Autumn 2014 Issue 8

PREDICTS Newsletter

Projecting Responses of Ecological Diversity In Changing Terrestrial Systems

PREDICTS output used in UNEP report

Some outputs from models we are now developing were recently included in a United Nations Environment Programme (UNEP) report 'Towards a global map of natural capital: key ecosystem assets' (read the full report here: http://wcmc.io/e0fd). This report aimed to compile the best available global data on the state of several components of ecosystems that are known to be important to humans: water, soil, carbon and biodiversity. A PREDICTS model was used to estimate the effect of human activities on terrestrial biodiversity, specifically the proportion of species remaining (of those that would have occurred naturally) given different levels of human land-use impacts (see Figure). This was combined with a map of native (vertebrate) species richness to estimate the number of species still remaining in different parts of the world. This is the first major policy output in which PREDICTS has played a role, and we hope that we can provide input into similar processes in the future.

Dr Tim Newbold, UNEP-WCMC

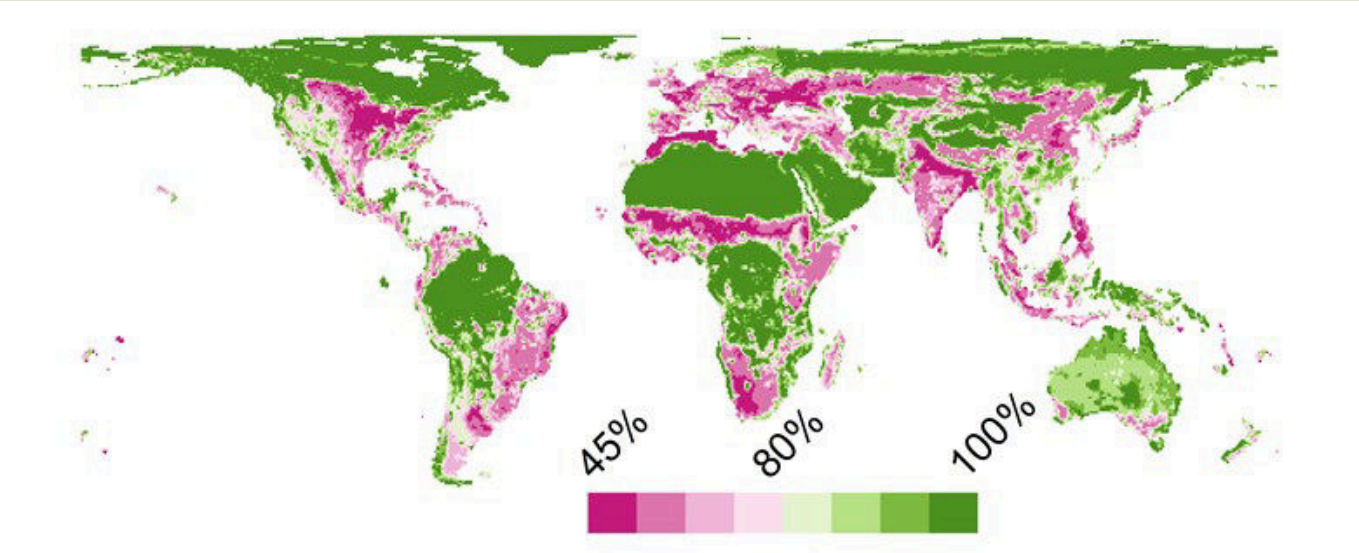

Figure: Percentage of species estimated to remain in ecological assemblages given current levels of human land-use impacts, of those that would have occurred in natural (primary) vegetation. Estimated by combining modelled estimates of the impact of land use on the proportion of originally occurring species remaining with estimates of current patterns of land use provided by the PBL Netherlands Environmental Assessment Agency.

PREDICTS models used in the Global Biodiversity Outlook 4 report

The Global Biodiversity Outlook 4 report was launched in October, providing an assessment of global progress towards meeting the Convention on Biological Diversity's Aichi Targets for 2020. This work involved analysis of the current status, ongoing trends and possible futures of a number of indicators related to the status of biodiversity, the pressures on biodiversity, the benefits humans derive from biodiversity, and efforts to prevent biodiversity loss. PREDICTS models were used to address the first of these, providing predictions of the status of local biodiversity under three scenarios of changes in land use: a business-as-usual scenario, and two mitigation scenarios with a reduction in land-use change through technology or societal (e.g. dietary) changes. We showed that the mitigation scenarios achieve substantial reductions, but not a halting, in the rate of biodiversity loss. The full report, including the technical document that has the details of the modelling, can be downloaded for free here: http://www.cbd.int/gbo4/.

MODISTools

A manuscript describing and showcasing MODISTools, an R package that downloads and processes MODIS data from the ORNL DAAC online repository, has been accepted by *Ecology and Evolution* and should be available open access soon. The project is a collaboration between Sean Tuck, a master's student with PREDICTS in 2012 and now a PhD student at Oxford University, and Helen Phillips, a PhD student with PREDICTS. The tool is also featured on the ORNL DAAC web service page - http://daac.ornl.gov/MODIS/MODIS-menu/modis_webservice.html. The most stable release of MODISTools is available through CRAN, and the most up-to-date version can be found at www.github.com/seantuck12/MODISTools.

Helen Phillips, NHM and Imperial College

Human impacts on soil biodiversity and ecosystem function

Soils are among the most important sources of ecosystem services, providing goods and functions beneficial to human populations, including supporting the majority of food production, regulating water quality and supply, buffering against floods and droughts and participating in carbon and nutrient cycling. Soil fauna are a major influence on ecosystem services provided by soils but despite this studies of land use change rarely consider below-ground biodiversity.

My MSc Taxonomy and Biodiversity research project in 2013, supervised by Dr Paul Eggleton, head of the Soil Biodiversity Group at the Natural History Museum, found that soil and litter invertebrate communities in a woodland on the Isle of Wight are strongly influenced by microhabitat type, particularly areas converted to conifer plantation. After my MSc I volunteered with the Soil Biodiversity Group on a NERC **Biodiversity & Ecosystem Service Sustainability** (BESS) project investigating drivers of earthworm abundance and diversity in grassland agricultural systems. These datasets, and others from the research group, will be collated with data from published research on how soil biodiversity and ecosystem function respond to land use change. Combined with new sampling on soil microbial diversity and its interactions with soil invertebrates with Dr Tom Bell, at Imperial College Silwood Park campus, I will develop models of how soil and litter community composition and rates of ecosystem processes will respond to predicted future changes in land use in the UK.

Victoria Burton, PhD student, Science and Solutions for a Changing Planet DTP, and Imperial College London

PREDICTS team members will be presenting at the following events/conferences:

- Dr Jörn Scharlemann: **"*Biodiversity: past & future trends and strategies to halt its loss*"**, University of Southampton, Centre for Biological Sciences, UK, 18th November 2014
- Prof. Andy Purvis: ***"The global response of terrestrial protected area biodiversity to human impacts"***, World Parks Congress, Sydney, Australia, 12-19 November 2014

Members of the PREDICTS team will be presenting at: **British Ecological Society and Société Française d'Ecologie Joint Annual Meeting 2014, Lille, France, 9-12th December 2014**

- Adriana De Palma: **"Predicting bee community responses to land use changes: effects of geographic and taxonomic biases"**, Session: Macroecology Biogeography and Landscapes, 10th December 2014
- Helen Phillips: **"The effect of land-use change on biodiversity: A comparison across four continents"**, Session: Tropical Ecology, 10th December 2014
- Dr Tim Newbold: **"*A global model of the response to land use of local alpha diversity, beta diversity and endemicity; and future projections under socio-economic scenarios*"**, Session: Conservation Ecology, 12th December 2014
- Dr Samantha Hill: "***Do protected areas mitigate human pressures? A global analysis of local biodiversity within protected areas"***, Session: Conservation Ecology, 12th December 2014
- Victoria Burton: ***"Responses of soil biotas to human impacts: from local to global"***, Poster session 9-12th December 2014

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