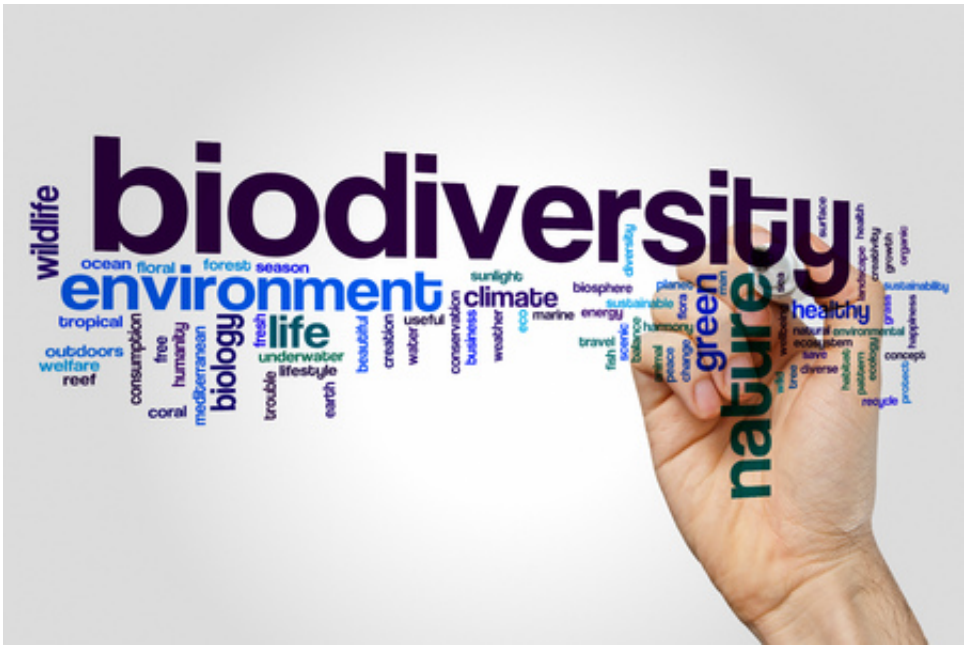
Vital improvements needed to forecast impact of climate change on biodiversity

September 9 2016, by Laura Graham



Credit: University of Aberdeen

Improvements must be made to how we predict the impact of climate change on plants and wildlife, according to new research published today in *Science*.

An international collaboration of 22 top biologists, including academics from the University of Aberdeen and led by Professor Mark Urban from the University of Connecticut, is calling for a coordinated global effort to gather much-needed biological information that will make climate

change forecasts for biodiversity more realistic and precise.

This will not only help the scientific community to identify the most at-risk populations and ecosystems, but will also allow for a more targeted distribution of resources as global temperatures continue to rise at a record-setting pace.

Current predictions concerning biodiversity responses to climate change draw on broad statistical correlations, often failing to provide the information required to make effective management decisions, which in turn can make it difficult for policy makers to respond accordingly. These predictions are often made without considering a full range of biological factors which can influence a species' reproductive success, survival, competition from other species, mobility and the capacity to adapt and evolve. These factors have been shown to be important in mediating past and present responses to climate change, which means current methods are not providing accurate predictions.

Developing approaches for providing more accurate forecasts is essential for global conservation efforts. Many species are already moving to higher ground or towards the poles to seek cooler temperatures, but the capacity of different organisms to survive climate change is likely to vary greatly. For example, some species of frog are able to move along miles of terrain and remain in a habitable environment but other species may only be capable of moving a few metres over generations.

Professor Justin Travis, Dr Greta Bocedi and Dr Steve Palmer from the University of Aberdeen have developed state-of-the-art computer software, called RangeShifter, which incorporates many of the biological processes missing in previous models. This Aberdeen group secured funding from the German Centre for Integrative Biodiversity Research and DIVERSITAS, to run a series of workshops that brought together modellers, field biologists and conservation biologists in order to identify

the opportunities and challenges involved in using more complex models, such as RangeShifter, to forecast biodiversity responses to climate change. This paper arose from those workshops.

Professor Travis said: "I hope that the findings and recommendations of this group are influential in promoting changes in how we conduct and organise ecological research such that we can transform our ability to forecast ecological responses to environmental change.

"The collaboration recommends that we approach ecological forecasting with the level of organisation and co-ordination that the climate community successfully adopts. The Intergovernmental Panel on Climate Change has overseen vast improvements in climate change forecasting by adopting more advanced tools and applying detailed information that is gathered, coordinated and shared on a global scale, and this is the approach that we require for making more realistic forecasts of ecological responses to climate change."

"An important start would be the establishment of Centres for Ecological Forecasting, each tasked with developing their own models. Then we can begin making the same comparisons between ecological forecasts as the climate community routinely does between different climate models. These centres would require teams of ecological modellers, computer programmers and, just as importantly, teams of field ecologists and evolutionary biologists working in a co-ordinated way to gather key data required by the models."

Dr Bocedi added: "This is an exciting time. With sufficient commitment and investment, ten years from now we can have a set of global and regional ecological models providing forecasts for biodiversity that are as influential in determining how we manage our planet as the climate models have become."

More information: S. Vignieri. Improving predictions, *Science* (2016). DOI: 10.1126/science.353.6304.1109-l

M. C. Urban et al. Improving the forecast for biodiversity under climate change, *Science* (2016). DOI: 10.1126/science.aad8466

Provided by University of Aberdeen

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