New indicator reveals impact of climate change on Europe’s birds

It is recognised that climate change is threatening biodiversity, but there are few indicators that summarise the impacts on many species over large areas of land. An EU-supported study has developed an indicator of climate change’s impact on European birds, which has subsequently been used to report threats to biodiversity.

There is evidence that climate change is affecting the geographical range and abundance of plants and animals. It is also changing the timings of their growth, reproduction and migration. As such, there has been a call by policy makers to develop indicators that can measure the potential impacts of climate change on biodiversity.

In 2004, the initiative ‘Streamlining European 2010 Biodiversity Indicators’ (SEBI 2010) was launched to develop a European set of biodiversity indicators to assess European and EU progress towards halting biodiversity loss¹. The indicator developed by this study for European birds has since been adopted by the SEBI initiative.

The climatic impact indicator (CII) provides a graphic representation in the form of an index to demonstrate how climate change is affecting biodiversity. When the size of a bird’s population changes in line with predictions, the indicator goes up. The predictions are derived from a climate envelope model which maps changes in the environment surrounding a certain species or ecosystem under likely climate change. The indicator has been increasing since the 1980s, a pattern that matches rising temperatures in Europe and which suggests that climate change is having an increasing impact on biodiversity.

CII captures both positive and negative changes in widespread bird populations. However, the researchers found that 75 per cent of changes to bird populations are in fact negative. Of those species projected to decline across Europe, the worst performers include the Common Snipe Gallinago gallinago; Meadow Pipit Anthus pratensis and Brambling Fringilla montifringilla. Populations projected to increase, and observed to be increasing, include the Sardinian Warbler Sylvia melanocephala; Subalpine Warbler Sylvia cantillans and the European Bee-eater Merops apiaster.

The researchers developed the indicator by studying 108 of the 124 species included in the EU-supported Pan-European Common Bird Monitoring Scheme². They measured changes in bird population sizes and forecast changes in their ranges using a climate envelope model, CLIM. Future potential changes in the range size of a species were predicted from CLIM.

They found a strong relationship between European bird population trends and change in potential habitat range between the late 20th and late 21st centuries. The strong relationship between range projections (CLIM) and population trends holds whether groups of birds are positively or negatively affected by climate change. The relationship is also not affected by breeding habitat, migratory behaviour and the average size of the birds.

The authors suggest that the CII could inform environmental policy. For example, a policy objective could be to slow the rate of increase of the CII, which might indicate that climate change’s impact on biodiversity is not growing at an uncontrollable rate. However, such a target would have to recognise time lags in the impact of climate change. Also, possible drivers of changes to population and range, other than climate change, such as pressures on the environment or the influence of other species, were not considered by this study. In the future, the authors suggest that separate indicators for individual countries and groups of birds could be used. CII could also be extended to different species.

2. The Pan-European Common Bird Monitoring Scheme is funded by the European Commission and by the Royal Society for the Protection of Birds (RSPB). See: http://www.ebcc.info/pecbm.html

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