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RTD19 Climate change impacts: key issues and future research

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1 Issues

Climate change is developing rapidly into one of the most important pressures that will affect bird populations and their conservation over the next 50–100 years. Impacts will be both direct (e.g. through changes in average weather patterns, occurrence of extreme events and sea-level rise) and indirect (e.g. through changes in habitats, land-use and employment of sea-defences). The overall aim of this RTD was to identify the important gaps in knowledge that need to be filled to allow the ornithological community to advise policy makers on how to mitigate the impacts of climate change on birds. The key issues discussed were:

(1) What are the key habitats for which climate change will be most important?

(2) What are the key factors that will make it difficult for birds to cope with change?

(3) What aspects of the impact of change need study urgently?

(4) What methodological issues need to be highlighted?

(5) Is there scope and need for international collaboration?

2 Outcomes

2.1 Key habitats

Although all habitats can be considered important, some are more vulnerable to change in the near future than others; these are where research effort should be increased. The key habitats identified were: (1) polar regions, (2) areas strongly affected by the El Nino Southern Oscillation, (3) low-elevation islands and mangrove habitats, and (4) cloud forest and other montane habitats. Habitats supporting locally endemic species were also identified as special.

2.2 Key factors of climate change affecting birds

Diverse intrinsic and extrinsic factors were suggested as inhibitors of adaptation to climate change. Any of those listed below could be important to individual species; all need further investigation:

• small population size

• lack of phenotypic adaptability

• reduced adaptability in the timing of migration by long-distance migrants, but greater plasticity in short-distance migrants, potentially improving their competitive status

• clash between photoperiodic control and shifts in phenology

• differential rates of effect/response between birds (at 1–2 days per °C, on average) and plants and invertebrates (5–8 days per °C)

• genetic constraints on adaptability

• mobile and generalist r-selected species coping better than sedentary, habitat-specific k-selected species in fragmented landscapes

• dispersal ability

• increase in frequency of extreme climatic events

• loss of habitat and decline in habitat quality

• changes in timing and abundance of food

• changes in agriculture, e.g. crop types and pesticides in response to pest changes

• non-analogue climate spaces

• range expansion by other species - increasing competition/predation, including impacts of invasive and alien species

2.3 Key impacts needing urgent examination

A number of such factors were identified by the study group:

• phenotypic and genetic adaptability

• climate sensitive areas for birds

• biodiversity hotspots and Important Bird Areas

• impacts of socio-economic change on habitats

• population monitoring (especially to detect range shrinkage)

• indirect effects, e.g. trophic level interactions, competitors, disease

• value of habitat corridors to aid dispersal

• impacts on species showing no phenological re-

sponse to climate change

2.4 Key methodological issues

A number of methodological qualifications in the study of climate change needed airing:

• unidirectional correlations in climate change, particularly in short-term data-sets, may be spurious, and could reflect other co-correlated factors; alternative hypotheses need consideration

• scientists must not exaggerate the significance of results and should make uncertainties clear; uncertainties in model predictions need to be articulated

• viewing publication bias towards "significant" results, as in any field of study, cautiously

• cautious use of meteorological data to ensure standardization, e.g. the same value of the North Atlantic Oscillation index may correspond to different European temperatures in the first and second halves of the 20th century, as average temperatures have warmed

2.5 International collaboration

The RTD concluded that the need for international collaboration was most important, particularly for migratory species that cross many national borders and use a network of stopover sites for replenishing nutrient reserves (e.g. shorebirds). Global climate change is a global phenomenon, and so a network of regional and continental monitoring stations is essential for assessing impacts on bird populations. Many such networks already exist (e.g. bird ringing observatories), and should now begin to incorporate climate change information as a key goal.

The ornithological community also needed to ensure that its results are fed into the deliberations of the Intergovernmental Panel for Climate Change. This was thought to be a proper role for the International Ornithological Committee and its congresses to facilitate. Thus the RTD proposed that the IOC should set up an active working group on climate change that would act as a conduit of information to the IPCC from world's scientific ornithological community.