Ympäristöministeriö
Miljöministeriet
Ministry of the Environment

Estimating benefits of river basin management in Finland

Turo Hjerppe, Ministry of the Environment
Virpi Lehtoranta, Finnish Environment Institute
Sari Väisänen, Finnish Environment Institute
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Three methods used for benefit estimations

The benefits of river basin management has been estimated using three different methods in Finland

1. Qualitative evaluation of the benefits with framework approach
2. Monetary estimate of recreational benefits using VIRVA-model
3. Willingness to pay estimates using contingent valuation

Tapio Heikkilä, YHA-kuvapankki

1. Framework approach

Functions:

- Identification of benefits for businesses, livelihoods, recreation etc.
- Significance of benefit factors
- Suitability of present water quality for benefit factors
- The effect of PoM alternatives for benefit factors

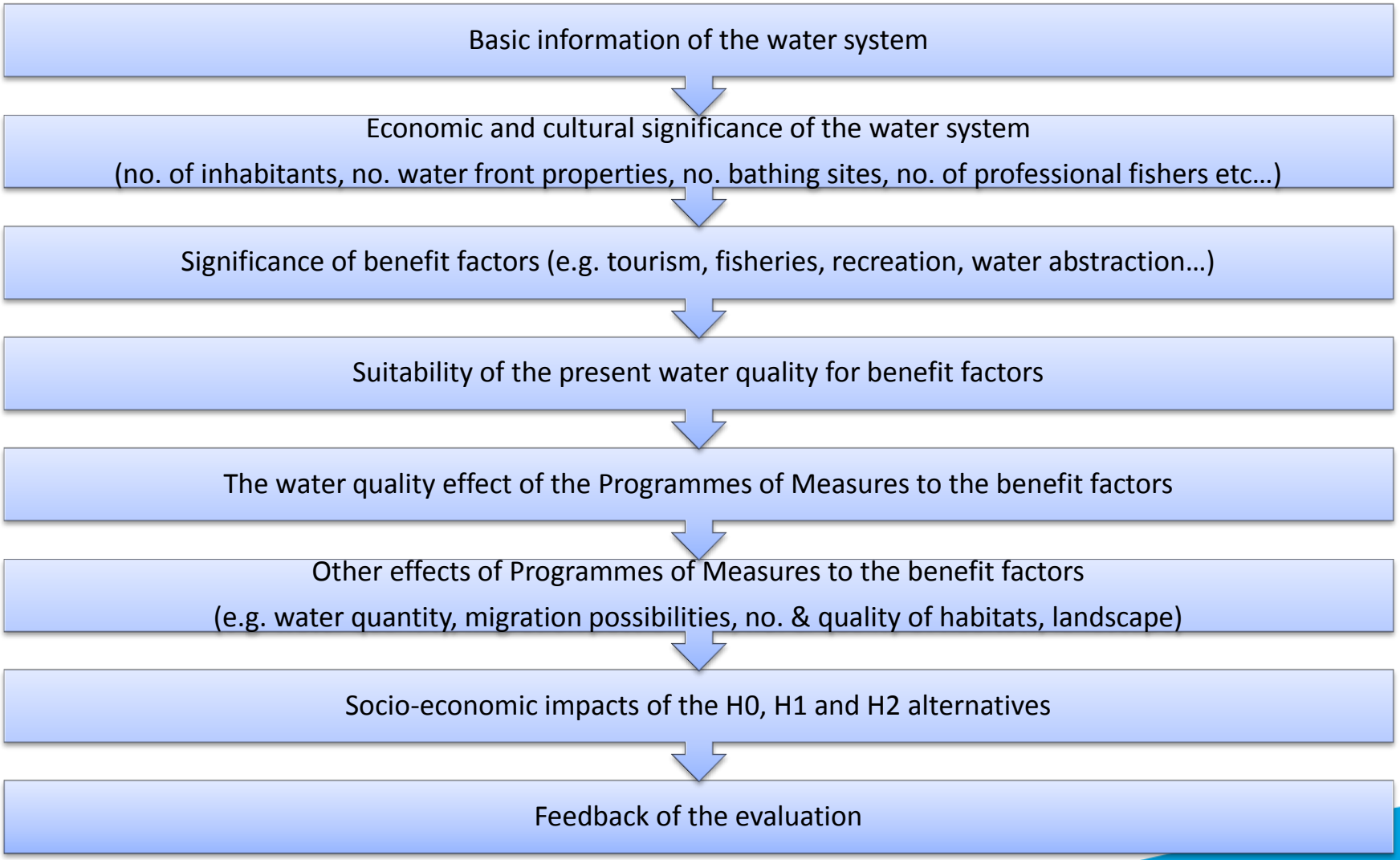
Objectives:

- Structures thinking
- Stimulates discussion with stakeholders
- Systematic description of effects and benefits
- No monetary benefits!

In practice:

- Easy to use MS Excel-spreadsheet tool
- Developed with macros/visual basic for MS Excel

Structure of the framework evaluation



An example of results

Oulujoki river basin			Alternative H0		Alternative H1		Alternative H2	
Benefit factors		Present water quality relative to benefit factor	Effect of water quality change	Effect of other changes	Effect of water quality change	Effect of other changes	Effect of water quality change	Effect of other changes
Fisheries		good/high	+	0	++	++	+	+
Tourism		good/high	0	0	+	++	+	+
Municipal and industrial water abstraction		good/high	0	0	++	0	+	0
Value of water front properties		good/high	0	0	+	+	+	+
Recreational use and environmental health	Swimming, water use for sauna and washing purposes	good/high	0	0	+	+	+	0
	Fishing, boating, enjoyment of scenery, hiking	good/high	0	+	+	++	+	+
Biodiversity of water environment		good/high	0	0	+	++	+	+
Safety and health: flood protection		no significanc e	0	0	0	0	0	0

The use of the framework in RBM plans

- The ELY-centers chose 2-3 representative sub regions within their territory
- The framework was used in these areas
- They were filled by the experts in the ELY-center
- Results were discussed in the regional stakeholder groups and presented in Programmes of Measures and RBM plans

2. Recreational use benefits

OBJECTIVES

- Recreational benefits for water front properties from achievement of good ecological status
- Benefit estimates for all water bodies (coastal, lakes and rivers) that currently have not achieved good status
- Aim is to evaluate the order of magnitude of the benefits [€]
- The benefit estimates are calculated for each river basin district

What benefit is evaluated with the VIRVA-model?

Out of the total economic value

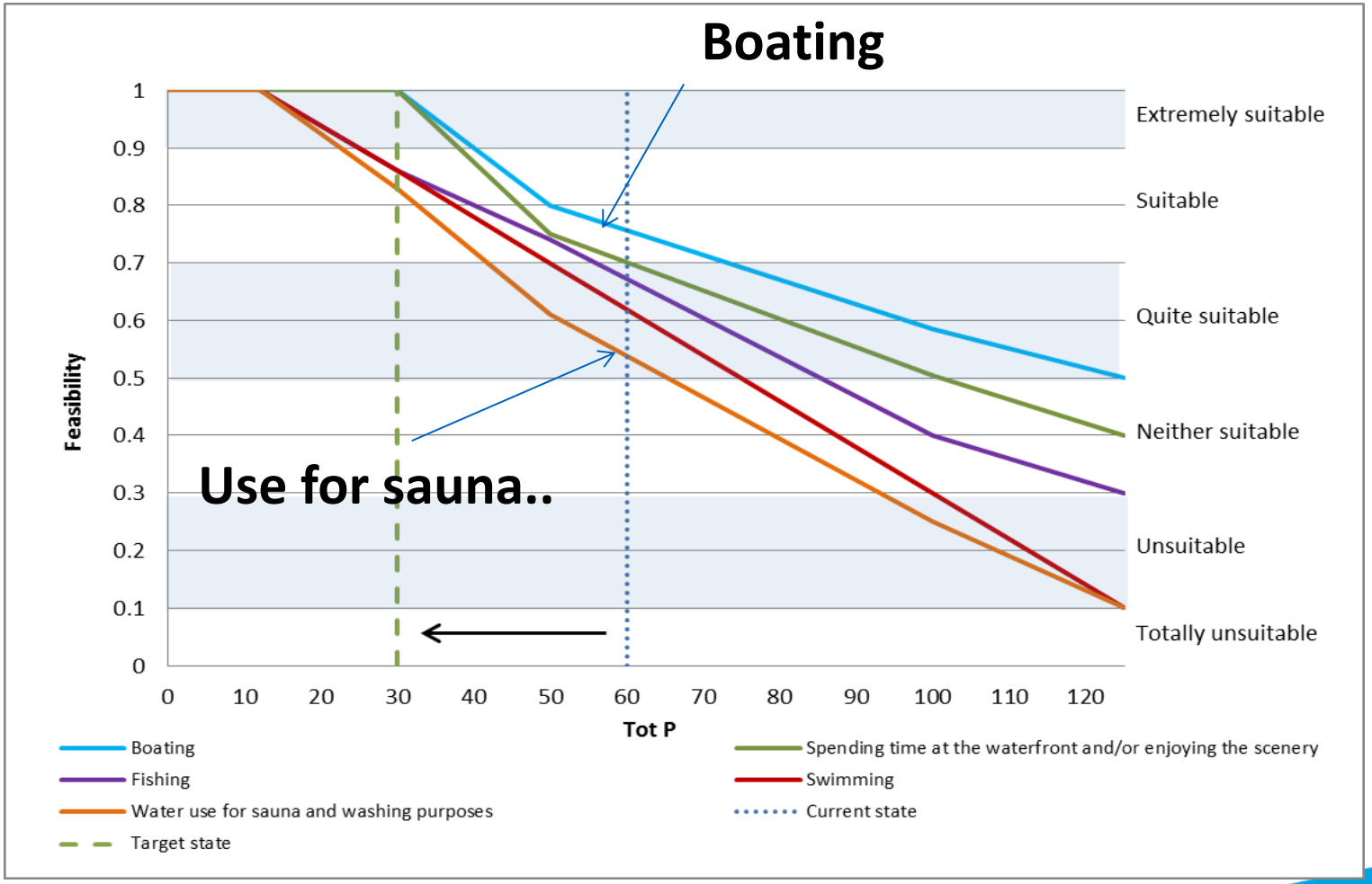
- Only the actual use value is estimated
- Only for the water front properties, not for other users

Benefit class	Benefit category	Description
Use values	Actual use value	Value of real and planned use of the environmental good
	Option value	Value of possibility to use the environmental good in the future
Non-use values	Existence value	Value of that the environmental good and its life forms and ecosystems exists
	Altruistic value	Value of that the environmental good is available for others
	Bequest value	Value of that the environmental good is available for future generations

The VIRVA-model

- A spreadsheet tool designed for estimating the monetary benefits of improved water quality to recreational use of the water bodies
  - Swimming
  - Fishing
  - Boating
  - Use of water for sauna and/or washing purposes
  - Spending time at the water front and enjoyment of scenery
- The feasibility of water quality to the recreational activities is determined with value functions
  - Based on several questionnaires in pilot areas
- The value estimates are connected to the average price of the water front property
- The method is easy to repeat to all water bodies

Value functions, an example



Results of the VIRVA-model

Annual recreational benefits for achieving the environmental objectives for each river basin district

River basin district	Recreational benefit
RBD1 – Vuoksi	7-15 million €/a
RBD2 - Kymijoki - Gulf of Finland	100-150 million €/a
RBD3 - Kokemäenjoki – Archipelago sea – Bothnian sea	150-180 million €/a
RBD4 - Oulujoki – Iijoki	6-9 million €/a
RBD5 – RBD7 - Lapland (Kemijoki, Tornionjoki and Tenojoki-Näätämöjoki-Paatsjoki)	1-2,5 million €/a

- The magnitude of the benefit estimate is dependet on the number of water front properties and number of water bodies classified as moderate, poor or bad

- In southern and western Finland (RBD 2 ja RBD 3) there is lot of population and water front properties. In addition the number of water bodies below good status is larger in these areas. Also the densely populated coastline of Gulf of Finland and Archipelago sea affect to the benefit estimate

3. Valuation studies

Contingent valuation studies: residents willingness to pay for the improved status of surface and ground waters

OBJECTIVES

- Total economic value (TEV) for achieving the environmental objectives

- Communication about river basin management
  - The studies were conducted during the public hearing

- Residents preferences about the objectives and measures of the RBMP

What benefit is evaluated?

Total economic value of

1. Achievement of environmental objectives in surface waters in one river basin district
2. Protection and improvement of ground waters in the City of Lappeenranta

Benefit class	Benefit category	Description
Use values	Actual use value	Value of real and planned use of the environmental good
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The studies

1. Surface waters

- Study area: Vuoksi river basin district
- Sample: 2500 persons in 2 sub samples
  I. 1500 residents within the study area
  II. 1000 summer house owners who live outside the study area
- The questionnaire was conducted electronically (webropol)
  - Third contact with a paper form
- Response rate
  - 43% for summer house owners
  - 22% for residents
- Non-response bias analysis was conducted in summer 2015

2. Ground waters

- Study area: City of Lappeenranta
- Sample: 864 residents
- The questionnaire was conducted as paper questionnaire
- Response rate was 38 %
- Non-response bias analysis was conducted in summer 2015

The scenarios

1. Surface waters

- Imaginary foundation for Vuoksi river basin district
  - The objective is to achieve good ecological status in all surface waters
  - The state would participate with 40%, polluters with 30 % and beneficiaries with 30%
- Are you willing to participate?
- How definitely you would be willing to pay for following amounts?

2. Ground waters

- Imaginary foundation for Lappeenranta city area
  - The objective would be to guarantee good status and lowest possible contamination risk for the ground waters of Lappeenranta area
  - The state would participate with 50%, polluters with 30 % and beneficiaries with 20%
- Are you willing to participate?
- How definitely would you be willing to pay for this?

Willingness to pay and annual benefit estimates, surface waters

- Out of all 762 respondents:
  - **12 %** would participate
  - **48 %** would possibly participate
  - **40 %** would not participate

- Respondents average annual willingness to pay in 2016–2021 (zero payers included):
  - 15–24 € per *resident*
  - 29–45 € per *summer house owner*

- Non-response bias analysis showed that the respondents do not significantly differ from the sample
- Total willingness to pay for whole study area (RBD1) is 7-11 million € annually (420 000 residents aged 18-75 years and 10 000 summer house owners living outside the river basin district).

Willingness to pay and annual benefit estimates, ground waters

- Out of all 326 respondents:
- **12 %** would participate
- **41 %** would possibly participate
- **47 %** would not participate

- Respondents average annual willingness to pay in 2016–2021 (zero payers included):
  - 14–23 € per *resident*

- Total willingness to pay for whole study area is 0,7-1,2 million € annually (50 000 residents aged 18-75 years)

Other ways of participation

In the surface water questionnaire we asked for respondents willingness to participate in river basin management in other ways

- 44 % of the respondents would participate in voluntary work

- Would pay the membership fee of a local water protection organization
  - 44% out of summer house owners
  - 22% out of residents

Kuva: Katja Pellikka

A few remarks

- Residents and summer house owners are willing to participate
  - The willingess to pay is higher for summer house owners
    - Dependent on the higher income of summer house owners
    - Also recreational use of the waters, summer houses are mainly situated on the water fronts
  - They are also willing to participate in other ways
- Benefit transfer to other river basin districts
  - Surface waters: Assumed that the willingness to pay would be the same
  - Ground waters: not conducted
  - Benefit transfer should be improved using statistical analyses
- Cost-benefit analysis:
  - Cost of planned supplementary measures in Vuoksi river basin district 31 million €/year
  - Willingness to pay 7-11 million €/year (30% of the scenario)
  - Total benefit 22-35 million €/year

Conclusions

- Three different methods have been used
  - They all serve for certain objectives
    - Participation of stakeholders, discussion about the benefits
    - Monetary recreational benefits for all surface water bodies
    - Total economic value and cost-benefit analysis
  - They complement each other
  - They address and partly respond to the uncertainty related to benefit estimation

- There are still further development and future needs
  - Benefit transfer or another valuation study in another RBD
  - Indirect monetary benefits?
    - Employment
    - Businesses, livelihoods
  - Should/Could we use these estimates to analyze disproportionate costs?

Thank you!

River Lapuanjoki
Photo: Turo Hjerppe