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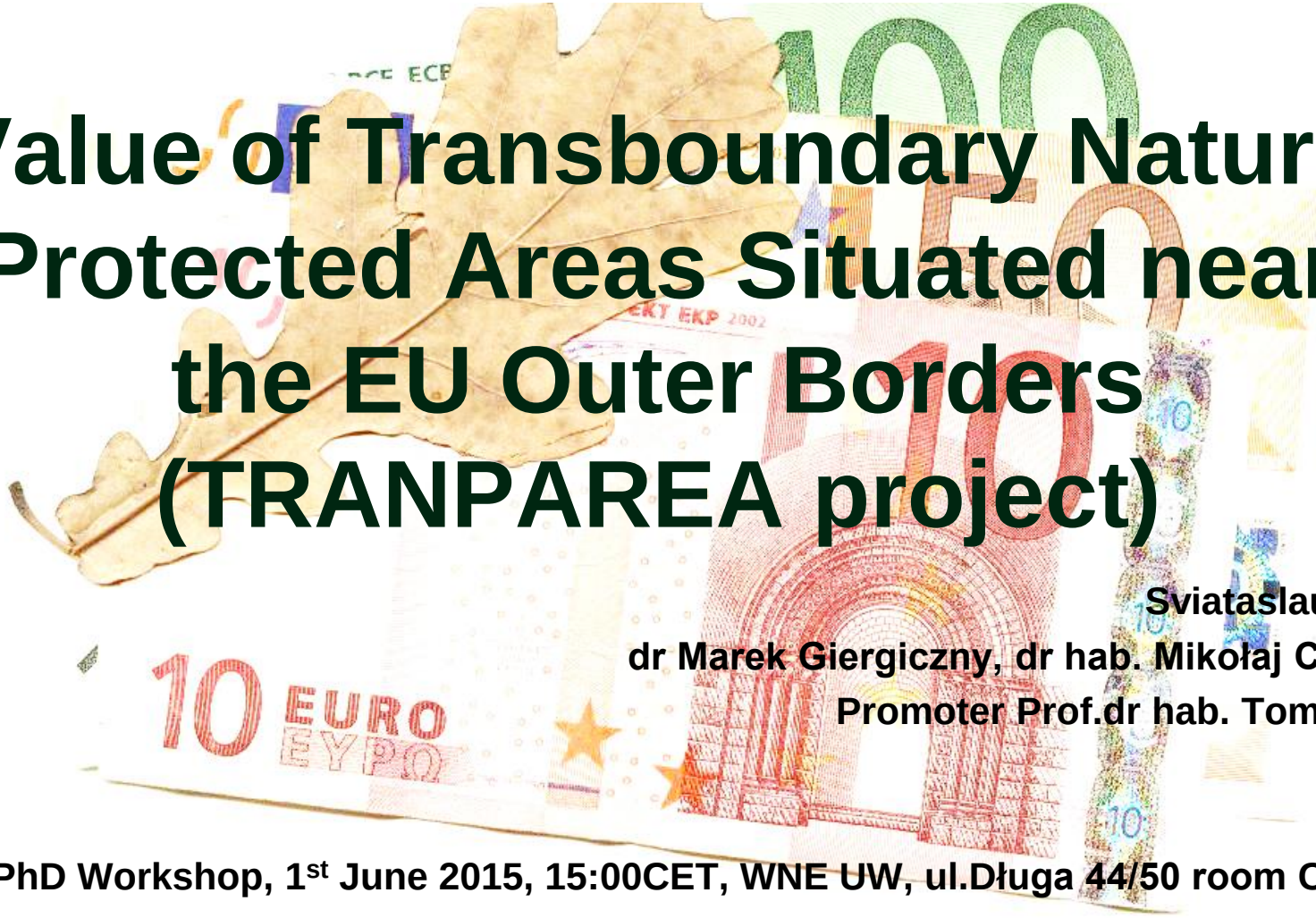

# Value of Transboundary Nature Protected Areas Situated near the EU Outer Borders (TRANPAREA project)

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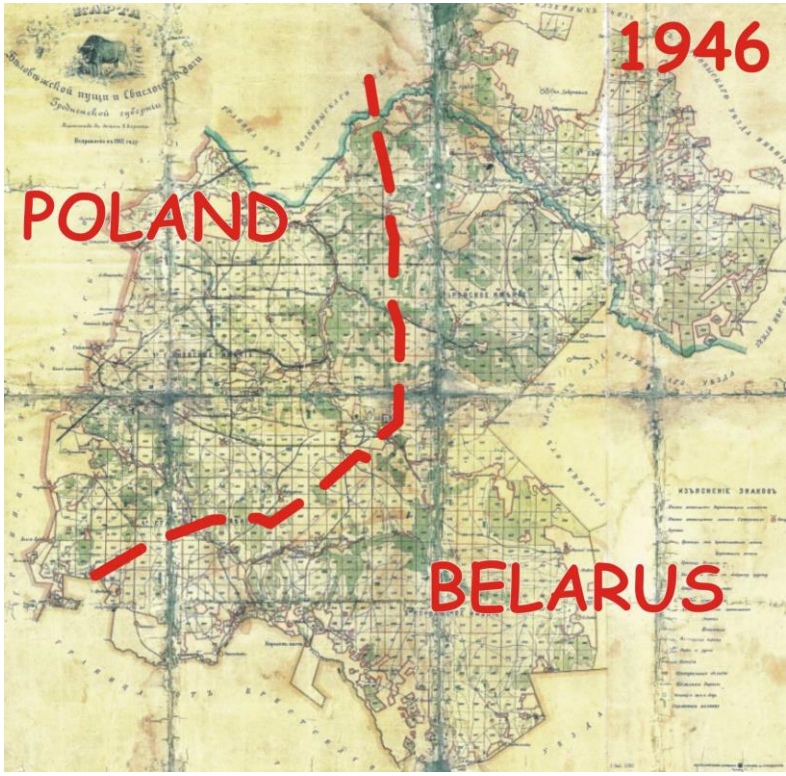
**PhD Workshop, 1st June 2015, 15:00CET, WNE UW, ul.Długa 44/50 room C**

Narodowe Centrum Badań i Rozwoju
SLU Sveriges Lantbruksuniversitet
Białowieski Park Narodowy
norway grants
Polish-Norwegian Research Programme

# Motivation

**Transboundary Nature Protected Areas (TNPA)** – contiguous natural complexes, artificially divided with the state borders, protected on the every side of the border

- 188 TNPA in 112 countries S=3.2mio sq.km (≅India), 17% of total PAs' (Chester, 2008)
- Significant scientific and popular literature in natural disciplines
- Scarce literature in economics (Busch, 2007) including empirical studies
- Idea of passive protection
- Białowieża/Bieławieskaja Pušča



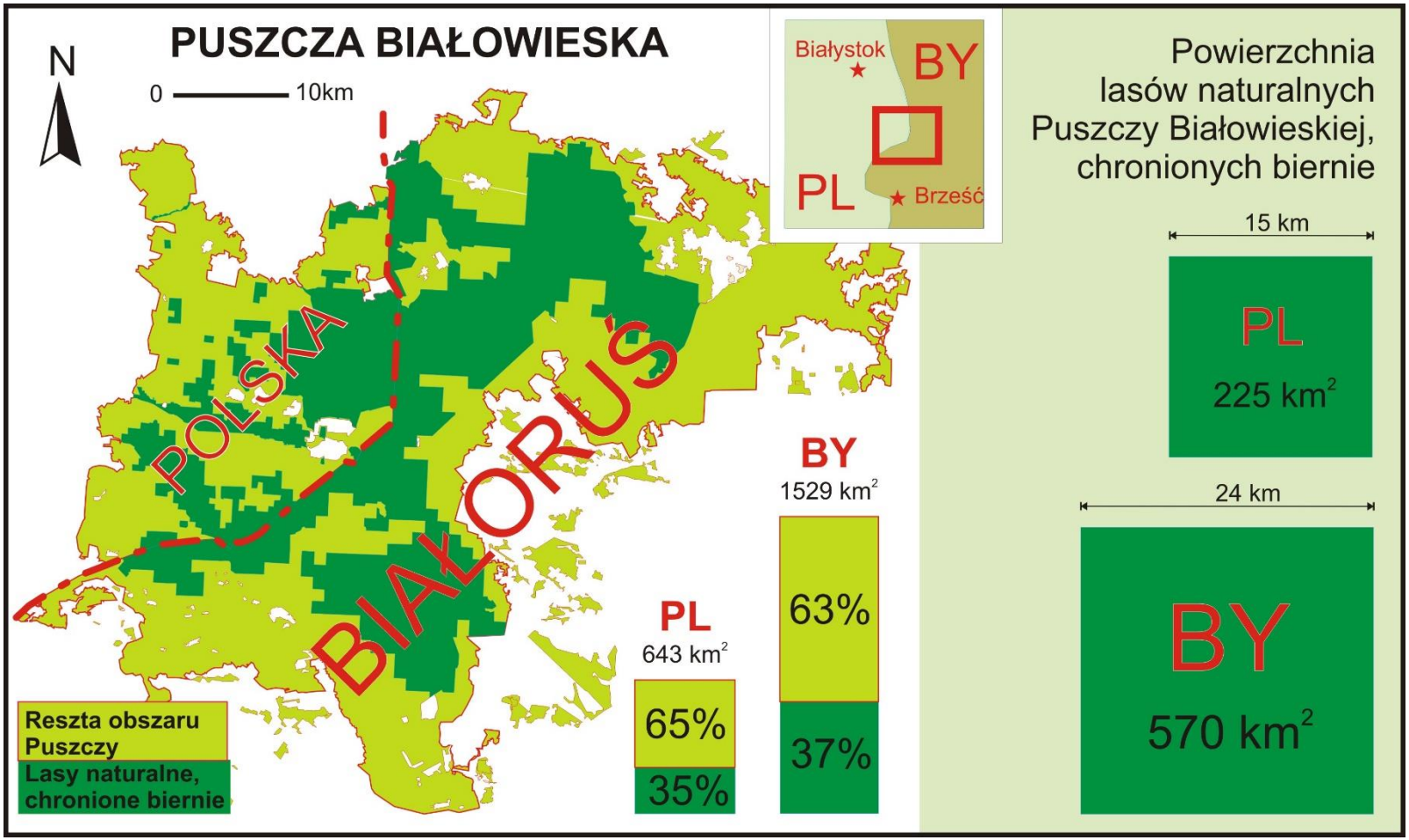
# Are TNPAs **international public goods?**

- Natural sciences: definitely
- Economics: far from trivial
  - Non-exclusion principle applies;
  - Non-rivalry principle applies;
  - Not being sold out or exchanged on regular markets => no market prices for them exist.

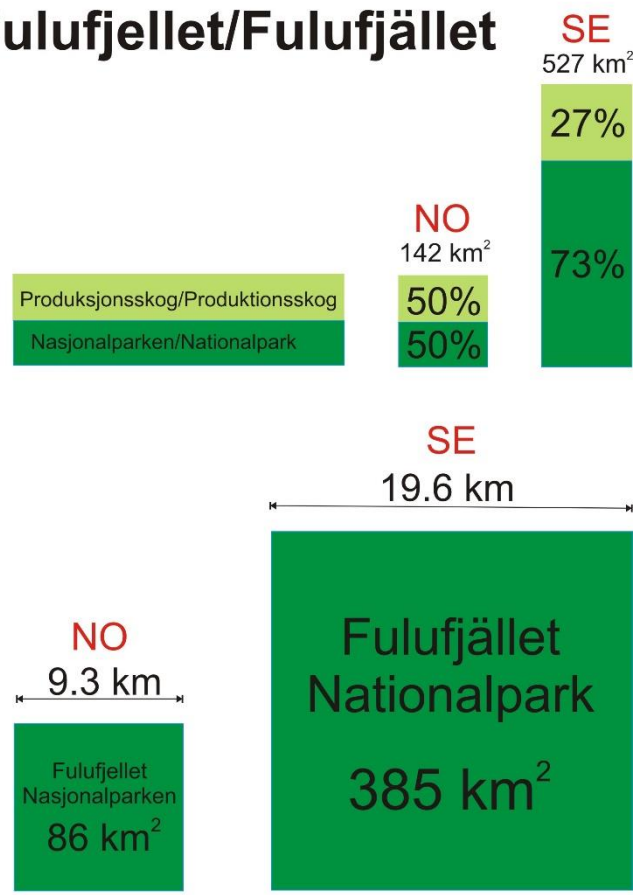
  Many natural goods theoretically qualify for being the international public goods…

  …but empirical evidence is needed if the theory is consistent with people's real preferences.

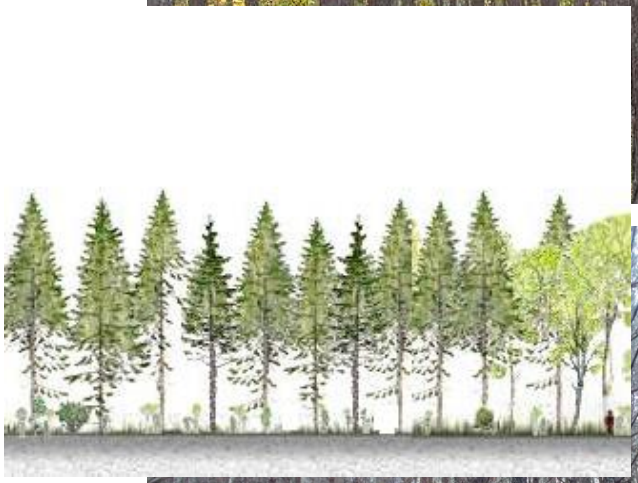
# Study sites: Białowieża/Biełavieskaja Pušča



# Study sites: Fulufjellet/Fulufjället

# Intact Natural Forest vs. Production Forest



# Methodology: Stated Preferences

- Simply asking the individual about her preferences;
- Accounts for the non-use values;

Two elicitation formats:

- contingent valuation (CVM);
- choice experiment (CE).

(Carson&Louviere, 2011)

# Empirical study setting

*Comparative study* – two mutually consistent bilateral surveys of people's preferences:

- Białowieża/Biełavieskaja Pušča (PL/BY, CAPI, N=1000+1000);
- Fulufjellet/Fulufjället (NO/SE, CAWI, N=1000+1000).

*Payment vehicle* – compulsory income tax increase, introduced and charged nationally and then transferred to bilateral target fund (initially thought about voluntary contributions as payment vehicle).

*Survey scenario:*

- introduces transboundary nature protected area as a common good of the both nations involved;
- contemplates enlargement of the existing passive protection zone in order to provide restoration of semi-intact forest ecosystems in distant future.

# Empirical study setting: survey scenario

Core idea of the scenario: passive protection regime expansion => forest ecosystems' restoration in a long run.


Every unit (sq.km) of the to-be-protected area is the same regardless of its particular location on either side of the border.

# Survey design

| Attribute | Levels for the national versions of the questionnaire | | | |
|---|---|---|---|---|
| | **PL** | **BY** | **NO** | **SE** |
| Expansion of the strict reserve protection regime in the domestic part of the site under consideration<br>SQ= +0 sq.km | + 0 sq.km<br>+ 35 sq.km<br>+ 70 sq.km<br>+ 105 sq.km | + 0 sq.km<br>+ 35 sq.km<br>+ 70 sq.km<br>+ 105 sq.km | + 0 sq.km<br>+ 20 sq.km<br>+ 40 sq.km<br>+ 60 sq.km | + 0 sq.km<br>+ 20 sq.km<br>+ 40 sq.km<br>+ 60 sq.km |
| Expansion of the strict reserve protection regime in the foreign part of the site under consideration<br>SQ= +0 sq.km | + 0 sq.km<br>+ 35 sq.km<br>+ 70 sq.km<br>+ 105 sq.km | + 0 sq.km<br>+ 35 sq.km<br>+ 70 sq.km<br>+ 105 sq.km | + 0 sq.km<br>+ 20 sq.km<br>+ 40 sq.km<br>+ 60 sq.km | + 0 sq.km<br>+ 20 sq.km<br>+ 40 sq.km<br>+ 60 sq.km |
| Additional sum of income tax paid annually during the next five years (2015 prices)<br>SQ= 0 | 25 PLN<br>50 PLN<br>75 PLN<br>100 PLN | 5 USD<br>10 USD<br>15 USD<br>20 USD | 135 NOK<br>270 NOK<br>405 NOK<br>540 NOK | 130 SEK<br>260 SEK<br>390 SEK<br>520 SEK |

**Design versions:**

SQ+1 – incentive compatible version – 1/3;

SQ+2 – standard version – 1/3;

SQ+3 – more informative (however complicated) version – 1/3.

Sixteen choice-sets for every respondent; best choice question.

# Choice-set appearance example (SQ+3 version)

| Wybór wariantów 1 | Stan obecny | Wariant 1 | Wariant 2 | Wariant 3 |
|---|---|---|---|---|
| Dodatkowe obszary w polskiej części Puszczy Białowieskiej objęte ochroną bierną<br><br>(Łączny procent ochrony biernej w polskiej części Puszczy Białowieskiej | + 0 $km^2$<br><br>(35%) | + 105 $km^2$<br><br>(51%) | + 70 $km^2$<br><br>(46%) | + 0 $km^2$<br><br>(35%) |
| Dodatkowe obszary w białoruskiej części Puszczy Białowieskiej objęte ochroną bierną<br><br>(Łączny procent ochrony biernej w białoruskiej części Puszczy Białowieskiej) | + 0 $km^2$<br><br>(37%) | + 105 $km^2$<br><br>(44%) | + 0 $km^2$<br><br>(37%) | + 35 $km^2$<br><br>(40%) |
| Dodatkowa kwota podatków od Pana/Pani dochodów pobierana raz do roku przez pięć lat | Brak | 100 PLN | 50 PLN | 75 PLN |
| Proszę wybrać najlepszy wariant | ☐ | ☐ | ☐ | ☐ |

# Expected results

- Estimated parameters of the empirical utility function
- WTP for passive protection calculated
- Comparison between the cases and between the national subsamples within each case conducted
- Hypothesis: „TNPAs are international public goods in accordance with people's preferences" tested empirically
- Impact of differences in socioeconomics and country context assessed
- Existence of ‚international' free-riding effect verified

# Respondent's utility function specification

$V=\beta_{SD}*S_D + \beta_{SF}*S_F + \beta_{COST}*Bid + \theta'*SEV,$

where

$S_D$ – additional strict reserve area on domestic side, $km^2$

$S_F$ – additional strict reserve area on foreign side, $km^2$

Bid – additional annual sum of income tax during five years to finance the conservation programme, PLN (NOK, SEK, USD)

SEV – vector of socioeconomic variables and their interactions with programme alternatives and with each other

# Hypothesis' of ‚international public good' testing strategy

$V=\beta_{SD}*S_D + \beta_{SF}*S_F + \beta_{COST}*Bid + \theta'*SEV$

Comparison of $\beta_{SD}$ against $\beta_{SF}$. Three profiles of respondents according to their individual preferences are possible:

- "Citizen of the Earth" $\beta_{SD} = \beta_{SF}$, maximises $S_F+S_D$.
- "Patriot": $\beta_{SD} > \beta_{SF}$ , maximises $S_D$ on average;
- "???" (various explanations) $\beta_{SD} < \beta_{SF}$, maximises $S_F$;

If statistically $\beta_{SD}= \beta_{SF}$ =>

H0: TNPA qualifies as the **international public good** in accordance with the preferences of the appropriate population – **cannot be rejected**

**Otherwise two separate national public goods exist instead of the common one**

# Socioeconomic and country-specific context

- Comparison of the national WTP per 1 sq.km across countries involved
- Impact of the respondents' socioeconomic characteristics on their WTP

- Basic expectation: if accounted for PPP and difference in income, WTP are similar in the countries under consideration

# Testing of the „International Free-riding Effect”

international aspect of the free-riding effect, e.g. Poles understate their WTP for the bilateral public good in anticipation that Belarusians would provide its supply and *vice versa*

Two ways of testing:

1. Correlation between probability of respondent's protest behaviour and her other side's participation confidence (similar to Wiser 2007), e.g. for Norwegians:
*"I expect Sweden to extend the National Park of Fulufjellet on its side of the border whether or not the bilateral programme discussed in the questionnaire is implemented"*

$$\text{Prob}(SQ`=1) = f(OSPC).$$

Positive correlation would have been an evidence of the ‚international' free-riding.

2. Comparison of WTP across the sub-samples with different incentive compatibility design (Carson and Groves, 2007). If WTP for SQ+1 version is higher, then free-riding in wider sense is the case.

# Pre-testing Białowieża/Biełavieskaja Pušča results (best choice)

- July-August 2012
- Aim: to estimate ‘priors’
- Administered via e-mail („friends of the friends”): 98(BY)+24(PL)
- Returned: N=32(BY only)

| Variables | Coeff. | t-rat. |
|---|---|---|
| SQ*** | -1.407 | -6.994 |
| S_BY*** | 0.127D-04 | 6.024 |
| S_PL** | 0.945D-05 | 2.410 |
| Bid*** | -0.091 | -9.405 |
| WTP per ha per year (S_BY)*** | 0.00013878 | 6.654 |
| WTP per ha per year (S_PL)*** | 0.00010344 | 2.620 |

Statistically significant at

**0,05

***0,01

WTP = 16.25 USD per person annually

# Follow up

- Tailor-made software adjustment
- Pilot surveys PL/BY and NO/SE N=2*(100+100)
- Re-designing according to priors
- Main field surveys PL/BY and NO/SE N=2*(900+900)
- Dataset analyses
- Academic writing

# Thank you for your attention!

Busch, J. (2008) Gains from configuration: The transboundary protected area as a conservation tool. Ecological Economics, vol. 67, issue 3, pages 394-404.

Carson, R.T., Groves, T. (2007) Incentive and informational properties of referencequestions. Environmental and Resource Economics 37: 181-210.

Carson, R.T. and J. Louviere (2011), 'A common nomenclature for stated preference elicitation approaches', Environmental and Resource Economics, 49 (4): 539-559.

Chester, C. (2008). Transboundary protected areas. Retrieved from http://www.eoearth.org/view/article/156688

Wiser, R.H. (2007) Using contingent valuation to explore willingness to pay for renewable energy: a comparison of collective and voluntary payment vehicles. Ecological Economics 62: 419-432.