

**An Assessment of the Non-Market
Benefits of the EU Water
Framework Directive to
Households in England and Wales**



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Envecon Conference, 14 March 2008
Royal Society, London

The Water Framework Directive Is A Far Reaching, And Expensive, New EU Law



- The WFD requires Good Ecological Status by 2015
 - Based on environmental status, rather than emissions.
 - It covers all types of water bodies
 - It needs to consider all pressures affecting habitats for plants, fish and other wildlife
 - GES is a high standard!
- The WFD will cost £billions
 - Latest cost estimate for full compliance is £55billion = £2,600/hh
 - Much higher than UWWT, Nitrates, Bathing Waters
- Fortunately, the WFD contains a clause allowing less stringent targets
 - Lower target for artificial and heavily modified water bodies
 - Phased improvements allowed
 - Less stringent permanent targets if disproportionately costly
- Benefits estimates are needed for disproportionate cost assessment

The Study Followed Best Practice SP Guidelines, With Added Features For Theoretical Testing And Development



- The Stated Preference (SP) approach was adopted:
 - Widely used, but controversial
 - Only way to capture large expected non-use benefits
- Survey design and development followed best practice in SP studies:
 - E.g. Arrow et al (1993), Mitchell & Carson (1989), Bateman et al (2002)
 - Extensive pre-testing, Conservative design; WTP, Dichotomous Choice format, Accurate description, Reminder of budget constraint; Use of follow-ups, Extensive validity checks, including scope sensitivity test, Representative sampling; Face-to-Face fieldwork
- Innovations include:
 - Multiple elicitation methods: – Choice Experiments (CE), and two Contingent Valuation (CV) questions
 - Multiple analytical methods – OLS, Tobit, Turnbull, Conditional logit, Mixed logit
 - Theoretically driven experimental design to test: - Scope effects, Order effects, Information provision effects, Cost of baseline effects, Form of benefit functions
- A great deal of care was taken to create a valid database of household preferences for benefits estimation

Choice Experiments And Two Contingent Valuation Questions Were Used To Elicit Values

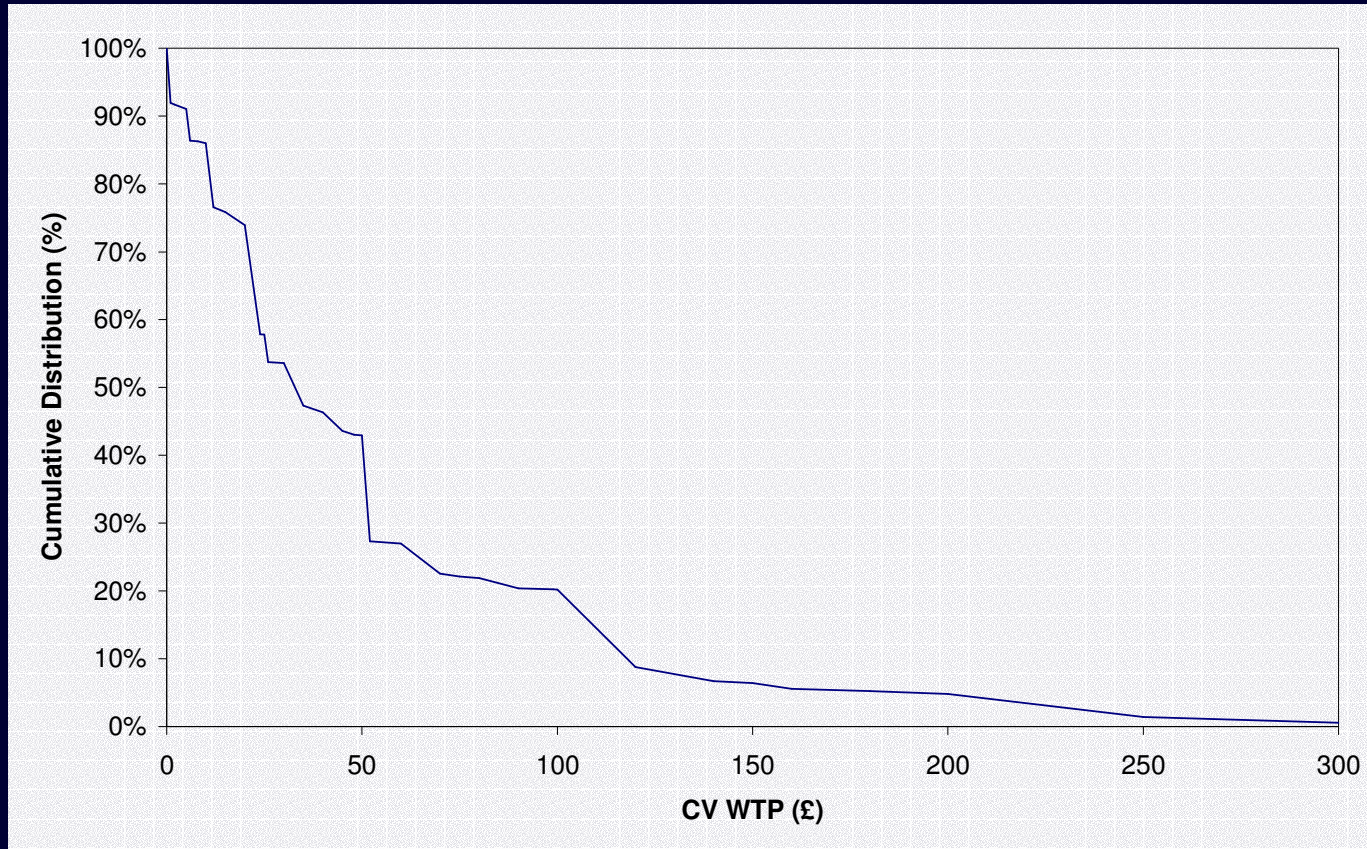


- Choice Experiment (CE)
 - “Please select your preferred option, A, B, or C”
 - Used to estimate marginal values per percentage point improvement in high quality, and reduction in low quality, both for local and national areas. Also valued timing of the improvements.
- Dichotomous Choice Contingent Valuation (DCCV)
 - “Please select your preferred option, A or B”
 - Used to estimate total values of WFD for two benchmark implementations
- Payment Card Contingent Valuation (PCCV)
 - “What amount on this card, or any amount in between, is the most (you / your household) would be willing to pay, through increased water bills and other household payments every year, on top of the payment to stop the water environment getting worse, to have the improvements shown in Option B?”
 - Used to estimate total values of WFD for same two benchmark implementations
- Expected decreasing order of values: CE->DCCV->PCCV:
- PCCV and DCCV employed to bracket the total value of the WFD, and scale the marginal values derived from CE.



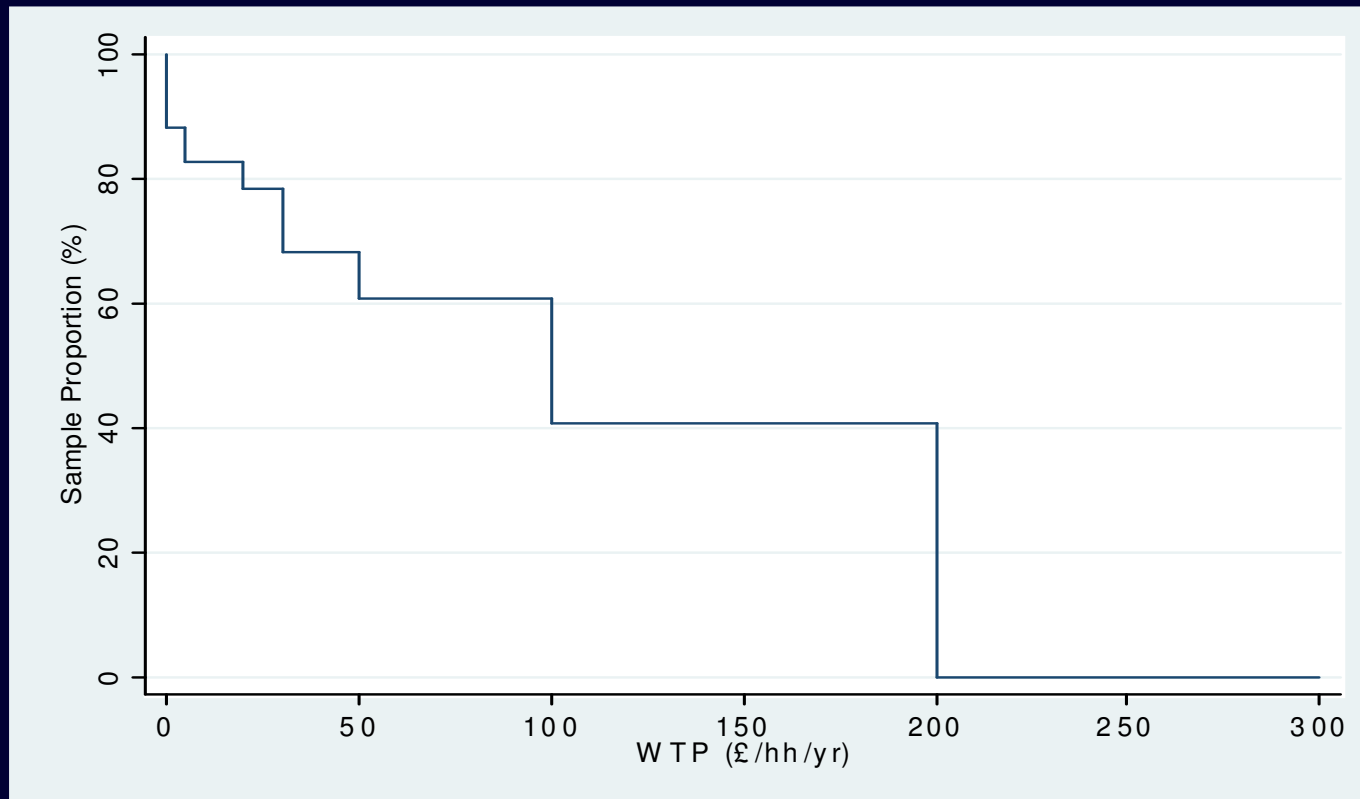
Results

Headline PCCV Results for 95% Scenario:



- The PCCV sample mean for the 95% scenario is £50/hh/yr and the median is £30/hh/yr.

Headline DCCV Results for 95% Scenario Are Higher Than PCCV, As Expected



- The DCCV Turnbull lower bound estimate of the sample mean is £110/hh/yr, and the median is between £100 and £200 – but 40% said they were willing to pay £200.

WTP Sensitivities Are In Line With Expectation



- As expected, WTP is found to be higher for:
 - Greater degree of environmental improvement
 - Those with higher incomes
 - Users of the water environment
 - Those with pro-environment attitudes
 - CE, then DCCV, then PCCV

- Further results, without prior expectation, find higher WTP for:
 - Male respondents
 - Male interviewers
 - Highly educated respondents
 - Respondents that understood the questionnaire and gave it careful consideration
 - Respondents answering PCCV question after CE and DCCV

- Again, without prior expectation, further results find no difference in WTP between
 - urban and rural areas
 - types of water body example shown

Aggregate PCCV Estimates of Benefits by DEFRA Policy Scenario



Policy Scenario	England and Wales		
	Mean WTP £/hh/yr	Annual WTP (for 21.7m hh) £million / yr	PV WTP (@3.5% discount rate) £million
Scenario 1 - Maximum	47.1	1,020.15	29,147.10
Scenario 2 - Front Loaded	40.7	880.57	25,159.10
Scenario 3 - Even Loaded	38.0	823.85	23,538.65
Scenario 4 - Back Loaded	35.5	769.94	21,998.30
Scenario 5 - Less Stringent Objectives	28.5	618.06	17,658.99
Scenario 6 - Nature Assimilation Lag	31.1	673.70	19,248.51

For the maximum improvement scenario – 100% high quality by 2015:

Present Value (PCCV WTP) = £29,147million

Aggregate DCCV Estimates of Benefits by DEFRA Policy Scenario



Policy Scenario	England and Wales		
	Mean WTP £/hh/yr	Annual WTP (for 21.7m hh) £million / yr	PV WTP (@3.5% discount rate) £million
Scenario 1 - Maximum	177.7	3,849.03	113,821.44
Scenario 2 - Front Loaded	153.4	3,322.40	98,248.03
Scenario 3 - Even Loaded	143.5	3,108.41	91,920.05
Scenario 4 - Back Loaded	134.1	2,905.00	85,904.87
Scenario 5 - Less Stringent Objectives	107.7	2,331.97	68,959.58
Scenario 6 - Nature Assimilation Lag	117.4	2,541.87	75,166.78

For the maximum improvement scenario — 100% high quality by 2015:

Present Value (DCCV WTP) = £113,821million

Conclusions



- A survey was thoroughly and carefully developed to provide valid benefits estimates, and the results show high standards of validity.
- A highly flexible modelling tool has also been developed which is capable of valuing a wide range of policy scenarios. This is being used for prioritisation of schemes.
- We have some numbers we can use! (Cautiously.)

- Further research will help:
 - to understand preferences regarding different types of water environment improvements
 - to better understand and deal with the sensitivity of results to elicitation method
 - to better understand context effects, particularly single-issue effect
 - to explore alternative experimental design approaches and demonstrate their statistical properties
 - To apply new econometric techniques capable of modelling choice behaviour with non-parametric mixing distributions