**Institution:** University of Cambridge

**Unit of Assessment:** UoA5

**Title of case study:** Putting evidence at the heart of policy making and implementation

**1. Summary of the impact** (indicative maximum 100 words)

A research methodology developed and refined by Professor Bill Sutherland (Department of Zoology) has pioneered the integration of scientific research and policy making, with the twin aims of enabling better application of knowledge arising from research, and providing research that better meets the information needs of policy makers.

Since 2008 the methodology has been widely used by policy makers and practitioners to define research priorities in order to inform policy (e.g. NERC; the UK Marine Science Strategy), to identify topics to underpin new policies and strategies (e.g. for the Global Food Security Programme; the Joseph Rowntree Foundation), and to identify emerging issues across a wide range of subject areas (e.g. by Scottish National Heritage; the UK water industry; conservation practitioners in Australia, Canada and Israel).

**2. Underpinning research** (indicative maximum 500 words)

Much of Professor William Sutherland's (Department of Zoology, 2006-present) academic career has focused on establishing evidence-based research within his own discipline of conservation biology.

In 2005-2006 (whilst at the University of East Anglia), Sutherland started to develop a methodology which could be used by UK-based policy makers and practitioners to identify and prioritise research questions of relevance to their organisations, with the academic community as the intended audience. He convened an expert group of policy makers (~ 20 individuals) and tasked them with identifying ecological issues deemed to have attracted insufficient research or policy attention, through consultation with relevant contacts (totalling over 650 people and organisations). A long list of 1003 identified issues was circulated to the group in advance of a workshop, where an iterative process scored each one according to its perceived usefulness, relevance and general recognition. However, the subsequent publication was used by a wide range of governmental and NGOs to refine their own research agendas. As a result, and following Sutherland's move to the University of Cambridge in 2006, he substantially refined the methodology to both improve its rigour, and to make the outputs generated more applicable to organisations wishing to review and direct conservation research programmes and financial support. Refinements included pre-workshop filtering of the long list of initial identified questions, adding a concluding plenary full-group discussion to finalise the list of questions, and expanding the expert group to have a global spread, and to include academics alongside policy makers. In 2008, Sutherland tested the redeveloped method in an exercise to identify 100 priority global conservation questions[1], which if answered, would potentially increase the success of global conservation actions.

Around the same time, Sutherland employed the methodology in horizon-scanning to identify opportunities for new environmental policies within the UK[2]. In advance, invited participants suggested possible issues and provided a short summary of each; these were then circulated and scored on four different scales. The subsequent workshop identified the top 25 issues via prioritisation and further scoring. In 2009 this was extended to a global horizon scanning exercise to identify the 15 most important global conservation issues[3] (it has been repeated every year since); further refinements included modification of scoring scales, assignment of two individuals (not including the original proposer) to critique each of the highest scoring issues prior to the workshop, and full group discussion of each of these during the workshop (i.e. no parallel sessions).

In 2011 the methodology was also used identify key unanswered questions on the relationship between science and policy in order to better understand how science can underpin policy formation and change. It was specifically used to identify UK policy opportunities presented by

new technologies, arising issues, or opportunities to modify and increase the effectiveness of current policies, demonstrating that the methodology could be successfully used with a starting point of policy selection[4] (as well as research questions or unresolved issues). Given the lack of a pre-determined community for this exercise, participants were drawn from a wide range of academic disciplines, Government, NGOs, consultancies and industry.

In addition to the outputs from the specific exercises, the methodology has been published separately[5], enabling anyone with an interest in evidence-based policy-making to use it as a basis for their own exercises (see below).

**3. References to the research** (indicative maximum of six references)


1. Sutherland, W.J. et al. (2009) An assessment of the 100 questions of greatest importance to the conservation of global biological diversity. *Conservation Biology*, 23, 557–567 DOI: 10.1111/j.1523-1739.2009.01212.x
2. Sutherland, W.J. et al. (2008) Future novel threats and opportunities facing UK biodiversity identified by horizon scanning. *Journal of Applied Ecology*, 45, 821-833 DOI: 10.1111/j.1365-2664.2008.01474.x
3. Sutherland, W.J. et al. (2010) A Horizon Scan of Global Conservation Issues for 2010. *Trends in Ecology and Evolution,* 25, 1-7 doi:10.1016/j.tree.2009.10.003; Sutherland, W.J. et al. (2011) A Horizon Scan of Global Conservation Issues for 2011. *Trends in Ecology and Evolution,* 26, 10-16 doi: 10.1016/j.tree.2010.11.002; Sutherland, W.J. et al. (2012) A Horizon Scan of Global Conservation Issues for 2012. *Trends in Ecology and Evolution*, 27, 12-18 doi: 10.1016/j.tree.2011.10.011; Sutherland, W.J. et al. (2013) A Horizon Scan of Global Conservation Issues for 2013. *Trends in Ecology and Evolution*, 28, 16-22 doi: 10.1016/j.tree.2012.10.022
4. Sutherland, W.J. et al. (2012) A Collaboratively-Derived Science-Policy Research Agenda. PLoS ONE, 7(3): e31824 doi:10.1371/journal.pone.0031824 Viewed almost 10,300 times in its first month and now 16,941 times 15 months later.
5. Sutherland, W.J. Fleishman, E., Mascia, M.B., Pretty, P. & Rudd, M.A. (2011) Methods for collaboratively identifying research priorities and emerging issues in science and policy. *Methods in Ecology and Evolution* 2, 238-247 DOI: 10.1111/j.2041-210X.2010.00083.x



**Funding:**
Since 2007, a range of organisations, including the RSPB, European Centre for Environment and Human Health, NERC, The Environment Agency, DEFRA, British Trust for Ornithology, Natural England, Arcadia, and the British Ecological Society have together contributed over £500K in non-grant funding to support the exercises. ESRC and NERC have also provided the following grant funding to support the development and implementation of the methodology:

- 2012-2013 NERC Novel knowledge exchange approaches for sustainable food production £500,895 (WJS as PI)
- 2010-2012 Testing a novel method for integrating research, policy and practice to identify solutions and research priorities. ESRC, £119,577.97 (WJS as PI)
- 2007-2011 Testing a novel approach for synthesising the evidence of effectiveness of conservation interventions. NERC, £212,851 (WJS as PI)
- 2005-2009 Implementing an evidence-based framework for review and dissemination of scientific evidence to support biodiversity conservation. NERC, £135,231 (component to WJS as Co-PI)


**4. Details of the impact** (indicative maximum 750 words)

**Impacts on public policy and services:**

From the outset, these exercises have aimed to have an impact on policy, with representatives from government agencies, non-governmental organisations and industry involved as collaborators and authors in order to increase credibility and ownership of the results within each user community. For example, the workshop underpinning the 2008 paper on emerging issues for UK biodiversity (section 3 ref 2) involved 32 people, 13 from major governmental bodies, 6 from non-governmental organisations, 1 from industry, 1 science journalist and 11 academics. Thirty-two of the 48 participants in (and authors of) a 2013 exercise to identify the key knowledge needs for evidence-based conservation of wild pollinators (led by Sutherland) were policy makers and

users, including 5 from governments and agencies, 16 from businesses (food production, retail, agrochemicals), and 11 directly involved in conservation[6]. In terms of direct evidence of impact of the work in section three, examples include:

- The UK horizon scanning exercise (section 3 ref 2) was used by NERC as a case study in their 'Science into Policy' (second edition, 2013) booklet. NERC has stated that "we used the outputs of the horizon scanning work in strategy development. We have fed in issues to our Strategy Board/Council and Theme leaders for discussions around refreshing our strategy. We are currently starting the 2011 strategy refresh, and the issues from the most recent exercise will again be fed into those discussions'.[7]
- The 2010 UK Marine Science Strategy[8] lists research questions under each of its three science priority areas and for each set of questions it states 'based in part on Sutherland et al (2006)'.
- In 2009, Sutherland and colleagues were commissioned to undertake an exercise on global agriculture questions as part of the UK Government's Foresight exercise on Global Food and Farming Futures. The resultant paper[9] was presented to the Food and Agriculture Organisation of the United Nations in 2010 by Sutherland and co-author Professor Jules Pretty (University of Essex). Within a month of publication, it was the most downloaded paper ever from the publisher's website.

The methodology has also had impacts beyond the biological sciences. For example, in 2013, Sutherland coordinated an exercise to identify the priority research questions required to reduce UK poverty on behalf of the Joseph Rowntree Foundation, which works for social justice. As stated in the resulting paper[10]: 'The Foundation funded the process and the workshop [i.e. the exercise coordinated by Sutherland] as part of its programme to develop anti-poverty strategies for the UK.'

The methodology has been adopted for use in many different countries, and Sutherland himself has assisted with the following:

- to identify environmental issues in the U.S.[11] (commissioned by the Kresge Foundation),
- to identify questions relating to global agriculture[9] (funded by Foresight and the Food and Agriculture Office of the UN)
- to identify relevant issues for the Canadian marine environment (2012, funded by Canadian Government)[12]. The accompanying press release states: 'This report [40 Priority Research Questions for Ocean Science in Canada] has already started to create a synergy amongst Canada's ocean scientists, leading to … an increased understanding regarding research priorities and needs.'

In 2011, the U.S. based Nature Conservancy reported of the Horizon Scan of Global Conservation Issues for 2012 (section 3 ref 3) that: 'our External Affairs team was meeting with the federal agencies who write the rules associated with the legislation [the Food Safety Modernization Act] …. the paper was used directly in the regulatory process. That was an early stage in the rule-making, and an important moment to have credible scientific material'.[13]

One of the fifteen issues identified in the same paper was the deleterious effect of increased cement demand on karst forest and cave ecosystems. Identification of this as an issue has led to, for example, the preparation of a Biodiversity Action Plan (BAP) for Holcim Vietnam (one of the largest multi-national cement producers in Vietnam) by the IUCN[14] in order to mitigate biodiversity loss as a result of quarrying activities. The BAP was 'prepared in the context of growing global concern about the impacts of cement production on biodiversity', and cites the 2012 paper as the context for this.

**Impacts on practitioners and services – practitioners/professionals have used research findings [here the methodology] in conducting their work:** Examples of organisations and practitioners being influenced by the work, or using the research methodology to take planning decisions include:

- Professor Ian Boyd, Director of the Sea Mammal Research Unit at the University of St Andrews, has stated 9in an e-mail to Sutherland): 'I am now chairing a scientific advisory board for Oil and Gas UK on offshore decommissioning. The [2010 paper on UK policy options] has been passed to the oil and gas companies, including BP (at global vice-

president level), Shell, Conoco, and several others that are less well known. It had an influential role to play in establishing the Scientific Advisory Board for a Joint Industry Programme that is seeking to better understand the rationale for current policies on offshore decommissioning.'

- the June 2011 workshop of the Global Food Security Programme (established in 2010 by the major UK funders of food-related research) to determine the Programme's research priorities commenced with an email to participants stating: 'we are using as a starting point a paper that came out of the Foresight project by Pretty *et al.* entitled 'The Top 100 Questions of Importance to the Future of Global Agriculture (attached). The workshop will aim to determine at least one question per programme theme from the 100 questions to be tackled first (we have four themes in the programme)'[15].
- In 2012, the Scottish National Heritage Scientific Advisory Committee used the methodology to identify the conservation issues which Scottish National Heritage will have to respond to in the short to medium term[16].

Independent studies using the methodology to conduct their own exercises in order to determine priorities for action or for further research funding include exercises in Australia, Canada, Israel and the Alps, and by sectors such as the water industry, forestry and mineralogy[17,18].

**5. Sources to corroborate the impact** (indicative maximum of 10 references)


6. Dicks, L. V. et al. (2013), Identifying key knowledge needs for evidence-based conservation of wild insect pollinators: a collaborative cross-sectoral exercise. Insect Conservation and Diversity, 6: 435–446. doi: 10.1111/j.1752-4598.2012.00221.x
7. Referee (who can corroborate the statement): Senior Innovation Manager at NERC
8. UK Marine Science Strategy 2010: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69293/pb13347-mscc-strategy-100129.pdf
9. Pretty et al. (2011) The top 100 questions of importance to the future of global agriculture. International Journal of Agricultural Sustainability, 8: 219-236 doi: 10.3763/ijas.2010.0534
10. Sutherland et al. (2013) 100 Questions: identifying research priorities for poverty prevention and reduction. Journal of Poverty and Social Justice, in press. Doi: 10.1332/175982713X671210
11. http://kresge.org/news/research-identifies-top-natural-resource-questions
12. The Council of Canadian Academies Communiqué, July 17th 2012
13. e-mail to Sutherland from The Nature Conservancy California Field Office
14. Biodiversity Action Plan: Hon Chong Plant, Kien Luong District, Kien Giant Province, Vietnam. Prepared by IUCN Vietnam on behalf of Holcim Vietnam Ltd. (2012)
15. www.foodsecurity.ac.uk/news-events/news/2011/110608-n-global-food-security-priorities.html
16. Scottish National Heritage Scientific Advisory Committee: www.snh.gov.uk/docs/B1144652.pdf
17. Canadian conservation questions: Rudd M.A. et al. (2011) Generation of priority research questions to inform conservation policy and management at a national level. *Conservation Biology*, 25, 476-484
18. Water industry: Brown, L.E. et al. (2010) Priority water research questions as determined by UK practitioners and policy makers. *Science of the Total Environment*, 409, 256-266