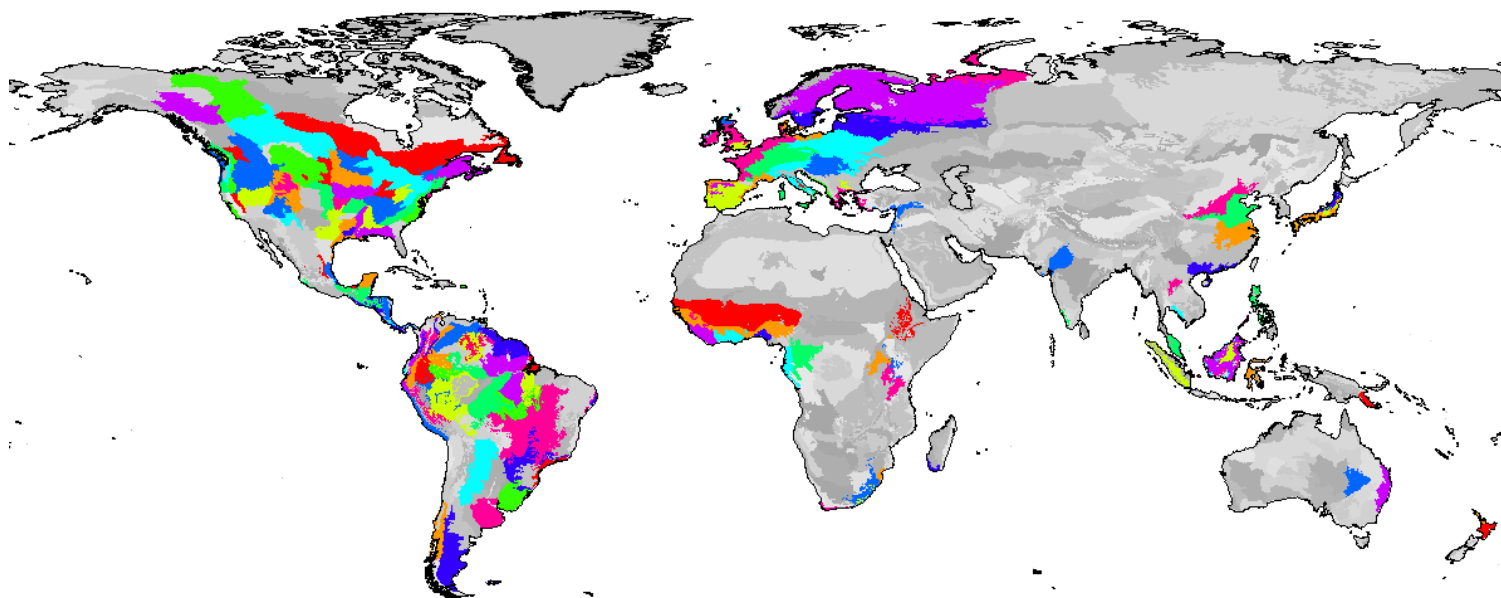# PREDICTS Newsletter

Projecting Responses of Ecological Diversity In Changing Terrestrial Systems

Coloured areas indicate the terrestrial ecoregions that are currently represented in the PREDICTS database

PREDICTS in 2014

The start of 2014 has presented us with the chance to take stock of our progress to date and to check whether we're on course to deliver the models we set out to build. The data sets are continuing to come in – we have over 400 now, with sites in 72 countries and over 200 of WWF's terrestrial ecoregions. Our gaps are also becoming clearer however. We have relatively few data sets from islands or from savannas, for instance, so are trying to target these during the year: if you have data that might be useful, please do let us know! Ongoing curation of the data – a huge behind-the-scenes task – is allowing us to model effects of habitat fragmentation and patch size on local diversity. The development of MODISTools (see Helen's article below) is making it easier for us to relate biodiversity and land use to remotely-sensed characteristics of vegetation, and in-

house R packages – which we will release once they're ready – are helping us to automate more of the data processing and analysis.

The combined result of all of these advances is that we're starting to write the first wave of papers from the project. One of the first and biggest of these will be a description of how the PREDICTS database has been put together: everyone who's provided data we've been able to put into the database and can make available will be offered authorship on this paper, so please watch out for a draft appearing in your inbox some time in the next few weeks. We are all extremely grateful to everyone who's shared data with us, and this paper will be tangible evidence of that - we hope you like it!

***Prof. Andy Purvis**, Natural History Museum*

DATABASE MANUSCRIPT TO BE CIRCULATED SOON...
We are pleased to announce that we are close to completing a manuscript describing the database in which all data contributors will be listed as co-authors. If you have contributed data to the PREDICTS project then **please keep a lookout for an email from dbmanuscript@predicts.org.uk** as we will be contacting you to check your details and to circulate the manuscript for comments.

Source: Wikimedia Commons
(http://upload.wikimedia.org/wikipedia/commons/8/81/CAMERON_HIGHLANDS_2.jpg)

## *Biodiversity in tropical forests*

During the development of the PREDICTS project, we performed a test of our modelling methods in a pilot study for tropical forests, using data from 609 tropical forest sites representing nearly 4000 animal species. A paper based on this study is currently in review. In summary, we quantified a strong impact of human land use on species' representation in ecological communities. We also showed that data derived from remote sensed products, such as forest cover and human removal of vegetation, were good correlates of species' responses. Importantly, responses differed among the different groups of species considered (reptiles & amphibians, birds, mammals, invertebrates). Furthermore, within mammals and birds, habitat specialist species responded more strongly than habitat generalist species.

***Dr. Tim Newbold**, UNEP WCMC*

The predictability of body length in Coleoptera and its association with physical and ecological traits

Coleoptera play a vital role in aquatic and terrestrial ecosystem function and the provision of ecosystem services. However, many species are relatively unstudied and the information on their physical and ecological traits has not been collated together. I compiled a trait database for all Coleoptera species present in the PREDICTS database. I focused on physiological and ecological traits that would be expected to influence species abundance and distribution including body length, flight ability, diet, habitat, invasiveness, and geographic range size. The resulting database contained data on 1867 species, in 702 genera, in 79 families. For my thesis I undertook phylogenetic analysis to determine the predictability of body length and its association with other physical and ecological traits. This analysis showed that unknown body lengths can be estimated using phylogeny and that flight ability and larval diet had significant correlation with body length in Coleoptera. Smaller species were more likely to be capable of flight, which was inferred from wing morphology. Body size in relation to diet matched predicted food availability with species feeding on highly available food sources being larger: herbivorous and saprophagous>carnivorous>fungivorous. Future analysis will seek to determine whether these and other traits are linked with geographic range size and then determine the effect of human impacts on the distribution and abundance of Coleoptera.

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***Melanie Edgar**, MRes Biosystematics Student, Imperial College London & NHM*
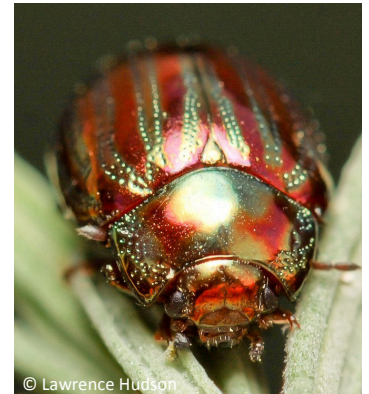
Cambridge Climate Forum

Dr. Tim Newbold conducted a workshop on the PREDICTS Project with a group of about 20 students at the **Cambridge Climate and Sustainability Forum**. The students engaged in a lively discussion of the issues around predicting biodiversity loss as a result of land-use change, and had a go at the PREDICTS game (see *Autumn 2013* newsletter).

MODISTools - download, preparation and storage of MODIS remote-sensed data in R

MODISTools is an R package that allows batch downloads of MODIS data (in ascii format) from the Land Processes Distributed Active Archive Center (LP DAAC) with just a few lines of R code. MODISTools also has functions for the preparation of site data for MODIS download as well as summarising the MODIS data that has been downloaded.

I have been working with Sean Tuck (a PhD student at Oxford University) to upgrade the package and we have added the ability to download multiple products (products being different MODIS data that capture different measurements and vegetation indices) and multiple bands (where bands are the different data which in combination create, amongst other things, vegetation indices).

MODISTools has been used, and continues to be used, within the PREDICTS project for downloading MODIS EVI data. Some of our models use EVI as a measure of habitat degradation and quality of a site for which the database holds biodiversity data. MODISTools has also been downloaded by researchers outside of PREDICTS, and we hope that people find it a useful tool in their analysis.

The most recent stable release of MODISTools is available on CRAN, and the latest developments can be downloaded from github (https://github.com/seantuck12/MODISTools).

***Helen Phillips**, PhD student at the Natural History Museum*

Thanks to Domenico Tozzi for producing the PREDICTS logo.