



WARSAW UNIVERSITY
Warsaw Ecological Economics Center

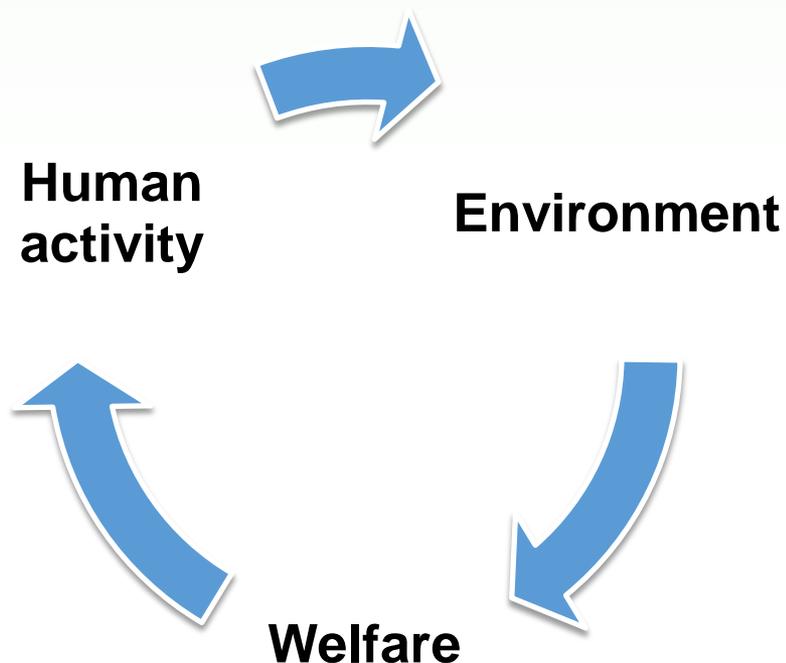


Estimation of cultural services and non-use values related to different WBZ scenarios

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Motivation for economic valuation

- ▶ Rational decisions with respect to the environment



- ▶ Market inefficiencies
 - ▶ Public goods
 - ▶ CBA
 - ▶ External effects
 - ▶ Pigou tax
- ▶ Assessing the economic desirability of policies
 - ▶ Demonstrate importance of an issue
 - ▶ Priority setting
- ▶ Legal damage assessment
- ▶ Green national accounting
- ▶ The least controversial argument



Individuals' motivation for WTP

- ▶ Sources of value in history
- ▶ Economic value = consumers' aggregated willingness to pay
 - ▶ Based on peoples' preferences
 - ▶ Anthropocentric!
- ▶ Motives are essentially irrelevant for the neoclassical economic theory of value
 - ▶ Economists accept consumer sovereignty
 - ▶ But, this is not to say that motives are irrelevant at all...

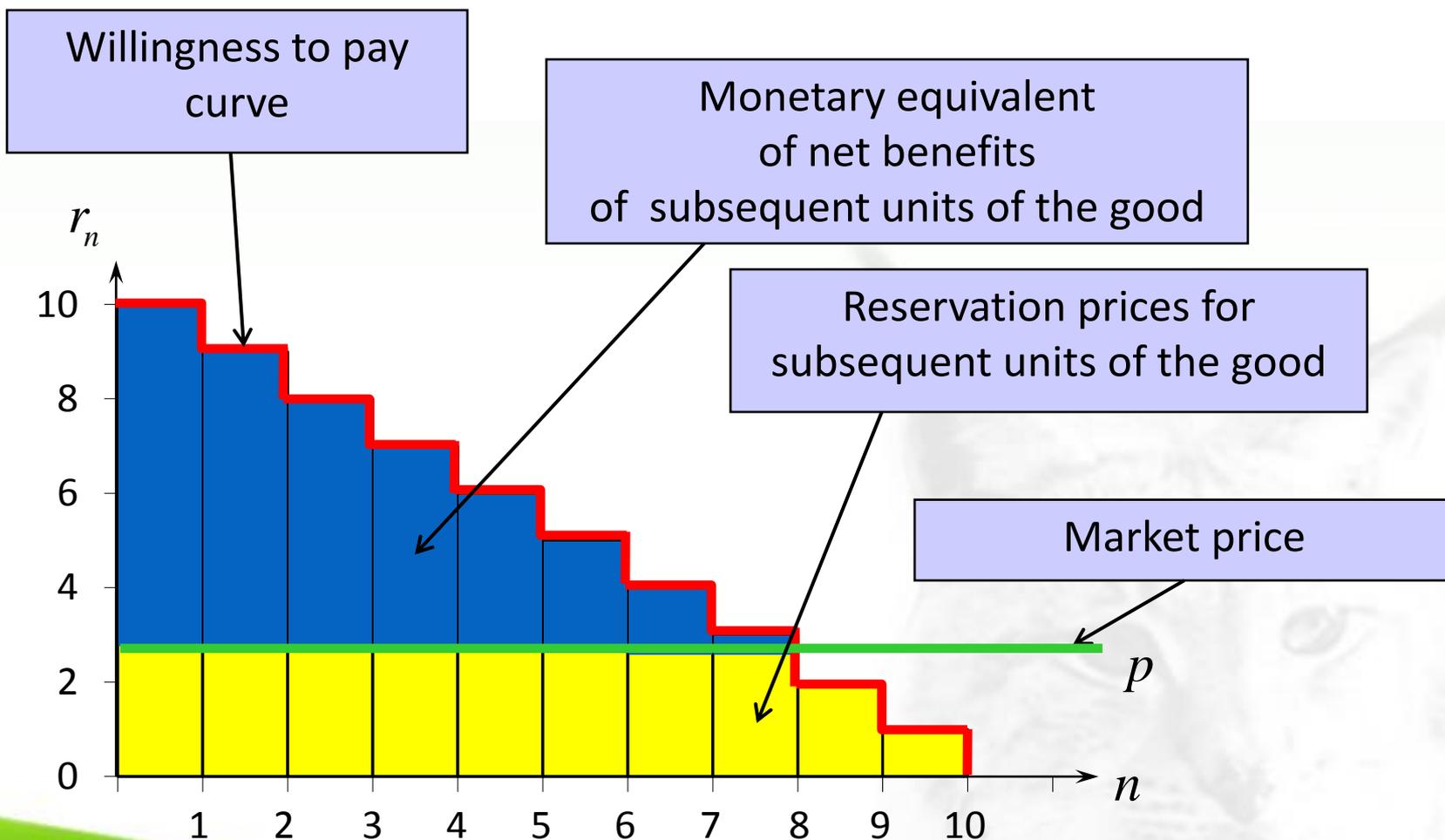


Economic value – economic theory

- ▶ What is a ‘value of a good’?
 - ▶ Is price of a good equal to its value?
 - ▶ ‘Simple case’ – market goods



Economic value – economic theory



Non-market valuation methods

- ▶ Revealed vs. stated preference valuation methods
 - ▶ Revealed preferences (RP)
 - ▶ People's choices are observed in actual market situations
 - ▶ Possible to use indirect (surrogate markets)
 - ▶ Stated preferences (SP)
 - ▶ Choices are observed in hypothetical situations
 - ▶ Usually in a survey context
- ▶ Scope of observed values
- ▶ Flexibility
- ▶ Reliability



Wetland buffer zones – ecosystem services

- ▶ Nutrients removal
- ▶ Protection against floods
- ▶ Protection against local droughts
- ▶ Biodiversity (SP)
- ▶ Recreation (RP)
- ▶ Landscape aesthetics (SP)



QUESTIONNAIRE – SCOPE

- ▶ Recreational value of rivers (RP – TCM)
- ▶ Recreational value of small rivers (if any)
- ▶ Impact of information (education) on preferences
 - ▶ Visual perception of different riverbed types and vegetation types (2 treatments)
 - ▶ Choice experiment on riverbed & vegetation type (SP method, focus on non-use values i.e. aesthetics, biodiversity)



SAMPLE & TREATMENTS

- ▶ In each country 700 respondents (representative samples w.r.t: gender, age, education, settlement size)
- ▶ Booster of 300 respondents in the rural area of the catchements of Narew, Ryck, Odense.
- ▶ SP Focus on landscape aesthetics, biodiversity.



Questionnaire – TCM

- ▶ **Have you visited any river (regardless of its size and the degree of naturalness) for recreation during the past 12 months?**
- ▶ When answering please consider that the main reason for the visit was recreation either in the river itself or in its proximity. This may include swimming, walking, angling, bird or wildlife watching, kayaking, biking or any other sports etc.
- ▶ Yes
- ▶ No



TCM – rivers

- ▶ **We will ask you now some additional details about the last visited river.**
- ▶
- ▶ **Can you tell us what is the name of the village (or town/city) that the place by the river that you visited is close to?**
- ▶ _____
- ▶ **+ don't know**

- ▶ **How many visits to this river in the last 12 months have you made?**
- ▶ |__| |__| times
- ▶ **+ don't know.**

- ▶ **Please indicate the approximate distance (one way) which you travelled to reach this river?**
- ▶ Less than 1km
- ▶ 1-3 km
- ▶ 4-10 km
- ▶ 11-20 km
- ▶ 21-50 km
- ▶ 51-100 km

- ▶ **Anglers: Questions on total catch of fish (in kg), consumption/sport**



▶ **What did you do by the river?** (you can choose more than one answer)

▶ bathing/swimming

▶ kayaking

▶ sunbathing

▶ picnicking

▶ walking

▶ wildlife / bird watching

▶ fishing/angling

▶ running

▶ horseback riding

▶ biking

▶ driving motorcycle/quad / off-road car

▶ hunting

▶ camping

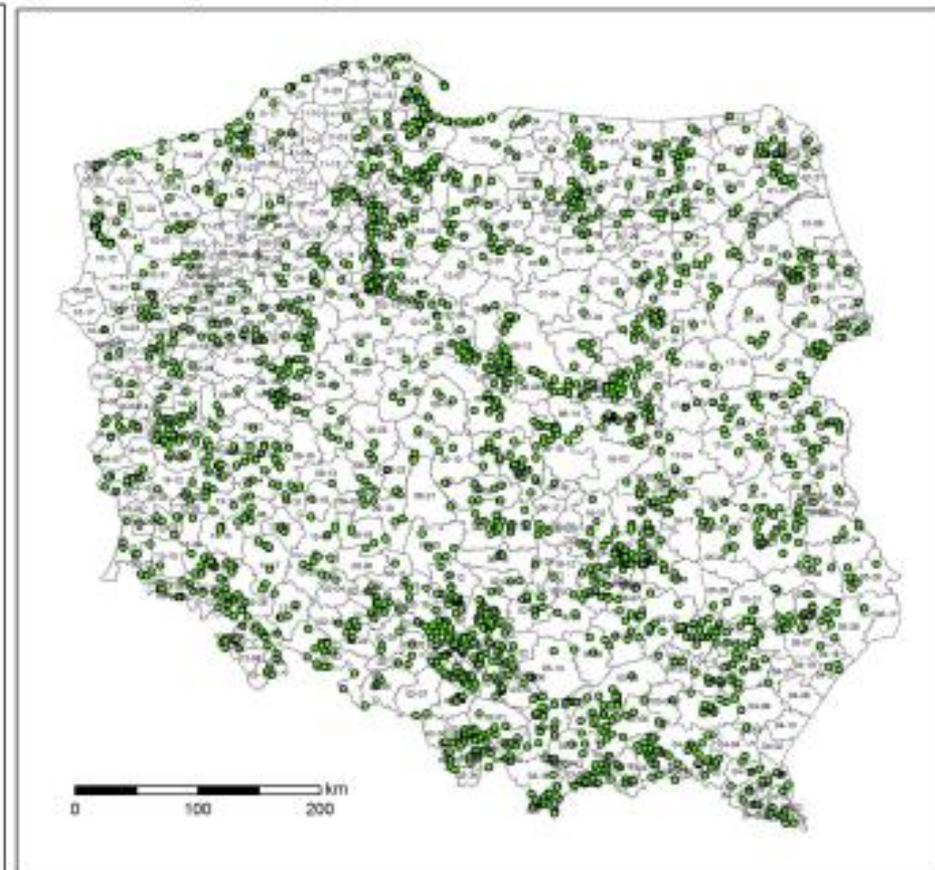
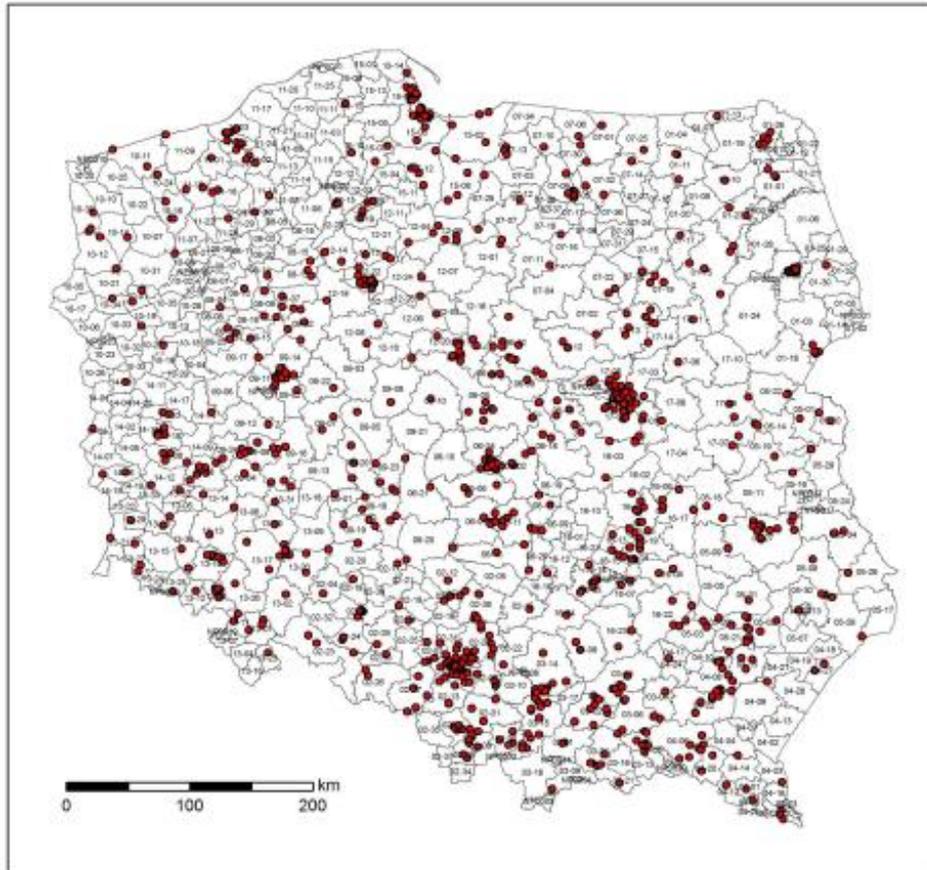
▶ playing with children

▶ appreciating scenery

▶ other (please specify)

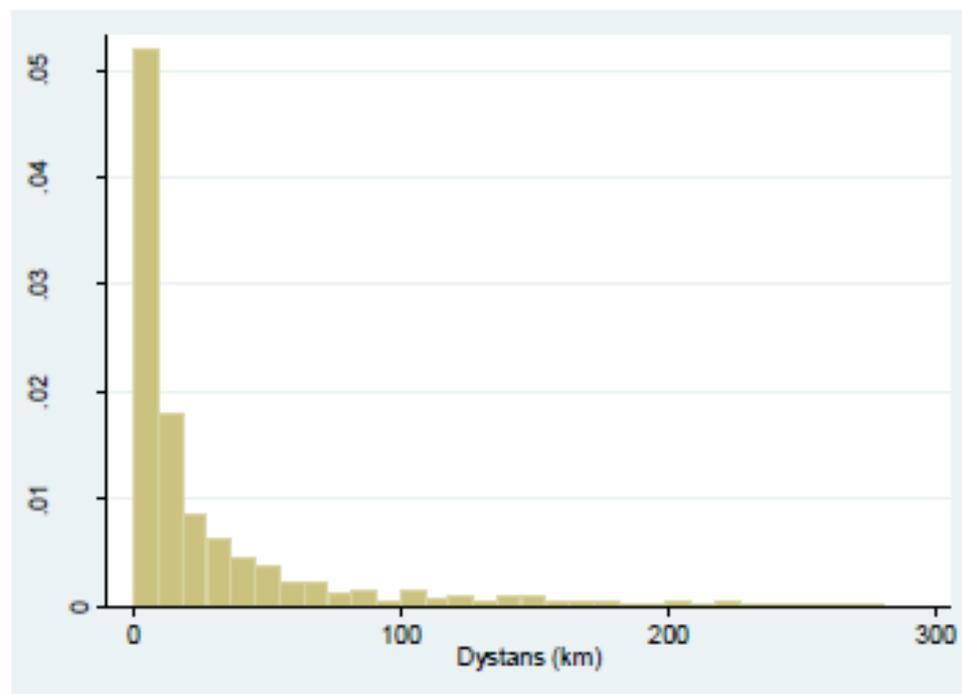


Spatial distribution of places in which respondents were interviewed and forests they visited



EXAMPLE: Distance travelled – forest visit

Centiles	Distance (both ways)
10	1,5
20	3
30	5
40	7
50	12
60	19
70	30
80	56
90	136



EXAMPLE: Travel cost method (forest)

- ▶ Negative binomial model (endogeneity, over-disperssion)

$$Pr(x_i | x_i > 0) = x_i \frac{\Gamma(x_i + \alpha^{-1})}{\Gamma(x_i + 1)\Gamma(\alpha^{-1})} (\alpha^{-1} \lambda_i)^{x_i - 1} (1 + \alpha \lambda_i)^{-(x_i + \alpha^{-1})}, \quad x_i = 1, 2, \dots$$

	Poisson Model		NB Model	
	Model FE	Model RE	Model FE	Model RE
TC	-0,069 (-9,54)	-0,073 (-12,47)	-0,065 (-5,24)	-0,074 (-6,91)
N	1862			
groups	1441			
CS (zł)/person/visit	14,37 (9,58)	13,54 (12,53)	15,38 (4,89)	13,51 (6,14)

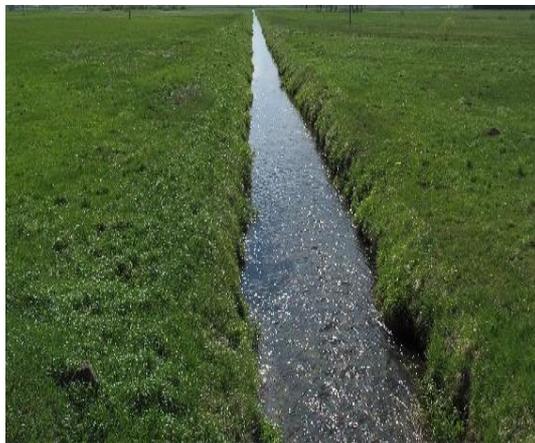
Summary of benefits from recreation and picking berries/mushrooms (forest)

Good or Service	Vists/person/year Kg or l/person/year	Total number of visits Total weight of mushr Total volume of berries	Value per unit	Total value mld zł	Value zł/ha
Recreation	8,00 visit/person/year	244,8 mln/year	13,51 zł/os	3,307	363,4
Mushrooms	8,24 kg/per/year	56,41 mln kg/year	5 zł/kg	0,28	30,8
Berries	7,39 l/per/year	12,79 mln l/year	5 zł/l	0,064	7,0
Suma				3,65	401,2



Riverbed – preferences

River bed



You will be presented now two sets of photographs of small rivers.

For each set please order them from the most to the least preferred landscapes that you would like to have in the region where you live



Vegetation – preferences



	Regulated straight riverbed	Regulated curvy riverbed	Naturally meandering riverbed
Riverbed shape and dynamics			
Icons			
Current share of each river type in your region	50%	40%	10%
POTENTIAL FOR SUPPORTING			
protection against local droughts and floods downstream	- Very low	 Medium	 High
river water purification	- Very low	 Medium	 High
high biodiversity	- Very low	 Medium	 High

Vegetation types

There are considered five variants of vegetation types in 5-50m stripe of land along a river:

- ▶ Meadows & Fields
- ▶ Intensive fields
- ▶ Wetland meadows & Managed Woodlands
- ▶ Dry herbs, Thickets & Woodlands
- ▶ Wetland wilderness



- ***Intensive fields***

Agricultural lands predominate in the river stripe, whereas their use is intensified, i.e. ditches are being dredged more frequently, more fertilisers is used, meadows and pastures are converted into intensive croplands. Intensive agriculture means a very high concentration of nutrients in the runoff water. Therefore, it is not possible to achieve a good quality of river water in this situation.

The landscape is regular and uniform. Agricultural production may increase due to intensification measures. Biodiversity is very low and limited to the most common species of plants and animals. **The current share of this vegetation type in your region is 30%.**

Intensive fields examples



- **Wetland wilderness**

Water table in the river vicinity is raised by blocking water outflow in drainage ditches or filling them with earth. While the wetness of the river stripe is increased, its agricultural use is abandoned and/or forbidden. Thus, the area used in agriculture shrinks, whereas natural wetland vegetation gradually becomes predominant in the riverine stripe, both non-forest (e.g. sedges, reeds) and forest (e.g. willow shrubs and alder woods). Nutrients runoff from the adjacent croplands is effectively absorbed and cycled, resulting, on the long-run, in an effective cleaning of the river water. The natural vegetation biomass can in principle be used (including for energy purposes or as a construction material).

The landscape is naturally mosaic with diverse patches. The option promotes high biodiversity (including rare species), especially favouring species of reedbeds and forests, and is friendly for the wildlife as a habitat and migration corridor. Numerous species of fish inhabit the river, including those being demanding with respect to habitat conditions, being promoted by various refuges within the stream (wetland vegetation, fallen trees) and shade from riverbank forests. **The current share of this vegetation type in your region is 5%.**

Wetland wilderness examples



Meadows & Fields examples

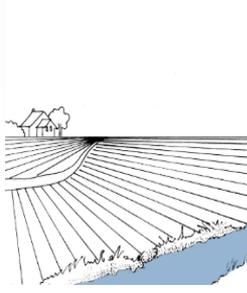


Wetland meadows & Managed woodlands



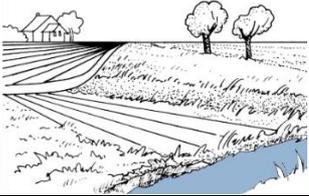
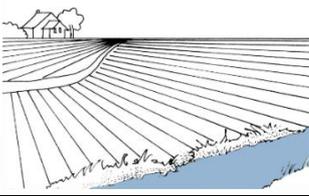
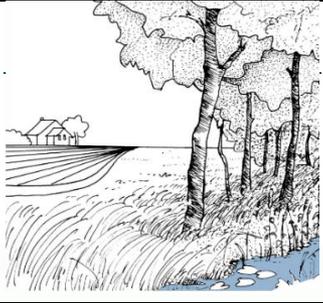
Dry herbs, Thickets & Woodlands



Vegetation type	Meadows & Fields	Intensive fields	Wetland meadows & Managed woodlands	Dry herbs, Thickets & Woodlands	Wetland wilderness
Photo depicting a given Vegetation type					
Icon representing a given vegetation type					
Current share of each vegetation type in your region	40%	30%	5%	20%	5%
POTENTIAL FOR SUPPORTING					
Protection against local droughts/floods	- Very low	- Very Low	 Medium	 Low	 High
Water purification	 Low	- Very Low	 High	 Medium	 High
High biodiversity	 Low	- Very Low	 High	 Medium	 High

CE - riverbed

	 Regulated straight	 Regulated curvy	 Naturally meandering	Annual Tax	Your choice
Status quo	60% of all small rivers	30% of all small rivers	10% of all small rivers	0 zł	<input type="checkbox"/>
Program A	30% <i>Decrease by 30% points</i>	40% <i>Increase by 10% points</i>	30% <i>Increase by 20% points</i>	30 zł	<input type="checkbox"/>
Program B	40% <i>Decrease by 20% points</i>	50% <i>Increase by 20% points</i>	10% <i>No change</i>	50 zł	<input type="checkbox"/>

	Meadows & Fields	Intensive fields	Wetland meadows & Managed woodlands	Dry herbs, Thickets & Woodlands	Wetland wilderness	Ant
						
Status quo	40% of all small rivers	30% of all small rivers	5% of all small rivers	20% of all small rivers	5% of all small rivers	0
Program_A	30% <i>Decrease by 10% points</i>	30% <i>No change</i>	20% <i>Increase by 15% points</i>	15% <i>Decrease by 5% points</i>	5% <i>No change</i>	71
Program_B	30% <i>Decrease by 10% points</i>	10% <i>Decrease by 20% points</i>	10% <i>Increase by 5% points</i>	30% <i>Increase by 10% points</i>	20% <i>Increase by 15% points</i>	51

There are on average 40 km of small rivers in the area of 100km² (10 km x 10 km square) in the lowland Poland.

For example **10% change** means modifying the length of **4km** of small rivers in each **10 km x 10 km** square in your region, what implies modifying approximately **12,000km** of small rivers in the entire lowland Poland.