

**Institution: University of East Anglia**

**Unit of Assessment: 7 - Earth Systems and Environmental Sciences**

**Title of case study:**

**Costing the Earth: Influencing Government Policy for Ecosystem Services**

### 1. Summary of the impact

The School of Environmental Sciences, through its Centre for Social and Economic Research on the Global Environment (CSERGE) has exerted a seminal influence upon decision-making regarding natural capital and the ecosystem services they supply. Major impacts have been upon UK Government Policy (including the Natural Environment White Paper); Government guidelines (regarding the valuation of ecosystem services and their incorporation within decisions); underpinning UK Official Reports (including the UK National Ecosystem Assessment); Government Committees (including the Defra Science Advisory Council and H.M. Treasury Natural Capital Committee); and the business sector (such as the privatised water companies). In addition, substantial TV, radio and newspaper exposure has generated impact through raising awareness of ecosystem service related issues.

### 2. Underpinning research

Either directly or indirectly, almost all human wellbeing and economic activity is dependent upon the natural environment and the 'ecosystem services' it provides. Natural resources play a vital role in the supply of food, the provision of clean water, regulation of the climate, availability of raw materials and so on. They also determine the quality of life through the provision of high quality recreation, beautiful landscapes, peace and quiet, urban green-space, and habitat for wild species. Yet the fact that many of these vital services lack market prices means they are often ignored when it comes to making decisions. CSERGE research has addressed this by developing theory and methods for valuing ecosystem services and incorporating them within decision making. The international status of CSERGE is demonstrated by independent citation assessment (Hoepner et al., (2012) *Ecological Economics* 77: 193–206) which positions CSERGE as the most influential institution in Europe and third most influential in the world in the fields of environmental and ecological economics: this status is also reflected in a track record of research funding [see Section 3].

#### **Theoretical and methodological basis of the Ecosystem Service approach and**

**environmental valuation:** CSERGE has led the European field in ecosystem valuation research for more than two decades and in this REF window the key contributions have included ground-breaking work linking ecosystem services through to economic values [1, 2]. Methods for estimating such values were described in numerous key books and journal papers resulting in several thousand citations. CSERGE researchers have pioneered the incorporation of environmental complexity within techniques for the economic valuation of non-market environmental goods. Influential academic publications such as [3] resulted in CSERGE leading international consortia in formulating guidelines for such valuation studies, including the official UK Government Department guidelines [4] and the UK-National Ecosystem Assessment (UK-NEA) discussed subsequently. Other key developments here include novel uses of geographical information systems to address complex spatial variation in ecosystem services [5], new approaches to the valuation of noise generated by different sources [6] and the advanced analysis of the diverse drivers and impacts of land use change across the UK.

#### **Key UEA Researchers**

This research has been led by the following key staff: Prof. **Turner** (employed 1977-present; awarded CBE in 2000), Dr **Fisher** (2006-09), Prof. **Bateman** (1989-present; Royal Society Wolfson Research Merit award in 2011 and OBE in 2013), Prof. **Day** (2001-present), Dr **Lake** (1998-present), Prof. **Lovett** (1990-present), Prof. R. **Watson** (2007-present; Knighted in 2012).

### 3. References to the research

(UEA authors in bold) {article citations from Scopus, book citations from Google Scholar}

- [1] Balmford, A., et al., and **Turner, R.K.** (2002) Economic reasons for conserving wild nature, *Science* **297** 950-953 doi: 10.1126/science.1073947 {446}
- [2] **Fisher, B., Turner, R. K.** et al., (2008) Ecosystem services and economic theory: integration for policy – relevant research, *Ecological Applications* **18** 2050-2067 doi: 10.1890/07-1537.1 {105}
- [3] **Bateman, I.J.** and Willis, K.G. (2001) *Valuing environmental preferences: theory and practice of the contingent valuation method in the US, EU, and developing countries*, Oxford University Press, Oxford ISBN-10: 0199248915 {505}
- [4] **Bateman, I.J.**, Carson, R.T., **Day, B.**, Hanemann, W.M., et al., (2002) *Economic Valuation with Stated Preference Techniques: A Manual*, Edward Elgar Publishing, Cheltenham ISBN-10: 1843768526 {1153}
- [5] **Bateman, I.J.**, **Lovett, A.A.** and **Brainard, J.S.** (2003) *Applied Environmental Economics: a GIS Approach to Cost-Benefit Analysis*, Cambridge University Press, Cambridge ISBN-10: 0521671582 {129}
- [6] **Day, B.**, **Bateman, I.J.** and **Lake, I.** (2007) Beyond implicit prices: recovering theoretically consistent and transferable values for noise avoidance from a hedonic property price model, *Environmental and Resource Economics* **37** 211-232 doi:10.1007/s10640-007-9121-8 {40}

#### Supporting funding

CSERGE has received more than £10M of funding for its ecosystem services research since 1993. Most recently, this funding has been extended by a £2.2M ESRC five year (2010-2015) “*Social, Economic and Environmental Research (SEER)*” Large Grant examining multi-objective land use decision-making; research which proved central to the UK National Ecosystem Assessment, as discussed below.

### 4. Details of the impact

**Impact on Government policy:** CSERGE played a major role in the UK National Ecosystem Assessment (UK-NEA) [7,8] with **Watson, R.** Co-Chair of the Assessment, **Bateman** leading the UK-NEA Economics Team, and **Burgess** (since 2007, now Emeritus) leading the Cultural Services team with major inputs from **Watkinson** (since 1976) and **Turner**. Indeed the CSERGE SEER project is explicitly acknowledged as the only external research underpinning the UK-NEA (see page 2 in [8]). The UK-NEA in turn became the empirical basis of the Government’s 2011 *Natural Environment White Paper* [9], an impact explicitly acknowledged in its Foreword by the then Secretary of State for Environment, Food and Rural Affairs, Caroline Spelman, who stated:

*“The National Ecosystem Assessment has given us the evidence to inform our decisions. It makes clear that government and society need to account better for the value of nature, particularly the services and resources it provides”.*

The UK-NEA is by far the most cited document in the Natural Environment White Paper, which has provided a 25 year vision for management of the UK natural environment and underpins all related policies.

**Impact on Government investment appraisals:** CSERGE wrote the UK Government official guidelines for the valuation of the environmental impacts of investments [4] and these have been used continuously in official appraisals since their publication in 2002. Indeed the Environment Agency inform us that these guidelines have been used as the basis of several hundred appraisals for the on-going Water Industry Price Review process [10]. These appraisals have determined decisions regarding several billion pounds of investment in water quality improvements across the UK. This guidance has also been used in various other appraisals covering a variety of environmental impact contexts too numerous to include here.

In 2007-08 **Day** was commissioned by the Government to undertake an assessment of the impact

## Impact case study (REF3b)

of varying vehicle taxation as a means of reducing emissions. His recommendations formed the basis of changes in taxation announced in the Chancellor of the Exchequer's 2008 Budget [11]. **Day** also led the 2009 study for the Department for Transport which led to their incorporation of noise impacts into the policy and practice regarding the planning of all UK trunk roads [12].

**Impact through projects undertaken for the business sector:** The School's work on economic valuation [4] has been used extensively by the private sector, most particularly by water companies in preparing submissions to the Ofwat Price Review processes (PR09 and PR14). As confirmed by [13], CSERGE researchers designed many of these studies including: appraisal of the £4 billion Thames Tideway investment (construction approved for 2012-23); appraisal (in 2008) for Thames Water Utilities of their £1 billion leakage reduction scheme and in 2011-2013 of their 5 year £5 billion investment plan for the 2014 (PR14); studies in 2008 and 2012-13 for the United Utilities PR09 and PR14 business plans entailing investment of around £3 billion; Southern Water PR09 study. CSERGE also provided peer review of the first Triple Bottom Line Account for a water company in the UK; and of the Severn Trent Water PR14 submission involving investment expenditure of around £2.5 billion. In sum this shows the active involvement of CSERGE in informing over £15 billion of water sector investment during the present REF period.

**Pathways to Impact #1: via direct advice to Government and via Government Committees:**

Since 2009 **Bateman** has given personal briefings to a variety of senior decision-makers including: The Defra Secretary of State, Oliver Letwin, MP and Minister of State at the Cabinet Office; Ministers from H.M. Treasury, Defra, Foreign Office, UK Trade and Industry, Department for Communities and Local Government, the Department for Transport, the Department of Energy and Climate Change, the Department for International Development and the Department for Business, Innovation and Skills; Members of the House of Lords and House of Commons; various Departmental Permanent Secretaries, Director-Generals, etc. **Bateman** also gave formal presentations and answered questions at the House of Commons Environment, Food and Rural Affairs Select Committee; also to the Government Chief Scientist, Sir John Beddington; all Government Chief Scientific Advisers and held regular meetings with the Defra Chief Scientist. He was appointed to the Defra *Science Advisory Council* in 2010 and to the H.M. Treasury/Defra *Natural Capital Committee* in 2012 (delivering the first State of Natural Capital report to the Chancellor of the Exchequer, George Osborn in 2013 [14], and providing briefings to Owen Paterson, Secretary of State for the Environment).

**Pathways to Impact #2: through networking, capacity building and wider engagement:**

CSERGE leads the NERC Valuing Nature Network (<http://www.valuing-nature.net>) which has over 1,200 business and policy members across 43 countries, and undertakes numerous collaborating studies worldwide. From 2011 it has co-funded 18 studies with the business and public sectors, including the joint business/Defra Ecosystem Market Task Force (EMTF). **Bateman** wrote the EMTF Top Ten Opportunities paper [15] which led directly to their final report recommendations for business opportunities raised through the delivery of ecosystem services [16]. Finally impact through raising awareness of ecosystem service related issues has been generated through more than 50 media interviews including TV appearances for BBC and ITV news, interviews on national and regional radio, and newspaper features in The Telegraph, The Times, The Guardian and others.

**5. Sources to corroborate the impact**

- [7] UK National Ecosystem Assessment (2011a) *The UK National Ecosystem Assessment: Synthesis of the Key Findings*.  
UNEP-WCMC, Cambridge. ISBN: 978-92-807-3165-1  
**CSERGE impact:** All pages – See Acknowledgement
- [8] UK National Ecosystem Assessment (2011b) *The UK National Ecosystem Assessment: Technical Report*.  
UNEP-WCMC, Cambridge. ISBN-10: 9280731645  
**Bateman** was Coordinating Lead Author on Chapter 2 Conceptual Framework (p.11-26); Chapter 22 Economic Values from Ecosystems (p.1067-1152); Chapter 26 Valuing Changes in Ecosystem Services: Scenario Analyses (p.1265-1308)

Impact case study (REF3b)

- [9] H.M. Government (2011) *The Natural Choice - Securing the Value of Nature: The Natural Environment White Paper*  
 HMSO, London. ISBN 978-0-10-180822-4  
 See: pages 2 (Foreword from the Secretary of State), 3,6,7,15,35,66,68,74,75
- [10] Letter held on file at UEA from the Economics Manager, Environment Agency (2013) which states:  
*"I am pleased to confirm that the work of CSERGE has played a fundamental role in many of the appraisals of freshwater quality conducted by the Environment Agency for the Ofwat Price Review (PR) process in 2004 and subsequently in work preparing for implementing the Water Framework Directive. For example the CSERGE led manual "Economic Valuation with Stated Preference Techniques" strongly impacted the more than 400 assessments undertaken for PR04 and the development of the studies underpinning our WFD valuation survey and our guidance from 2007 onwards, during which time we have undertaken many hundreds of further assessments up to the present day."*
- [11] Letter held on file at UEA from the Department for Transport confirming Day's input into the 2008 report *Demand for Cars and their Attributes* (report held on file at UEA)
- [12] Department for Transport (2012) *Transport Analysis Guidance (TAG): The Noise Sub-objective*, TAG Unit 3.3.2, Department of Transport  
 Report available at: [www.dft.gov.uk/webtag](http://www.dft.gov.uk/webtag)  
 See: pages 3, 23
- [13] Letter held on file at UEA from the Managing Director of **eftec**, confirming CSERGE input into **eftec**-led consultancy.
- [14] Natural Capital Committee (2013) *The State of Natural Capital: Towards a framework for measurement and valuation*, report to the Chancellor of the Exchequer and the Economic Affairs Committee, Defra, London  
 Available at: <http://www.defra.gov.uk/naturalcapitalcommittee/work/state-of-natural-capital-reports/>  
 See: pages 37, 39
- [15] Bateman, I.J. (2012) Paper for the Ecosystem Markets Task Force - "Top 10 opportunities", May 2012, Professor Ian Bateman, Head of Economics for the UK National Ecosystem Assessment, Defra, London  
 Available at: <http://www.defra.gov.uk/ecosystem-markets/files/Briefing-Paper-for-the-EMTF-Professor-Ian-Bateman-final.pdf>  
 See: pages 1-7
- [16] Ecosystem Markets Task Force (2013) *Realising nature's value: The Final Report of the Ecosystem Markets Task Force*, Defra, London.  
 Available at: <http://www.defra.gov.uk/ecosystem-markets/files/Ecosystem-Markets-Task-Force-Final-Report-.pdf>  
 See: page 46