



# Valuation of water quality improvements in the Water Framework Directive

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## Valuation results, benefit transfers and the practical use in WFD implementation

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# Overview

- › **Introduction**
- › **Valuation study of improved water quality in Roskilde Fjord**
- › **Benefit transfers**



# Introduction

- › **What are we valuing?**
  - › **Non-marketable values and non-use values**
  - › **Benefits of improved water quality**
- › **What can these results be used for?**
  - › **Cost-Benefit Analysis (CBA)**
  - › **Helping decision-makers, guidance**
- › **The Water Framework Directive (WFD)**
  - › **“Disproportionate cost”**
  - › **Exemptions (time or objective)**
  - › **Assessments of environmental costs, costs of no action**



# Valuing improved water quality - Roskilde

## › **Improvement**

- › **Valuing an improvement from moderate ecological status to good ecological status**

## › **Questionnaire**

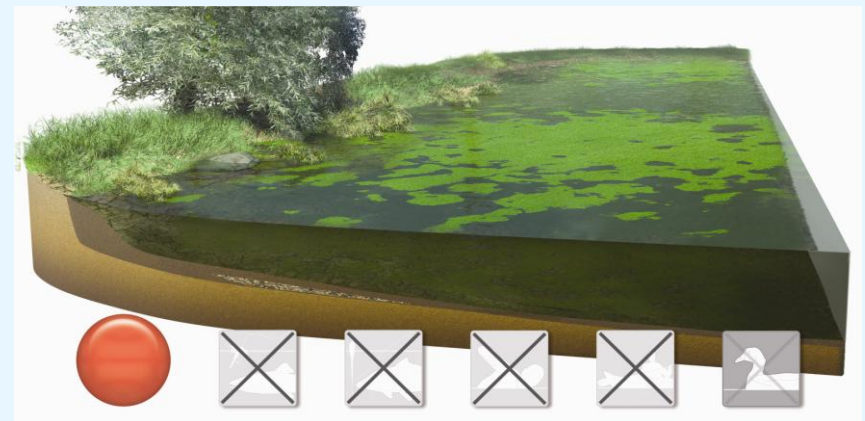
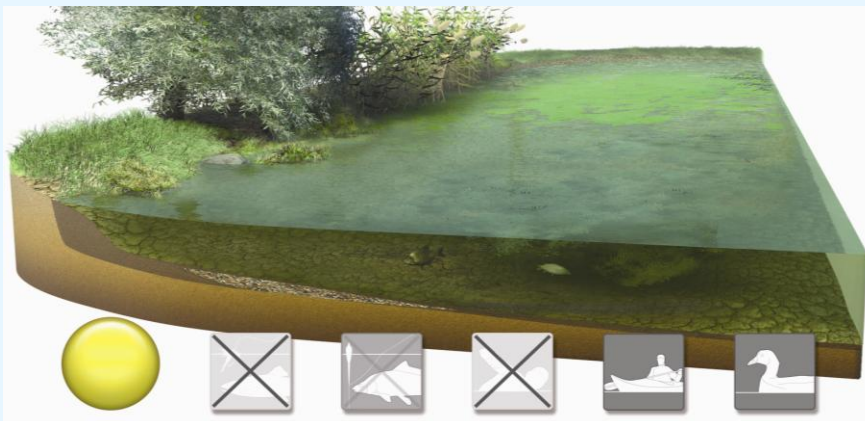
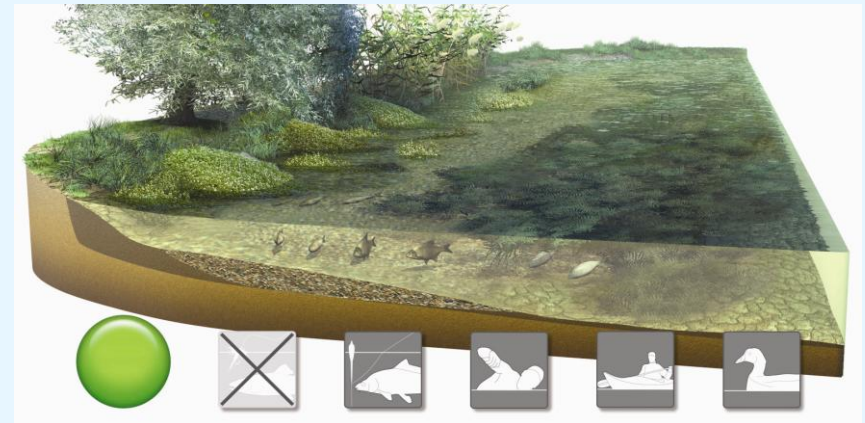
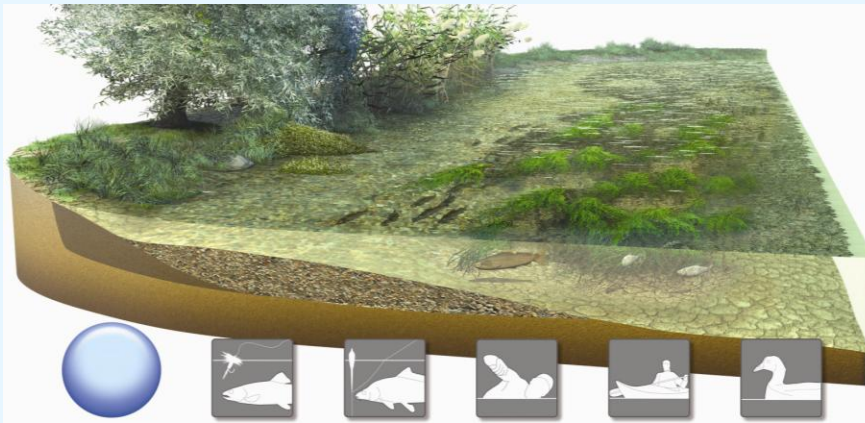
- › **Internet survey, in May 2009**
- › **600 respondents, sampled at Zealand and Lolland-Falster**

## › **Willingness to Pay (WTP)**

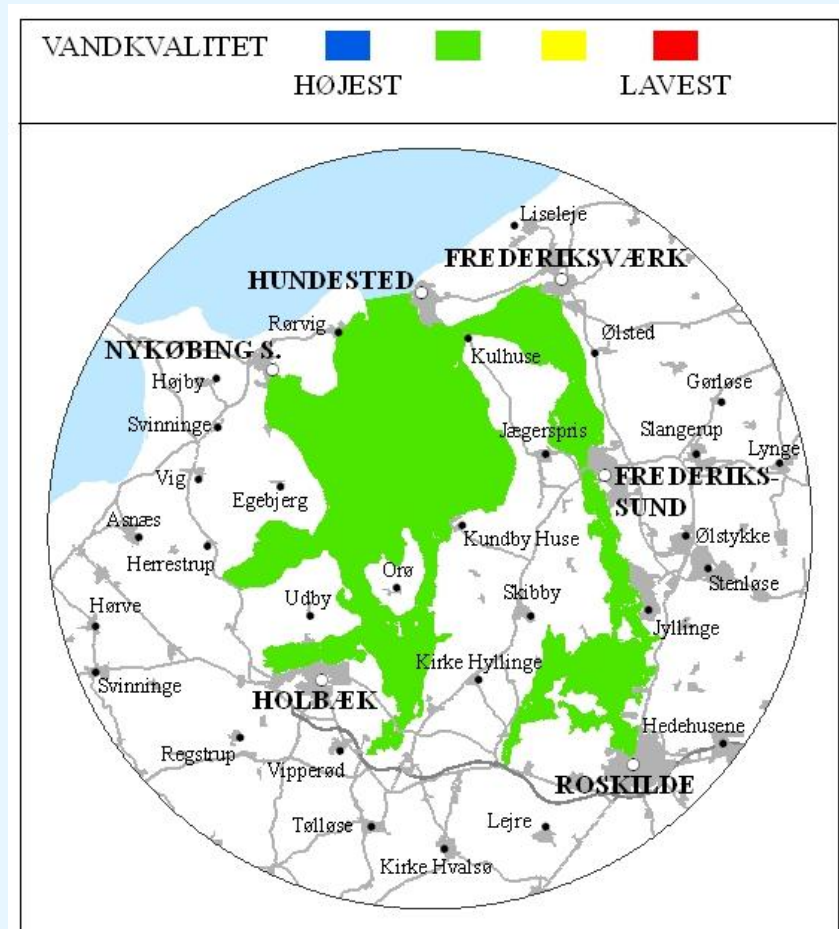
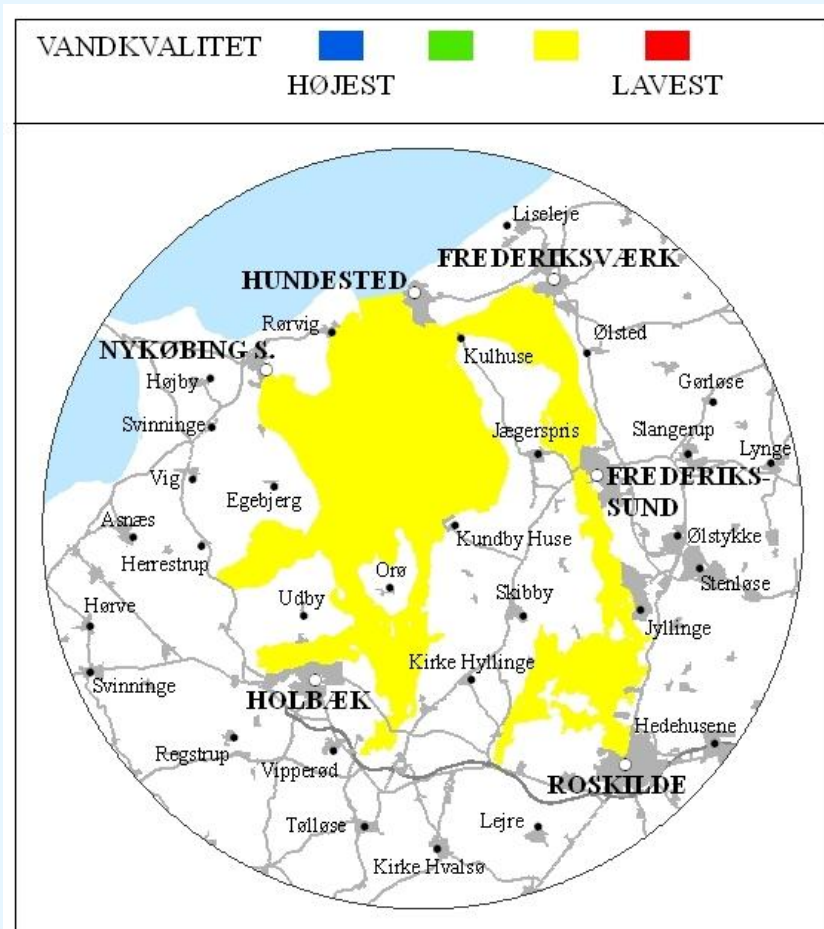
- › **Asking their WTP for improving the water quality**
- › **Use the WTP results to estimate average WTP per household and**
- › **aggregated value of the improvement for the population affected**



# Water quality ladder



# Maps of water quality





## Mean WTP

Estimated mean WTP	Mean	Std.err.	95 % CI	Obs.
WTP	558	30	498-617	612

## Aggregation

- › **Aggregate the mean WTP to a total WTP**
  - › **Comparable with the total costs of improving the water quality**



# Benefit transfer

- › **Primary studies costly and time consuming**
  - › saves money and time to “reuse” results from another site
- › **Different transfers**
  - › Simple transfer of mean WTP
  - › Transfer of a function explaining what affects WTP

# Results of transfer between two Danish sites

## › Mean WTP for Roskilde and Odense Fjord

Site	mean WTP	N (obs)
Roskilde	558	612
Odense	482	267

## › Transfer error

- › How well the transferred benefits predicts the benefits from an original study

$$TE = \frac{WTP_T - WTP_O}{WTP_O}$$

- › Average transfer error of 15 % between the two studies
- › Other studies: 50-200 %



# Results of transfer between two Danish sites

<b>Transfer of mean WTP</b>		
Roskilde-Odense	Odense-Roskilde	Average
15,5%	13,4%	<b>14,5%</b>
<b>Function transfer only with income as variable</b>		
Roskilde-Odense	Odense-Roskilde	Average
8,6%	35,3%	<b>21,9%</b>
<b>Function transfer with income and distance to site</b>		
Roskilde-Odense	Odense-Roskilde	Average
6,9%	36,5%	<b>21,7%</b>
<b>Function transfer with 7-10 variables</b>		
Roskilde-Odense	Odense-Roskilde	Average
15,2%	31,0%	<b>23,1%</b>

# Other transfer results

WTP measure	1 country	4 countries	5 countries
Mean value transfer			
Average errors	14	47	116
Multivariate transfers			
Few variables with theoretical expectations			
Average errors	22	89	94
More variables with theoretical expectations			
Average errors	22	69	61
Model with all statistically significant variables			
Average errors	23	68	77



# Concluding remarks

- › **Valuation studies very useful in the WFD**
- › **Benefit transfers can be used to save time and money without increasing the uncertainty too much**



# Thank you for your time

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