASED SECTORS - 4



SHARE OF FORESTRY BASED SMEs IN ALL POTENTIAL PBBs



POLITICAL CONTEXT

The 2007 EU Portuguese Presidency

- Building a partnership between the business sector and biodiversity conservation as one of the Presidency's priorities
- Lisbon, November 2007 – a European Conference on the link between biodiversity conservation and business development
- The start of a long-term strategic initiative "Business and Biodiversity"

'SUPPORTING BUSINESS FOR BIODIVERSITY'

Innovative approach

- Merging biodiversity and financial expertise
- Using pool of existing information & knowledge
- Providing biodiversity expertise in a format accessible for businessmen and entrepreneurs
- Using a bespoke methodology for identifying and prioritizing potential pro-biodiversity businesses

MAIN BARRIERS TO INVESTMENTS IN BIODIVERSITY - 1

- The lack of practical know-how within both the SMEs and the financial institution sector with regard to the potential of enterprise development in N2000 sites and the natural conditions affecting investment projects
- The banking sector's disregard of the market niches of SMEs that depend on natural resources and are located in high natural value areas
- The high risk to investments caused by a lack of management plans for N2000 sites and a lack of protection plans for other areas

MAIN BARRIERS TO INVESTMENTS IN BIODIVERSITY - 2

- A lack of technical assistance - professional advisory services or tools for the identification and assessment of commercial investment projects in N2000 sites, which could ensure positive economic as well as nature outcomes
- A lack of access to funding sources and suitable financial instruments as well as a lack of procedures that are friendly to SMEs

PROJECT METHODOLOGY

- **„Pro-biodiversity SMEs”** - identifying SMEs with investment potential, which if realized, would encourage and enable sustainable management of Natura 2000 sites
- **Technical assistance – „Biodiversity Technical Assistance Unit” -** transferring and applying knowledge to encourage and create suitable economic development within Natura 2000 sites
- **Dedicated financial instrument „Biodiversity Financing Facility”** for pro-biodiversity SMEs operating within Natura 2000

Biuro Przyrodniczej Pomocy Technicznej

Ogólnopolskie Towarzystwo Ochrony Ptaków
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05-270 Marki k. Warszawy
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E-mail: zenon.tederko@otop.org.pl

COUNTRIES & FORESTS IN TRANSITION: RESEARCH SEMINAR ON THE BENEFITS OF MULTI-FUNCTIONAL FOREST POLICY

20-21 FEBRUARY 2009

FACULTY OF ECONOMIC SCIENCES
UNIVERSITY OF WARSAW

Ill-functional, unsustainable

Andrzej Bobiec
Rzeszów University, Agroecology

You have come hither (...), so that we may join together to consider the question of the conservation and use of the great fundamental sources of wealth of this Nation.

- Multifunctional forest policy is a governance approach aimed to optimize and perpetuate the non-production and production use of forest functions and resources.

- What functions are complementary to each other?
- What functions are neutral?
- What functions are conflicting, i.e. exclusive?

- What are the conditions under which we can integrate all forest functions in one system of multifunctional forest policy?

- Are we successful with this in Europe?

- What are our perspectives?

Considering the objectives and measures set out in the Convention on Biological Diversity that was signed at the United Nations Conference on Environment and Development in June 1992 in Rio de Janeiro, and considering in particular the precautionary principle in the preamble to the Convention, which notes that "where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat."

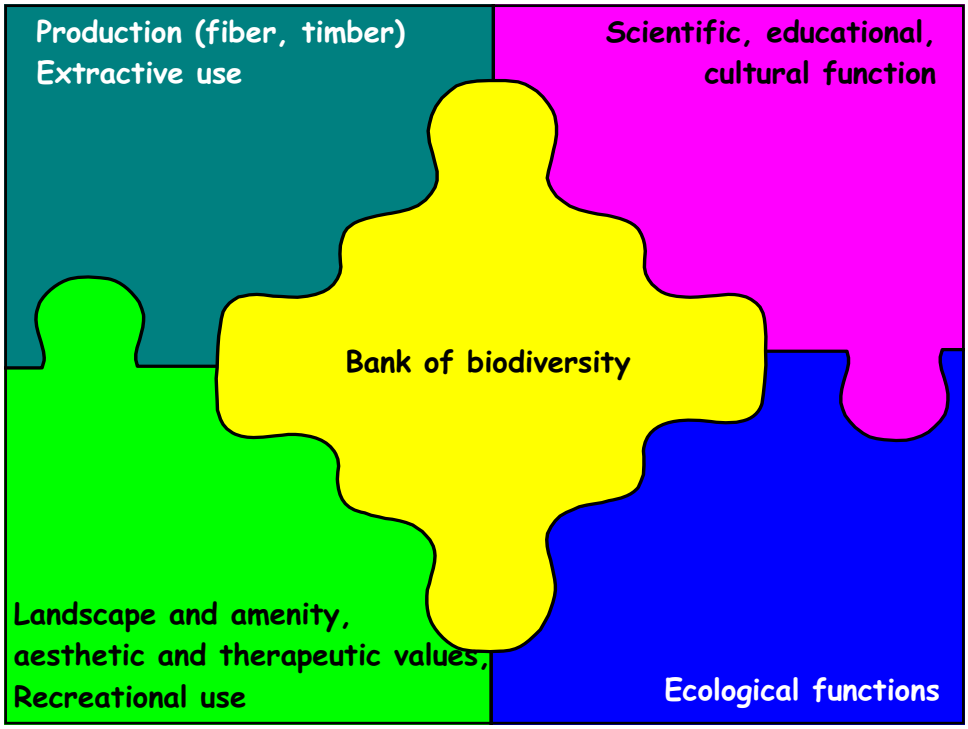
(...) the conservation and appropriate enhancement of biodiversity as an essential element of sustainable forest management.

The Signatory States and the European Community will establish at national or regional levels a coherent ecological network of climax, primary and other special forests aimed at maintaining or re-establishing ecosystems that are representative or threatened.

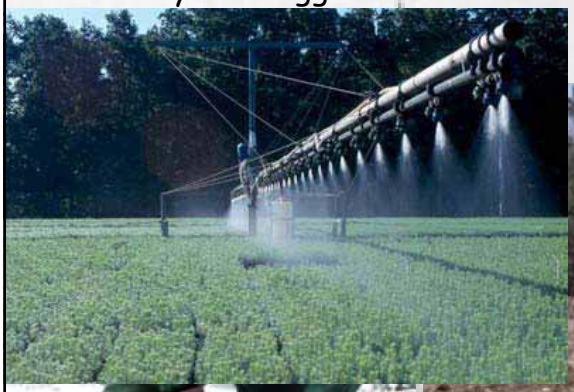
from 2nd MCPFE, Helsinki 1993, Res. H2, General Guidelines for the Conservation of the Biodiversity of European Forests

By 2008, all core areas of the Pan-European Ecological Network will be adequately conserved and the Pan European Ecological Network will give guidance to all major national, regional and international land use and planning policies as well as to the operations of relevant economic and financial sectors.

from Kyiv Resolution on Biodiversity, 2003

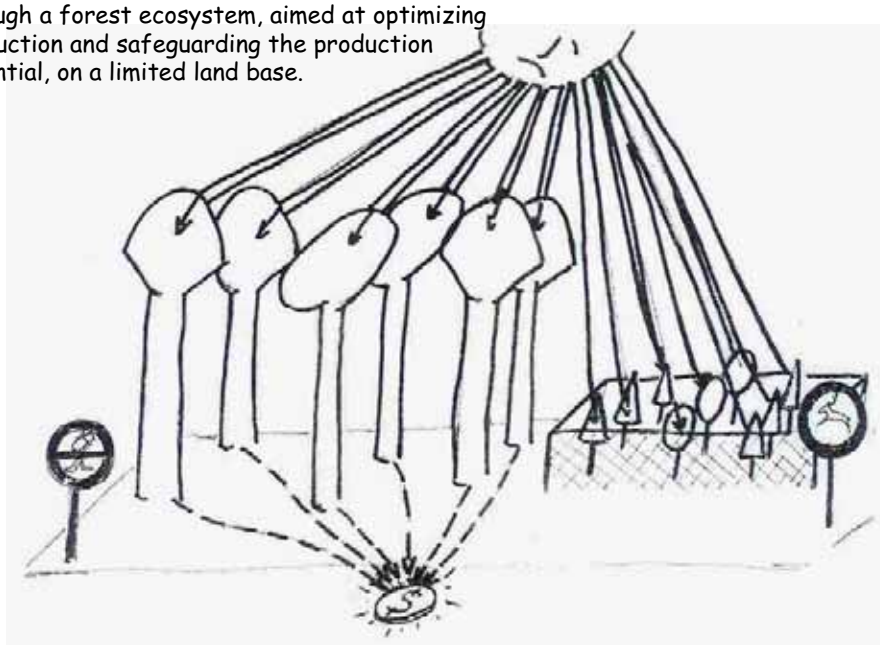


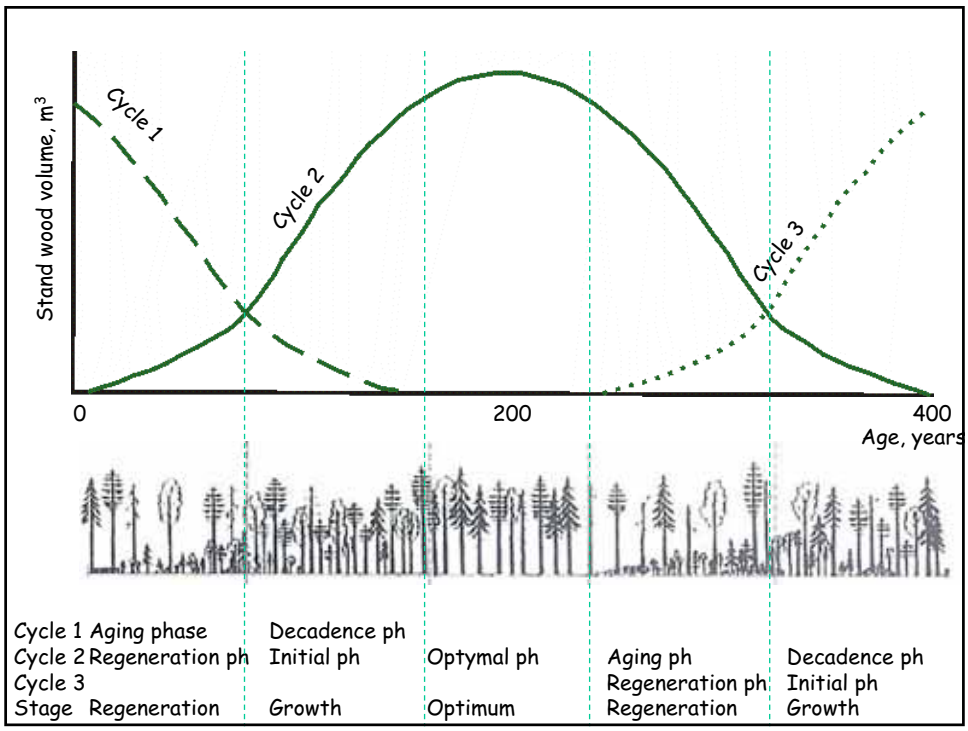
Forestry: our biggest achievement

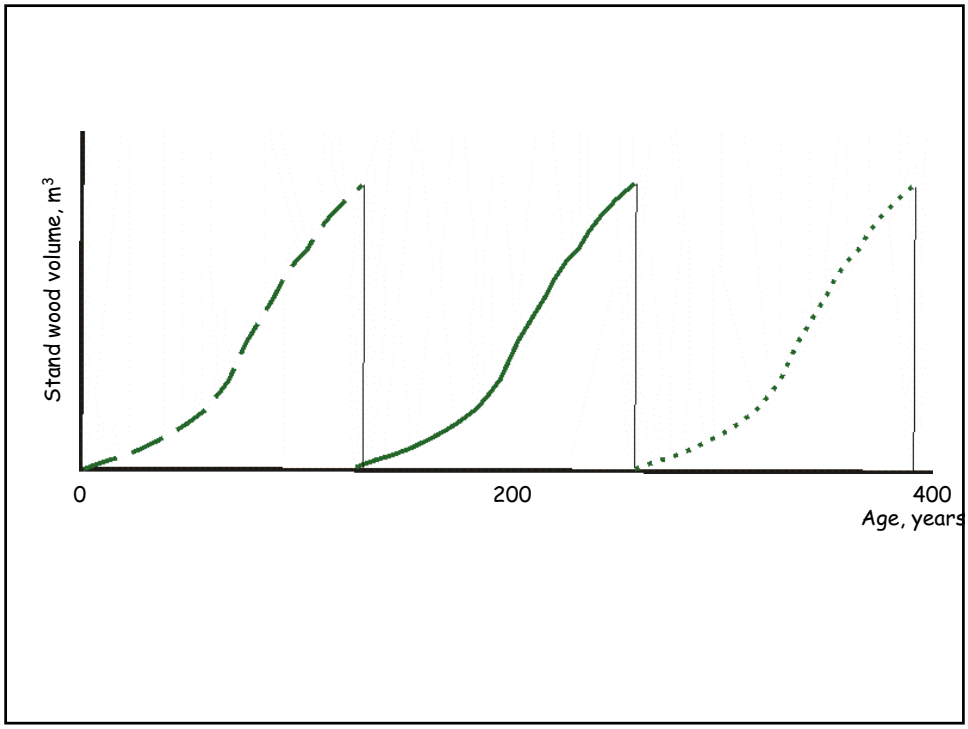


Forestry:

intentional control of the solar energy flow through a forest ecosystem, aimed at optimizing production and safeguarding the production potential, on a limited land base.




Stand wood volume, m3
Cycle 1
Cycle 2
Cycle 3
0
200
400
Age, years
Cycle 1 Aging phase
Cycle 2 Regeneration ph
Cycle 3
Stage Regeneration
Decadence ph
Initial ph
Growth
Optymal ph
Optimum
Aging ph
Regeneration ph
Regeneration
Decadence ph
Initial ph
Growth


Stand wood volume, m3
0
200
400
Age, years


Forestry: our pitfall, our curse…
FIN
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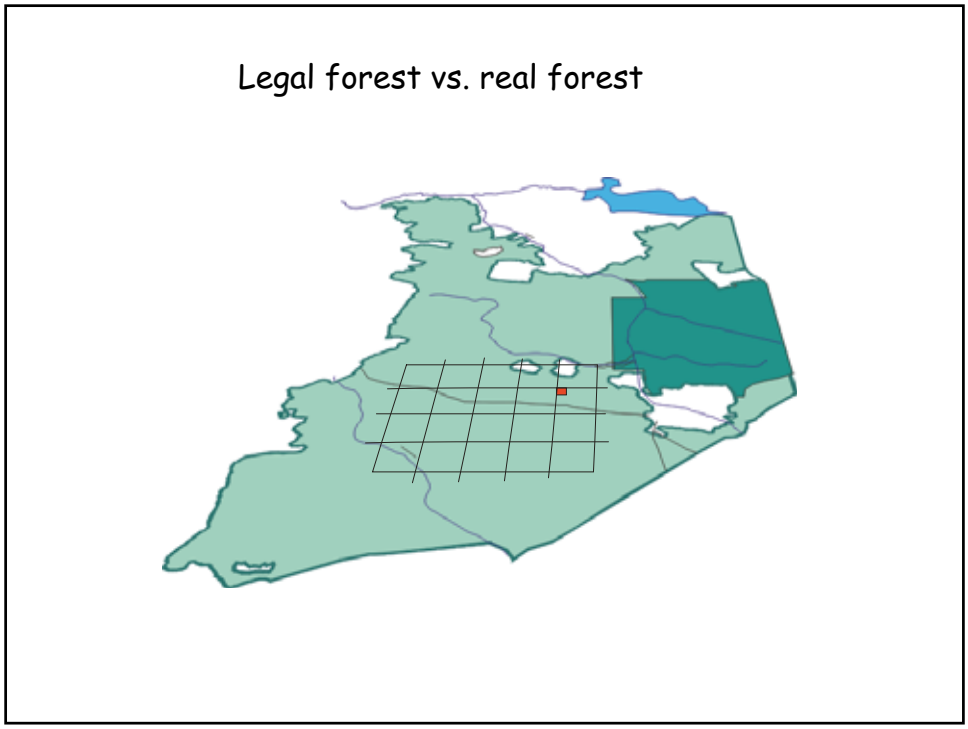
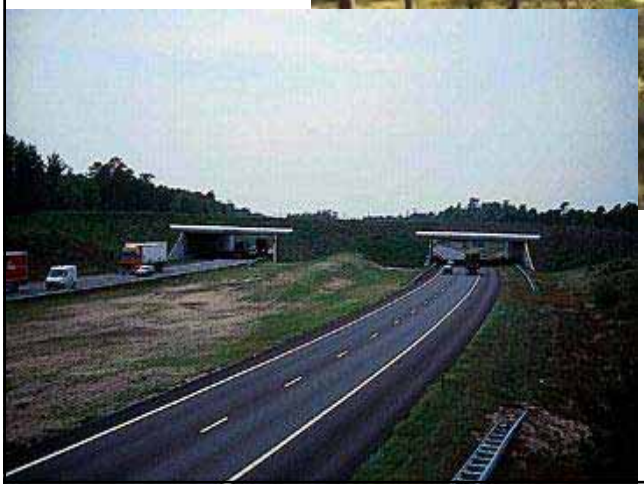
CY
MT

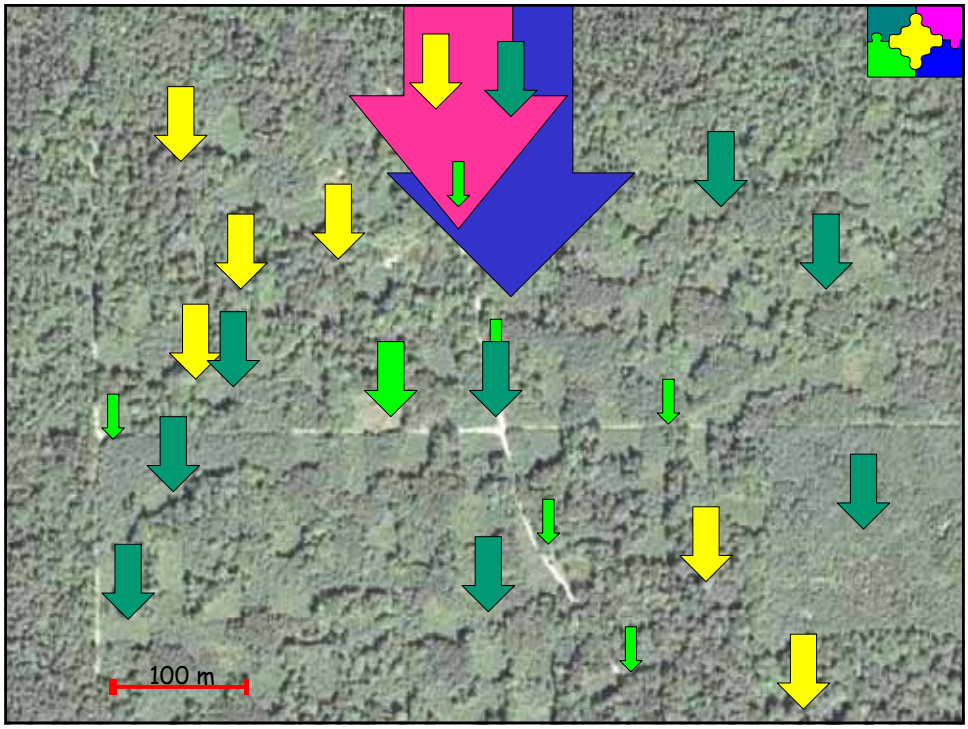

Legal forest vs. real forest

Our forestry myths…

1. All forest functions can be secured by adequate management measures and practices incorporated in the wood production process and implemented at the stand level.

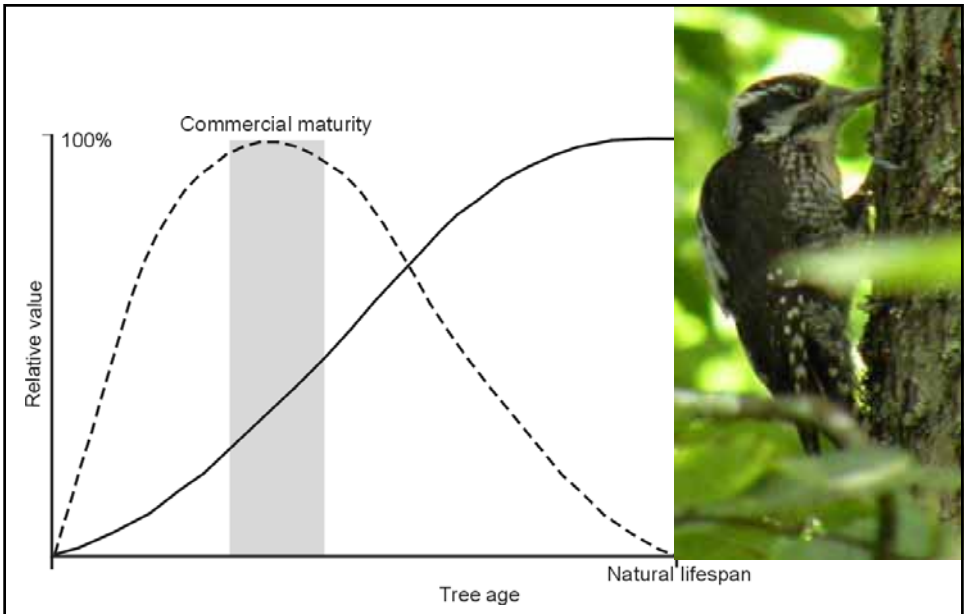


Fot. H. Bekker



Our forestry myths…

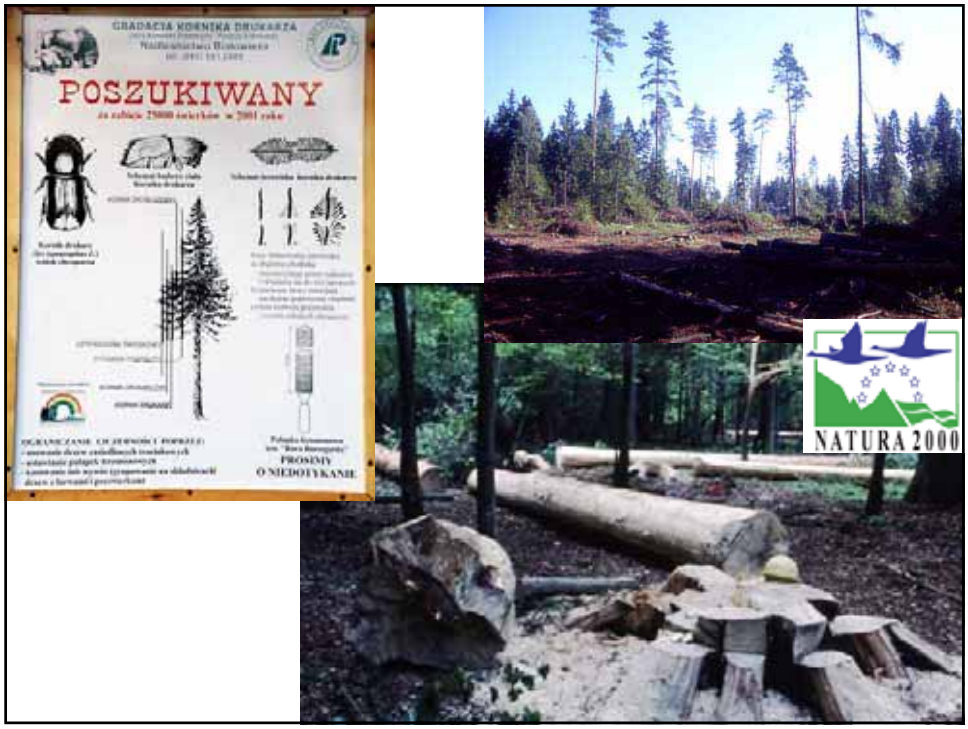
2. Forest management mimics natural processes



Our forestry myths…

3. Under current environmental circumstances (including climatic uncertainty, air pollution, etc.) forest nature needs active support.

3. 1. Stands are unstable, burden with high risk of disturbance, „forest durability" is under threat. Therefore, pests should be controlled, eradicated.



Phot. Rastislav Jakus

Forest protection is a constant concern in the EU. Biotic factors and grazing are main causes of forest damage. Other major factors affecting forests are air pollution, storms and forest fires.

Communication from the Commission to the Council and the European Parliament; Reporting on the implementation of the EU Forestry Strategy COM(2005) 84

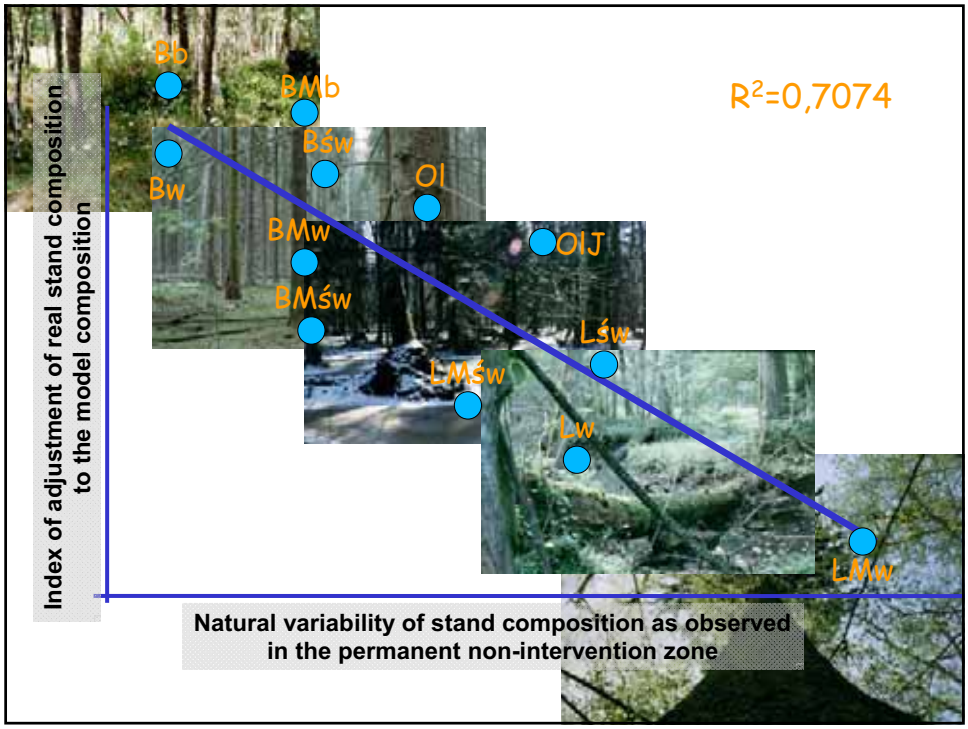
Our forestry myths…

3. 2. Stands should undergo „remodelling" (=their species composition should be adjusted to site conditions)

Exemplary fragment of the stand table, an essential part of the BPF management plan for the period 2002-2011

Forest compartment	Area [ha]	Forest site type	Target stand composition	Management recommendations
			=40%, participation of species in stand canopy / Average age of trees	
211Dc	2.48	Humid mix forest	2-4Qr, 1-4Pa, 1Ag, 1Tc, 1-2Ap 1-2Cb, +Ps, +Fe, +Ug	Nested cut, soil prep., plant., tending, early thinning
22 Bhx	1.54	Slightly wet forest	3-6Qr, 2-4 Pa, 1-3Cb, 1Tc,, +Ug	Late thinning
642Ah	1.49	Humid mix con. forest	6-8Pa, 2-4Qr, +Ps, +Ag	Nested cut, soil prep., plant., tending, early thinning
212Aa	4.60	Riparian for.	3-6Ag, 2-6Fe, +Qr, +Ug, +Tc, +Cb	Late and early thinning

Pa: Picea abies, Ps: Pinus sylvestris, Qr: Quercus robur, Cb: Carpinus betulus, Tc: Tilia cordata, Ag: Alnus glutinosa, Fe: Fraxinus excelsior, Ap: Acer platanoides, Ug: Ulmus glabra



Our forestry myths…

4. As the annual increment is much higher than the crop, forest management is biodiversity sensitive;

5. As the average age of stands increases, forest management is biodiversity friendly.

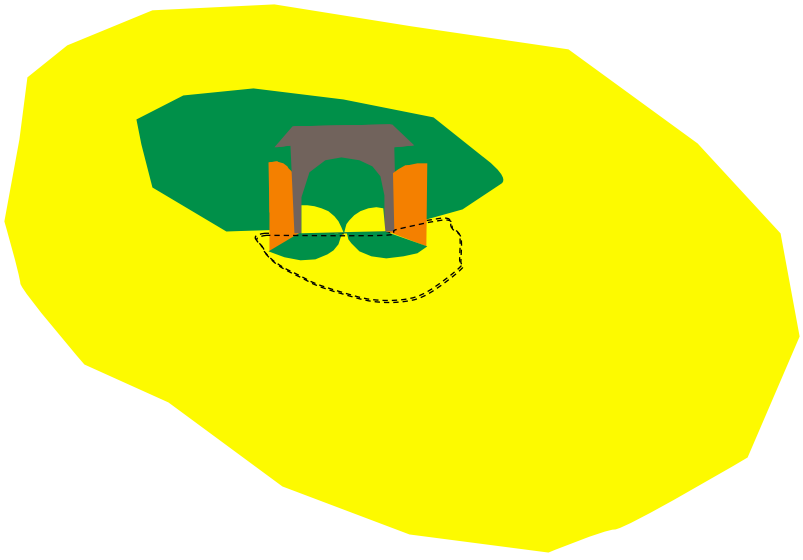
At the Pan-European level, the MCPFE has become a well established process, through which European countries and the European Community have developed comprehensive guidelines for forest policy, and strengthened co-ordination and co-operation. (...)the EU has made progress in putting into place new and improved instruments to promote the protection and sustainable management of forests.

Communication from the Commission to the Council and the European Parliament; Reporting on the implementation of the EU Forestry Strategy COM(2005) 84

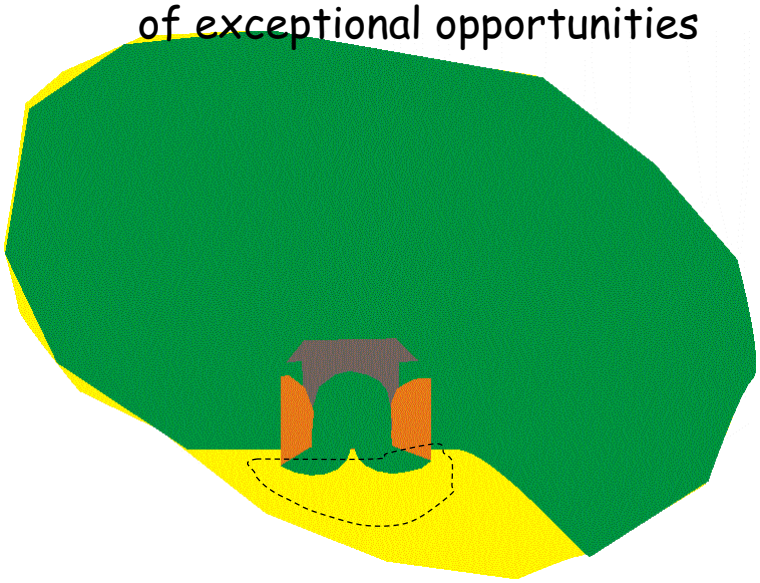
Our forestry myths…

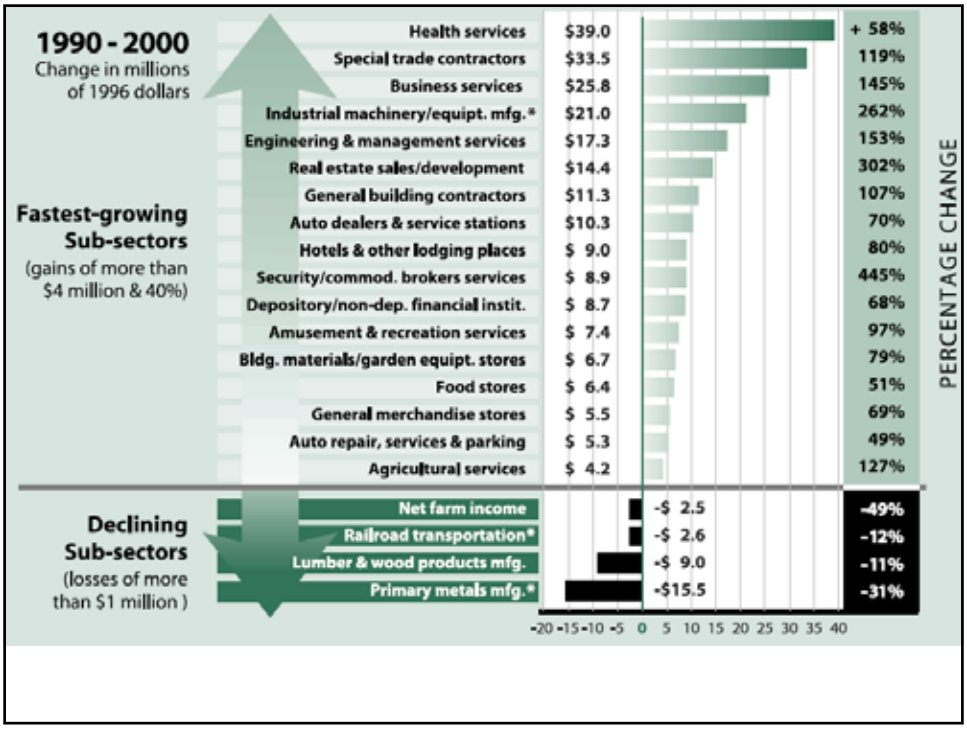
6. Forestry brings revenue, preservation induces costs.

Gateway to a national park as a region of exceptional opportunities

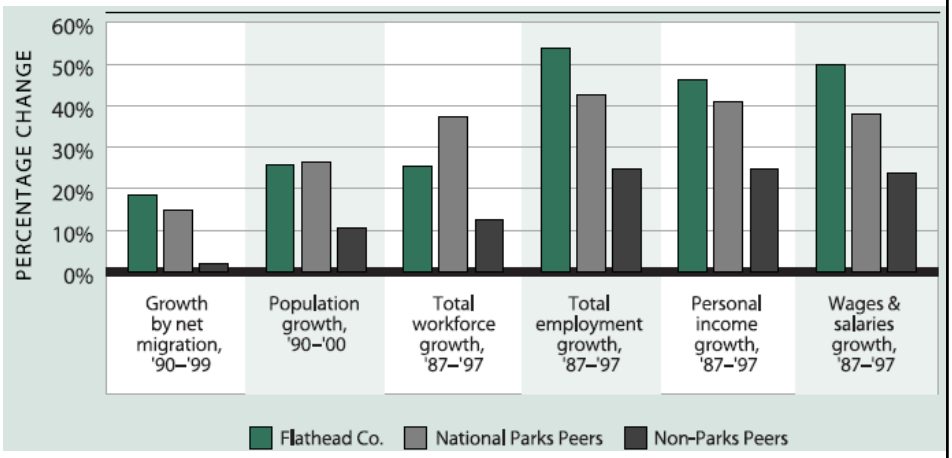


Gateway to a national park as a region of exceptional opportunities





The Constitution of the United States thus grew in large part out of the necessity for united action in the wise use of our natural resources.

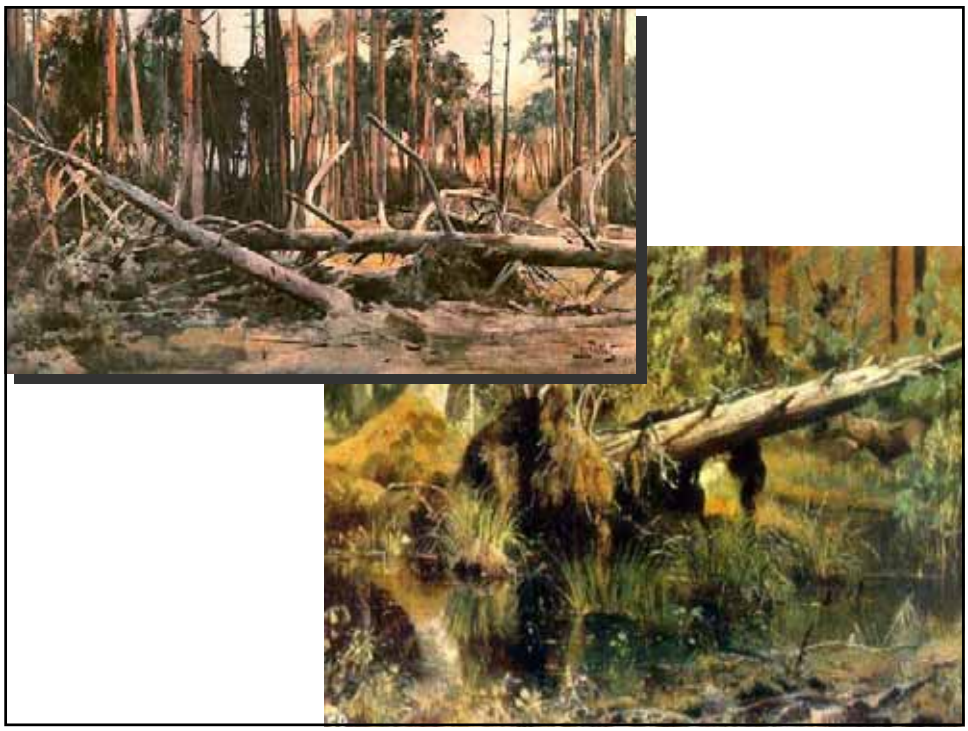


Gateway to Glacier
The Emerging Economy of Flathead County

Healthy Parks, Healthy Communities

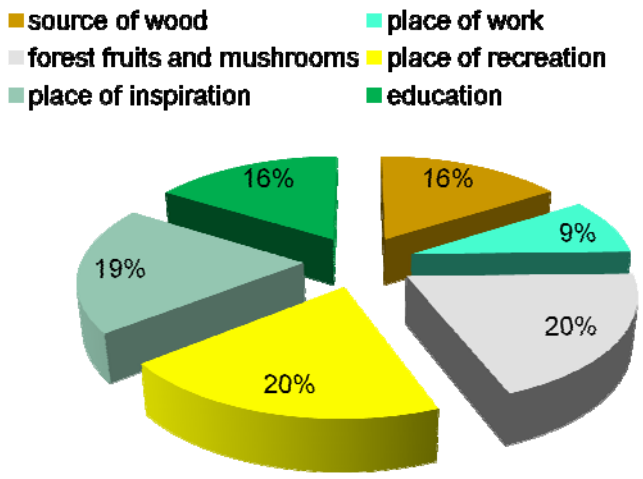
Our forestry myths…

7. Preservation is an outdated, extreme idea – incompatible with our knowledge, modern society and the paradigm of sustainable development.



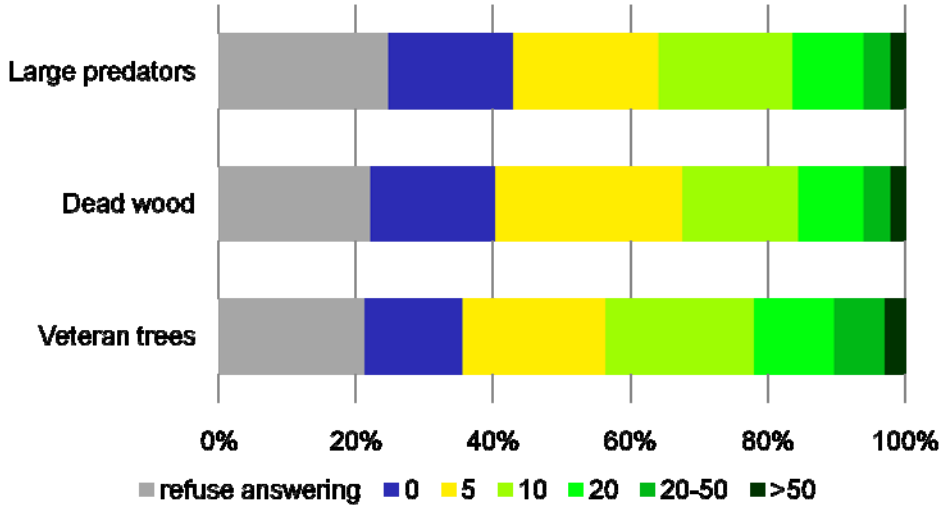
What a forest means for you?

(question 20, according to the priority score, N=231)



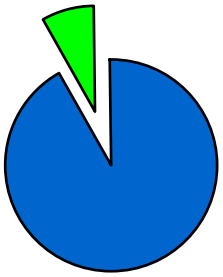
How much would you pay for non-extractive values of forests?

(questions 5, 10, 16; in PLN per year, N=231)



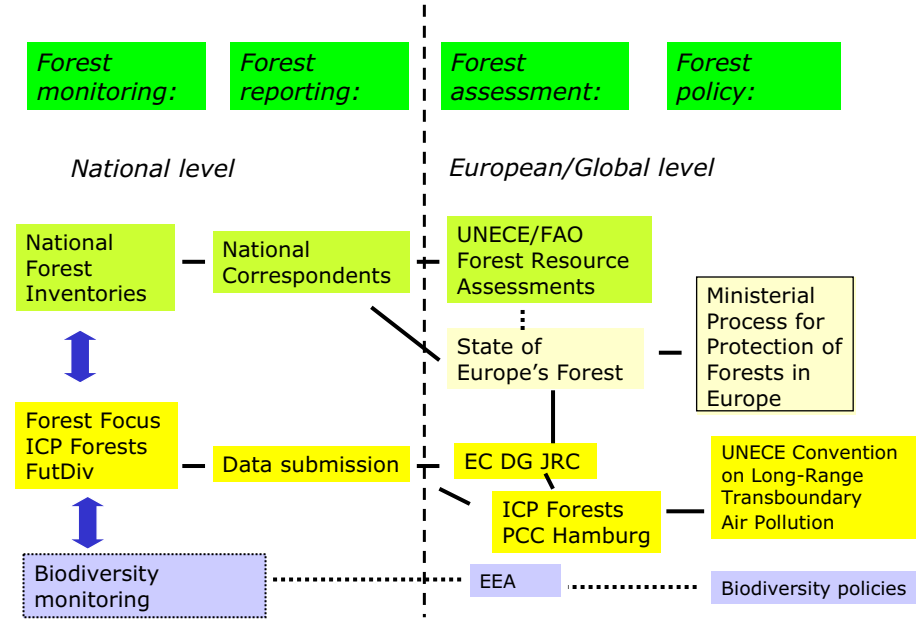
Percentage of Protected Forest Areas in selected European countries (according to WCMC)

Europe in bulk



Source of our forest problems…

1. Lack of the common forest policy



BirdLife 25 October 2007

Courtesy: T-B Larsson, European Environment Agency

Forest management in EU is sustainable and multifunctional, because

MCPFE says so, because

MCPFE says so, because national correspondents rapport so.

In defiance of wars, economic reforms and changes in the political systems, the State Forests in Poland have maintained their primary characteristics for 83 years by now. This is how we traditionally put into action the idea of sustainable forestry in Poland. And we are not looking for the way to change this approach.

from the statement of the PL State Forests National Forest Holding, 5th MCPFE, 2007

Sweden feels that it is time to review what has been done and on the basis of this move forward. We would like to call on an external review of this process in 2008, to find out what added values it has delivered. We should identify the lacks and means of success. On the basis of this we can propose enhancing measures and needs for reformation, if needed.

from the Swedish statement, 5th MCPFE, 2007

We, as State forest organizations, we have a big tradition of sustainable forest management and we consider that it is our mission to propose original and operational solutions introducing in practice the principles and orientations given by Ministers during these "conferences on the protection of forests". (...)EUSTAFOR members want therefore to develop solutions for a better and higher wood mobilization both for timber, paper and for energy. This needs improving the data on wood resources and integrating wood energy as a part of our management objectives.

from the EUSTAFOR statement at the5th MCPFE, 2007

Source of our forest problems…

2. Terrible communication:

Technical („burocrazy") language
Lack of bold ideas and simple messages

Biofuel From Forestry Waste Is Close - **UPM-Kymmene**

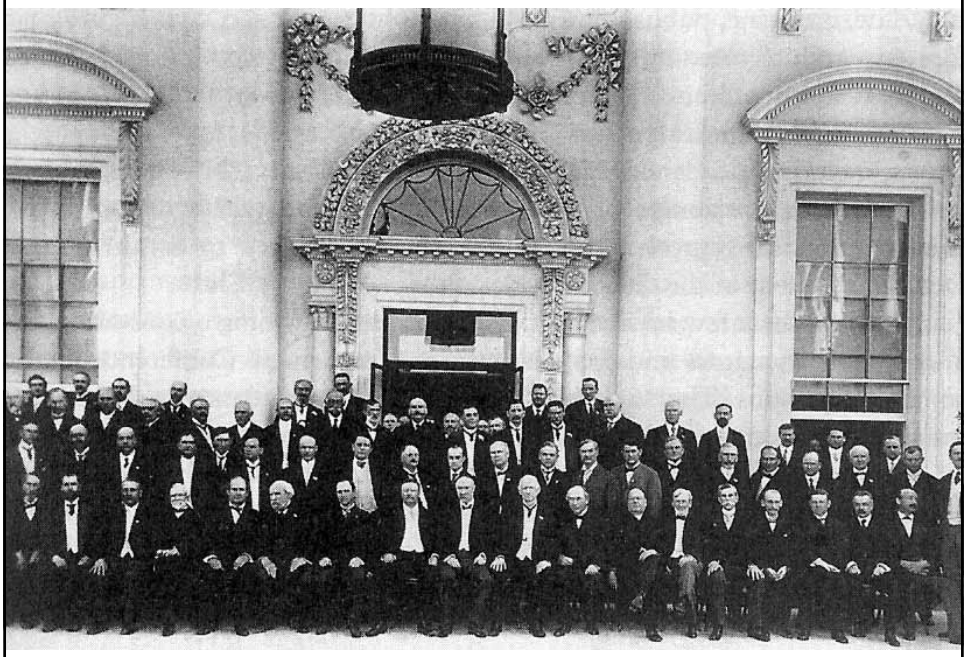
Reuters

MUNICH - New types of green fuels produced using waste from forestry may be among the first new generation biofuels to start production, an executive from Finnish forestry and paper group UPM-Kymmenesaid on Thursday.

UPM was planning to expand into biofuel production and was currently conducting trials to produce biodiesel, bioethanol and he fuel oils from forest residues including tree bark, twigs and stumps, said vice president corporate relations and development Har Sohlstrom.

ernments worldwide want second generation biofuels to replace first generation green fuels produced from food
and vegetable oils, following bitter controversy about whether biofuel production raises food prices

necessary information in our hands to make decis



The Constitution of the United States thus grew in large part out of the necessity for united action in the wise use of our natural resources.

this conservation of our natural resources is a subject of transcendent importance, which should engage unremittingly the attention of the Nation, the States, and the People in earnest cooperation.

We have to, as a nation, exercise foresight… and if we do not exercise that foresight, dark will be the future!

Is there any law that will prevent me from declaring Pelican Island a Federal Bird Reservation? Very well, then I so declare it.

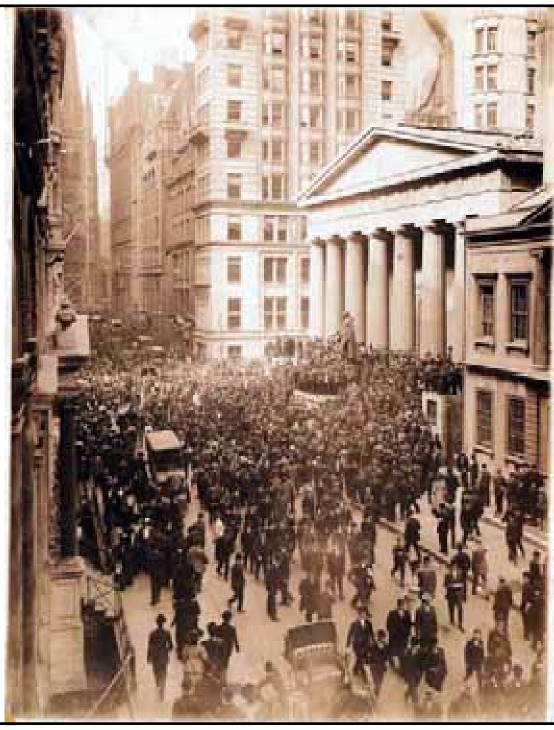

FOR THE BENEFIT AND
ENJOYMENT OF THE PEOPLE


WILD
EUROPE
Conference on
Wilderness and Large Natural Habitat Areas in Europe
Czech Presidency of the EU Council and European Commission
27-28 May 2009, Prague
EU2009.CZ
Home
Conference
Programme
Venue
Background information
Contact
Sitemap
LATEST UPDATES
Wildness in Europe
06.02.09
Background documents
30.01.09
Draft Conference Agenda
30.01.09
The Benefits of Wildland Areas
30.01.09
Excursions
15.01.09
EC Presidency Conference on Wilderness and Large Natural Habitat Areas
We are pleased to announce a Conference on 'Wilderness and Large Natural Habitat Areas' which will take place in Prague on May 27-28 2009.
The Conference, which is by invitation only,will assess and propose a range of policy options designed to promote a coordinated strategy for the protection and restoration of these areas across Europe.
Jointly hosted by the Czech Presidency of the EU Council and the European Commission, it will bring together policy makers, academics, civil society and other interested groups and individual experts from some 40 countries.

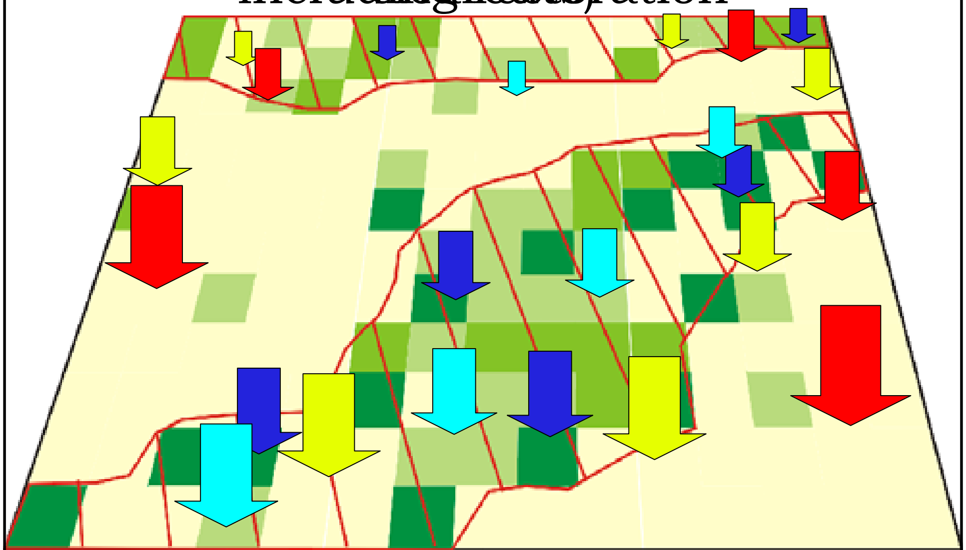
5% of EU equals the surface of ca. 22 Yellowstone National Parks.

Wild Europe is not only about changing the language…

- We can create our own trans-continental wilderness corridor, such as B2B (Balkans-to-Boreal) Wilderness as a zone of
- Efficient preservation and restoration of large functioning forest ecosystems
- Harmonious development based on local tradition and rustical culture, including protection of our heritage of traditional crafts
- Area of recreation, spiritual and intellectual inspiration, education and science

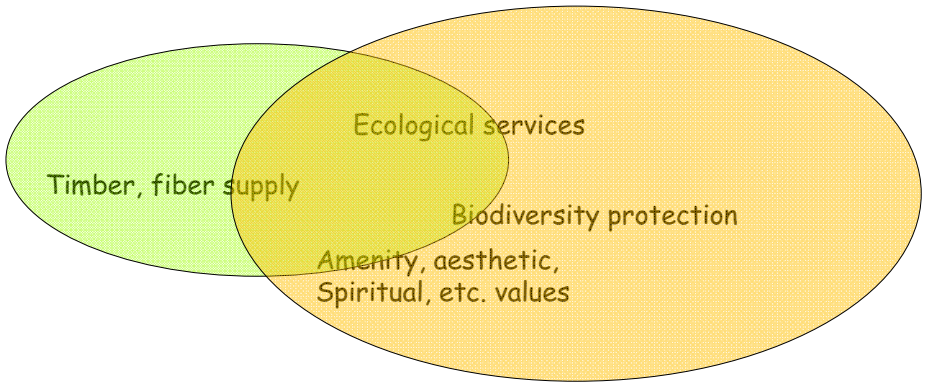


3. Spatial analyses/modelling → decisions on conservation/management including restoration



Diversified ownership model as an opportunity

Forests at EU level



COUNTRIES & FORESTS IN TRANSITION:
RESEARCH SEMINAR ON THE BENEFITS OF
MULTI-FUNCTIONAL FOREST POLICY
University of Warsaw - 20-21 February 2009

Incentive Contracts for Natura 2000 Implementation in Forest Areas

Signe Anthon
Forest & Landscape, KVL, Frederiksberg, Denmark
Serge Garcia, Anne Stenger
Laboratoire d'Économie Forestière, INRA-ENGREF, Nancy, France

Motivations

Natura 2000 purpose:

- Natura 2000: a European ecological network
- To preserve biodiversity by maintaining or restoring natural habitats
- Often based on a policy of contracts (concluded with local partners)

Challenges for the design of conservation contracts:

- Private information (about the ability to produce environmental outputs)
- Hidden conservation actions (investments)
- Uncertainty about the ecological outcome of contract
  (variability and complexity of biological systems)

Two main objectives in our paper :

- to provide theoretical justification for the contractual approach for Natura 2000 implementation in forest areas
- to compare observed payment mechanisms to optimal solutions in our theoretical contract model

Contents of the paper

1. A mixed model of contract:
   An adverse selection problem followed by moral hazard
2. Payments based on performance:
   The conservation outcome is uncertain *ex ante* but observable *ex post*
3. Risk-neutral agents with limited liability
4. A multiple-use forest model:
   The conservation measures and forest management interact
   (impact + or − on management cost)
5. Application to Danish and French cases:
   Comparaison with (theoretical) optimal contracts based on social values

Natura 2000 contracts in France (1)

EU legislation

Birds Directive (1979) and Habitats Directive (1992)

⇒ Setting of a European ecological network of special areas of conservation

Natura 2000 sites in all EU Member States based on specified nature types

Implementation in France

24 December 2004: A legislative text defining Natura 2000 implementation

2006: 1674 Natura 2000 sites, covering 6.5 millions ha, 1/3 in forested areas

- For each Natura 2000 site, a management plan (60% of the sites in 2005)
- For each management plan, one or several contracts (359 in 2005)
- Only 64 contracts in forest (for 1.2 million euros)

Natura 2000 contracts in France (2)

Six components in the management plan:

- Assessment of the actual state of the site
- Objectives of sustainable development
- Proposals of regulation and contractual measures
- Juridical terms and conditions for future contracts
- Financial devices: cost evaluation, financing, partnership
- Monitoring and evaluation procedures

Natura 2000 contracts in France (3)

A volontary agreement between the State and a public or private owner, the Natura 2000 contract includes :

- The type of measure to reach the objective of preservation
- The contracted surfaces and length of contract (5 years minimum)
- The commitments (eligible and/or not for financial counterpart)
- The financial conditions for each measure
- The documents to control for contractual commitments

Natura 2000 contracts in France (4)

Examples among the 13 measures in forest:

- Creation or restoring of clearings
- Diversification of species
- Preservation of senescent trees...

Examples of eligible commitments:

- Tree cutting, soil cleaning
- Assisting the regeneration and budding
- Struggle against competitive species...

Literature review

- Incentives for nature conservation or for endangered species protection :

  Moyle (Ecolog Econ, 1998); Polasky and Doremus (JEEM, 1998); Smith and Shogren (JEEM, 2002); Crépin (JEEM, 2005); Hallwood (Ecolog Econ, 2007)

- In the context of agri-environmental policy :

  Bourgeon et al. (EER, 1995); Wu and Babcock (JARE, 1995); Moxey et al. (JAE, 1999); Ozanne et al. (ERAE, 2001); Fraser (JAE, 2002, 2004); Gren (ERAE, 2004); Hart and Latacz-Lohmann (ERAE, 2005)

  However, these studies generally involve either moral hazard *or* adverse selection separately.

- Moral hazard *and* adverse selection for agri-environmental policy:

  White (JAE, 2002); Bontems and Thomas (AJAE, 2006); Ozanne and White (JAE, 2007).

- Only one study on conservation contracts in forest with both informational problems but with unlimited liability: Huennemeyer, (Phd dissertation, 2001).

- Theoretical findings:

  Guesnerie et al. (1989) show that the moral hazard problem does not lead to additional welfare loss compared to the pure adverse-selection case, since risk delegation is without cost when agents are risk-neutral.

  With risk-averse agents, (Theilen 2003) finds that the principal strictly prefers to relax the moral hazard constraints even though this increases the risk premium.

Basic economic model (1)

Mixed model: **Laffont and Martimort (2002)**

With environmental hazard: **Hiriart and Martimort (2006)**

Investment $I = \{\underline{I}; \overline{I}\}$

Ecological state of forest $S = \{S^L; S^H\}$

Probability to reach a high state with a low invesment = $\{\underline{\alpha}_0; \overline{\alpha}_0\}$

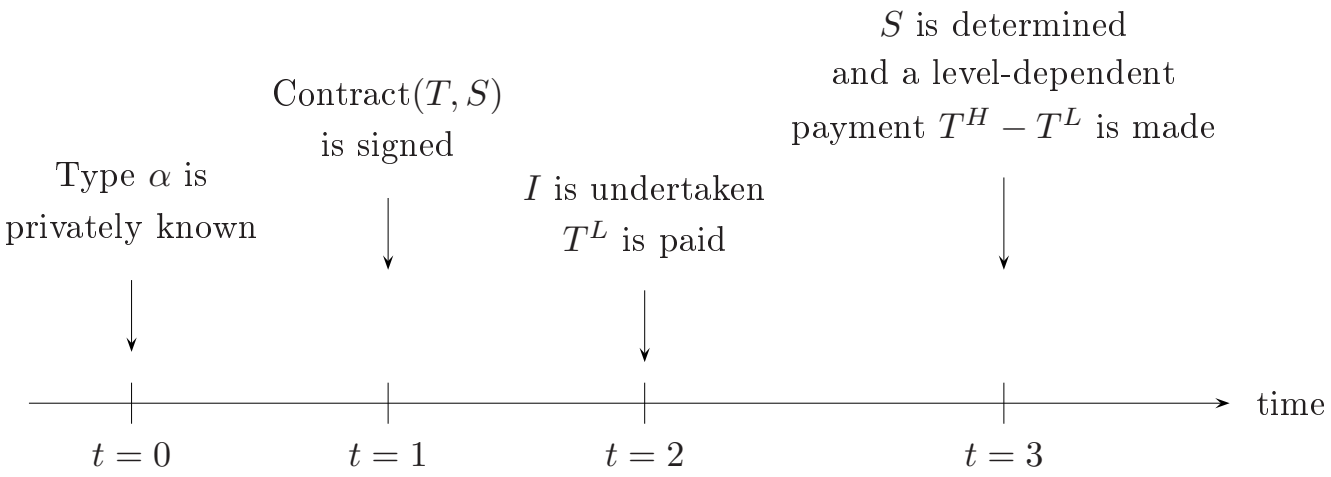
Probability to reach a high state with a high invesment = $\{\underline{\alpha}_1; \overline{\alpha}_1\}$

$$\overline{I} \text{ leads to } \begin{cases} S^H & \text{with probabilities } \overline{\alpha}_1 \text{ and } \underline{\alpha}_1 \text{ according to the type} \\ S^L & \text{with probabilities } (1-\overline{\alpha}_1) \text{ and } (1-\underline{\alpha}_1) \end{cases}$$

$$\underline{I} \text{ leads to } \begin{cases} S^H & \text{with probabilities } \overline{\alpha}_0 \text{ and } \underline{\alpha}_0 \text{ according to the type} \\ S^L & \text{with probabilities } (1-\overline{\alpha}_0) \text{ and } (1-\underline{\alpha}_0) \end{cases}$$

Basic economic model (2)

Contract schedule: adverse selection is followed by moral hazard



Basic economic model (3)

In a first time, do not consider private activities of the owner

Participation constraints:

$$\overline{\alpha}_1 \overline{T}^H + (1 - \overline{\alpha}_1)\, \overline{T}^L - \overline{I} \geq 0 \qquad (\overline{PC})$$

$$\underline{\alpha}_0 \underline{T}^H + (1 - \underline{\alpha}_0)\, \underline{T}^L - \underline{I} \geq 0 \qquad (\underline{\text{PC}})$$

Expected social value of conservation for the risk-neutral principal:

$$\begin{aligned} W =& \nu \left[\overline{\alpha}_1 \left(V^H - \lambda \overline{T}^H \right) + (1 - \overline{\alpha}_1) \left(V^L - \lambda \overline{T}^L \right) - \overline{I} \right] \\ &+ (1 - \nu) \left[\underline{\alpha}_0 \left(V^H - \lambda \underline{T}^H \right) + (1 - \underline{\alpha}_0) \left(V^L - \lambda \underline{T}^L \right) - \underline{I} \right] \end{aligned}$$

Principal's objective: a high (low) investment for a high (low)-prob agent (separating contracts)

Basic economic model (4)

Results with symmetric information

Types and actions are observable and verifiable

The transfers paid by the principal are the same whatever the ecological level of the forest and cover the investment of each type of agent :

$$\overline{T}^0 = \overline{T}^H = \overline{T}^L = \overline{I}$$

$$\underline{T}^0 = \underline{T}^H = \underline{T}^L = \underline{I}$$

The model with asymmetric information

Adverse selection problem

Private information on the ability of producing environmental outputs.

Adverse selection incentive constraints:

$$\overline{\alpha}_1 \overline{T}^H + (1-\overline{\alpha}_1)\overline{T}^L - \overline{I} \geq \overline{\alpha}_0 \underline{T}^H + (1-\overline{\alpha}_0)\underline{T}^L - \underline{I}$$

$$\underline{\alpha}_0 \underline{T}^H + (1-\underline{\alpha}_0)\underline{T}^L - \underline{I} \geq \underline{\alpha}_1 \overline{T}^H + (1-\underline{\alpha}_1)\overline{T}^L - \overline{I}$$

However we show that $\underline{T}^H = \underline{T}^L = \underline{I}$, because:

- No reward for the low-prob agent for a high ecological level: $\underline{T}^H \leq \underline{T}^L$
- No incentive for the high-prob agent to ensure the low level: $\underline{T}^H \geq \underline{T}^L$

$\Rightarrow$ Binding participation constraint, thus $\underline{T} = \underline{I}$

$$\overline{\alpha}_1 \overline{T}^H + (1-\overline{\alpha}_1)\overline{T}^L - \overline{I} \geq 0 \qquad (\overline{AD})$$

$$\underline{\alpha}_1 \overline{T}^H + (1-\underline{\alpha}_1)\overline{T}^L - \overline{I} \leq 0 \qquad (\underline{\text{AD}})$$

Moral hazard problem

The investment is supposed to be observable but non-verifiable

No moral hazard problem for the low-prob agent since this agent has no incentive to make a higher investment when the low investment is covered.

Moral hazard incentive contraint:

$$\overline{\alpha}_1 \overline{T}^H + (1 - \overline{\alpha}_1)\, \overline{T}^L - \overline{I} \geq \overline{\alpha}_0 \overline{T}^H + (1 - \overline{\alpha}_0)\, \overline{T}^L - \underline{I} \qquad (\overline{MH})$$

Mixed problem:

Combinations of both problems could also exist.

Mixed constraints insure that each type prefers to accept the contract designed for his type rather than the one designed for the other type in which he would *not undertake* the desired investment *either*.

We show that these mixed constraints are always overruled by adverse selection or moral hazard constraints.

Limited liability constraints:

$$T^L \geq 0 \quad T^H \geq 0$$

Agents do not have to pay for participation.

The set of relevant constraints for the principal:

$$\overline{\alpha}_1 \overline{T}^H + (1 - \overline{\alpha}_1) \overline{T}^L - \overline{I} \geq 0 \qquad (\overline{PC})$$

$$\underline{\alpha}_1 \overline{T}^H + (1 - \underline{\alpha}_1) \overline{T}^L - \overline{I} \leq 0 \qquad (\underline{\mathrm{AD}})$$

$$(\overline{\alpha}_1 - \overline{\alpha}_0)(\overline{T}^H - \overline{T}^L) - \Delta I \geq 0 \qquad (\overline{MH})$$

$$T^L \geq 0$$

$$T^H \geq 0$$

Hence, the optimal solutions in the mixed model are:

For the low-prob agent: • $\underline{T} = \underline{I}$

For the high-prob agent:

Depending on the binding constraint:

- $A : T^L = 0,\ T^H = \frac{\overline{I}}{\overline{\alpha}_1}$
- $B : T^L = \overline{I} - \frac{\overline{\alpha}_1}{(\overline{\alpha}_1 - \overline{\alpha}_0)}\Delta I,\ T^H = \overline{I} + \frac{1-\overline{\alpha}_1}{(\overline{\alpha}_1 - \overline{\alpha}_0)}\Delta I$
- or $]AB[$

If (MH) is above (PC), then (PC) is not binding:

- $D : T^L = 0,\ T^H = \frac{\Delta I}{(\overline{\alpha}_1 - \overline{\alpha}_0)}$ (with a positive expected informational rent)

Taking forest management into account

Measures in Natura 2000 contracts can affect forest operation (> 0 or < 0)

We simply consider that the cost of measure I can be increased or reduced by an amount $A(I)$

$A(I) < 0$ can be viewed as a source of economies of scope

We simply replace I by $(I + A(I))$ in the optimal solutions

Finally, the implementation of Natura 2000 comes from the menu of contracts:

- A basic contract: agents are asked to invest $\underline{I}$ and are paid $\underline{T} = \underline{I} + A(\underline{I})$
- A contract with additional measures: agents are asked to invest $\overline{I}$ and are given a prepayment $\overline{T}^L < \overline{I} + A\left(\overline{I}\right)$. After termination of the contract, agents are given a bonus equal to $\overline{T}^H - \overline{T}^L$, if S^H is achieved.

Payment mechanisms

In France, the payments are:

$$\underline{T} = \underline{I}, \qquad \overline{T}^L = \overline{T}^H = \overline{I}$$

Payments:

- are independent of outcomes
- do not take private information into account.
- do not take related forest management into account.

$\Rightarrow$ Choice of the high-investment and then make the low investment.

The agent's profits are:

$$\begin{aligned} \overline{\pi} &= \overline{\alpha}_0 \overline{T}^H + (1 - \overline{\alpha}_0) \overline{T}^L - \underline{I} - A(\underline{I}) \\ \underline{\pi} &= \underline{\alpha}_0 \overline{T}^H + (1 - \underline{\alpha}_0) \overline{T}^L - \underline{I} - A(\underline{I}) \end{aligned}$$

$$\overline{\pi} = \underline{\pi} = \Delta I - A(\underline{I})$$

The agents participate only if $\Delta I \geq A(\underline{I})$ (overcompensation)

$\Rightarrow$ Loss in welfare

The expected benefits decrease as the probability of the high ecological level decreases: $-\nu \left[(\overline{\alpha}_1 - \overline{\alpha}_0) \left(V^H - V^L \right) \right]$

The tax distortion increases due to the information rent of both agent types:

Low-prob agents: $-(1 - \nu) \left[\lambda \left(\Delta I + A(\underline{I}) \right) \right]$

High-prob agents: $-\nu \left[\lambda \left(\overline{I} + A\left(\overline{I} \right) \right) - \lambda \frac{\overline{\alpha}_1}{\overline{\alpha}_1 - \overline{\alpha}_0} \left(\Delta I + A\left(\overline{I} \right) \right) \right]$.

The gain from the decreased cost of the high-prob agent is $\nu \left[\Delta I + \Delta A(I) \right]$.

Conclusion

- Results from mixed model:
  1. For the inefficient agent: a low-investment contract with a forest-state independent payment
  2. For the efficient agent: a contract with a forest-state dependent payment (with a bonus when the high ecological level is reached)
  3. The efficient agent is in some cases overcompensated
  4. The adverse selection problem is solved without costs
- Neglecting related forest management costs has a strong implication in terms of participation and efficiency
- Inefficiency of actual mechanisms in France and Denmark

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Innovation and entrepreneurship in the Norwegian Non-timber Forest Products and Services sector

- The influence of external relationships and learning orientation

Erlend Nybakk
Norwegian Forest and Landscape Institute
UMB
Warsaw, Faculty of Economic Sciences
University of Warsaw, 20.01.09

Objectives

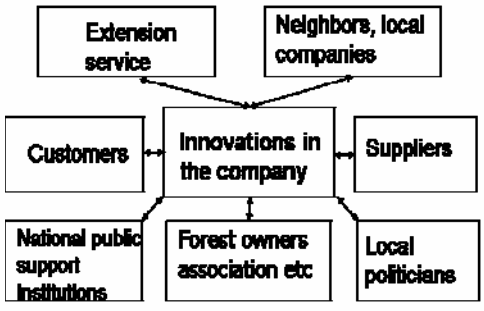
> Maintaining rural populations and robust regions throughout Norway and increase innovativeness and entrepreneurship on forest land and wilderness in Norway

> Promotion of innovation and entrepreneurship related to forest land

Foto: Troll Mountain

Study 1. Networking, Innovation and Performance in Norwegian Nature-Based Tourism

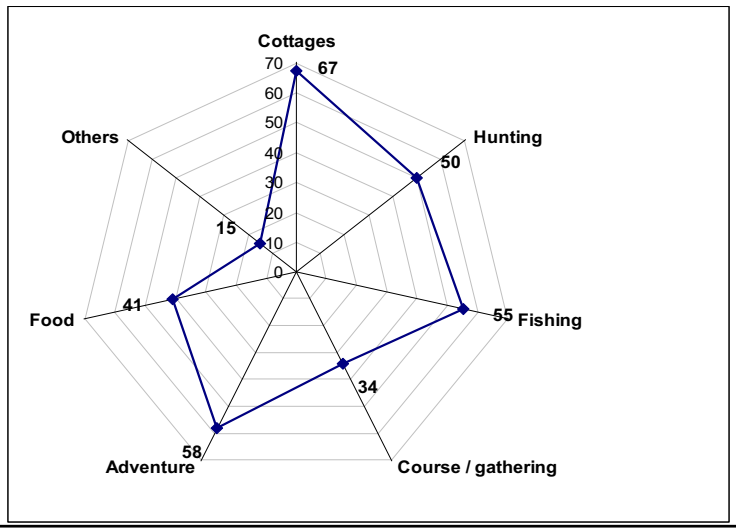
- Co-authors; Birger Vennesland, Eric Hansen and Anders Lunnan
- **Journal of Forest Products Business Research. 2008, 5(article no 4): 26.**
- Hypotheses:



E-mail Survey

- The questionnaire was forwarded to 324 managers by e-mail, followed by two reminders.
- The response rate was 55 percent.
- Non-response bias test (early respondent v late respondent)

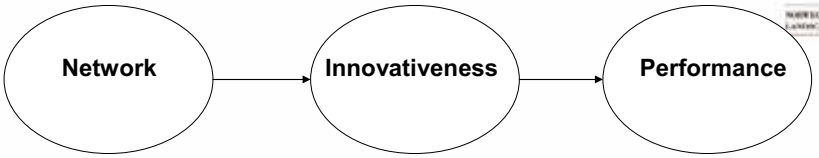
Descriptive data- Services



Method and analyses

- Multiple-scale to measuring latent variables
- Structural Equation Modeling
  - to test a model based on theory
  - that utilizes actual variables you measure (observe) versus concepts that underlie these variables (latent) (e.g., values, norms, attitudes (innovativeness)
  - that combines confirmatory factor analysis and path analysis
  - that accounts for measurement error
  - that can test direct and indirect relationships

Measurement



Construct	Dimension	Concept Description	Scale anchors
Network	1. Supplier 2. Customer 3. Neighbors 4. National public support institutions 5. Local Extension service 6. Local Politician	Degree of interaction with different actors, connected to innovations and changes in the micro companies.	1: totally disagree 6: totally agree

Measurement

Construct	Dimension	Concept Description	Scale anchors
Innovative-ness	Product innovation	Percentage of sales related to new products.	1: Less than 10 percent 6: More than 50 percent.
	Process Innovation Market innovation Organizational Innovation	Have made changes in processes, marketing or organization during the last three years.	0: No changes last three years 1: Changes done last three years
Perform-ance	Growth in Sales Growth in Net-income Growth in Man-year	Changes in sales, net income and man-years during the last three years	1: Reduced 2: Same 3: Increased

Results - The Measurement Model

> T-values form the factor loadings varied from 8.7 to 19.8 ($p<0.01$)

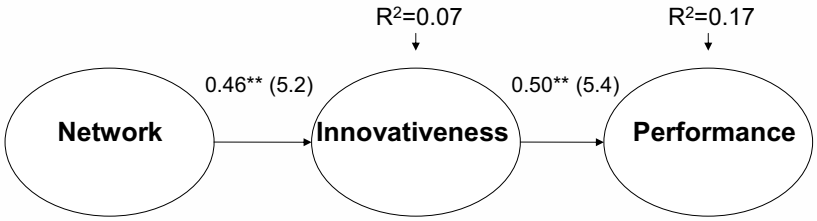
> CR=Composite Reliability; VE= Variance Extracted

Polychoric correlation matrix for the constructs (n=174)

	CR	VE	Network	Innovative-ness
Network	**0.83**	**0.43**		
Innovativeness	**0.83**	**0.51**	**0.50**	
Performance	**0.88**	**0.72**	**0.23**	**0.46**

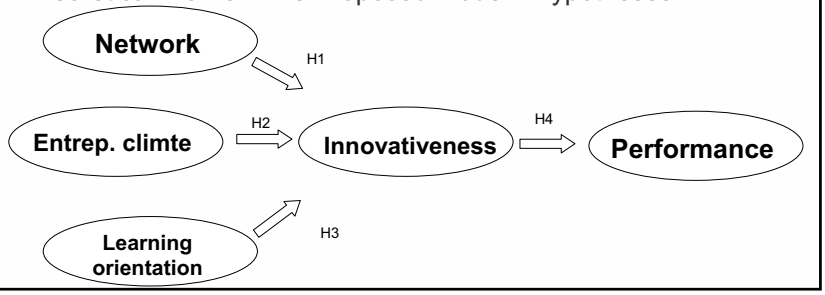
Results -The Structural Model

- The model showed acceptable fit
  - *X*2=131.5; *df 52*=; p=0.00;
  - CFI=0.93; IFI=0.93; NNFI=0.91; PNFI=0.70;
  - *X*2/df=2.53; SRMR=0.15;
  - RMSEA= 0.09 [0.07; 0.11])



Study 2. Antecedents to Innovativeness among forest owners

- Co-authors; Pablo Crespell, Eric Hansen and Anders Lunnan
- Journal of Forest Ecology and Management, 27 (2009) 608 - 618
- Theoretical Frame - The Proposed Model - Hypotheses



Method – postal survey

- > Questionnaire was developed based on earlier research
- > Pre-survey tested on 10 forest owners and 5 researchers
- > Postal survey, one reminder letter and one full questionnaire reminder
- > 683 useable responses
- > Non-response test
- > Analyzed with SPSS and EQS (Structural Equation Modeling).

Table 1. Proportion of respondents who ranked the importance of the respective product/service as 2 or higher on a scale from 0 to 7 (0= no activity, 1= very low importance and 7= high importance).

NTFP&S	%
Leasing of hunting rights	37
Arranging hunting (small game)	20
Arranging hunting (big game)	17
Real estate, building cottages, sale of plots etc.	12
Renting out cottages	11
Leasing of fishing rights	9
Arranging fishing expedition	8
Extraction of gravel / minerals	8
Renting of fall(s) for hydropower	7
Culture tourism / adventure tourism etc.	4
Golf course, motor sport track, horse riding etc.	4
Bioenergy (firewood not included)	3
NWFP, mushrooms, lichens, mosses etc.	2

Results - The Measurement Model

Table: Robust fit indices by sample.

Sample	N	CFI	SRMR	RMSEA [95% C.I.]
Calibration	341	0.96	0.066	0.042 [0.033-0.050]
Validation	342	0.95	0.056	0.051 [0.043-0.058]
Pooled	683	0.96	0.053	0.046 [0.040-0.051]

Table: Descriptives and correlation matrix for the constructs

	CR	C.'s Alpha	SN	EC	LO	IN
Social Networking	.98	.89	1			
Entrepreneurial climate	.95	.82	.44	1		
Learning orientation (LO)	.98	.87	.48	.38	1	
Innovativeness (IN)	.99	.92	.52	.13	.50	1
Performance	.94	.85	.38	.20	.18	.28

Example - Measuring innovativeness and performance

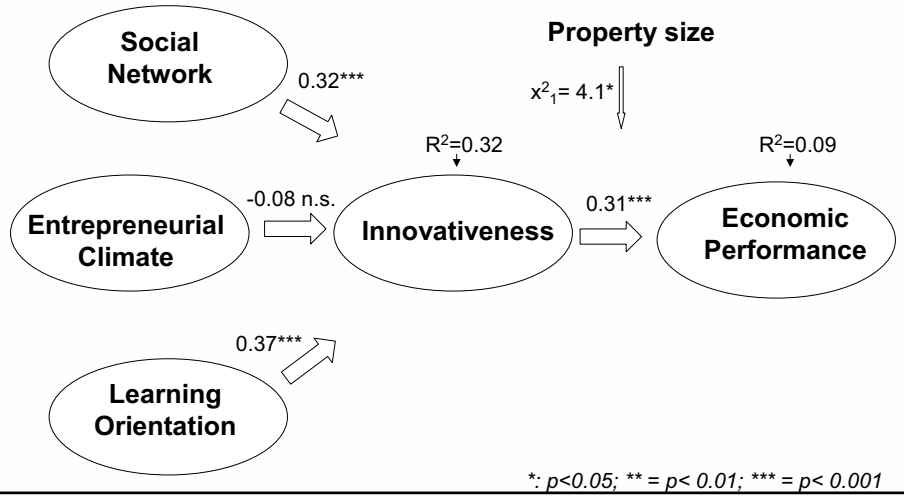
Cronbach alpha:

Inno >.8

Perf >.8

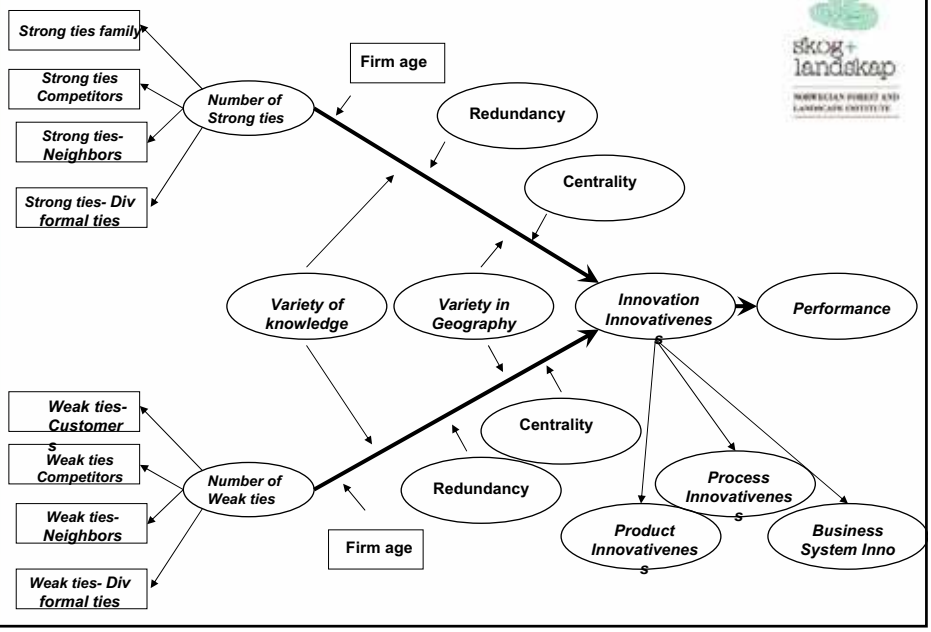
Results - SEM

The model showed acceptable fit
X^2=514.9202; p=.00;
CFI=.95; X^2/df=2.5;
SRMR=.0072;
RMSEA= 0.045 [0.04; 0.05])



*: p<0.05; ** = p< 0.01; *** = p< 0.001

Future research



Thank you for the attention!

Foto:Terje Birkeland

Plenary session III: Environmental valuation & forest policy

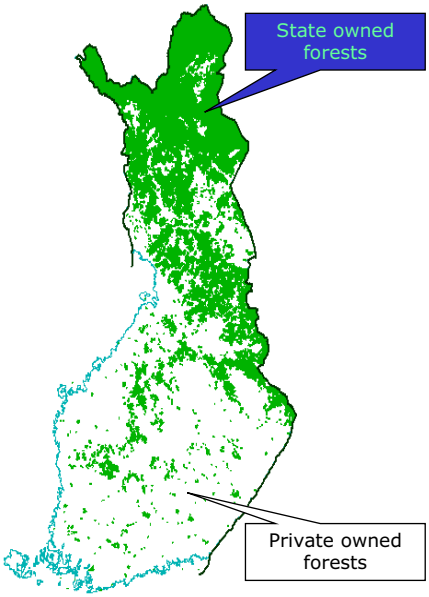
Forest valuation and policy: Experiences from Finland

Paula Horne
PTT, Finland

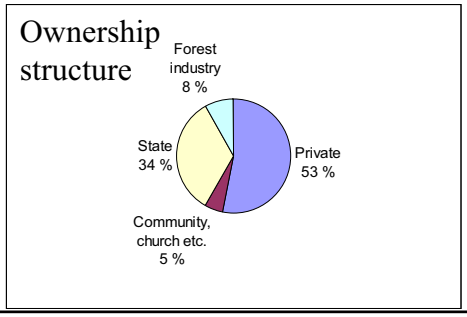
Contents

- Forests and non-wood forest goods and services in Finland
- Biodiversity policy
- Valuation research
- Conclusions

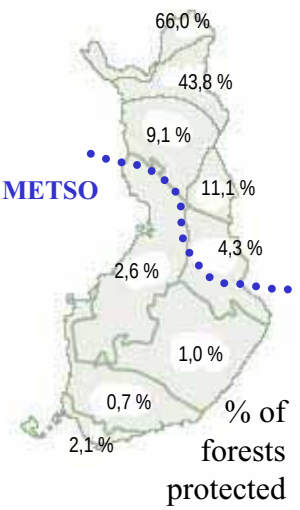
Landowner structure and forest services in Finland

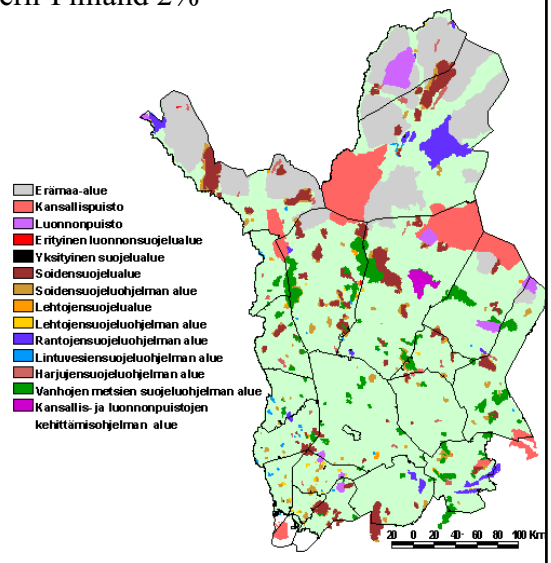


- Finland is covered by forest (86%)
- Forests are distributed evenly and they are easy to reach
- Private forests are located in Southern Finland and State owned forests are located in Northern Finland



Total amount of protected areas 9,8 % (33 000 km2)
In Northern-Finland 28,6% of land area protected
In Southern-Finland 2%





Key non-wood forest goods and services in Finland

- Provisioning forest ecosystem services
  - reindeer husbandry, game, berries, mushrooms, lichen etc.
- Regulating forest ecosystem services
  - biodiversity, carbon sequestration, water purification etc.
- Social & cultural forest ecosystem services
  - aesthetic, recreational, spiritual etc.

Research on valuation of non-wood forest goods and services (in 2000's)

- Provisioning forest ecosystem services
  - game: moose population (Horne & Petäjistö 2003)
- Regulating forest ecosystem services
  - biodiversity (Siikamäki 2001; Kuuluvainen et al. 2002; Horne et al. 2005; Juutinen et al. 2005; Horne 2006; 2008)
- Recreational & cultural forest ecosystem services
  - Aesthetic (Horne et al. 2005)
  - recreational (Huhtala 2004, Ovaskainen et al. 2001, Väänänen & Tyrväinen 1998, Tyrväinen 2001, Tyrväinen & Miettinen 2000, Lönnqvist & Tyrväinen 2007)
  - spiritual (Horne 2008)

Contents

- Forests and non-wood forest goods and services in Finland
- Biodiversity policy
- Valuation research
- Conclusions

Compensation mechanism for biodiversity values

METSO programme 2002-2007, 2008-2016

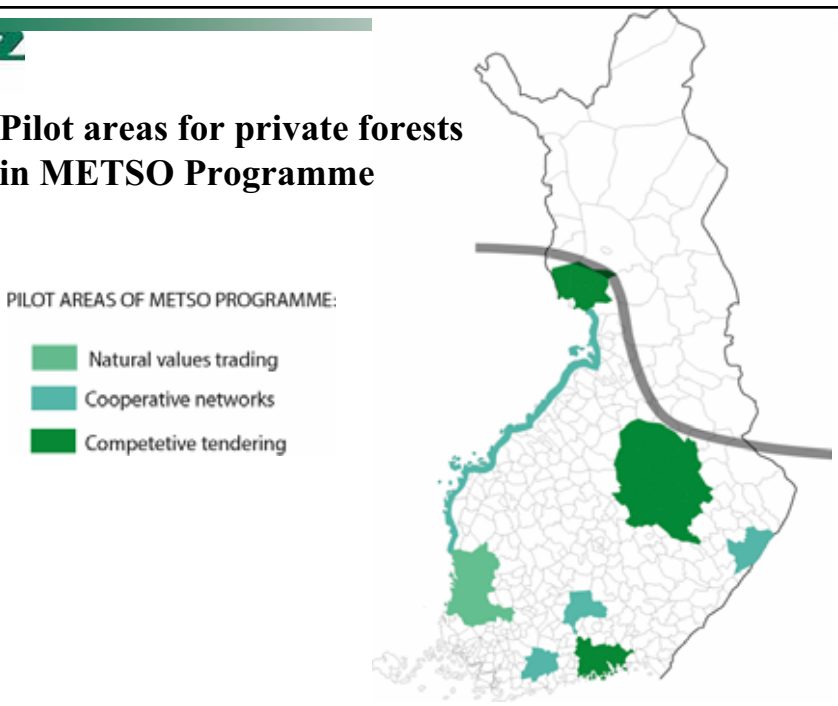
METSO; phase by phase

- 2000: WG on the need for forest protection in southern Finland and Ostrobothnia
- 2000-2002: Commission on the protection of forest biodiversity in southern Finland (26 members, 25 meetings)
- 2002: Government decision in principle – METSO
  - 17 actions and pilot projects, including monitoring and assessment
- 2006: Assessment of the ecological, social and economic effects
- 2007: Decision on the continuation of METSO

METSO: 17 actions

- **Actions targetting current conservation areas or other areas in restricted forestry (1,2,13)**
  - Collection of basic information on nature conservation areas
  - Restoration and management of habitats in nature conservation areas
  - Protecting biodiversity in state-owned and municipal areas used for recreational purposes
- **Actions expanding and enhancing the network of conservation areas (3,4,5,6,7,8)**
  - Biological criteria for site selection
  - Voluntary measures
- **Actions developing the management of commercial forests for biodiversity safeguarding (6,9,10,11,12,13)**
  - Nature management in commercial forests
  - Nature management areas
  - Training, forest management planning and advisory services
  - Forest Act and Forest Fungi and Insect Damage Prevention Act
- **Actions improving the knowledge and financial base in biodiversity conservation (14, 15, 16)**
  - Research and surveys
  - Forest conservation foundation
  - Monitoring of the action programme

Pilot areas for private forests in METSO Programme



Results in terms of volume of voluntary mechanisms in late 2006

	Contracts	Hectares
	number	
Fixed-term contract, in total	**241**	**1780**
Nature values trading	185	1520
Sites under the Act on the Financing of Sustainable Forestry	35	105
Sites under the Nature Conservation Act	21	158
Permanent contract (private conservation areas)	**27**	**186**

Nature values trading in South-West Finland

	2003		2004		2005		2006		In total /average ha	
	#	ha	#	ha	#	ha	#	ha	#	ha
Sites offered	137	1450	62	570	38	430	41	490	278	2940
No contracts	36		48		44		22		152	
Contracts	**31**	**228**	**35**	**323**	**27**	**319**	**28**	**346**	**121**	**1216**
Average price euro/ha/a	170		122		123		106		130	
Sites within the criteria		228		232		230		253		943
Price euro/ha/a	170		161		155		142		157	

METSO monitoring and evaluation

The object of monitoring is to

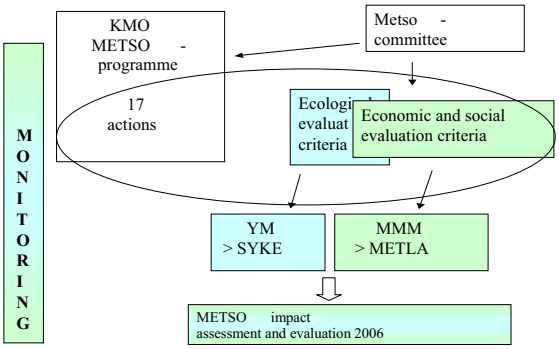
- collect extensive and comparable information on the impacts of the actions of METSO programme (to the extent that they are observable over the monitoring period)
- assess the impacts occuring during the implementation period

The object of evaluation is to

- evaluate the implementation of all the actions
- assess the impacts of extending the programme in time and space, especially in regard of voluntary agreements and nature conservation areas

METSO monitoring and evaluation, 2004-2006

- **Evaluation process:**



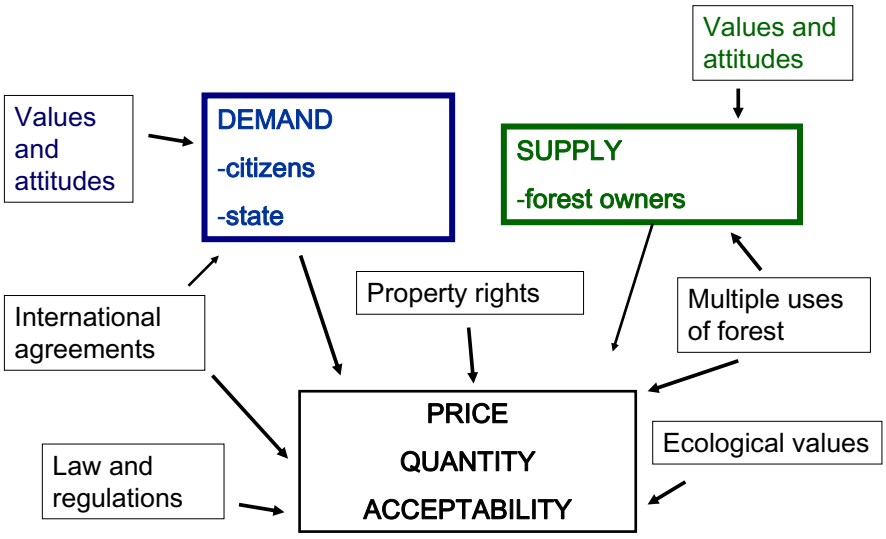
Information gathering for METSO monitoring and evaluation

- Ecological inventories
- Self-evaluation questionnaire to METSO projects
- Interviews, discussions
  - METSO projects
  - interest groups
- Statistics
- Reports from METSO projects
- Research
  - research results
  - expert opinions

Contents

- Forests and non-wood forest goods and services in Finland
- Biodiversity policy
- Valuation research
- Conclusions

Markets for biodiversity conservation



RESEARCH AND METHOD

The aim of the research

- To examine private forest owner's and citizens' views on biodiversity conservation focusing on the acceptability of the new policy measures, especially on the terms of conservation contracts

Data collection

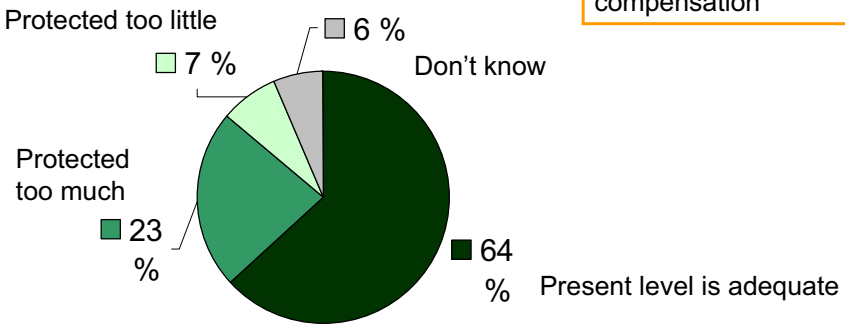
- Mail survey to 3 000 private forest owners in spring 2003
- Response rate 42 %

- Mail survey to 3000 citizens in spring 2002
- Response rate 40 %

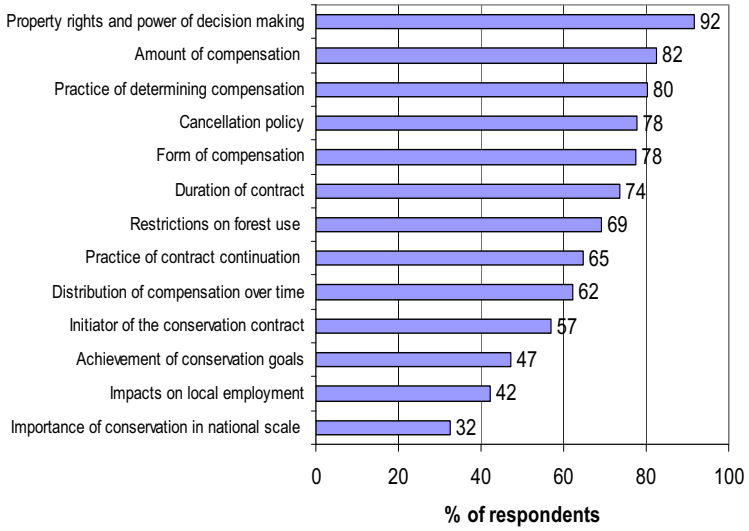
Forest owners' attitudes towards biodiversity conservation

Almost 2/3 of forest owners consider the present level of biodiversity conservation in NIP forest adequate

About a third of forest owners safeguard biodiversity in their forests totally voluntarily, without contracts or compensation



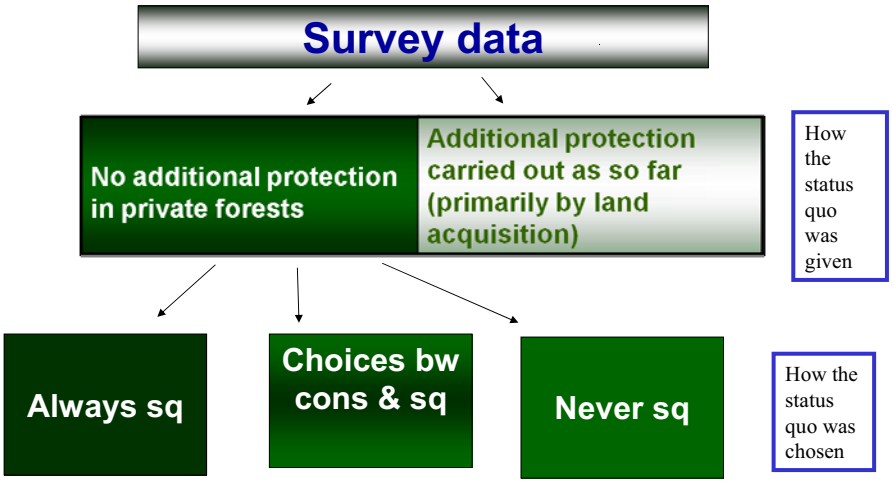
Acceptability of the factors of conservation policy in private lands



Attributes used in choice experiment of the forest owner study

Initiator in the conservation contract	Forest owner Forest organisation Foundation of forest conservation Environmental organisation
Restrictions on forest use	Only small patches preserved Nature management plan No silvicultural practices Strict nature reserve
Compensation /ha/year	0 € 70 € 140 € 210 € 280 € 350 €
Duration of contract	5 years 10 years 30 years 100 years
Cancellation policy	Forest owner can cancel New owner can cancel Binds also a new owner

A choice experiment on forest owners views: Status quo in the questionnaire and in the choices



Estimation results / Definition of status quo

Variable	No additional conservation Co-efficient	Add. conservation through land acquisition
Constant	1.7385****	1.0831***
Compensation	0.0034**	0.0038***
Initiator_ Forest owner	0.4626****	0.5113***
_ Forest organisation	- 0.0573	-0.2016***
_ Environmental organisation	- 0.2503***	-0.1916***
_ Foundation of forest conservation	- 0.1550 (bc)	-0.1181 (bc)
Restrictions _ Only small patches preserved	0.4601****	0.3873***
_ Nature management plan	0.2373***	0.3266***
_ No silvicultural practices	- 0.1379*	-0.2080***
_ Strict nature reserve	- 0.5595 (bc)	-0.5059 (bc)
Duration of contract_ 5 years	0.4841****	0.5499***
_ 10 years	0.2865****	0.3571***
_ 30 years	0.0713	0.0569
_ 100 years	- 0.8419 (bc)	-0.9638 (bc)
Cancellation policy _Forest owner can cancel	0.1725***	0.3016***
_New owner can cancel	0.0591	0.1499***
_Binds also new owner	- 0.2316 (bc)	-0.4515 (bc)

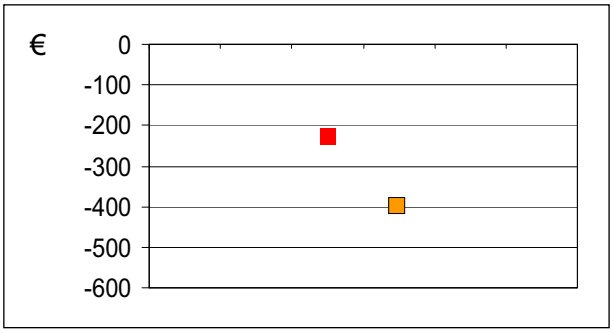
**** = significant at $p < 0.0001$, *** = significant at $p < 0.001$, ** = significant at $p < 0.01$, * = significant at $p < 0.10$

Logit model of always choosing the status quo alternative / Definition of status quo

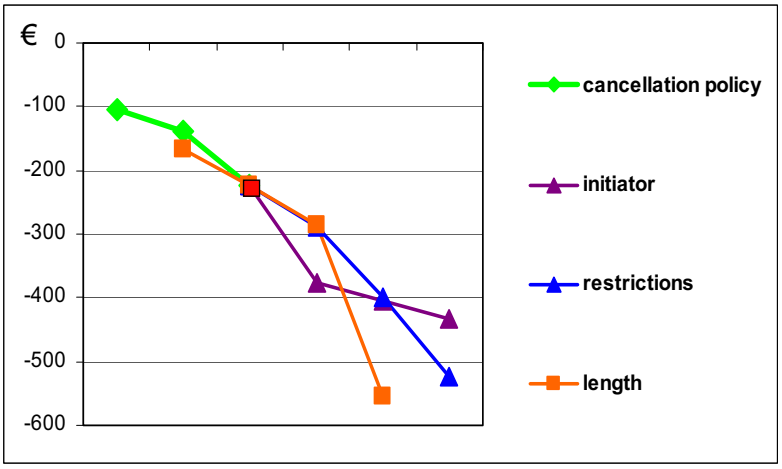
Background characteristic	Significance
gender	0,836
age	0,000
education	-0,011
forestry education 1	0,372
occupation	0,729
residential environment	0,562
arable land area	0,684
forest area	0,440
forest activity (categorical)	0,622
regional location	0,612
years of holding	0,917
residence at property	0,207

Welfare impacts / Status quo as No additional protection in private forests

- Base scenario:
  - Forest owner as the initiator, Duration of contract 10 years, Contract binds also new owner
  - Small patches are protected / Larger areas protected



Changes in welfare



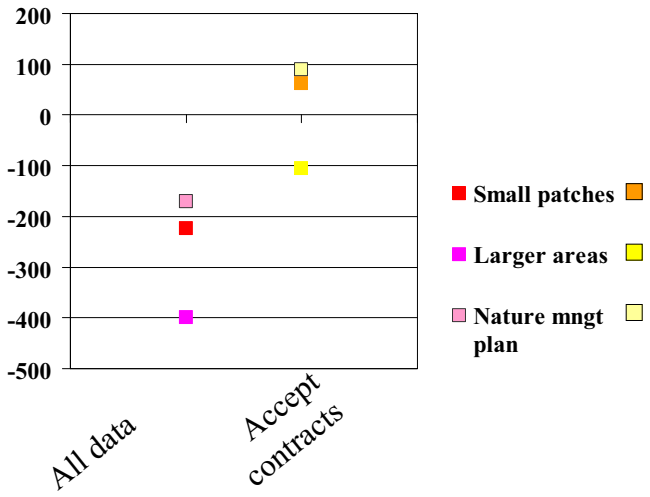
Heterogeneity of forest owners 1 / Choice of status quo

Always status quo → no conservation contract
- 28 %
- Over 60 years old, primary education, retired

Always conservation contract option
- 29 %
- Female, higher education
- Other occupation
- Length of ownership 6 – 15 years

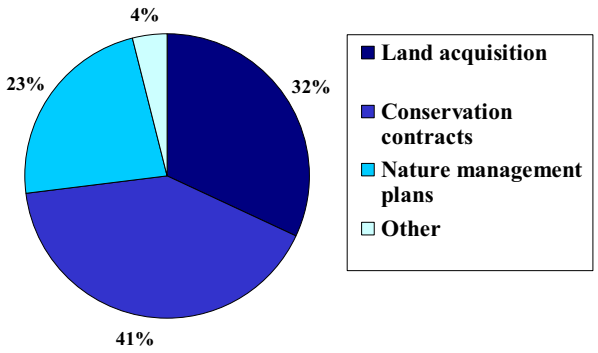
Both status quo and conservation options
- 42 %
- Under 41 years old
- Farmers

Heterogeneity of forest owners 2 / Choice of status quo



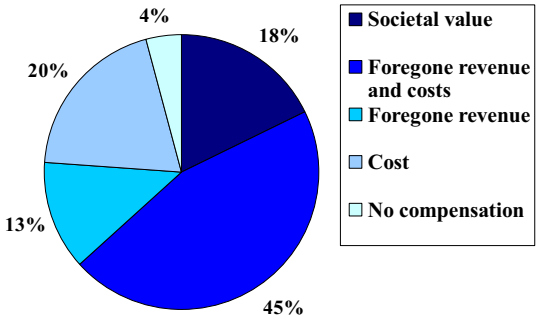
Which policy mechanisms the citizens prefer?

Nearly 2/3 preferred policy mechanisms based on voluntariness on the part of forest owners



What do the citizens think of the compensation to the forest owners?

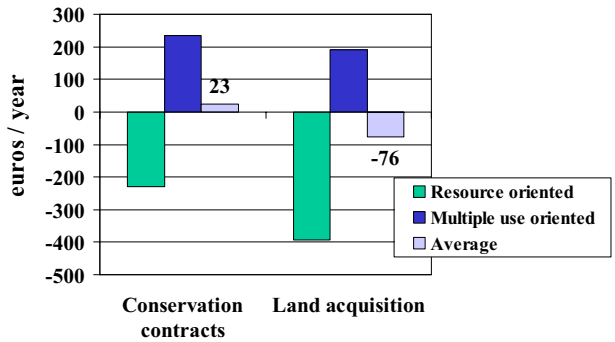
About 75 % would approved of full compensation for foregone revenue



A choice experiment on citizens' acceptance of the biodiversity conservation

•If the area under conservation in Southern Finland is rised to 4,2 % and consequently 450 jobs are lost in 10 years time:

- Price:
- In average 224 euros/ha/year
- Approval of citizens for compensation: 48 milj. euroa / v
- Quantity:
- More than 200 000 hectares → about 4,2 % of forest land
-



Contents

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Potential for cost efficiency?

- Incorporation of land owners with low opportunity cost for forest?
  - Many of the land owners with contracts are active in forestry
    - high opportunity cost
  - Many of those left without contracts had more positive attitude towards nature conservation
    - ”internalising nature values in their objective function”
    - low opportunity cost

Potential for cost efficiency?

- Competetive tendering
  - when the supply exceeds the demand/financial resources,
    1. the price will fall
    2. collection of offers gives an opportunity to select the optimal site combination for cost effectiveness

- Investing in the long-run
  - sites with lower values now, but with high potential for the future

Potential for cost efficiency?

- Fixed term contracts vs. permanent solution
  - cost efficiency depends on the interest rate
- State purchase or private conservation areas
  - ownership is important for forest owners
  - often no need to pay for ownership, hunting rights etc.
- Level of restrictions on forest use
  - often no need to pay for strict conservation

CONCLUSIONS AND POLICY IMPLICATIONS

- Socially acceptable policy
  - Forest owners value their sovereignty
  - No one forced into contracts
  - Citizens in average accept the policy
- Economically effective policy
  - Forest owners with an interest in nature conservation require a lower compensation
  - Welfare remains at least at the present level

CONCLUSIONS AND POLICY IMPLICATIONS

- Use of results in policy implementation:
  - Potential to identify the target groups for conservation contracts (savings in transaction costs
  - In setting the compensation level for contracts
- Use of results in policy decision making:
  - Social and economic evaluation, especially of the long term impacts

Remarks on the voluntary instruments: Social and economic implications

- Voluntary mechanisms are widely accepted which increases supply in the future
- Advisory services and multiple-use planning require financial incentives
- Local networks provide new models for procedures, but they are not directly transferable

- For the policy to be acceptable, the local social and economic impacts need to be accounted for
- Collaboration between the forest and environmental agencies is an prerequisite for expanding the use of new instruments
- It takes time and resources to create new culture and networks in biodiversity conservation

(METSO evaluation report Syrjänen, Horne, Koskela & Kumela 2006)

Conclusions

- **Fixed-term and permanent voluntary mechanisms need be targeted to specific situations and further developed**
- **Targeting short-term contracts**: e.g. fire areas, large deciduous trees, management dependent habitats, threatened species under surveillance l
- **Development of nature management areas and their policy instruments**: e.g. number of retention trees over the recommendations, development of structural elements, concentration of decayed wood, planting of deciduous trees, restoration of herb-rich forests, retainment of damage areas
- **Development of methods for planning, restoration and nature management** in commercial forests and in conservation areas, support for the use of methods and entrepreneurship
- **Long-term and permanent contracts** for permanent and slowly developing nature values: old-growth forests with decayed wood, hydrologically comprehensive marshlands with surroundings, ´restorated sites

(METSO evaluation report Syrjänen, Horne, Koskela & Kumela 2006)


THANK YOU FOR YOUR ATTENTION!

Laboratoire d'Economie Forestière
Unité Mixte de Recherche
AgroParisTech/INRA

Forests adding value to water quality in a land use perspective

Julien FIQUEPRON, Serge GARCIA, Anne STENGER

Introduction

- **Objective**

  Quantify the impact of forests on the quality and price of water at territorial level

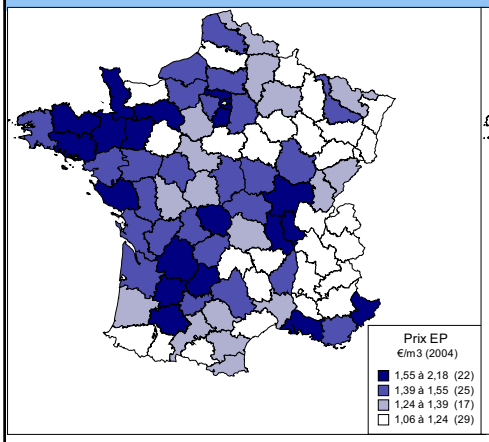
- **Regulatory context: recognition of the forest as a basis for many goods and services**

  LOF 2001: multifunctionality, water protection

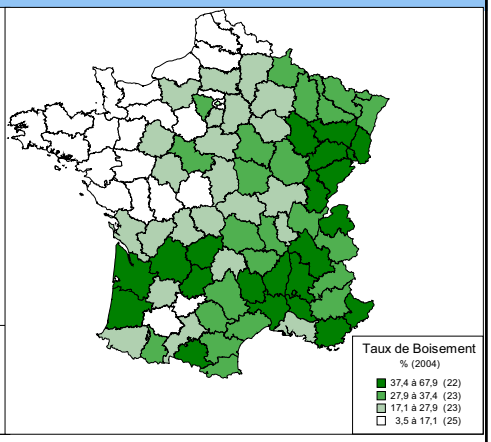
  DCE 2000, LEMA 2006: restoration of quality, priority given to protection and prevention

  Warsaw Declaration (Nov. 2007) at MCPFE (Ministerial Conference on the Protection of Forests in Europe) - "Forests and Water" resolution: "incorporate the economic valuation of water-related forest services into policies …"

Introduction



Price of drinking water (2004; drinking water part; €/m³; IFEN SCEES)



Afforestation rate (2004; % ; SCEES)

Introduction

- **Scientific context**: studies on the links between forests and water… but little from the economist's viewpoint

⇒ **Crucial in terms of valuation of the service and potential forest-owner payment**

- **Is it possible to measure the impact of forest coverage on the prices of drinking water supply through its effect on the quality of raw water?**
- **Selected approach**

  Econometric analysis: explanatory model of the price of water, with endogenous variables (the quality of raw water and the management service) and exogenous land coverage

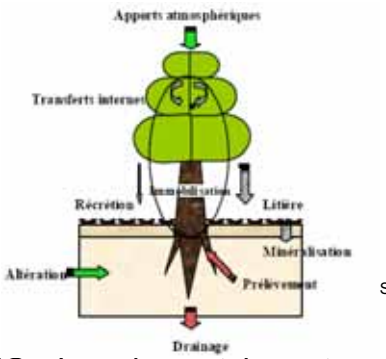
  Hypothesis: effect of land coverage on water quality

2 Links between forests and water quality

- Presence of forests and water quality
- Forestry management and water quality

2 Links between forests and water quality
- Presence of forests and water quality

- **Good linkage of biogeochemical cycles.**
  Perennial coverage limiting release phenomena



Source: Ranger

- **Dilution effect on NO_3**: Lorraine catchment areas, afforestation rate of 30% allowing compliance with drinking water standards (Benoît et al., 2002)

2 Links between forests and water quality
- Presence of forests and water quality

Occupation du sol	[NO_3^-] des eaux à 60 cm de profondeur en mg/l
Forêts	2
Prés de fauche	19
Pâtures	31
Prairies temporaires	28
Blé d'hiver	46
Colza	62
Céréales de printemps	120
Maïs fourrager	126

Nitrate contents of sub-root water for different types of land coverage in Lorraine (Benoît et al.1997)

2 Links between forests and water quality - Presence of forests and water quality

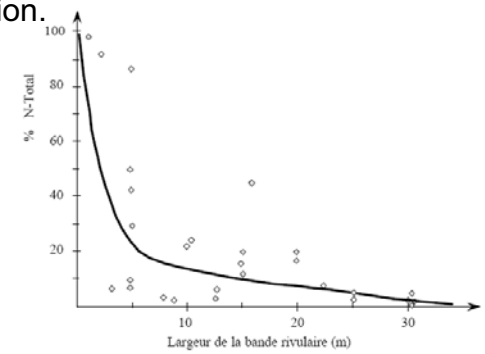
- **Forestland: acidic and rich in MO**
  - MO increases the capacity for retention of water and potentially pollutant elements.
  - Acidity can be transmitted to water and can increase the mobility of pollutants

Source : Jabiol

2 Links between forests and water quality - Presence of forests and water quality

- **Ground protection role**, limited turbidity
- **Purifying role** more marked for wooded formations in contact with polluted water (riverside vegetation, alluvial forests ~ bocage). Filtration, absorption, favourable conditions for denitrification.

Average change in total nitrogen content in water according to the width of the riverside strip (Maridet, 1994)

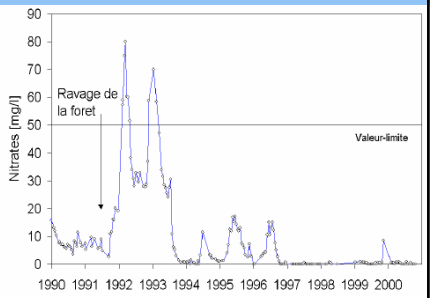


2 Links between forests and water quality - Forestry management and water quality

- **Less intensive management than in agriculture** :
  - **Little use of inputs**
  - **Rarer disruptions of tree cover, long-term management**

2 Links between forests and water quality - Forestry management and water quality

- **Disruptions of tree cover**: Risk of increase in [NO_3^-] (transitory and measured)



Sub-root water, Bavaria

Source: Attenberger

- **Forestry:** Risk of turbidity (logging, crossing of waterways). Machinery maintenance.

2 Links between forests and water quality

- **Forests: territorial coverage that is globally favourable to the quality of drinking water**

Protection of water quality:

– location and proportion of forests on the territory are more decisive than the types of forests

– however, the good average quality of forest water does not guarantee constant quality. This protective role can be strengthened by management precautions (Ferry, 2004)

Water treatment:

– Wooded formations (bocage, riverside vegetation, alluvial forests, SRC...) whose root system has access to a “polluted” water flow

3.1 Econometric methodology

- Principles for building the model
  - The forest effect cannot be interpreted in isolation
    - Take account of other land covers/uses
    - Data relating to the characteristics of drinking water supply services
  - Hypothesis: role of land covers/uses in the prices of drinking water supply via the quality of raw water
  - Choice of the department scale

3.1 Econometric methodology

➢ **Presentation of the basic model**

- Quality equations

$$Pesti = \gamma_0 + \gamma_x x + \gamma_z z + \varepsilon_{Pesti}$$

$$mNO_3 = \delta_0 + \delta_x x + \delta_z z + \varepsilon_{mNO3}$$

x: characteristics of the service

z: land covers and uses

- Price equation

$$PxEP = \alpha_0 + \alpha_x x + \alpha_z z + \alpha_2 Pesti + \alpha_3 mNO_3 + \alpha_4 Del + \varepsilon_p$$

- Management mode equation (DSP)

$$pDSP = \beta_0 + \beta_x x + \beta_z z + \beta_{1\,Pesti} + \beta_{2\,mNO3} + \varepsilon_d$$

3.1 Econometric methodology

- Estimation method

– certain variables to be explained (pDSP, Pesti and mNO_3) also act as explanatory variables

– The estimation methods (MMG) take into account:

  – The endogeneity of the variables

  – The strong heterogeneity of the individuals in the sample (departments)

  – The correlation of errors (simultaneous equation systems)

3.2 Data

- Base of 67 departmental variables
- Sample: 93 departments
  (without Paris and Corsica)

3.2 Data

➢ **Variables to be explained:**

variables	*code*	*year*	*source*
Pesticides, % controlled raw water flows where standard is exceeded for DW	**Pesti**	2002-2005	Min. Health Sise-Eaux
Nitrates, average content of controlled raw water flows (mg/l)	**mNO3**	2002-2005	
Choice of management mode (direct or delegated) % pop. in delegated management	**pDSP**	2007	Min. Health
Average drinking water supply price (drinking water part) € for120m^3/subscriptions/year	**PxEP**	2004	IFEN-SCEES

3.2 Data

➢ **Explanatory variables**:

• Constraints on water services (**x**)

variables	*code*	*year*	*source*
Volumes put into distribution	**VolDist**	2004	IFEN-SCEES
Length of network	**Long**	2004	IFEN-SCEES
Population density	**DensPop**	2005	INSEE
Population per distribution unit	**PopUDI**	2007	Min. Health
Seasonal pop. Max pop. / resident pop.	**Pmax**	2005	Min. Tourism
Average climatic balance (P-ETP) from Oct to April: *recharge*	**Hydrech**	1961-1990	LERFoB
Origin of raw water % flows originating from groundwater	**pESO**	2007	Min. Health

3.2 Data

• Land covers and uses (**z**)

variables	*code*	*year*	*source*
% woodland (including poplars)	**pSBoisPe**	2004	SCEES-SAA
% grazing land	**pSSTH**	2004	SCEES-SAA
% arable lands	**pSTerAra**	2004	SCEES-SAA
% viticulture, arboriculture, market gardening land	**pSViArMa**	2004	SCEES-SAA
% mountainous zones	**pSMontTo**	2007	MAP

3.3 Estimation results

Equations	R² ajusté	Paramètres	Estimation	seuil de significativité
Pesti	0,62	Constante	97,1	1%
		pSBoisPe	-0,572	1%
		pSSTH	-0,492	1%
		pSTerAra	0,149	1%
		pSViArMa	1,149	1%
		pDebESO	-0,628	1%

Equations	R² ajusté	Paramètres	Estimation	seuil de significativité
mNO3	0,65	Constante	14,6	1%
		pSBoisPe	-0,176	1%
		pSTerAra	0,249	1%
		pSMont	-0,065	1%

3.3 Estimation results

Equations	R² ajusté	Paramètres	Estimation	seuil de significativité
pDSP	0,33	Constante	34,0	1%
		VolDist	0,209	1%
		DensPop	0,002	1%
		Long	0,668	10%
		Hydrech	-0,032	1%
		Pmax	0,090	1%
		Pesti	0,211	1%

Equations	R² ajusté	Paramètres	Estimation	seuil de significativité
PxEP	0,52	Constante	1,46	1%
		Long	0,006	5%
		PopUDI	-0,001	10%
		pDebESO	-0,005	1%
		pDSP	0,004	1%
		mNO3	0,003	5%

3.3 Estimation results

- Limits
  - Aggregation of data at department level
  - Linear model
  - Temporal dimension not taken into account
    - No inertia in the effects of changes in land coverage on the water resource

3.4 Simulation of a change in the territory's canopy

Changement occupation du territoire	variation	Surface	
pSBoisPe	5%	2 675 901	ha
pSTerAra	5%	2 675 901	ha

NO3	-2,1 mg/l
Pesti	-3,6 % de débits à traiter

DSP	-0,8 % pop desservie en DSP

PxEP	-0,009 €/m^3

PxEP France	-30 millions d'€
PxEP France	-11 €/ha boisé

Conclusion

- Summary of the main results
  - Good adjustment of the estimated model
  - Impact of land covers and uses on the quality of raw water and of drinking water supply prices

  Confirmation and evaluation of the role of forests:
  - positive influence on the quality of raw water
  - indirect effect leading to a drop in the price of drinking water
- Perspectives

  Questions related to the uses and development of the territory

  Limits: the department scale does not correspond to the drinking water territories (BAC); certain catchments are hardly dependent on land coverage.

⇒ Tendency to underestimate the effects of land coverage

Targeting actions on vulnerable BAC would strengthen the effects presented in the model

Jakub Kronenberg
University of Lodz

Joanna Mieszkowicz
The Aeris Futuro Foundation

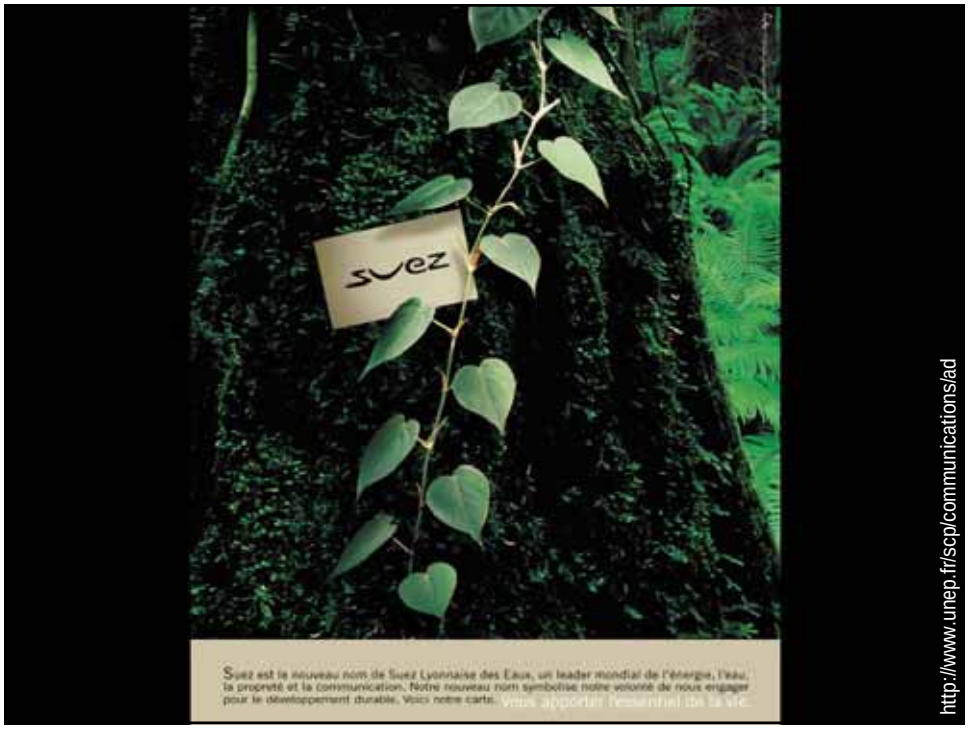
Illustration: book cover: *Marketing calculator* by Guy R. Powell

Outline

- Marketing departments' use of forest services
- Assumptions
- Method, survey sample
- Survey results
- Valuation results
- Discussion
- Conclusions

Marketing depts' use of forest services

- Advertising – image
  - Trees and forests symbolise strength, endurance, stability
  - A forest is the most tangible image of nature – being forest-friendly means being nature-friendly



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Marketing depts' use of forest services

- Advertising – image
  - Trees and forests symbolise strength, endurance, stability
  - A forest is the most tangible image of nature – being forest-friendly means being nature-friendly
- Voluntary carbon offsets through afforestation
- Planting trees as a social activity
  Pretext for social, PR / CSR / HR events
- Forests as a publicity theme


The Aeris Futuro Foundation: ww.aeris.eko.org.pl


The Aeris Futuro Foundation: ww.aeris.eko.org.pl

Assumptions

1. Planting trees (and forests) is a visible and highly symbolic intervention and is expected to benefit the company image
2. Companies paying for a tree planting event reveal their WTP for trees
3. This is not carbon sequestration value,
   but an additional value that forests have for PR departments – a pretext for a PR / CSR / HR tree planting event
4. This value is inflated by the expected ROI in tree planting

Method

1. Survey of companies involved in tree planting as a PR / CSR / HR activity
   - motivation and use of tree planting for promotion
   - whether companies study the effectiveness and efficiency of tree planting as a PR / CSR / HR tool
2. Study financial data available on tree planting projects financed by those companies
   - how much and for what did the companies pay?

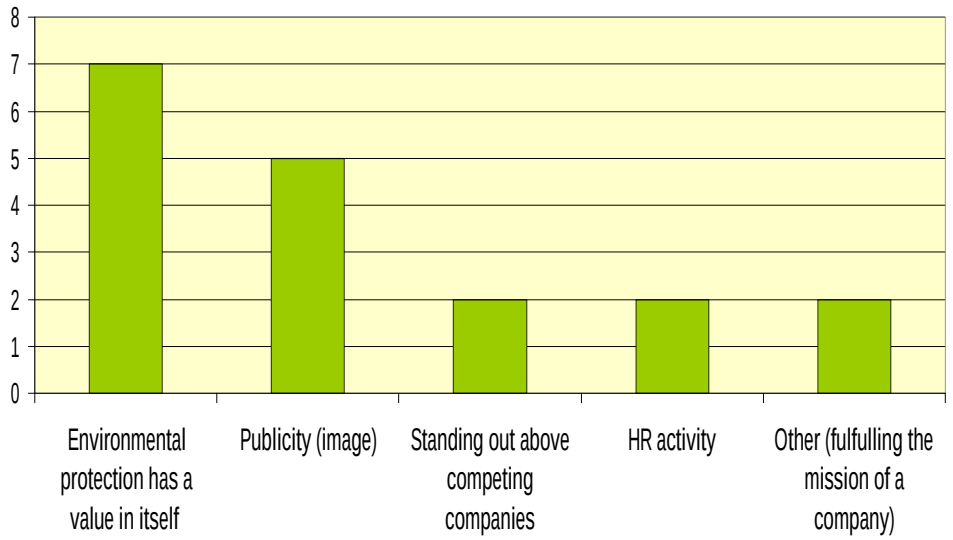
Suvey sample

- Companies involved in tree planting
  with the Aeris Futuro Foundation (Poland)
  (95% of trees planted by the Foundation)
- 7 companies, 11 tree planting projects (2006-2008)
  - 10 afforestation projects qualified
  - 1 project of a different character rejected
- 1 additional company, not cooperating with the Aeris Futuro Foundation, included in the sample for reference

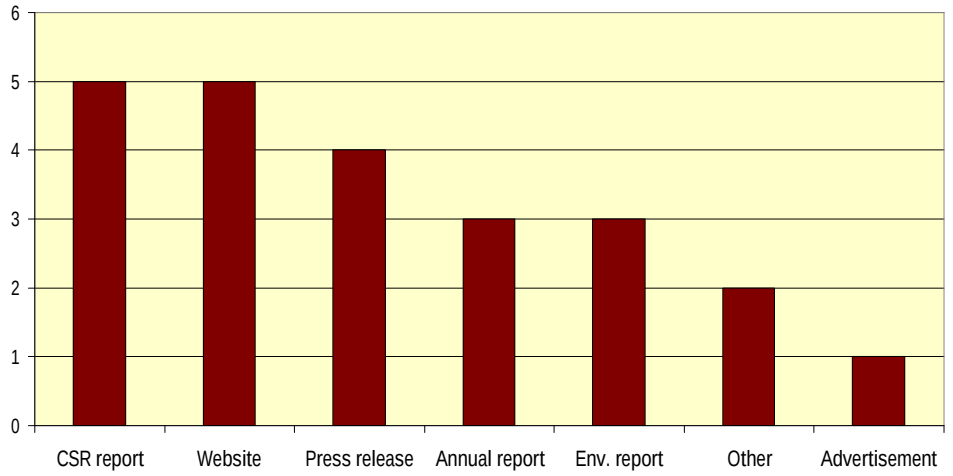
Survey results

- Effectiveness of tree planting as a PR/CSR tool
  None of the eight companies surveyed studied consumer attitudes towards tree planting by a company
- Efficiency of tree planting as a PR/CSR tool
  1 of the 8 companies surveyed declared using a ROI on tree planting activity:
  25% (with a comment: calculating this indicator is difficult)
- Of the surveyed companies, 2 participated in carbon offsets; 7 were planting trees without offsetting CO_2 emissions

What are your reasons for tree planting and, consequently, climate protection?



How do you use tree planting for the promotion of your company?



Costs related to tree planting

1. Direct costs: choosing and preparing the area, saplings, transportation of saplings, planting, nurturing (5 years)
2. Indirect costs: items and services necessary for planting: foresters' supervision; gloves; transportation; memorial stone or plaque; coordination and management
3. Additional indirect costs: catering; additional entertainment; gifts, souvenirs, prizes

Valuation results (in USD per tree)

		Total	Min. record	Max. record
Lower estimate	Average direct cost	3.80	3.29	9.58
	Average indirect cost	1.52	0.98	28.84
	Average additional indirect cost	0.86	0	91.59
	Average total cost	6.17	4.27	130.00
Upper estimate LE*1.25	Average direct cost	4.75	4.11	11.98
	Average indirect cost	1.90	1.22	36.05
	Average additional indirect cost	1.08	0	114.49
	Average total cost	7.72	5.34	162.50

Interpretation / discussion

- Significant range of values – 5.34 to 162.5 USD
  - Economies of scale
  - The former was a typical tree planting project with the expected result of having the trees planted
  - The latter was a typical HR project, with tree planting serving as a pretext to organize a social event
- Were it not for the forest's appeal, a forest would not be used as a pretext to have a memorable corporate event

Limitations / discussion

1. This method only applies to forests planted within voluntary carbon offset or other projects greening companies' image
2. It neglects the ecological services provided by forests
3. It depends on whether preventing climate change through tree planting is perceived as 'trendy'
4. The elicited values may depend on the level of development of a given market (higher prices, higher values)
5. Great spectrum of costs borne by different companies – and of implied values – depends on the character of a project

Conclusions

- Some services provided by forests have not yet been valued
- Were it not for the forest's appeal, a forest would not be used as a pretext to have a memorable corporate event
- Value of trees as a publicity theme, exploited by corporate PR and CSR departments, USD 7.72 per tree
- This value adds to other values of forests, except for the timber value
- Companies need forests...
  but if there were no forests, they would use other PR options

"The link to climate change has put forests back on the business agenda. I wouldn't have got funding without REDD* in the proposal."

Andrea Babon,
researching a doctoral thesis on forest-dependent communities in poor countries

* Reducing Emissions from Deforestation and Degradation

Types of voluntary carbon offset

- Renewable energy
- Fuel substitution
- Energy-efficiency improvements
- Subsidising public transport
- Carbon sequestration by afforestation or prevented deforestation

If this were a tree, you woudn't even noticed. Protect nature.

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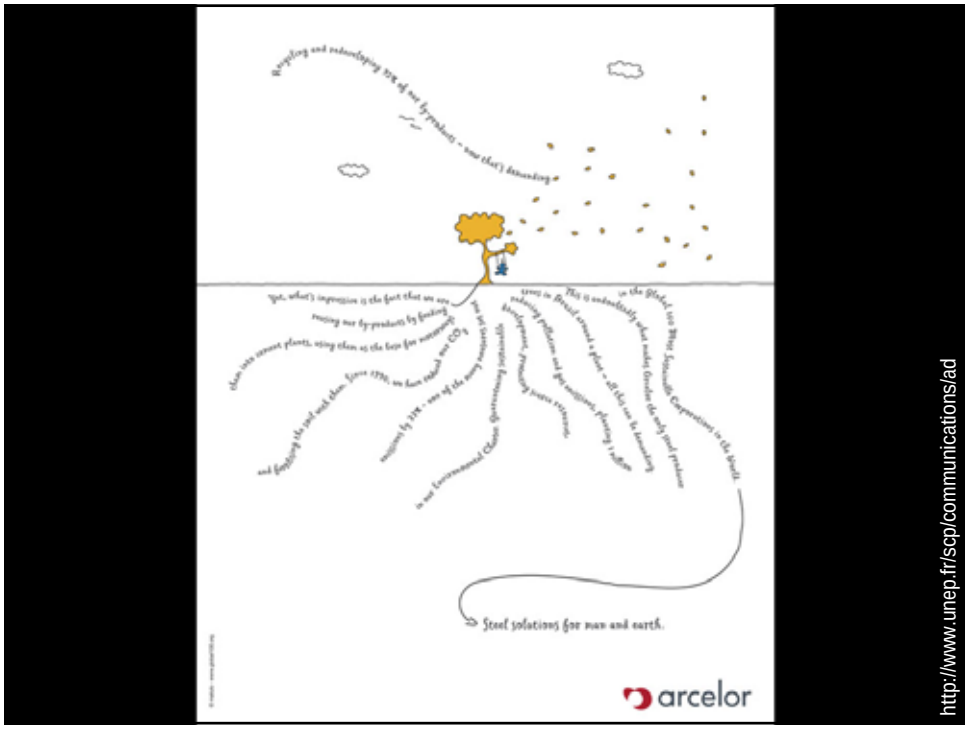
http://www.unep.fr/scp/communications/ad



http://www.unep.fr/scp/communications/ad

Tree planting market in Poland

- Planting directly with Regional Centres of National Forests
- Planting with the Aeris Futuro Foundation
- Planting with other NGOs – Klub Gaja, Nasza Ziemia
- Planting with international operators, such as CO_2 Reduction Poland offerring certified carbon offset services

Economic values of a forest

- Direct use values: timber, fuel wood / charcoal, non-timber forest products, genetic information (agricultural, pharmaceutical), recreation / tourism, research / education, cultural / religious
- Indirect use values: watershed functions (soil conservation, water supply, water quality, flood / storm protection, fisheries protection); global climate (carbon storage, carbon fixing); biodiversity; amenity (local)
- Option values; Existence values
- Land conversion values

SCBD 2001

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Mechanisms for compensating forest owners for biodiversity protection in Norway (Work in progress)

Henrik Lindhjem, Econ Pöyry & Norwegian University of Life Sciences
Eirik Romstad, Norwegian University of Life Sciences
Forests and Countries in Transition, Warsaw, Poland, 21. February 2009

Contents

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Norwegian policy on biodiversity conservation in forests

- Norway signed up to Biodiversity Convention to halt biodiversity loss by 2010
  - Ca 1830 of 18 500 species assessed in Norway are threatened (Red List 2007)
  - Ca 40 000 species in total in Norway (uncertain)
- Currently ca. 1.5 % of Norway's productive forest area protected in reserves
  - Much lower than Sweden and Finland, and other countries (next slide)
  - Reserves mostly located where timber values (opportunity cost) are low
- Biologists' evaluation says at least 4.5 % is required (Framstad et al 2002)
- But expensive and conflict-ridden to protect forests
  - 80-90% privately owned forests
  - Compensated for reserve protection on a voluntary basis
  - Very slow process to reach long-term targets
- New ways to increase forest reserves needed!

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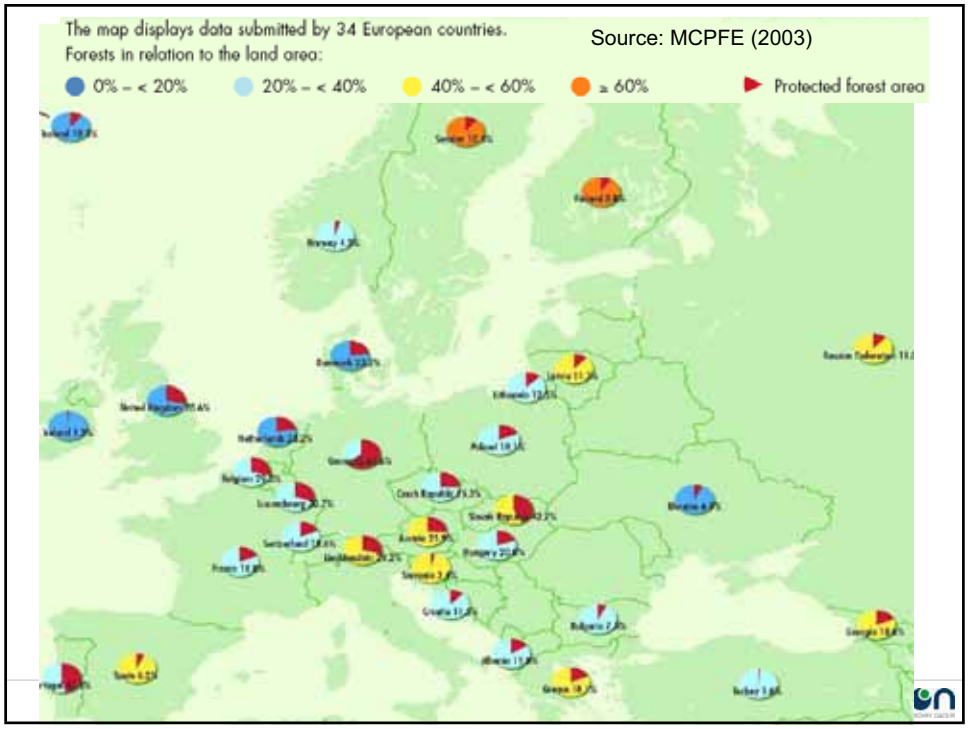
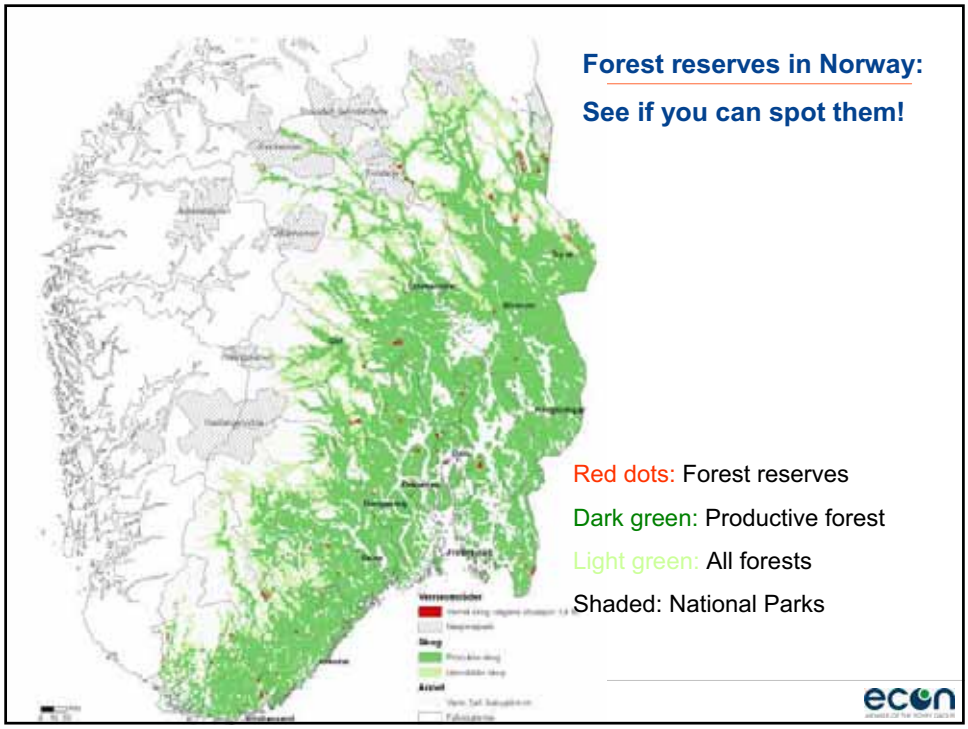
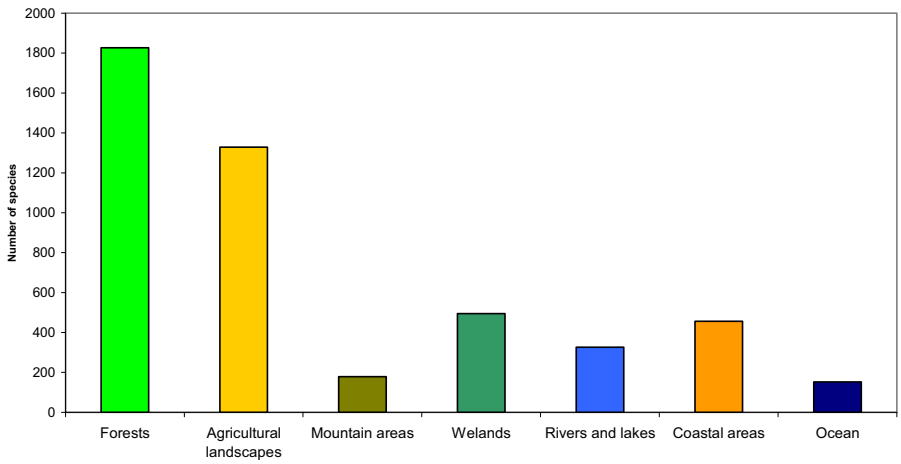

The map displays data submitted by 34 European countries.
Forests in relation to the land area:
0% – < 20%
20% – < 40%
40% – < 60%
≥ 60%
Protected forest area
Source: MCPFE (2003)


Forest reserves in Norway:
See if you can spot them!
Red dots: Forest reserves
Dark green: Productive forest
Light green: All forests
Shaded: National Parks

Number of threatened species in Norwegian by habitat types



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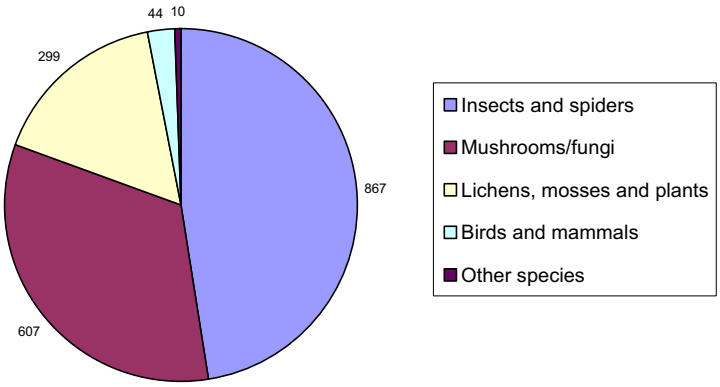
Number of threatened species in Norwegian forests



7

Examples of endangered species in Norway

8

Contents

Background to Norwegian biodiversity policy

Research questions and methods

Some very preliminary results

Conclusions & next steps

9

Costs and benefits of biodiversity protection

- Benefits: Have conducted nation-wide survey of general population's
  - Types and frequency of forest use
  - Attitudes to forest policy and biodiversity conservation
  - Willingness to Pay to conserve forests: different protection levels (2.8%, 4.5%,10%)
- Costs: Compensation to forest owners for loss of timber (and other values)
  - Marginal cost of biodiversity protection increasing as more expensive land is used

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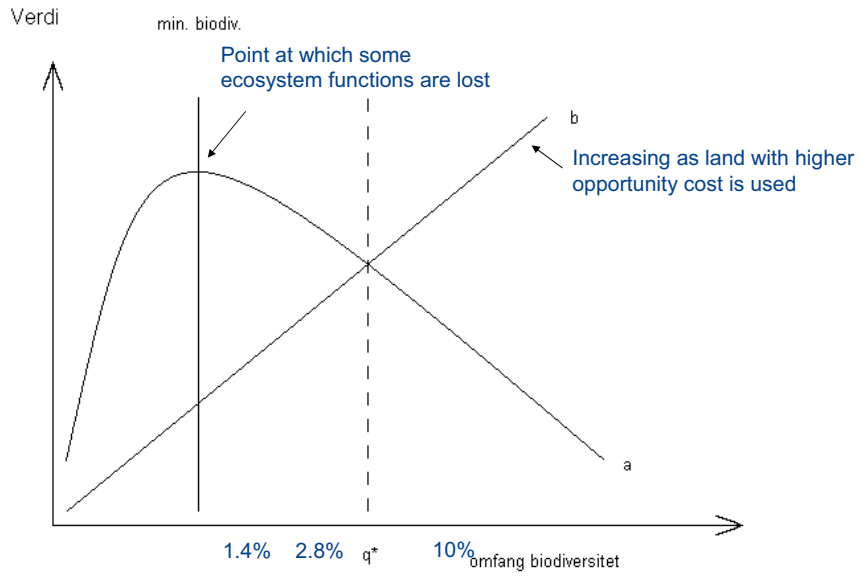
Marginal value (a) and marginal cost (b) of biodiversity protection



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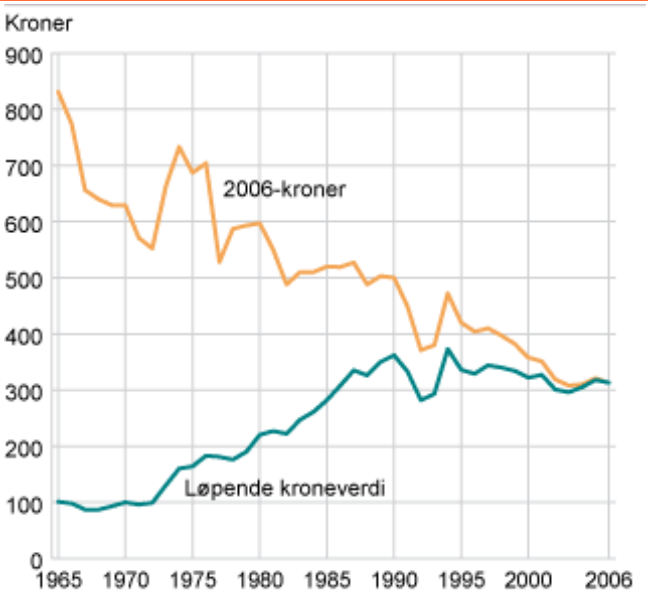
Price of timber – “opportuntity cost” of biodiversity conservation decreasing



12

Two mechanisms to compensate forest owners

- 1. Voluntary on a “case-by-case” basis:
  - Traditional way, as done to date – reserves are created, standard compensation
  - According to a standard formula for calculating loss of timber values
  - Slow, high transaction costs
- 2. Auctions where forest owners submit a bid for conserving land:
  - Using that private owners know better if they have biodiversity on their land
  - Private owners also know their costs of biodiversity protection
  - Using auction can save on costs of collecting bio-info, reach conservation targets
  - Participating in the auction at a cost, deterring owners with low/no biological value
- Relates to the literature on auctions/contracts – Anne was referring to

13

Auction with 9 bidders, 5 awarded contracts at price of 6th bidder (Vickrey style auction – Romstad and Polasky (2008))

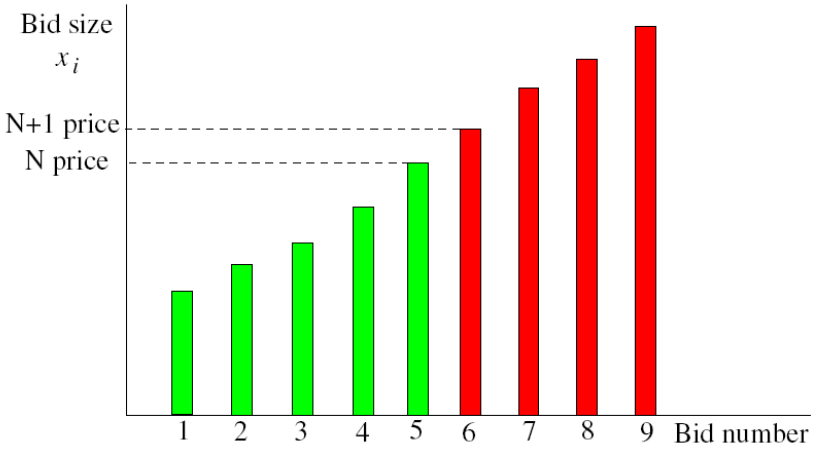


Figure 1: N+1 and N price reverse multi contract auctions.

14

Research questions

- What is the share of forest owners willing to set aside land for conservation?
- What is the forest owners' willingness to accept (WTA) compensation for forest reserves (per 0.5 hectare)?
- Does their participation or level of compensation depend on the mechanism?
- Given the WTA compensation level, what are:
  - Share of their forest they are willing to set aside?
  - Biological value of the land? (which biological elements are present in the forest?)
  - Costs of harvesting timber?
- Overall: How does the the supply curve for forest protection look like?
- Growing literature on incentive schemes for private land owners to provide public goods

15

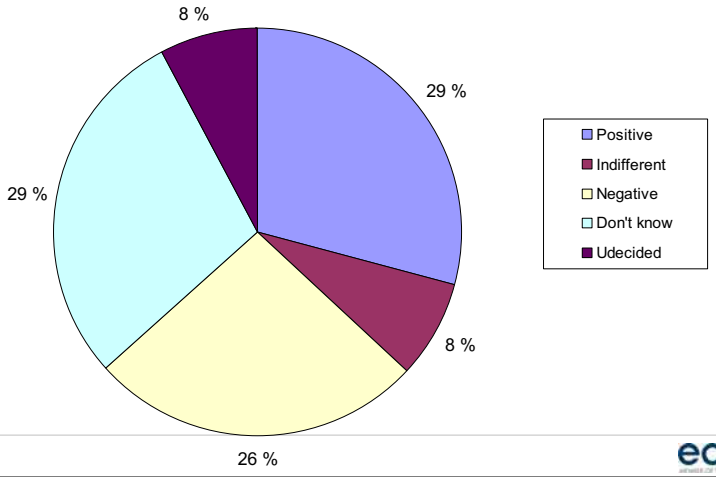
Methods: Stated preference survey of forest owners

- Stated preference survey among forest owners in Norway
- Administered to a sample of 2000 owners conducted late 2007
- Sample frame: national register/database of all forest owners paying taxes
  - Linked with land holding sizes
- Three samples:
  - WTA framed as a "standard" voluntary compensation scheme
  - WTA framed as participation in an auction – participation fee A
  - WTA framed as participation in an auction – participation fee B (A<B)
- + A range of questions related to:
  - How they use the land, purpose of ownership, income sources
  - Forest characteristics (size, age, structure, biological hotspots etc)
  - (Erlend's part on innovativeness, networks etc)
  - Attitudes towards forest conservation and polices
  - Socio-economic information
- Response rate overall: **Ca 35 %**

Contents

Some very preliminary results of the two auction samples – work in progress

"How do you see an auction as a way of compensating forest owners…."
(both samples pooled, n= 392)



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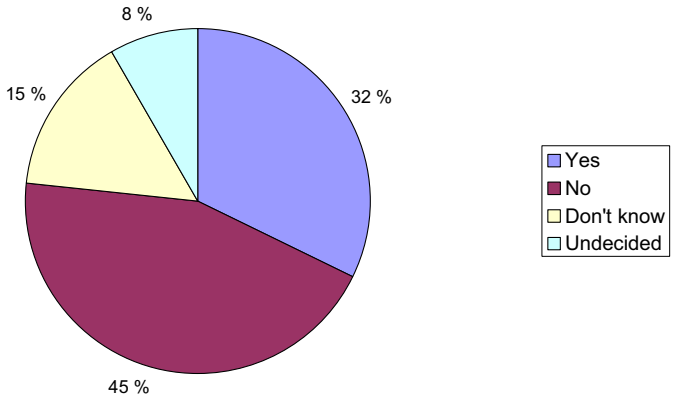
Preliminary results cont'd

- "If you get sufficient compensation through an auction, would you voluntarily set aside parts or the whole of your forest for conservation?"
(Both samples pooled, n = 392)



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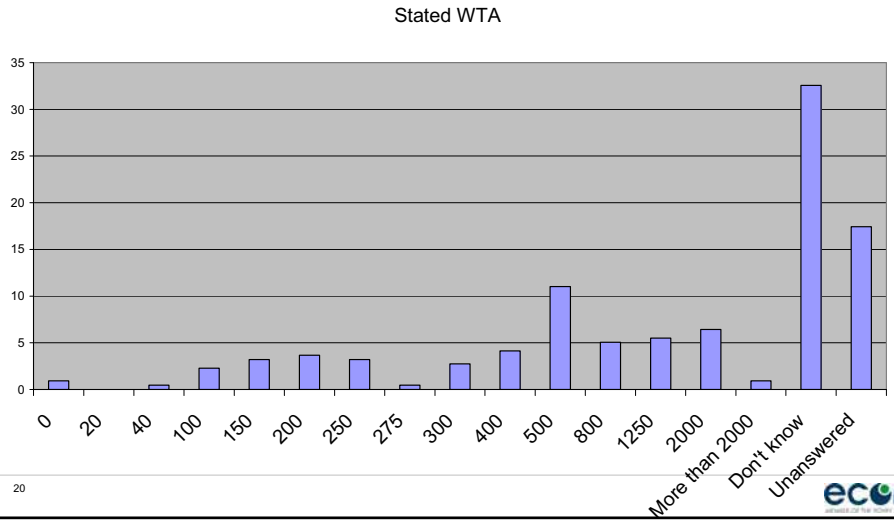
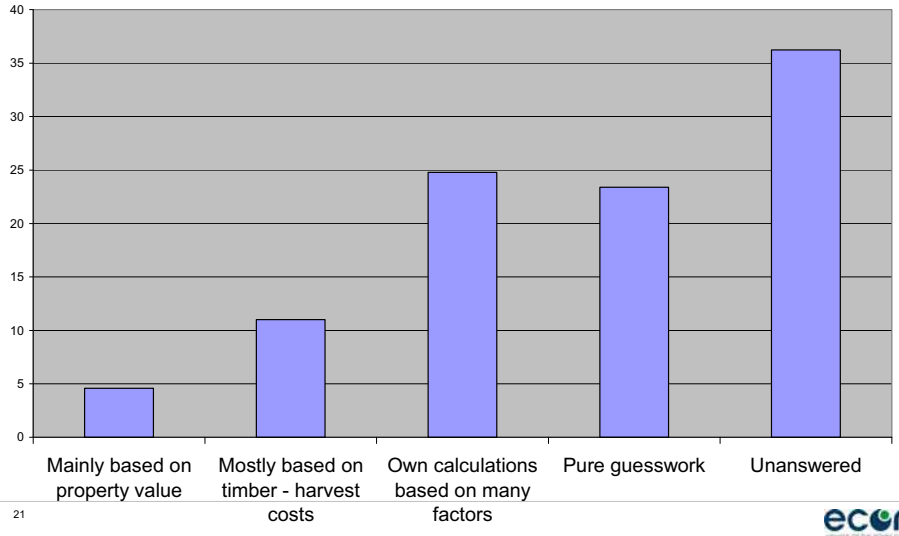
Preliminary results cont'd

- "Assume you in an auction can be offered an annual payment per 0,5 hectare (5 dekar"),.....what would be your minimum bid you would give?" (n=218)



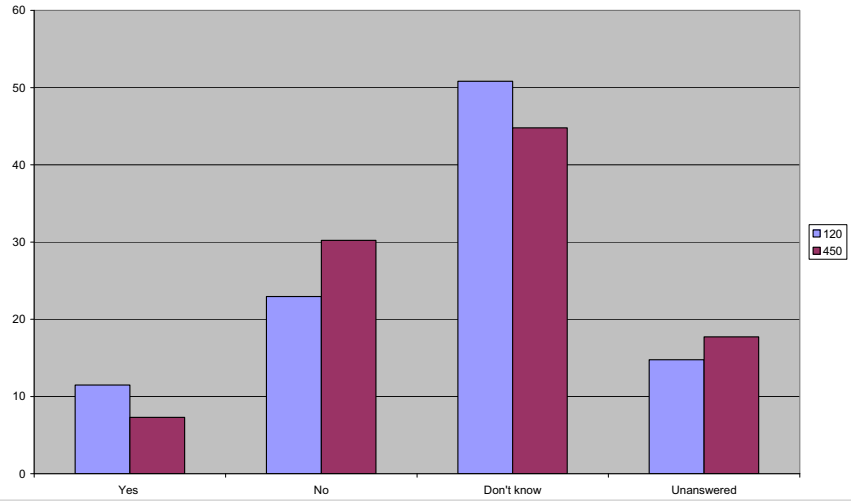
Preliminary results (cont'd)

- "How did you calculate the WTA amount?" (pooled sample, n = 218)



Preliminary results cont'd

- "Would you submit a bid if the participation fee was x (X= 120, 450)"



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Contents

Background to Norwegian biodiversity policy

Research questions and methods

Some very preliminary results

Conclusions & next steps

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Conclusions & next steps

- Remains to do more data analysis:
  - Comparison of participation rates and WTA for the two mechanisms
  - Calculation of WTA for forests of different characteristics (biology, costs)
  - Calculation of a marginal cost curve for biodiversity
- Auction is a difficult and unusual concept for forest owners to grasp
- Forest owners seem unsure about WTA levels, difficult to state in a survey

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Annex 1: Program for seminar

Warsaw University
Warsaw Ecological Economics Center

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norway grants

Countries & Forests in Transition: Research seminar on the benefits of multi-functional forest policy

20-21 February 2009
Faculty of Economic Sciences
University of Warsaw
44/50 Dluga Street, 00-241Warsaw

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norway grants

Seminarium naukowe dotyczące korzyści z efektywnej wielofunkcyjnej gospodarki leśnej

20-21 lutego 2009
Wydział Nauk Ekonomicznych
Uniwersytet Warszawski
ul. Długa 44/50, 00-241 Warszawa

CONFERENCE PROGRAM

Friday 20. February, 2009

Room "A", Faculty of Economic Sciences, Warsaw University

8 45 – 9 00	Registration
9 00 – 9 15	Professor Tomasz Zylicz to welcome attendees

9 15 – 12 00 Plenary session I – The social value of forests

(Chair: Anna Bartczak)

9 15 – 10 15	**Keynote I: Professor Jeffrey E. Englin**: (Department of Resource Economics, University of Nevada, USA), ***"Valuation of forest recreation in the US – state of the art and methods"***.
10 15 – 10 30	Coffee break
10 30 – 11 00	Jürgen Meyerhoff (Technische Universität Berlin), *"Mapping heterogeneous preferences for forest biodiversity using latent class choice models"*
11 00 – 11 30	Mikolaj Czajkowski & Nick Hanley (Warsaw University), *"How to 'Sell' an Environmental Good: Using Labels to Investigate Scope Effects"*
11 30 – 12 00	Jan Melichar & Jan Urban (Charles University Environment Center), *"Composite Approach of Forest Scenic Beauty Model and Choice Experiment"*
12 00 – 13 15	Lunch (in-house)

13 15 – 16 15 Plenary session II – Multi-functional forest policy

(Chair: Tomasz Zylicz)

13 15 – 13 45	Patrice Harou (INRA, France), *"Multifunctional forest instruments in Albania in the context of the EU enlargement policy"*
13 45 – 14 15	Zenon Tederko (Independent), "Biodiversity conservation through private sector"
14 15 – 14 45	Andrzej Bobiec (Rzeszów University), *"Ill-functional, unsustainable"*
14 45 – 15 15	Coffee break
15 15 – 15 45	Signe Anthon, Serge Garcia & Anne Stenger (KVL, Denmark & INRA France) *"Incentive Contracts for Natura 2000 Implementation in Forest Areas"*
15 45 – 16 15	Erlend Nybakk (Norwegian University of Life Sciences and Norwegian Forest and Landscape Institute), *"Innovation and entrepreneurship in*

the Norwegian Non-timber Forest Products and Services sector: The influence of attitudes, external relationships and learning".

18 00 – 21:00 Dinner

Saturday 21. February, 2009

Room "A", Faculty of Economic Sciences, Warsaw University

9 00 – 12 00 Plenary session III: Environmental valuation & forest policy (Chair: Jeff Englin)

9 00 – 10 00 **Keynote II:** Paula Horne (Research Director, Forest Economics Research Group, PTT, Finland), ***"Forest valuation and policy: Experiences from Finland"***.

10 00 – 10 15 Coffee break

10 15 – 10 45 Julien Fiquepron, Serge Garcia, Anne Stenger (INFRA & IDF, Institut pour le Développement Forestier, France), "*Forests adding value to water quality in a land use perspective"*

10 45 – 11 15 Jakub Kronenberg and Joanna Mieszkowicz (University of Lodz & The Aeris Futuro Foundation), "*How much is a forest worth for a PR department?"*

11 15 – 11 45 Henrik Lindhjem and Eirik Romstad (Econ Pöyry & Norwegian University of Life Sciences) "*Eliciting forest owner compensation levels for biodiversity protection: A comparison of two mechanisms"*

11 45- 12 00 Summary/conclusion of conference

12 00 – 13 00 Lunch/departure

13 00 – 15 00 Post conference open workshop: Research design for biodiversity and recreation valuation surveys 2009, Poland[1]

(Chair: Henrik Lindhjem)

13 00 – 13 30 Anna Bartczak (WEEC), *"Overview of the POLFOREX project – sketch of research design for on-site and national surveys"*

13 30 – 15 00 Discussion of possible ideas, problems and solutions

[1] Everybody who is interested is very welcome to participate.

ORGANISERS

Warsaw Ecological Economics Center (WEEC), Faculty of Economic Sciences, University of Warsaw
Econ Pöyry, Oslo, Norway
Funded by: The Polish-Norwegian Research Fund

SCIENTIFIC & ORGANISING COMMITTEE

Anna Bartczak, WEEC, Poland; Henrik Lindhjem, Econ Pöyry, Oslo, Norway; Tomasz Zylicz, WEEC, Poland.

VENUE & TRANSPORT

The conference will be held at the: Faculty of Economic Sciences, Warsaw University, Dluga 44/50, lecture theatre "A", Location: http://www.wne.uw.edu.pl/

Transport: See next page for details. There will be no organised transport from/to airport.

Conference website: http://www.polforex.wne.uw.edu.pl/

HOTEL OPTIONS

1. Hotel ** IBIS Stare Miasto (the closest to the conference venue – most people will stay here).
Ul. Muranowska 2, 02-209, phone: +48 22 310 10 00
http://www.orbis.pl/en/warszawa/hotels/ibis_warszawa_stare_miasto

2. Hotel **** Sofitel Victoria
Ul. Królewska 11, 00-065 Warszawa, phone: +48 (0) 22 657 80 11
http://www.orbis.pl/en/warszawa/hotels/sofitel_victoria_warszawa

3. Hotel ** Harenda
Ul. Krakowskie Przedmieście 4/6, 00-333 Warszawa, +48 22 826 00 71
http://www.hotelharenda.com.pl/

REGISTRATION

There is no conference fee. Register at arrival. Speakers in this program are confirmed. Other participants should confirm their participation by e-mail by e-mail to Anna Bartczak or Henrik Lindhjem (see e-mail below) by 9. February, latest.

CONTACTS

Anna Bartczak
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Phone: + 48228314725
E-mail: bartczak@wne.uw.edu.pl

Henrik Lindhjem
Econ Pöyry (www.econ.no)
Biskop Gunnerus' gate 14A, PO Box 5, 0051 Oslo, Norway
Ph: +4798263957,
E-mail: henrik.lindhjem@poyry.com

Access to the Faculty of Economic Sciences, University of Warsaw

- **Start location:** **Warsaw Frederic Chopin Airport**
  Address: No 1 Żwirki i Wigury street, Warsaw
- **Destination:** **Faculty of Economic Sciences, University of Warsaw**
  Address: **No 44/50 Długa street**, Warsaw
- Length of the route: **10.4 km**
  Estimated time of arrival: **20 min.**

- **Taxis & minicabs:**
  - **Merc Taxi**, Tel: +48 22 677 77 77
    Travelling expenses: **32.30 zlotys***;
  - **MPT Radio Taxi,** Tel: +48 22 9191
    Travelling expenses: **28.56 zlotys***;
  - **Sawa Taxi,** Tel +48 22 650 22 01
    Travelling expenses: **32.30 zlotys***;
  - **City Warsaw Taxi,** Tel: 9459
    Travelling expenses: **22.92 zlotys***.

  * estimated expenses between 6 a.m. and 22 p.m.

- **Municipal bus services (ZTM):**
  - **Line 175**: will take you from Frederic Chopin Airport to "Centrum" bus stop (approx. 30 minutes); change to an underground; travel towards "Młociny" underground station (approx. 4 minutes) and get off at 'Ratusz Arsenał'; go on foot to Długa street. (look at the street plan at the bottom of the page)
  - **Line 188**: will take you from Frederic Chopin Airport to "Metro Politechnika" bus stop (approx. 22 minutes); change to an underground; travel towards "Młociny" underground station (approx. 6 minutes) and get off at 'Ratusz Arsenał'; go on foot to Długa street. (look at the street plan at the bottom of the page)

- **Travel by car:**
  1. Żwirki i Wigury street: drive down the street (5.6 km)
  2. E30- drive straight.
  3. Krzyckiego street: straight (0.3 km)
  4. Raszyńska street: straight ahead (0.6 km)
  5. Plac Zawiszy (roundabout): take the second turn to the Towarowa street.
  6. Towarowa street: drive straight (1.6 km)
  7. Turn right into Solidarności street (2 km)
  8. Turn around about 200 m behind "Plac Bankowy"
  9. Take the first street on the right (120 m)
  10. Turn into Długa street

Bus fares:
Single fare ticket - valid for all day lines and night lines: 2.80 zlotys
One Day City Travelcard - valid for any number of journeys within 24 hours from validation:

STREET MAP:

Annex 2: Participants list

Final list of participants – Forest Conference Warsaw 20.-21. February 2009

Name	Affiliation	E-mail	Presentation	Fri	Sat
Adam Antosik	Warsaw University				
Adam Sikora	IBL				+
Agnieszka Kopanska	Warsaw University	kopanska@coin.wne.uw.edu.pl	No	+	+
Andrzej Bobiec	Rzeszów University	atb.ftf@gmail.com	Yes	+	+
Andrzej Muter	NFOŚiGW	A.Muter@nfosigw.gov.pl	No	+	+
Anna Bartczak	Warsaw Ecological Economics Center, Warsaw University	bartczak@wne.uw.edu.pl	Yes	+	+
Anna Dubel	University of Science & Technology, Krakow	alasut@ghnet.pl	No		+
Anna Janusz	University of Agriculture, Cracow		No		
Anne Stenger	INRA, France	stenger@nancy-engref.inra.fr	Yes	+	+
Barbara Maksimowska,	NFOŚiGW			+	
Bartłomiej Kastelik	State Forest Enterprise				+
Dariusz Szwed	Leader of Polish Green party				
Dorota Smoczyńska	Wydział Nauk Ekonomicznych UW				+
Erlend Nybakk	Norwegian Forest and Landscape Institute	erlend.nybakk@skogoglandskap.no	Yes	+	+
Ewa Fabisiak,	NFOŚiGW			+	+
Henrik Lindhjem	Econ Pöyry, Oslo	henrik.lindhjem@poyry.com	Yes	+	+
Ida Aronsen	Econ Pöyry, Oslo	ida.aronsen@poyry.com	No	+	+
Ireneusz Mirowski	EkoFundusz	imirowski@ekofundusz.org.pl	No	+	
Jakub Kronenberg	University of Lodz	kronenbe@uni.lodz.pl	Yes	+	+
Jan Melichar	Charles University Environment Center	jan.melichar@czp.cuni.cz	Yes	+	+
Jan Urban	Charles University Environment Center	jan.urban@czp.cuni.cz	No	+	+
Jeffrey Englin	University of Nevada	englin@unr.edu	Keynote	+	+
Joanna Mieszkowicz	The Aeris Futuro Foundation	jmieszkowicz@aeris.eko.org.pl	No	+	+
Jürgen Meyerhoff	Technische Universität Berlin	jumeyerhoff@googlemail.com	Yes	+	+
Kazimierz Rykowski	Instytut Badawczy Leśnictwa –Forestry Research Institute			+	
Magda Kozyra,	NFOŚiGW			+	
Marcin Piszczek	University of Agriculture, Cracow	rlpiszcz@cyf-kr.edu.pl	Yes		
Marian Cieślak	EkoFundusz	mcieslak@ekofundusz.org.pl	No	+	
Marta Zygmunt	Warsaw University				
Michał Krawczyk	Warsaw Ecological Economics Center, Warsaw University	M.W.Krawczyk@uva.nl	No	+	+
Mikolaj Czajkowski	Warsaw Ecological Economics Center, Warsaw University	miq@hot.pl	Yes	+	+
Monika Szrymer	Dolnośląska Fundacja Ekorozwoju	m.szyrmer@eko.org.pl	No	+	+
Olimpia Pabian	OTOP			+	
Patrice Harou	INRA, France	harou@jouy.inra.fr	Yes	+	+
Paula Horne	Pellervo Economic Research Institute, Finland	paula.horne@ptt.fi	Keynote	+	+
Simona Dragoi	Forest research and management planning institute, Romania	si_dragoi@yahoo.co.uk	No	+	+
Tomasz Gałęzia	Nadleśnictwo Augustów	galeziat@wp.pl		+	+
Tomasz Zylicz	Warsaw Ecological Economics Center, Warsaw University	tzylicz@wne.uw.edu.pl	Welcome	+	+
Włodzimierz Adamczyk	Ministry of Environment	Wlodzimierz.Adamczyk@mos.gov.pl	No	+	
Wojciech Bobiatyński	Zieloni 2004				
Zenon Tederko	Independent, OTOP	zenon.tederko@aster.pl	Yes	+	