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## **JOINT NATURE CONSERVATION COMMITTEE**

### **FUTURE ORGANISATION AND WORK ON NATURE CONSERVATION AND CLIMATE CHANGE**

**Paper by Emma Durham, Diana Mortimer, Wyn Jones and Stephen Grady**

#### **1. Introduction**

- 1.1 There is strong evidence to suggest that climate change due to increasing greenhouse gas emissions from human activities is occurring. During the 20<sup>th</sup> century, the average global temperature increased by 0.6°C, and the Third Assessment Report (2001) of the Intergovernmental Panel on Climate Change determined that global temperature will rise by at least 1.4°C above 1990 levels, and potentially by as much as 5.8°C, by 2100. In addition to increasing temperatures ('global warming'), other changes will include changing precipitation patterns, increasing frequencies of extreme weather events such as droughts and storms, and rises in sea level (caused by glacier retreat, ice melt and thermal expansion of sea water in response to higher temperatures).
- 1.2 Potential changes in the UK climate over the next century were published as a set of scenarios by the UK Climate Impacts Programme in 2002. The major changes forecast include an increase in annual temperature, particularly in the south and east; drier summers and wetter winters; a decrease in snowfall; a continued rise in relative sea-level; and increases in the frequency of extreme sea levels.
- 1.3 Even with stringent controls on emissions there will be a continuing commitment to climate change for at least several decades as a consequence of past and present emissions, due to response lags in the climate system. Therefore, some future climatic changes are unavoidable. There are, however, uncertainties regarding the actual rate and magnitude of these changes, and also of the direct and indirect consequences of these changes, including on wildlife and ecosystems.
- 1.4 The effects of some greenhouse gases are not limited to climate change. For example, over the last 200 years, the sea has absorbed approximately half the CO<sub>2</sub> produced by the burning of fossil fuels and cement production, and it is calculated that this has led to a decline in pH of 0.1. If current trends continue, the average ocean pH could fall by 0.5 by the year 2100. The effects of this are uncertain but it is likely to impact calcium deposition and have a substantial effect on some phyto plankton (and hence throughout the food chain), and on the maintenance of coral reef systems.

## 2. Impacts/effects – UK, global, Overseas Territories

- 2.1 There is evidence that plants and animals in the UK are already responding to changes in climate. For example, warmer temperatures appear to have led to an earlier onset of springtime events, including trees coming into leaf, amphibians spawning and birds laying eggs. Conversely, autumn events, such as leaf fall, are occurring later. Species distribution patterns may also be changing, for example several butterfly species have extended their ranges northwards across Britain in recent decades.
- 2.2 Changes of this sort may appear fairly benign, but climate change has enormous potential to have a damaging impact on the UK's biodiversity. For example, results from the MONARCH (Modelling Natural Resource Responses to Climate Change) project (see also paragraph 4.3 below) indicate that there are likely to be major changes in species and habitat distributions. Potential changes include the following:
- i. the distributions of many mountain species (e.g. Trailing Azalea *Loiseleuria procumbens*) are likely to contract;
  - ii. some birds and insects with southerly distributions in Britain (e.g. Reed Warbler *Acrocephalus scirpaceus* and the Large Skipper butterfly *Ochlodes venata*) are likely to expand their range northwards;
  - iii. beech woodland may be lost from southern and eastern Britain as soils become too dry;
  - iv. in response to rising sea levels, salt marshes may move inland (as long as this is not prevented by artificial barriers such as sea defences);
  - v. peat bogs and other wetland habitats may be lost from southern England due to summer droughts, but may benefit from increased rainfall in the north and west;
  - vi. most semi-natural habitats will persist but their species compositions may change.
- 2.3 Marine ecosystems in the UK will also be affected by climate change. For example, warm water plankton have moved northwards by 10° latitude compared with the situation 40 years ago. The change in composition of the plankton is likely to affect its suitability as a food source for fish fry such as cod, and to result in a shift northwards of this species. Changes are also expected in the communities of benthos, in other fish species and in the populations of seabirds; the recent poor breeding success in some populations of kittiwake and guillemot may be reflecting these wider changes in marine communities.

- 2.4 At the global scale, a recent Defra commissioned study on the impacts of climate change on migratory species predicts that 84% of bird species listed on the Convention on the Conservation of Migratory Species of Wild Animals will face some threat from climate change, due to their reliance on vulnerable habitats (coastal, wetland, montane and tundra). Over half of these species will suffer as a result of changes in water regime. Other selected impacts of climate change noted by this study, include:
- i. barriers to migration may become more severe in response to climate change. Breeding numbers of whitethroat (which cross the Sahel region on migration) are substantially lower in drier years. With increasing desertification of the Sahel (partly as a result of reduced precipitation), the decline of other trans-Saharan migrants might be expected with climate change.
  - ii. in the northern hemisphere many arctic and montane species are unable to move further north under the warming climate. Migratory waders such as red knot and spoon-billed sandpiper face large population declines and the threat of extinction, respectively. Polar bear and seals will struggle to exist with the predicted loss of Arctic sea ice. Changes in the range of some species are already documented, with most species distributions shifting poleward e.g. the presence of little egret, loggerhead turtle and red mullet is increasing in the UK.
  - iii. the fecundity of some species can be directly related to temperature changes, for example, in warmer waters cetaceans have reduced fecundity (e.g. sperm whales during warm El Niño events), whereas fecundity in birds is positively correlated to temperature.
- 2.5 Small island nations, which include the majority of the UK's Overseas Territories, are particularly vulnerable to climate change, especially increases in temperature and sea-level rise. Because of physical and socio-economic factors, such as geographic isolation, their small size, limited funding and limited human resources, they have very little capacity to adapt to these changes.
- 2.6 Threats to biodiversity with the Overseas Territories include the following:
- i. bleaching of coral reefs. Coral reefs are highly sensitive to temperature change, and have a symbiotic relationship with algae, which provide the coral's nutritional requirements through photosynthesis, and from which they gain their colour from the photosynthetic pigments within the algae. Under stress, which can be caused by increases in temperature, the relationship between the algae and the coral breaks down, resulting in the expulsion of the algae from the coral, leaving the coral tissues and the white skeleton beneath.

- ii. declines in marine turtle populations. Marine turtles are vulnerable to two main impacts of climate change; sea-level rise, which causes the beaches and coastal vegetation used as nesting sites to be subjected to increased erosion and inundation (32% of turtle nesting beaches in the Caribbean are predicted to be lost with a rise in sea-level of 0.5m); and increases in temperature affecting egg incubation, – the sex of reptiles can be influenced by the temperature at which eggs are incubated. Marine turtles also forage in seagrass and coral reef habitats which themselves are vulnerable to climate change.
- 2.7 Global climate change will have a huge number of direct and indirect impacts. Decreases in agricultural yields might be expected in tropical or sub tropical regions due to low rainfall, yet in other areas, such as the UK, food production may benefit from less severe winters and longer growing seasons. Sea-level rise may flood coastal areas and make them uninhabitable. Plant and animal distributions may shift, and pests and diseases may spread.
- 2.8 The Millennium Ecosystem Assessment has identified anthropogenic climate change as one of the most important direct drivers of biodiversity loss and change in ecosystem services. The impact of climate change on global biodiversity over the last century has been assessed as **low** in most biomes, including boreal, temperate and tropical forest, temperate grassland and Mediterranean drylands, inland water, marine, and islands; **moderate** in tropical grasslands and savannah, deserts, coastal areas, and mountains; and **high** in polar regions. Importantly, the Millennium Ecosystem Assessment has identified there will be a very rapid increase in intensity of the global impact of climate change in all these biomes. As a result, climate change (combined with other drivers such as land use change, pollution and the spread of non-native species) will exacerbate the loss of biodiversity and increase the species extinction risk.
- 2.9 Agriculture and land use, water supplies and water quality, energy use, urbanisation and biodiversity are all likely to be affected. Impacts on sectors such as water, energy, agriculture and land use, however, might have greater impacts on biodiversity through causal effects, rather than the direct effects of climate change on biodiversity alone.
- 2.10 The way land is managed is likely to have an important impact on greenhouse gas emissions. Organic soils, including peats, are both a source and a sink for carbon, and a programme of research is being carried out to investigate the relationship between organic soils and carbon emission/absorption/retention under a range of management scenarios. It was reported recently in the scientific literature that UK soils are releasing some 14 million tonnes of carbon per year, a release which outstrips the UK's carbon reduction targets under the Kyoto Protocol.

### **3. Mitigation and adaptation**

- 3.1 Although it is evident that accurate predictions of climate change impacts cannot be made, and that the exact timing and magnitude of these impacts is unclear, measures are being introduced to try to address climate change and its impacts – mitigation and adaptation. These measures need to be developed despite the uncertainties that are faced.

#### ***Mitigation***

- 3.2 Climate mitigation involves an anthropogenic intervention to reduce greenhouse gas emissions through their reduction at source, or the enhancement of sinks of these gases. Measures proposed to achieve this include improvements in energy efficiency or changes in energy sources (e.g. biofuels, nuclear), emissions trading schemes, carbon taxes and changes in land use such as through the development of forests and peatlands for carbon sequestration. A reduction in greenhouse gas emissions will reduce the projected magnitude and rate of climate change and lessen the pressure on natural and human systems.

#### ***Adaptation***

- 3.3 The Intergovernmental Panel on Climate Change has acknowledged that adaptation is a crucial response to climate change because, even if current agreements to limit emissions are implemented, they will not stabilize atmospheric concentrations of greenhouse gas emissions and climate. Adaptation is necessary because climate change is already affecting many ecosystems. The recent Convention of Biological Diversity Ad Hoc Technical Expert Group on Biodiversity and Adaptation to Climate Change outlined that ‘adaptation is an adjustment by an ecosystem to a new or changing environment without simplification or the loss of structure, functions and components’. More widely, adaptation can be considered to comprise human activities that reduce a system’s (human or natural) vulnerability to climate change.
- 3.4 Adaptation can be considered to have two components – autonomous adaptation and directed adaptation. Autonomous adaptation is an ecosystem’s inherent ability to adapt to changing environmental conditions. The maintenance of ecosystem resilience is generally seen as of vital importance for successful adaptation.
- 3.5 Directed adaptation activities are those human interventions required to offset the threats to biodiversity and ecosystem characteristics, or to take advantage of opportunities created by a given change in climate. This approach should be considered across all sectors such as water management, forestry, agriculture and infrastructure development and planning, as part of the overall approach to sustainable development. Activities can include a range of approaches such as scientific, technological, institutional, behavioural, political, financial, regulatory and /or individual adjustments, which take

account of changing climate conditions. They also include the approaches taken by all sectors to adapting to climate change impacts.

- 3.6 We need to adopt “adaptive management” as the mechanism for meeting the changes required to respond to climate change. This requires the systematic evaluation of the merits of different practices and policies in relation to climate change through time. It is then possible to adjust the actions (alterations in management strategies, changes to regulations etc.) to better achieve sustainability and offset the negative affects of climate change. The Convention on Biological Diversity’s ecosystem approach sees adaptive management as a key tool and provides a solid framework on which to build adaptation strategies.

#### **4. Recent work on climate change and current arrangements**

- 4.1 Work carried out on climate change by the country agencies is currently conducted through an Inter-agency Climate Change Group which reports on its work to the Chief Scientists' Group. The Inter-agency Climate Change Group has a representative from each of the country agencies and JNCC, and an observer from the Environment and Heritage Service.
- 4.2 The Group provides a useful forum for exchanging views and information. Its members are involved in a few projects collaboratively, including the MONARCH research project, a recently-commissioned Defra-funded project 'Targeted monitoring of atmospheric pollution and climate change impacts on biodiversity', and co-funding of several research projects through the Tyndall Centre. However, the work undertaken through the Group consists predominantly of work carried out by each agency individually, much of which focuses on very practical aspects and applications of climate change at country level. The range of work carried out by the organisations participating in the Inter-agency Climate Change Group are listed at Annex 1.
- 4.3 The MONARCH research project commenced in August 1999 and is due to produce a final report in 2006. It was funded by a consortium of 11 partners including the Countryside Council for Wales, English Nature, Environment and Heritage Service, JNCC and Scottish Natural Heritage. The project utilised relevant datasets (on climate, soils, land cover, distribution of biodiversity etc) and developed simulation models of species distribution and/or abundance. Climate impact models on the distribution and abundance of a range of these species were developed and run with a range of climate change scenarios. This research was co-ordinated by the Environmental Change Institute at the University of Oxford. Within the project, there has been a tension between the desire, on the one hand, to develop the modelling methodology, and, on the other, to develop products likely to prove useful in practice. The results of phase 2 of the project which, using the impact models developed in phase 1, aimed to simulate future land cover changes and species distribution proved inconclusive. This led to a reassessment of phase 3 of the project to ensure that the proposed outcomes are meaningful. However, the project has helped to raise the profile of the country agencies with Government in relation to climate change work.

- 4.4 JNCC has contributed resources to the MONARCH project, and is also currently involved, through the air pollution Lead Co-ordination Network, in the Defra-funded expansion of the Environmental Change Network to consider monitoring and surveillance of air pollution and climate change. Previous areas of involvement include recently-completed studies which investigated the impacts of climate change on the Overseas Territories and the impacts of climate change on migratory species. JNCC has provided funding for several research projects through the Tyndall Centre, and has had some involvement with the marine climate change project MarClim. The Lead Co-ordination Networks, which fall within JNCC's remit, have undertaken some limited climate change work. Although climate change is a priority issue, the Networks are not actively working in this area due to limited resources and insufficient direction on how to become engaged.
- 4.5 While individual country agencies have made arrangements to enable the work carried out on climate change to inform their other programmes, at the inter-agency level, relatively little such exchange has occurred, in either direction. To date, there has been relatively little read-across from the work of the Inter-agency Climate Change Group into inter-agency policy groups, such as the Land Use Policy Group.

## **5. Future Work Areas**

- 5.1 Over the next few years, JNCC and the country agencies will be asked to provide advice to relevant international Conventions and Agreements, the Overseas Territories, various European fora and organisations (including the European Commission), and the range of UK Government Departments and devolved administrations, on aspects of climate change relevant to nature conservation. Advice of relevance to the UK's Overseas Territories will be particularly important, as the consequences of climate change for the Overseas Territories are likely to be even more profound than for the United Kingdom itself.
- 5.2 Advice in relation to climate change issues will need to be delivered by an effective programme of communication and promotion. JNCC and the country agencies already have good communication links with a wide range of fora, both in the UK and abroad, and these links need to be fully utilised and strengthened to deliver a two-way flow of information and advice on climate change issues.
- 5.3 In order to provide advice effectively, JNCC and the country agencies need to inform themselves appropriately. The variety of issues on which advice will be required is likely to be considerable, and the context for that advice will range from global to local. There will be a need to utilise information being provided from a wide variety of sources. There will also be a need to identify priorities for effort and to use available resources efficiently.

- 5.4 Following a review of current knowledge in relation to measures needed to address climate change, themes of work in which it will be necessary for the country agencies and JNCC to engage are likely to be:

Mitigation

- 1 Promoting technologies aimed at reducing reliance on energy supplies which result in significant greenhouse gas emissions and their replacement by low-emission energy supplies.
2. Promoting energy conservation measures.
3. Achieving an improved understanding of the role of organic soils, including peatlands, as carbon sinks and as potential producers of greenhouse gases under different management regimes.

Adaptation

4. Promoting the reduction of stressors on natural habitats and biodiversity, such as atmospheric nitrogen and ozone.
5. Achieving an improved understanding of the likely responses of soils in terms of structure, functioning and biota in the context of climate change under different management regimes.
6. Forecasting probable changes in land and water use, both in the context of climate change and also in the context of the changing socio-economic environment.
7. Achieving improved knowledge of the value of connectivity between habitats in facilitating the movement of species.
8. Developing approaches to land and water management for conservation which will decrease fragmentation and increase robustness and resilience of communities and species in the context of climate change.
9. Forecasting likely changes resulting from sea level rise, including changes in erosion, deposition and flooding frequency, and developing conservation approaches to accommodate these.

- 5.5 In addition to these themes of mitigation and adaptation, JNCC and the country agencies will need to consider changes in the character of biological communities, the distribution of species, and the nature of underlying processes through data provided by the range of available surveillance and monitoring programmes.

- 5.6 It should be recognised that, as regards adaptation, climate change is only one of the drivers requiring the work referred to in paragraph 5.4 above to be carried out. This work will be required in any event to support nature

conservation through reducing fragmentation, improving connectivity, improving the ecological basis of site management and reducing the impact of human activities, such as pollution. However, climate change will be an important driver to help ensure these programmes are carried out.

## 6. The Case for Change

- 6.1 The views of the members of the Inter-agency Climate Change Group, Lead Co-ordination Networks and JNCC project managers have been sought to determine their climate change information needs in relation to their work programmes, as well as their views generally on the role of JNCC and the agencies on climate change. Additionally, an analysis of JNCC's strategy against climate change issues within programme targets has also been undertaken to provide further guidance on JNCC's requirements.
- 6.2 All recognised the need to build upon the existing work of the Inter-agency Climate Change Group and to better coordinate the work of the JNCC and the agencies, providing a clear focus and direction for engagement on climate changes issues. The need to provide added value was also stressed. Much of this focused on the better analysis of information particularly to inform policy advice.
- 6.3 The conclusions reached following this exercise are:
  - i. the special functions work currently carried out through the Inter-agency Climate Change Group needs to be brought formally under the auspices of the JNCC;
  - ii. climate change work is perceived as a high priority for the JNCC and the country agencies and, therefore, needs to be suitably resourced;
  - iii. work undertaken on adaptation and mitigation needs to be continued and developed to provide generic advice;
  - iv. considerable research has and is taking place. This needs to be better analysed so as to inform the wider policy agenda;
  - v. this work needs to inform national, European and global policy agendas;
  - vi. greater analysis and advice is needed regarding the direct and indirect effects of climate change on the Crown Dependencies & Overseas Territories;
  - vii. advice on the direct and indirect impacts of climate change should be provided on a range of sectoral policy areas, including agriculture, soils, marine, energy, transport and planning as well as on biodiversity and ecosystem services;

- viii. advice also needs to influence overarching policy areas such the EU Lisbon strategy and the sustainable development strategies in the UK and Europe, informing also the 6<sup>th</sup> Environmental Action Programme, 7<sup>th</sup> Research Framework Programme and Thematic Strategies and Action Plans.
- 6.4 In summary, future needs will be directed towards areas of work which fall within the special functions of the Joint Nature Conservation Committee, including global advice, overseas territories, the UK impact abroad, and UK policy advice, and also within areas of work which fall within the general functions of the country agencies, including policy advice at the country level, and practical implementation at local level.
- 6.5 The existing Inter-agency Climate Change Group is not able to meet these varying requirements, although individual Group members are all likely to continue to play an important role in climate change work in the future. A number of options for future organisation and working have been considered.
- 6.6 Firstly, consideration was given to whether the Inter-agency Climate Change Group could be converted to a Lead Co-ordination Network and operate under a Service Level Agreement with the JNCC Support Co. The mechanism of the Lead Co-ordination Network was established to meet JNCC's needs for small-scale, specialist services, where relevant expertise existed within the country agencies but not within the JNCC. The LCN would be chaired by an officer of one of the country agencies who was considered to have particular expertise in the topic. This is not the scenario for work on climate change, which requires the issue to be mainstreamed throughout the work of both JNCC and the country agencies and delivered by a variety of means into a wide range of fora, including the range of international and European fora in which JNCC is already heavily engaged through its other work.
- 6.7 Secondly, consideration was given as to whether Climate Change could be managed as an inter-agency project, with the resources of the country agencies and JNCC being contributed to the delivery of an agreed work programme. Attractive though this proposal is, in practice there is no control mechanism available for determining a joint work programme, no means of ensuring a country agency's resources are applied to implementing a particular component of such a work programme, and no means of achieving effective project management. JNCC has tried this approach previously (e.g. the Common Fisheries Policy project) and found it an extremely difficult mechanism to operate. Devolution, and the desire of the country agencies to retain control of their own staff time and work programmes, acts as a major constraint on such an approach.
- 6.8 Thirdly, consideration was given to other models of inter-agency working in operation in JNCC and the other agencies, such as the Land Use Policy Group. However, none of these had the breadth of scope (either geographically or in topic coverage) of climate change, nor the level of strategic direction needed to ensure climate change work is conducted effectively and economically.

- 6.9 It was considered that a rather different approach was needed which recognised the dichotomy and complementarity between special and general functions work, which was able to cover the breadth of geographic and topic coverage involved, and the range of stakeholders to be engaged, and which could provide the appropriate level of strategic direction.
- 6.10 In this approach, it is suggested that a formal Climate Change Strategic Policy Group be established, under the auspices of the Joint Committee, which would include specialists on climate change, socio-economics, land use change, marine, energy policy and conservation management, drawn from the country agencies and JNCC. The Group should be chaired either by a JNCC Director or, preferably, by a member of the Joint Committee. The Climate Change Strategic Policy Group would be supported by an officer provided by JNCC who would undertake a co-ordinating role. The Group would include the members of the current Inter-agency Climate Change Group, and representatives of relevant inter-agency policy groups, such as the Land Use Policy Group. The Group would:
- i. develop a shared overall strategy for climate change;
  - ii determine the critical areas of policy advice to be developed and promoted at international, European and UK level;
  - iii. engage with partners and stakeholders to influence Government and others; and
  - iv. be the focus of advice to Government on the impacts of climate change on the UK Overseas Territories.

Where appropriate, the Group would determine responsibility for undertaking aspects of this work.

- 6.11 This Group would be supported by a Climate Change Science and Practice Group which would operate under the oversight of the Chief Scientists' Group who would determine its operating procedure. The Terms of Reference of the Science and Practice Group would, however, be determined by the Strategic Policy Group. The Science and Practice Group would:
- i. provide scientific support to the Strategic Policy Group, undertaking analysis as necessary;
  - ii. focus upon measures to address climate change, developing mitigation and adaptation approaches, capturing best practice and working with the Lead Co-ordination Networks as necessary;
  - iii. contribute to the mainstreaming of climate change into country agency work programmes;
  - iv. carry out, and contribute to, research to underpin this work.

- 6.12 The membership of this group would comprise the members of the present Inter-agency Climate Change Group and other members as appropriate. The Science and Practice Group would act as the scientific and practical development arm of the Climate Change Strategic Policy Group.
- 6.13 The Joint Committee is invited to **comment** on the matters set out in this paper and **discuss** the proposals for future organisation of JNCC and inter-agency Climate Change work.

**Annex One**

**Inter-Agency Climate Change Group (IACCG) - Work programme for period February 2002 to March 2006**

| Objectives/Tasks  | Lead contact(s) | Contracts   | Costs           | Start date | End date | Comments/notes  |
|---|-----------------|---|-----------------|------------|----------|---|
| <b>Objective 1: Modelling Natural Resource Responses to Climate Change (MONARCH)</b>  |                 |   |                 |            |          |   |
| Scientific research to further understanding of the likely impacts of climate change on the nature conservation resources of Britain and Ireland. (Phase 1 report published in November 2001) |                 |   |                 |            |          |   |
| Task 1.1: MONARCH 2.1   | Mike Harley     | Research team led by Environmental Change Institute, Oxford | £134K           | (Q3 01/02) | Q2 02/03 | Project funded by consortium of 13 government agencies and NGOs in Britain and Ireland.                             |
| Task 1.2: MONARCH 2.1 (extension)   | Mike Harley     |   | £130K           | Q3 02/03   | Q4 02/03 | Run workshop (with ACCELERATES) to present outputs in Q1 04/05; publish final reports in Q3 04/05.                  |
| Task 1.3: MONARCH 2.2   | Mike Harley     |   | £174K           | Q1 03/04   | Q4 03/04 |   |
| Task 1.4: MONARCH 3 (see 4.1)   | Mike Harley     |   | £320K (2 years) | Q1 04/05   | Q4 05/06 | Project development in Q2 03/04; revise specification and costs to reflect potential funding shortfall in Q4 03/04. |
| <b>Objective 2: Collaborative research with Tyndall Centre for Climate Change Research</b>  |                 |   |                 |            |          |   |
| Co-funded scientific research of technical, policy and practical value to the statutory nature conservation agencies, JNCC and Tyndall Centre (undertaken through PhD studentships).          |                 |   |                 |            |          |   |
| Task 2.1: The role of nature conservation in mitigating climate change.   | Mike Harley     | Tyndall Centre, UEA   | £24.5K          | Q2 02/03   | Q2 05/06 | Project 50% funded by CCW, EHS, English Nature, SNH and Woodland Trust.   |
| Task 2.2: Implications of climate change for biodiversity in UK Overseas Territories.   | Mike Harley     | Tyndall Centre, UEA   | £21.5K          | Q4 01/02   | Q4 04/05 | Project 50% funded by JNCC.   |
| Task 2.3 Intervention measures to help biodiversity adapt to the impacts of climate change (see 8.1).   | Mike Harley     | Tyndall Centre, UEA   | £1K ++          | Q4 03/04   | ?        | Develop detailed project specification and secure funding with UEA in Q4 03/04.                                     |

| Objectives/Tasks  | Lead contact(s)       | Contracts | Costs               | Start date | End date              | Comments/notes   |
|---|-----------------------|-----------|---------------------|------------|-----------------------|--|
| <b>Objective 3: Raising awareness</b>   |                       |           |                     |            |                       |  |
| Raise awareness in the statutory nature conservation agencies, and with others, of the significance of climate change for biodiversity, and promote a culture change towards a more dynamic vision for nature conservation in which global environmental change is a key driver.  |                       |           |                     |            |                       |  |
| Task 3.1: Climate change webpage  | Mike Harley/Wyn Jones | None      | None expected       | Q2 02/03   | Q3 02/03/<br>Q4 03/04 | Establish on JNCC website as part of wider LCN/LA webpage programme (Q3 02/03); add detail in Q4 03/04.  |
| Task 3.2: IACCG newsletter  | Mike Harley           | None      | Minimal (see notes) | Q4 03/04   | Ongoing               | Produce two issues per year and disseminate electronically (webpage, above).   |
| Task 3.3: Papers to statutory nature conservation agencies  | All IACCG members     | None      | Minimal (see notes) | -          | Ongoing               | Provide regular updates on progress and emerging issues to inform strategic decision making and positioning (including three-monthly reports to CSG); produce JNCC 'Statement on Climate Change' in 03/04. |
| Task 3.4: Influencing others  | All IACCG members     | None      | None                | -          | Ongoing               | Prepare papers for and give presentations to other key audiences.  |
| <b>Objective 4: Influencing Biodiversity Action Plans</b>   |                       |           |                     |            |                       |  |
| Promote the need to accommodate explicitly likely climate change impacts into the Biodiversity Action Plan process at both national and local scales (Species Action Plans, Habitat Action Plans, Local Biodiversity Action Plans) and into the development and implementation of site monitoring protocols and activities. |                       |           |                     |            |                       |  |
| Task 4.1: The Biodiversity Action Plan process  | (i) All IACCG members | None      | None                | Q4 01/02   | Ongoing               | Explore effective ways of influencing inclusion of climate change in BAP process; use examples of good practice to inform wider action.  |
|   | (ii) Mike Harley      | See 1.4   | See 1.4             | Q1 04/05   | Q4 05/06              | Use MONARCH methodologies to model vulnerability of SAP species and inform review of UK BAP in 05/06.  |

| Objectives/Tasks   | Lead contact(s)   | Contracts | Costs | Start date | End date               | Comments/notes   |
|--|-------------------|-----------|-------|------------|------------------------|--|
| <p><b>Objective 5: Advice and guidance</b></p> <p>Provide advice and guidance to help develop more flexible approaches to the conservation of both designated sites and the wider countryside in order to allow species and habitats to adapt to climate change.</p>   |                   |           |       |            |                        |  |
| Task 5.1: Inform conservation management   | All IACCG members | None      | None  | Q4 02/03   | Ongoing                | Provide information to inform management of special sites and development of landscape-scale programmes under climate change.                      |
| Task 5.2: Consultations  | All IACCG members | None      | None  | -          | Ongoing                | Respond to relevant consultations, providing information, advice and opinion, as appropriate (Mike Harley for IACCG; all for respective agencies). |
| <p><b>Objective 6: Regulatory and policy changes</b></p> <p>Work with DEFRA, the devolved administrations and others to press for regulatory and policy changes which will allow the effects of climate change, particularly habitat compositional changes, to be adequately reflected in the delivery of commitments under UK and European wildlife legislation and wider European and global multilateral environmental agreements (MEAs).</p> |                   |           |       |            |                        |  |
| Task 6.1: Interpreting 'conservation status'   | Wyn Jones         | None      | None  | Q3 02/03   | (Q3 02/03)<br>Q2 04/05 | Re-assess need for guidance on how to interpret 'conservation status' in context of climate change.  |
| Task 6.2: Common standards monitoring  | Wyn Jones         | None      | None  | Q3 02/03   | (Q4 02/03)<br>Q2 04/05 | Re-assess ways of incorporating climate change considerations into guidance on common standards monitoring.  |
| Task 6.3: Influencing wildlife policy  | All IACCG members | None      | None  | Q4 02/03   | Ongoing                | Seek opportunities to influence policy changes in statutory framework to accommodate climate change impacts at nature conservation sites.          |

| Objectives/Tasks  | Lead contact(s)   | Contracts | Costs | Start date | End date | Comments/notes  |
|---|-------------------|-----------|-------|------------|----------|---|
| <p><b>Objective 7: Agri-environment schemes</b></p> <p>Work with DEFRA, the devolved administrations and others to seek an increase in the level of support for species and habitat management under agri-environment schemes, and an extension of such schemes to cover the whole countryside as a means of providing ecological links between fragmented habitats and, hence, facilitating species movements under climate change.</p>  |                   |           |       |            |          |   |
| Task 7.1: Opportunities for species dispersal   | All IACCG members | None      | None  | Q1 02/03   | Ongoing  | Engage with land use policy specialists (including LUPG) in statutory nature conservation agencies to inform advice to EC, DEFRA and devolved administrations about need for incentive schemes to provide opportunities for species dispersal under climate change. |
| <p><b>Objective 8: Adapting to the effects of climate change</b></p> <p>Scope the development of a conceptual framework and a set of rules for implementing intervention measures to help biodiversity adapt to the impacts of climate change; this would include consideration of the sustainability of existing habitats and communities, the influx of non-native species, the restoration of ecological damage following extreme weather events, and the relationship between climatic variables and responses of species and ecosystems (for example, through the Environmental Change Network).</p> |                   |           |       |            |          |   |
| Task 8.1: Intervention measures (see 2.3)   | All IACCG members | None      | None  | Q3 02/03   | Q4 03/04 | Review policy and practical outputs of MONARCH 1 and draw out key adaptation issues (Wyn Jones); present these for consideration by IACCG (Q4 02/03). Scope development in light of outputs of MONARCH 2 and other relevant activities by Q4 03/04.                 |
| Task 8.2: Encouraging acquisition and use of data   | All IACCG members | None      | None  | Q1 02/03   | Ongoing  | Encourage acquisition and use of ECN data, extension of ECN network and development of similar data collection schemes (eg validation networks).  |