Use of GBIF helps clarify environment-species links

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Analysis of a massive set of mammal data accessed through the Global Biodiversity Information Facility (GBIF) Data Portal has helped quantify the influence of various environmental factors on which species are present in a particular area.

A team of Israeli scientists based at the Technion Institute, Haifa, used all available mammal occurrence records with detailed coordinates in the 'lower 48' states of the continental United States.

Some 308,000 records of 284 species, from 70 datasets published through the GBIF network to global standards, were mapped against a number of environmental variables at ten spatial scales, ranging in resolution from 20 sq km to 10,000 sq km 'grain' size, and from 20,000 sq km to 10m sq km in extent.

The results, published in PLoS One (http://www.plosone.org/article/info:doi/10.1371/journal.pone.0025440) , suggest that at the larger scale and coarser resolution, climate is the biggest factor influencing the composition of mammal species communities, while land use and land cover (human uses and natural vegetation types) become increasingly important at smaller scales and higher resolution.

While much previous research has examined species richness – the sheer number of species in a particular area – the Technion team believes this is the largest study of its kind to look at what determines 'species

composition', in other words which species are present as well as how many.

It built on earlier research from the same team, published in *Diversity and Distributions* (http://onlinelibrary.wiley.com/doi/10.1111/j.1472-4642.2011.00755.x/full) validating the use of presence-only data, of the kind published through GBIF, for this type of analysis.

Lead author Rafi Kent explains: "In every location that we were looking at, we made a list of all the species that were there. Rather than just count them we used the identity of species. "We wanted to see whether there is a link between variation in environmental conditions and variation in species composition, and we wanted to do it over several spatial scales and large spatial extents."

Kent says that the results were expected: that over larger areas it is factors such as temperature and rainfall that mainly determine which species are present, while at the more local scale, species composition is influenced more by the presence of forest, urban development, agriculture and other variables in land use and cover.

"It was expected according to the theory, but this is the first time that anyone actually showed it quantitatively and empirically over very large spatial scales. This is the novelty of the research," Kent argues.

The team believes the study has very important implications for conservation, because it advances the understanding of how species interact with their environment over large scales – crucial, for example, in designing protected area policies and wildlife corridors.

"The study would not be possible if we did not have such free access to the data as provided by the GBIF portal," Kent adds.

"We used over 300,000 occurrence records of mammals in the United States which is a huge database, not available in any other form than through GBIF.

"Collecting those data separately from each of the data publishers that are connected through GBIF would be, although not impossible, unfeasible. The GBIF portal creates opportunities for studies that simply would not be possible otherwise."

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