

Reflections on Cross-cutting issues in Climate Change Impact Assessment

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Presentation Structure

- Context of UK-focussed Research
- Informational needs of adaptation & mitigation communities
- Data needs
- Uncertainty
- Endogeneity & Separability
- Provisional UK Impact costs
- Concluding thoughts

Research Demand

- **Experience in use of monetary metric in CC Impact assessment**
- **UK Climate Impacts Programme:**
 - **Development of Costing Methodology 2000-2004**
 - Emphasis on technical assistance to stakeholder community
 - **Local scale sectoral case study applications in partnership with stakeholder groups 2004-6**
 - local authority road subsidence
 - Historical gardens management
 - Scottish Highlands tourism
 - County-level health care
 - Cultural buildings flooding
 - Property subsidence
- **UK Department of Environment, Food and Rural Affairs**
 - **UK Regional & national estimates for key sectoral impacts 2004-6**
 - See results later in presentation

Research Demand (2)

- Funders reflecting needs of stakeholder community
 - More emphasis on understanding impacts in order to plan adaptation
 - Does not seem to reflect strategic aim to minimise CC cost function:

$$C_{T}^{UK}(e^{UK}, e^{ROW}, a^{UK}) = C_{I}^{UK}(e^{Ga^{UK}}) + C_{A}^{UK}(a^{UK}) + C_{M}^{UK}(e^{UK})$$

Differences in Informational Needs

- **Time periods of interest**
 - Adaptation: now – 50 + years
 - Mitigation: now – 200 + years
- **Geographical scale and depth of analysis**
 - Adaptation: local, capturing site-specificity in detailed analysis
 - Mitigation: global, less detail required(?) but uncertainty is consequently increased

Data Needs (Adaptation context)

- Basis of climate-impact relationship
 - Most demanding of CC scenario data when based on:
 - Day-period events e.g. cardio-vascular health impacts
 - Climate variable variability
 - Most demanding of historical analogues when:
 - Impact-event frequency function constructed on basis of e.g. only 2 data points

Data Needs (2)

- The use of socio-economic scenarios to construct reference cases:
 - interpretation needs to allow credible reference & CC cases to be constructed without over-interpreting qualitative story-lines.
 - Monetisation: Income elasticities, GDP growth rates and Δ in preferences?

Use of SES : Property subsidence example

- **Quantitative:** population and household size
- **Qualitative:**

<i>Socio-economic factor</i>	<i>Socio-economic scenario</i>			
	GS	NE	LS	WM
Planning Policy	- ve	+ ve	- ve	+ ve
Building Design	- ve	+ ve	+ ve	- ve
Insurance policy	+ ve	?	?	- ve
Overall net effect	- ve	+ ve	Same	- ve

+ve - increase numbers of subsidence cases; -ve – decrease numbers of subsidence cases

Uncertainty (contextual)

- Metric is sometimes critical: e.g. mortality impacts

Annual Deaths and life years saved from warmer winters in UK, 2080s

Metric	Low	High
Attributable Deaths	4285	7822
Life-years	2964	4464

Annual value of deaths and life years saved from warmer winters in UK, 2080s (£m)

Metric	Low	High
Attributable Deaths (VSL)	5142	9386
Life-years value (VOLY)	44	67

VSL=Value of a Statistical Life; VOLY=Value of a Life-Year

Uncertainty (2)

- **Non-market valuation** (e.g. of mortality risk)

Taxonomy of uncertainty in valuation of premature mortality

Origin of uncertainty
Knowledge of risk e.g. Δ in risk of death, Δ in life expectancy?
Context – climate change <ul style="list-style-type: none">- appropriate size of risk change- (in)voluntariness
Study design features
Relevant populations & sample sizes in study?
Choice of econometric methods & treatment of data
Interpretation of results
Validity of spatial transfer e.g. socio-cultural differences

Endogeneity & Separability

- **Endogeneity**
 - For example, of adaptation to CC impacts
e.g. reactive underpinning of property to subsidence prevents future impact
- **Separability**
 - Need for a clear reference case - to isolate
 - a) adaptation and effects to sector change / socio-economic development from;
 - b) climate-specific adaptation and effects

Provisional UK national results

	W hat quantified	P roxy for W elfare change
H ealth		
M ortality	P remature deaths; years of life lost	W T P
M orbidity	R espiratory H ospital A dmissions	W T P
A griculture		
C rops	Δ in C rop yield	G ross margin
F looding	Δ in C rop yield	
B iodiversity		
S elected species and habitats	Δ in species space	R estoration cost
T ourism		
V isitor Spend.	Δ in visitor numbers	T ourist spend
W ater Resources		
D rought – domestic use		
T ransport		
I nfrastructure subsidence	R ail buckling; road subs. Time loss	R estoration cost; W T P
F looding & coastal inundation	T ime loss	W T P
W inter disruption & maintenance	Δ in maintenance req.	P reventative/ R estoration cost
E nergy		
H eating	Δ in space heating req.	Δ in C onsumer surplus
C ooling	Δ in space cooling req.	Δ in C onsumer surplus
B uilt Environment & C ultural Heritage		
F looding	F lood damage to buildings	P artial W T P
S ubsidence	S ubsidence damage to buildings	R estoration cost

Sector/Impact	Annualised Impact Costs (£ million, 2004 prices) (-ve denotes benefit)			
	2080s			
	Low	M - L	M - H	H
Health				
Mortality - summer	3	3	4	8
Mortality - winter	-34	-39	-44	-67
Agriculture				
Crops - mean precpn. (Eng. only)	49	-	-	294
Flooding (Eng & Wales)	-1	18	2	-4
Biodiversity				
Selected species and habitats	-	-	-	-
Transport				
Infrastructure subsidence	35	49	62	101
Flooding & coastal inundation	13	19	19	26
Winter disruption & maintenance	-102	-	-	-340
Built Environment & Cultural Heritage				
Flooding - fluv. & coastal (Eng. & Wales)	-272	-470	419	353
Flooding - intra-urban	-131	-100	368	32
Subsidence (Eng. only)	162	114	213	316
	Changes in Consumer Expenditure (£bn, 2004 prices); -ve denotes Consumer Spend reduction			
Tourism				
Visitor Spend.	14.8	11.3	12.6	28.9
Energy				
Heating	-1.2	-1.3	-2.1	-2.8
Cooling	0.3	0.1	0.3	1.2

Caveats

- Range of benefits and costs from climate change in the UK,
- **BUT**
 - includes only selected impacts
 - excludes the impacts on the UK of climate change elsewhere in the world

Concluding thoughts

- Those making decisions relating to adaptation (in UK at least) require info. On impact costs that stretches data & methodologies to limit
- Does mitigation policy require the same (level of) info? If not, what form should IA take?
- Do we need to separate S-E Δ from CC adaptation (and mitigation)?