



Valuation of the upcoming revisions to the Bathing Water Directive

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Background

- MASTS is a research group / project involving Universities and Research Organisations across Scotland – 10 institutions and 700 researchers - £66 million annually.
- 5 year post-doc to research the environmental economics of the coastal zone. Funding for research into rBWD from external sources.



Summary of research

- 2015 will see changes to the Bathing Water Directive.
- Data has already started to be collected for these changes but reporting based upon a 4 year average.
- Current good standard to become the future mandatory standard; current excellent becomes the good standard; and future excellent twice as strict.
- Any bathing water failing to meet standards will have to post advisory notices – failure to meet standards for four years in a row will lead to de-designation as a bathing water and requirement for permanent signs.

Choice Experiments

- Value of a good made up of the attributes of the good.
- By analysing choices between different levels of the attributes relative importance can be determined.



		
Source	Australia	UK
Production	Organic	Non-organic
Price per Kg	£1.50	£1.60
Choice		



Health Risk

- Health risk: identified by the directive, current good standard identified to have a 10% risk of stomach upsets. Based upon dose response relationship (see for example Georgiou and Langford 2002). We assume a linear relationship.
- Estimates vary somewhat but approaching 2 million incidence a year ballpark for UK.
- Submerging head and face
- Can be mild so based on surveys of households rather than hospital records – so uncertain.



Health of the Seas

- Nutrient cycle and therefore health of the sea beds (benthic health) will also change.
- Difficult to get across to the public.
- Will have knock on impacts upon other species – mammals, birds etc. so these are used as indicators.
- Simplification, but generally a fair assumption.



Beach Litter

- Litter on the beach (and in the water) – both from waste water (e.g. cotton buds) and other sources (e.g. fly tipping).
- Identify **prevention** (fitting/cleaning storm water filters, policing of fly tipping) and **collection** actually removing debris from the coastline.
- Can't control for some important factors, surf conditions, isolation, foreshore structure.

Sample Choice Card

	Beach A	Beach B	Beach C
Benthic Health and population.	Small increase More fish, mammals and birds. Limited potential to notice the change in species numbers.	Large increase More fish, mammals and birds and an increased potential of seeing these species.	No Improvement
Health Risk (of stomach upsets and ear infections)	Very Little Risk – excellent water quality	5% Risk – good water quality	10% Risk – no improvement
Debris Management	Prevention – more filtration of storm water, more regular cleaning of filters and better policing of fly tipping.	Collection and Prevention – debris collected from beaches more regularly in addition to filtration and policing.	No Improvement
Additional cost of travelling to each beach.	£3	£9	£0
Please tick the <u>ONE</u> option you prefer.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Sample

- Three parallel surveys – general public (including non use), general public (direct use), active recreationalists (surfers, kite surfers, sea kayakers etc.).
- Postal survey using water rates as payment vehicle (Northern Ireland, Scotland and Northern England)
- On site surveys – payment vehicle additional cost of one more trip to a beach with the given characteristics (Ireland, Northern Ireland, Scotland and Northern England)
- Seasonal changes?



Northern Ireland Results

How regularly do you visit the beach? and If you can, estimate the number of days you spend at the beach each year?

Frequency of visitation	All Respondents	Active Users	Illness Sufferers	Regular Visitors
Daily	21%	25%	41%	38%
Weekly	34%	41%	39%	62%
Every Few Weeks	19%	21%	9%	0
Every Few Months	15%	10%	6%	0
Once or twice a year	10%	3%	5%	0
Never ^s	0.04% (2 people)	0.07% (1)	0	0
Average Estimated Visitation (days)	99	115	174	160
Sample size ^{ss}	548(414)	147 (121)	80 (66)	298(235)



Types of Users

Which of these activities do you use the beach and sea for?

Activity	All Respondents ^s	Active Users	Illness Sufferers	Regular Visitors
Surfing	28%	72%	60%	33%
Windsurfing	4%	11%	8%	5%
Kitesurfing	3%	8%	5%	3%
Kayaking	12%	24%	16%	14%
Swimming	26%	42%	32%	28%
Walking	72%	51%	66%	69%
Dog Walking	32%	18%	26%	36%
Bird Watching	8%	4%	2.5%	12%
With Children	24%	18%	24%	24%
To Relax	50%	34%	37%	48%
Fishing	10%	14%	11%	13%
Other	13%	12%	14%	17%



Socio-economics

Socio-economic and household characteristics

	All respondents	Active Users	Illness Sufferers	Regular Visitors
Illness	13%	29%	100%	20%
Number of Adults	2.35	2.47	2.46	2.26
Number of Children	0.67	0.69	0.71	0.62
Dog Ownership	45%	34%	44%	48%
Age	43	33	38	44
Gender (Female)	38%	17%	27%	35%
Conservation Group Membership	25%	20%	31%	29%
College Educated	26%	27%	26%	25%
University Educated	58%	65%	68%	53%
Average Income	£23,100	£22,600	£25,000	£22,500

Preliminary data



Results – Northern Ireland

	All respondents – error component		Active Users – error component		Illness Sufferers – error component		Regular Users – error component	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Benthic Health – small increase	0.599***	0.064	0.399***	0.116	0.585***	0.173	0.585***	0.084
Benthic Health – large increase	0.765***	0.066	0.690***	0.126	0.708***	0.200	0.739***	0.089
Health Risk 5%	0.687***	0.080	0.701***	0.158	1.002***	0.198	0.658***	0.112
Health Risk – very little	0.927***	0.073	1.001***	0.133	1.359***	0.189	0.982***	0.097
Debris - Prevention	0.945***	0.059	0.795***	0.103	0.902***	0.142	0.900***	0.079
Debris – Collection and Prevention	1.118***	0.066	0.926***	0.125	1.082***	0.189	1.037***	0.093
Cost	-0.128***	0.005	-0.074***	0.009	-0.106***	0.012	-0.111***	0.007
Illness	2.070***	0.711	2.375***	0.862	N/A	N/A	2.740***	1.037
Active	2.050***	0.519	N/A	N/A	1.396*	0.744	1.928**	0.807
Error Sigma	3.578***	0.249	3.109***	0.457	2.490***	0.454	4.237***	0.418
r-square	0.336		0.282		0.323		0.345	
Log likelihood	-2878.4		-790.8		-422.3		-1536.9	
N	501		130		71		274	

Preliminary data



WTP Northern Ireland

	All respondents – error component		Active Users – error component		Illness Sufferers – Error Component		Regular Visitors – error component	
	WTP	SE	WTP	SE	WTP	SE	WTP	SE
Beneficial health – small increase	£4.67*** (±£1.03)	0.527	£5.40*** (±£3.37)	1.72	£5.54*** (±£3.41)	1.74	£5.27*** (±£1.56)	0.80
Beneficial health – large increase	£5.97*** (±£1.03)	0.525	£9.34*** (±£3.82)	1.95	£6.70*** (±£3.78)	1.93	£6.66*** (±£1.64)	0.84
Health Risk 5%	£5.36*** (±£1.42)	0.722	£9.49*** (±£5.51)	2.81	£9.48*** (±£4.55)	2.32	£5.93*** (±£2.32)	1.18
Health Risk – very little	£7.22*** (±£1.31)	0.666	£13.56*** (±£5.49)	2.80	£12.86*** (±£4.47)	2.28	£8.84*** (±£2.09)	1.07
Debris - Prevention	£7.37*** (±£1.01)	0.513	£10.77*** (±£3.88)	1.98	£8.54*** (±£3.00)	1.53	£8.10*** (±£1.59)	0.81
Debris – Collection & Prevention	£8.72*** (±£1.19)	0.605	£12.54*** (±£5.00)	2.55	£10.24*** (±£3.98)	2.03	£9.34*** (±£1.94)	0.99



Further WTP Results

	Scottish Surfers	NI Active Today	NI Active Not Today	NI Active Never	Scottish General Public
Benthic Small	£6.77***	£6.11***	£4.11***	£5.13***	£23.84***
Benthic Large	£12.00***	£9.82***	£7.16***	£5.07***	£29.32***
Health 5%	£13.13***	£10.47***	£6.62***	£4.44***	£30.38***
Health low risk	£15.72***	£14.45***	£7.73***	£6.04***	£54.09***
Debris P	£9.91***	£11.08***	£6.81***	£6.99***	£52.97***
Debris P&C	£13.19***	£13.10***	£8.45***	£8.40***	£65.36***



Outcomes

- Research suggests that the public is supportive of rBWD when described through attributes.
- Consistency in relative values between different groups.
- Absolute values vary depending on – the use made of the beach, previous illness and to some extent how regularly the beach is used.
- The process of experience may impact upon stated preference.



Further Research

- Work currently in the field in England (at 34 beaches “at risk”).
- Contingent behaviour adopted – travel cost associated with questions as to how behaviour would change.
- In addition local economic impacts to be analysed.
- National survey – currently waiting for focus group feedback.
- Stimulus:

Stimulus



**Advice
against bathing**



**Poor
bathing water quality**

- ★ ★ ★ excellent
- ★ ★ good
- ★ sufficient
- poor

Thank you for your attention.

Review of previous research involved in the identification of values of previous changes to the EU Bathing Water Directive.

Survey	Details	Annual WTP/WTP per visit
Brouwer and Bronda (2004)	CVM - value of for a reduction in illness risk level by 5% for swimmers in Holland.	£27.60
Day et al (2001)	CVM for improvements to the EU mandatory levels for beaches failing the (then) current standards, in South West Scotland.	£6.80 to £15.50
Georgiou et al (1998)	CVM for achievement of the (then) current mandatory standards in East Anglia.	£18.30
Georgiou et al (2000)	CVM to achieve the (then) revised EU standards in East Anglia.	£39.70
Hanley et al (2001)	CVM to achieve the then current EU mandatory standards in South West Scotland.	£10.20 (£0.60 per visit)
Hanley et al (2003)	TCM / SP for an improvement in bathing water standards in South West Scotland.	£7.30 (per individual)
Machado and Mourato (1999)	CVM to achieve the then current EU Mandatory standards in Portugal	£46.20 (£9.20 per trip)
Machado and Mourato (1999)	CVM to achieve the then current EU Guideline standards in Portugal	£117.60 (£15.90 per trip)
Mourato et al (2003)	CE for a 1% reduction in the risk of stomach illness in the UK.	£1.40

CVM – Contingent valuation method, CE – Choice Experiment, TCM – Travel cost method. SP – stated preference in this case the additional trips which would be made under changed water quality.

Previous research relating to bathing water quality generally (i.e. not related to the Bathing Water Directive):

Survey	Details	Annual or per visit WTP
Barton (1998)	Improvements to swimmable in Costa Rica	£114.40 – 137.30
Beharry-Borg et al (2010)	CE – Low chance of ear infection related to snorkelers in Trinidad and Tobago	£2.50 – 3.10
Bocksteal et al. (1987)	TCM - Improvement in water quality for Boston, USA	£11.80 for a 10% improvement (£37.40 for 30%)
Bocksteal et al (1989)	CVM – improvement from unacceptable to acceptable water standards in Chesapeake Bay, USA	£151.60
Choe et al (1996)	CVM for a shift to swimmable standards in the Phillipines	£11.40 – 22.90
Eggert and Olsson (2010)	CE – Bathing water quality, biodiversity and cod stock attributes, Swedish West Coast.	£56 Water, £117 Fish, £59 High Biodiveristy
Feenberg and Mills (1980)	TCM - 10% improvement in water quality in Boston, USA	£4.40
Le Goffe (1995)	CVM - change in water quality to swimmable (and sufficient to safely take shellfish)	£41.70
Mantymaa (1999)	CVM – change in water quality related to sewage levels in Barbados	£13.40-180.50
McConnel and Ducci (1989)	CVM - From swimmable to drinkable in Finland	£38.10
Nikilitshek and Leon (1996)	CVM and TCM – To swimmable in Chile	£101.00 (CVM) £133.40 (TCM)
Sandstrom (1997)	TCM 50% Improvement in terms of nutrients in Sweden	£31.60 – 43.80 per trip values.
Zylicz et al (1995)	CVM – To swimmable (in terms of eutrophication) in Poland	£17.20 – 67.70

CVM – Contingent valuation method, CE – Choice Experiment, TCM – Travel cost method.

Beach Debris values from previous surveys.

Survey	Details	Annual or per visit WTP
Beharry- Borg et al (2010)	CE Reduction in plastic debris on 30m length of beach, Trinidad and Tobago	£1.60 – 5.40 (per tourist trip)
Mourato et al (2003)	CE Reduction in litter on beaches in England and Wales	£7.50 – 13.80
Mourato et al. (In Pearce D. Ed 2006)	CE per percentage point of sewage litter in relation to beaches of the Thames Tideway	£2.30 (Health risk reduction £0.50)