Science-Policy challenges in polar conservation and management

A workshop series co-convened by British Antarctic Survey and Cambridge Conservation Initiative

Report of Workshop 1: Integrating Climate Change Science into Ecosystem-based Management

Aurora Cambridge, British Antarctic Survey

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Overview

The British Antarctic Survey (BAS) and Cambridge Conservation Initiative (CCI) are convening a series of short workshops focused on science-policy interactions within topical conservation and management issues. Each of the topics are issues faced in the Polar Regions but are also of global relevance and reach beyond traditional disciplinary boundaries. By bringing together the Cambridge academic and conservation communities, and involving decision-makers from the outset, we aim to provide a forum for gathering and sharing expertise on these key issues.

Aims

- To provide a forum for discussion of key topics across experts working within the Cambridge academic and conservation communities, in different but relevant geographical regions and disciplines, and to involve relevant decision-makers from the outset;
- To facilitate the continuation of discussions/communications on a regular basis (which may include smaller focus groups as appropriate);
- To identify potential areas of collaboration and future work.

Workshop 1 - Integrating Climate Change Science into Ecosystem-based Management

This first workshop of the series considered how best to use current knowledge to provide information for policy makers about the effects of climate change on species and ecosystems in the Polar Regions and beyond. Four invited panel members each gave short presentations (summarised below) outlining their perspectives and highlighting specific challenges and potential solutions. This was followed by an open discussion with questions from the audience.

The following questions were given to the panel before the workshop and were also used as a basis for structuring the workshop discussion:

- How can we utilise current knowledge on climate change in a way that provides useful information for ecosystem-based management (EBM) decision-makers?
    - What information would improve this/what are the major knowledge gaps?
- How can we best assess risk from climate change to specific ecosystem management issues?

- How can we present clear messages to policy makers whilst dealing with high levels of uncertainty?

The workshop agenda, expert panel biographies, and a list of workshop participants are given in the Appendix.

Panel Chair
Ms Jane Rumble (Foreign and Commonwealth Office - FCO)
Panel Members
Dr Simon Brockington (Department for Environment, Food and Rural Affairs - Defra)
Mr Henry Burgess (Natural Environment Research Council (NERC) Arctic Office)
Dr Val Kapos (UN Environment World Conservation Monitoring Centre - UNEP-WCMC)
Professor John Turner (British Antarctic Survey - BAS)

Introduction – Rachel Cavanagh, BAS

How do ecosystem managers account for the effects of climate change on the species and ecosystems they are responsible for managing?

Those responsible for the conservation and management of ecosystems are increasingly expected to account for climate-driven changes. Some of the challenges can be highlighted in the case of the Southern Ocean where the effects of climate change are of growing concern, and the body responsible for the management of living marine resources (Commission for the Conservation of Antarctic Marine Living Resources, CCAMLR) is currently working towards new approaches for climate change information to be considered as part of its ecosystem-based management. Input from the scientific community is vital and much relevant research is underway, yet integrating this information into decision-making is challenging. While such region-specific approaches are necessary, exchanging knowledge towards best practice guidelines is likely to be beneficial.

Presentations from the Expert Panel

John Turner (BAS) – Some Issues Regarding Polar Climate Change

Challenges

- Limited data for investigation of past climate change. E.g. station meteorological data only began in the 1950s, satellite data the late 1970s, and sub-surface ocean data only now becoming adequate e.g. Argos floats in the early 2000s;
- Separating anthropogenic influences from natural climate variability;
- For future predictions we are reliant on global atmosphere-ocean-ice models. Issues of scale. Some predicted changes include: the ozone hole will heal by about 2060-2070 but winds over the Southern Ocean will continue to get stronger; expect about 2 – 4C of surface warming across the Antarctic by 2100 depending on greenhouse gas (GHG) emissions; we can't give detailed predictions for specific locations; annual average total sea-ice area is expected to decrease by about a third by 2100; the snowfall increase will offset sea level rise by 1.04 ± .43 mm yr-1 by the year 2100;

Priorities

- Better understand natural/pre-industrial climate variability through models and ice core data;
- Improve the simulation of the ocean in climate models;
- Run high resolution, limited area models over areas like the Antarctic Peninsula to understand microclimates;
- Maintain the satellite observing systems;
- Why is Antarctic sea ice extent increasing at a time of record concentrations of greenhouse gases?

Val Kapos (UNEP-WCMC) – Biodiversity and adaptation to change

Adaptation: adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Ecosystem-based adaptation: the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change – Convention on Biological Diversity.

Challenges

- Setting objectives for EBM (and being explicit about them): conservation and social resilience:
    - Biodiversity can play a role in societal adaptation;
    - Societal adaptation strategies can have impacts on biodiversity;
    - Biodiversity conservation as a sector requires adaptation strategies.

- Uncertainty in ecosystem response:
    - Interaction with other pressures;
    - Ecosystem service provision is contingent on the impacts of other pressures.

- Understanding effectiveness:
    - Timeframes;
    - Thresholds and tipping points.

Solutions

Engineering options/ecosystem-based options/hybrid options

Question

What kinds of ecosystem modelling can best help assess effectiveness of management in relation to climate change? How?

Henry Burgess (NERC Arctic Office) – How can we provide the best knowledge to decision-makers and in the most influential ways?

Challenges/solutions

- Considerable “unknowns” in the Arctic;
- Ensuring contributions from all stakeholders – including traditional and local knowledge;

- How can we provide the best knowledge to decision-makers and in the most influential ways?
    - Communicating big messages in eye-catching ways;
    - Making the message personal to those you are aiming it to;
    - The role of trusted intermediaries.

Examples/solutions/progress

- UK example: connecting Arctic science to policy makers (see "The rapidly changing Arctic environment" policy report):
    - Finding policy and other decision-makers where they are;
    - Providing evidence 'for' them, not 'to' them;
    - Building in the plans at the start of the programme/project.

- International example: Arctic Marine Biodiversity Report:
    - Synthesis – status and trends of Arctic marine biodiversity and monitoring;
    - Evidence for the impacts of drivers on Arctic marine biodiversity including: observed and expected impacts of climate change (e.g. of increasing ocean temperature, reduction in sea ice, changes in currents).

Question

Can/are these approaches influence conservation?

Simon Brockington (Defra) – Integrating Climate Science into Ecosystem Based Management

Challenges

- Much science to policy thinking appears based on a linear model 'science informs policy';
    - But – policy is dominated by discourse, and while science plays a vital role, so do other forms of evidence and positions of many stakeholders;
- Climate change is a global international issue – needs increased UK coordination at international level;
- How to strengthen engagement with existing science advisory structure.

Examples/solutions/progress

- UK perspective: Good progress in conducting, analysing and communicating science – e.g. Marine Climate Change Impacts Partnership (MCCIP) – e.g. their report cards provide a comprehensive, authoritative mechanism to communicate science.
    - Analysis of these shows that UK marine legislation starts to mention climate change after 2008 (evidence of evolution in provision of climate science advice since 2006) and this is an indicator of success.

Opportunities

Opportunities lie in engaging with the policy process:

- Examining the science to policy model and strengthening engagement with existing science advisory structures;
- Increasing UK co-ordination at an international level (climate change is a global issue).

Questions and discussion

The Panel responded to a range of questions from workshop participants; these questions and the resulting discussions have been grouped into themes in the following sections.

Advising and influencing decision-makers

Q: *Who are the decision makers? Who advises and influences them? How do we get our messages across to such an apparently 'crowded space' of advisors? (Business seems more clear-cut).*

- In developing policy, government often emphasises engagement with stakeholders. Firstly, who they are, and secondly, how to communicate with them. In addition to natural science, key disciplines include Economics and Law. Learning from social science studies is also important, as is public opinion as reflected by non-governmental organisations (NGOs). An important question is how to inject science into this process (how you get your message across) and giving input to impact assessments are an additional way to inform policy.

- Within the science community there are contradicting messages, a lack of confidence and high uncertainty – this can make it easier for non-scientists/policy makers/the public to ignore – therefore what we need are consistent, clear, coherent messages from scientists. Science can 'crowd itself out' – simplified messages are needed.

    - Clear messages are needed but this can be difficult due to the uncertainty and complexity of the science. Intergovernmental Panel on Climate Change (IPCC) reports manage to achieve a general consensus on the state of knowledge and is taken seriously.

- Science advice must be impartial and pragmatic.

- Clear message need to target those that can influence action (e.g. economists). There is a need to explain messages to a wider audience than just the 'Ministry'. Think about who your messages need to be heard by, who is your target audience: target your science messages to a range of audiences.

- The Arctic Council are presented with basic facts and figures to keep science brief and consistent. It is helpful to be able to show that this is what we know now and also where possible to show that other people/other countries have taken this information onboard.

    - Demonstration of things already happening, or happening elsewhere –e.g. where others are already acting on particular information/evidence - can be reassuring and encouraging to policy makers.

- The summary "report cards" from the UK marine collaboration were very effective (refer to presentation by Simon Brockington, Defra). They emphasised key points.

Q: *Why might a Minister choose to listen to NGOs rather than scientists?*

- Evidence feeds in, we have an elective democracy, different points of view lead to debate and NGOs can challenge/be critical of certain policies. NGOs have large memberships, follow

wider public opinion, represent people who care about issues – these factors reflect how we organise ourselves as a society.

Communication with policy makers

Q: *With policy makers never "switching off" and constantly being communicated to through various mediums, such as social media e.g. Twitter, i.e. with more avenues of communication than ever before, how can we best get our information to them?*

Q: *How do we communicate information effectively using social media?*

- Don't underestimate the importance of the scientific literature, blogging and tweets to get your messages out.

- Slot [your] findings into relevant syntheses, the IPCC reports are a good example. The importance of research findings/important messages need to be clear to the advocacy community as well as to policymakers (we have advocacy organisations, boundary organisations and syntheses such as the IPCC report). Think about the current policy debate/questions.

Communication of scientific evidence, how this might help close the gap between evidence and legislation

Q: *What is the 'secret of the IPCC success' (= collective consensus, large numbers of scientists impressively coming together)? Is there space for others to do similar for other issues – the process, the reports, etc?*

Q: *Could local people/the public act as a science-policy interface? E.g. MPs were interviewed and asked 'Why, with so much climate change evidence, is there so little climate change legislation?' They said that they didn't want to appear as zealous. Therefore, with the increase in methods of communication, should we be trying to influence public opinion to influence policy (should scientists try to be clearer in how they communicate to the public, should they put more effort into this)?*

- The IPCC only look at peer-reviewed literature rather than carrying out their own research. They have been remarkable (have been described as a "miracle of cooperation"!). There is definitely more to be done regarding working with different communities. People are starting to understand the Earth system is extremely complex. There is space for ecosystem and biodiversity modelling services and this is starting to be addressed with some governments.

- The IPCC provides a peer reviewed summary requiring extensive collaboration and communication. Working Group 1 = considers the peer-reviewed literature; WG2 considers the impact of change; WG3 = what we can we do about it: this aspect is more difficult.

- There is space for more reports (as much space as there are issues!) but we need to be careful about information saturation. We shouldn't overdo communication. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has potential to be the "IPCC for biodiversity". Citizen engagement is crucial but be aware that this aspect does get picked up by the organisations whose focus this is.

Evidence-based policy, gaps in our knowledge, urgency in decision-making, and the issue of uncertainty.

***Q:** How difficult is it to get evidence-based policy to on-the-ground practitioners? i.e. the issue of addressing the gap between practitioners using evidence and evidence sitting with policy makers.*

***Q:** With so many gaps in our knowledge, how is a "must-be-made decision" actually made (especially where urgency is key)? i.e. based on what we've got at the moment. How do we make the best decisions, even where there is little available knowledge? Do we have strategies to address knowledge gaps?*

Q: *Can uncertainty regarding scientific predictions cause inaction with policy makers?*

***Q:** How do we communicate uncertainty to policy makers and the public?*

- Decisions centre around risk. Evidence is used to combat the scrutiny around the risk. Politicians deal with uncertainties all the time and are used to it. Communities also have their lives revolving around uncertainty. Many other sectors – e.g. financial – deal with uncertainty all the time, and are used to doing so. You could argue that the interpretation of uncertainty is the politics.

- Policy without evidence is a risk - but that doesn't mean politicians can't work with uncertainty. We must state what we know and politicians will take it from there. Phrases such as "we need more info" and "we need more money" are not particularly helpful in this regard.

- Arctic communities live and respond to uncertainty – uncertainty is embedded in their lifestyle, people living with uncertainty are often decision-makers themselves – therefore make the evidence and the uncertainty make sense to them.

- IPCC reports strike a useful balance between conveying a clear message about what we know and uncertainty (they have a way of dealing with uncertainty – and have done a lot to improve 'uncertainty literacy'). Need to find a balance in communicating uncertainty and making messages meaningful, understandable and useable. The policy community has become more accepting/more literate regarding uncertainty (note that other sectors, e.g. finance/insurance are much more used to this – see above). Frame it as uncertainty, frame it as risk: it is dealt with in other sectors e.g. social, this issue is not unique to climate change.

- IPCC define the meaning statistically of terms such as "likely", "highly likely" etc. We cannot predict everything but if we show extremes and a % chance we can cover the range of scenarios and the data/information is more useable.

- If there is some certainty surrounding impacts/protection then we should protect environments. If not, we should at least be precautionary - focus on what we know and use it. Uncertainty is basically the language of politics (i.e. different approaches to the same issue) – so scientists need to "own the uncertainty": focus on what you do know – e.g. flood rise, will it happen in our lifetime? When you focus on what you do know, what you don't know will become obvious.

Use of community knowledge

***Q:** Thinking about the adaption of community knowledge in climate change and social impact: what strategies are used to ensure decisions are as informed and effective as possible? How can we include indigenous people when making policy decisions when their livelihood may be dependent on it?*

- People typically prefer to be involved in the interpretation of their knowledge rather than just provide it.

- Traditional and local knowledge is incredibly useful. But this needs to be treated with respect and indigenous people should be involved with how their information is used due to complex cultural and social factors. We have a long way to go to effectively incorporate local and indigenous knowledge.

Potential development of fisheries in the central Arctic Ocean

Q: *Increased open water (due to sea ice melt) in the central Arctic Ocean may mean this area could soon be accessible to fisheries, are the surrounding nations likely to form a CCAMLR equivalent before such fishing occurs?*

- There is already some discussion of this by the countries concerned. The five Arctic coastal states and five additional states with an interest in Artic fisheries are meeting in Washington this month.

- There is uncertainty re the timing and re information on the fish stocks, e.g. whether there is a large stock of fish there at all given that the area is very deep, (therefore also difficult to access). Currently no sense of imminent danger from fishing.

Q: *Not having information about the fish stocks is no reason for complacency – consider the example of CCAMLR and toothfish*.

- The Arctic Ocean is one of the only remaining regions not currently covered by a regional fisheries management organisation (RFMO). Sustainable resource use and protection are becoming more prominent in Arctic discussions.

Geoengineering.

Q: *A meeting to discuss geoengineering recently took place in Washington, USA. Should we be having this conversation in the UK? And how should this be done?*

- There is still so much that we don't understand regarding the possible consequences of geoengineering activities, making them risky. Although possible geoengineering solutions are being proposed, for example to rising temperatures, there is currently no implementation of large-scale deliberate geoengineering. It is a highly controversial topic, we don't know enough.

  Q: *There was a meeting in Berlin to discuss the ethics and tech of geoengineering. They calculated that 2 degrees Celsius of cooling would only cost $10bn a year. The Met Office has already done a lot of modelling on the topic.*

- We are already changing the earth system and maybe some engineering approaches would reverse this – e.g. marine plastics pollution (give politicians something to change).

- If we use model data to design geoengineering how much can we trust models? There are currently ocean conventions for iron seeding for example, but no such conventions for atmospheric modifications i.e. no international atmospheric convention. Some countries e.g. China already modify the weather, e.g. cloud-seeding. This is an area where policy is definitely behind - there are gaps, loopholes, the policy isn't there ahead of any of these kind of developments.

- Some geoengineering may be underway but only at small scales. Scaling it up is the tricky part. Verifying results is also difficult.

Common themes/summary points

- How to communicate comprehensive, authoritative, clear scientific messages and uncertainty to policy makers;
- Precautionary vs evidence based policy/using what we have now, what we know now;
- Within the science community there is a lack of understanding/knowledge about the science-policy process/engaging with the policy process;
- There is a need to extend the range of stakeholders engaged in providing policy advice, as well as to develop further collaborations between these stakeholders;
- How to evaluate and improve the effectiveness of interactions between scientists and policymakers.

Next steps/potential ways forward

- We aim to produce a paper based around common themes (this will be developed throughout the workshop series) e.g. how to communicate uncertainty to policy makers;
- Consider scope to improve communication with policy debrief work and other potential collaborative work.

Future workshop topic suggestions

- Marine plastics (March 2018 TBC)
- Tourism (with a focus on wilderness tourism)
- Sustainable Development Goals
- Geoengineering (possibly as a subset of a wider focus on negative emissions technologies)
- Ecosystem services and valuation
- Marine spatial planning
- Invasive species
- Stakeholder engagement

Suggestions received for structure of future workshops

- Inclusion of breakout groups for more in depth discussion of topics raised;
- Representation of more senior decision-makers to discuss how decisions are made;
- Boundary organisations (e.g. UNEP-WCMC) bridge the gap between science and policy, and it would be useful to have more such organisations at future events.

APPENDIX

Workshop 1 - Agenda

13:30-14:00	*Registration*
14:00	***Welcome*** Dr Rachel Cavanagh, British Antarctic Survey
14:15-15:00	***Expert panel discussion*** Chair: Jane Rumble, Foreign and Commonwealth Office Panel presentations
15:00-15:45	***Open discussion*** *– questions/suggestions*
15:45-16:00	***Next steps*** Elizabeth Allen, Cambridge Conservation Initiative
16:00-17:00	*Tea/coffee and networking*

Workshop Organisers

Cambridge Conservation Initiative (CCI) is a collaboration between the University of Cambridge and nine leading biodiversity conservation organisations. By catalysing strategic partnerships between leaders in research, education, policy and practice CCI aims to transform the global understanding and conservation of biodiversity and, through this, secure a sustainable future for biodiversity and society.

British Antarctic Survey (BAS) an institute of the Natural Environment Research Council (NERC), delivers and enables world-leading interdisciplinary research in the Polar Regions. Its skilled science and support staff based in Cambridge, Antarctica and the Arctic, work together to deliver research that uses the Polar Regions to advance our understanding of Earth and our impact on it. The BAS mission is to deliver a world class programme of scientific research and to sustain the influence and leadership of the UK in Antarctic affairs.

Organising Committee

Rachel Cavanagh (BAS): rcav@bas.ac.uk
Susie Grant (BAS): suan@bas.ac.uk
Elizabeth Allen (CCI Executive Director's Office): e.allen@jbs.cam.ac.uk
Fiona Danks (UNEP-WCMC): fiona.danks@unep-wcmc.org
Alison Harvey (UCCRI): ah786@cam.ac.uk

Expert Panel

Dr Simon Brockington joined Defra in mid-2017 as a Deputy Director within the Marine and Fisheries Division. His role is to support Defra's engagement with the UK and international science community and to ensure that policy making is fully informed by scientific and economic analysis. Prior to joining Defra Simon spent seven years as Executive Secretary of the International Whaling Commission. He gained his scientific training while working at British Antarctic Survey as a marine biologist from 1996-2001.

Henry Burgess is Head of the NERC Arctic Office, hosted by the British Antarctic Survey (BAS). The Office supports UK research in the High North; provides advice to policy makers; develops international scientific cooperation across all aspects of Arctic research; and helps to deliver the operation and planning for the NERC Arctic Station. Prior to this, Henry was the Deputy Head of the Polar Regions Department in the FCO from 2012-16. His responsibilities there included: representing the UK in discussions within the Antarctic Treaty on environmental protection; ensuring the effective governance and administration of the British Antarctic Territory; and liaison and planning with the Royal Navy's ice patrol vessel, HMS Protector. Before that he held a variety of posts within the Department for Culture, Media and Sport; Office of the Deputy Prime Minister; and the Cabinet Office. He holds a Law Degree from Oxford University.

Dr Valerie Kapos heads the Climate Change & Biodiversity programme of the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) in Cambridge, UK and has worked with the Centre for many years. She trained as a tropical forest ecologist and conducted field research in Latin America and the Caribbean for 15 years, including studies of forest nutrition and water relations in Jamaica and Venezuela, and research on the ecological effects of forest fragmentation in Amazonia. Her recent work with UNEP-WCMC and others has focused on: analytical and other approaches for supporting the potential of climate change mitigation policy and

action to deliver multiple benefits, including for biodiversity conservation; and development and use of biodiversity indicators, including spatial indicators derived from land cover data and indicators derived from national forest assessments, to support policy and decision making at international and national scales. Valerie holds a PhD from Washington University, Missouri and has authored over 50 journal articles and many other publications.

Jane Rumble has been Head of Polar Regions Department, Foreign & Commonwealth Office (FCO) since January 2007, previously having spent 3.5 years as Deputy Head. Jane started her civil service career in the Department of Environment, where she undertook a range of environmental and corporate policy roles, including on health and safety and genetically modified crops. In 2000, Jane moved to the cross-Whitehall Teenage Pregnancy Unit, as a local government and environmental adviser; taking on a broader spectrum of public health policy responsibilities as the Unit merged into the Department of Health. A geographer by background, Jane is a Fellow of the Royal Geographical Society. Jane merged her environmental and social policy interests in joining FCO to work on polar policy in 2003. She is the fourth Head of the FCO's polar brief since 1943.

Professor John Turner is a researcher at the British Antarctic Survey in Cambridge, UK where he leads a project investigating the climate of the Antarctic. He has a BSc in Meteorology/Physics and a PhD in Antarctic Climate Variability. From 1974-1986 he was employed by the UK Meteorological Office where he was involved in the development of numerical weather prediction models and satellite meteorology. Since 1986 he has been at BAS working on high latitude precipitation, polar lows, teleconnections between the Antarctic and lower latitudes and weather forecasting in the Antarctic. From 1995-2003 he was the President of the International Commission on Polar Meteorology. From 2003-2011 he served as the International Association of Meteorology and Atmospheric Sciences (IAMAS) Deputy Secretary-General and from 2011-2015 as IAMAS Vice-President. He is currently the President of IAMAS. He chairs the Scientific Committee on Antarctic Research (SCAR) Expert Group on Climate. He is co-author of King and Turner (1997) *Antarctic Meteorology and Climatology* and co-editor of Rasmussen and Turner (2003) *Polar Lows: Mesoscale Weather Systems in the Polar Regions*.

Workshop Participants

Name	**Affiliation**
Alaia White	UNEP-WCMC
Alastair Jones	University of Cambridge
Alex Hauser	UNEP-WCMC
Andy Wood	British Antarctic Survey
Beatrix Schlarb-Ridley	British Antarctic Survey
Cameron Mackay	University of Cambridge
Chester Sands	British Antarctic Survey
Claire Waluda	British Antarctic Survey
Colin Harris	Environmental Research & Assessment
Dan Jones	British Antarctic Survey
Daniela Sampaio	Royal Holloway, Department of Geography
David Riley	University of Southampton
Elizabeth Allen	Cambridge Conservation Initiative
Elizabeth Christie	University of Cambridge
Emma Martin	
Eoghan Griffin	Scientific Committee on Antarctic Research

Gillian Young	British Antarctic Survey
Hannah Wauchope	University of Cambridge, Dept of Zoology
Hugh Hunt	University of Cambridge, Dept of Engineering
Iain Staniland	British Antarctic Survey
Inigo Everson	University of East Anglia
Jane Francis	British Antarctic Survey
Johanna Schoenecker	University of Cambridge, SPRI
Johnny Briggs	Pew Trusts
Katrin Linse	British Antarctic Survey
Kevin Hughes	British Antarctic Survey
Kirstie Jones-Williams	British Antarctic Survey
Lisa Ingwall King	UNEP-WCMC
Madeleine Brasier	University of Liverpool
Mark Belchier	British Antarctic Survey
Mark Schuerch	University of Cambridge
Michael Herzog	Univ Cambridge, Dept of Geography
Noa Steiner	UNEP-WCMC
Oliver Ingwall King	
Phil Trathan	British Antarctic Survey
Rachael Beasley	University of Cambridge, Dept of Zoology
Rachel Cavanagh	British Antarctic Survey
Rachel Seary	University of Cambridge, Dept of Geography
Simeon Hill	British Antarctic Survey
Sue Gregory	Government of South Georgia & South Sandwich Islands
Susie Grant	British Antarctic Survey
Tim Lennox	UNEP-WCMC
Zvi Steiner	University of Cambridge, Dept of Earth Sciences

Panel members

Simon Brockington	Marine & Fisheries Division, Defra
Henry Burgess	NERC Arctic Office
Jane Rumble	Polar Regions Department, FCO
John Turner	British Antarctic Survey
Valerie Kapos	UNEP-WCMC