Summer 2017 Issue 12

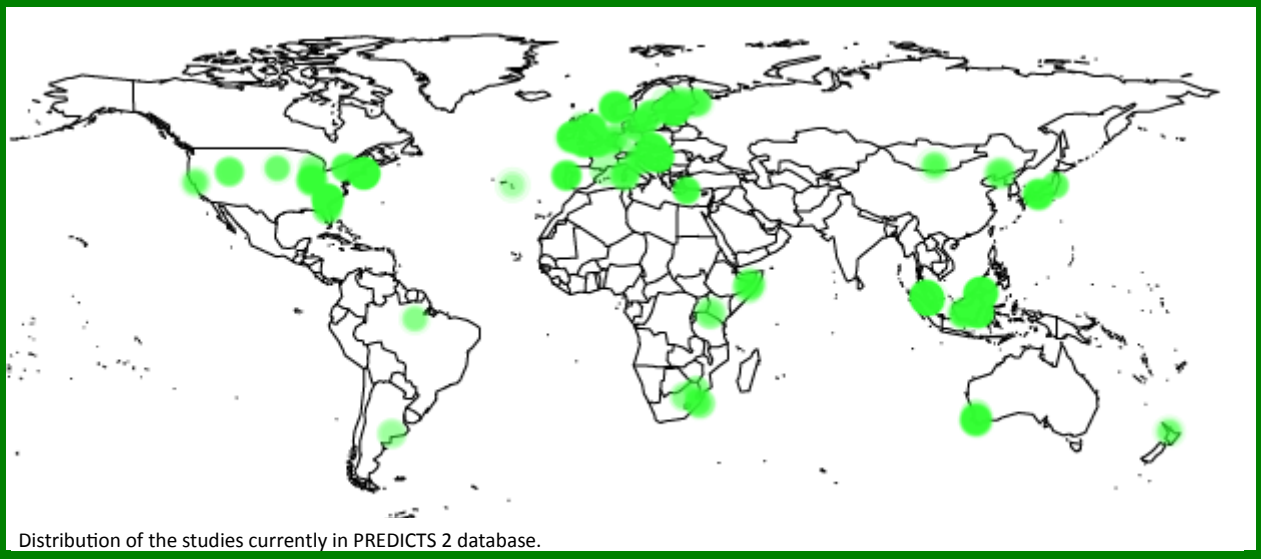
PREDICTS Newsletter

Projecting Responses of Ecological Diversity In Changing Terrestrial Systems

PREDICTS 2 database update

The database for PREDICTS 2 is continuing to grow. At the last tally, we had 76 sources in the database, which relate to 84 studies, 3159 sites and 9172 species; in total, we have 1,489,278 rows of data. The data relate to a number of interesting land-use transitions including: agricultural abandonment and de-intensification, habitat restoration, logging activities and deforestation, and the establishment of biofuel crops. Almost all studies have sampled biodiversity across multiple years, allowing us to assess temporal dynamics of change for these different transitions.
Many thanks to all those who have contributed data so far and to all the students who have worked on the project. So far, seven students have successfully completed postgraduate projects as part of the lab.

Dr Adriana De Palma, Natural History Museum



Distribution of the studies currently in PREDICTS 2 database.

We are still actively looking for temporal data, particularly regarding the following land-use transitions: agricultural expansion and intensification, deforestation and urbanisation. We are also generally looking for studies that follow a Before-After Control-Impact design where the impact is a land-use change.
Please contact us if you would like to contribute. In exchange for data that we can use, we are again offering co-authorship on a manuscript that will describe the PREDICTS2 dataset.

A 'core indicator' for IPBES assessments

We're delighted to be able to tell you that the Biodiversity Intactness Index (BII), which we estimated in **our Science paper last year**, has been adopted by IPBES (The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) as a 'core indicator' of the state of nature for use in regional and global assessments. The core indicators (see **here** for the full list) were chosen based on their global coverage, comparability among regions, transparency and a set of other stringent criteria. BII's selection means that your data are now feeding directly into the first global IPBES assessment of biodiversity and ecosystem services! Thanks again for your generosity in sharing your data with us.

Prof Andy Purvis, Natural History Museum

Conferences

At the start of June, the Inaugural Digital Data in Biodiversity Research Conference was held in Ann Arbor, USA. Adriana De Palma represented PREDICTS at the meeting, giving a presentation on how PREDICTS has harnessed the long-tail of small data in a collaborative way, to better understand land-use impacts on biodiversity.

A number of PREDICTS students will be presenting their work at the Macroecology Annual Meeting (a special interest group of the British Ecological Society) in July.

Adriana De Palma will also be attending the Ecological Society of America Annual Meeting later this summer, to talk about her current work exploring how plant communities shift in functional trait space in response to land-use change.

A project of projections

The P in PREDICTS is for Projecting. That's because it is no longer sufficient to model biodiversity, we must be able to project the effects of human driven changes on biodiversity. Unfortunately, the initial efforts to project biodiversity using PREDICTS-derived models, in space and time, were cumbersome and slow. When the team did a high-resolution (cell size of 30 arc-degree seconds) the effort took multiple weeks and caused one of the lab servers to crash!

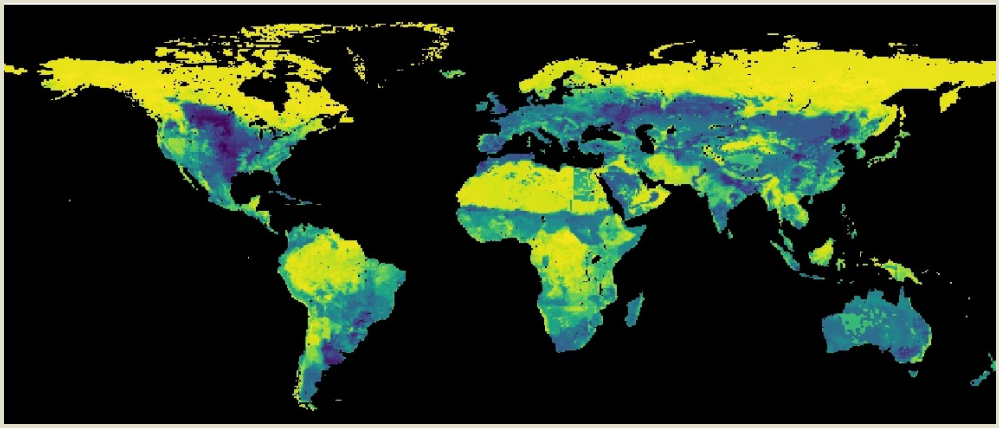
As part of my MRes project at Imperial College, I've developed a generic set of tools that simplify and accelerate generating projections based on linear or mixed-effects models developed in R. Using this system it is possible to do the same high-resolution projection in about 5 minutes (down from several weeks). Alternatively, projecting biodiversity for the rest of the century for any scenario takes a few minutes and generates a nice video for visualizing the projections. And when someone develops a new model, they can immediately generate projections without having to modify the code.

The framework consists of three parts: a library for lazily evaluating functions on raster maps; a library for extracting R models from RDS files for use in Python or C; and a shim layer with PREDICTS-specific definitions. The first two are not tied to PREDICTS and can be used with any linear or mixed-effects model in R. Only that last part is PREDICTS-specific. The system generates the projection in a CPU and memory efficient way, which is especially important for high resolution projections.

I am using this framework for projecting biodiversity (both abundance and species richness), for all Shared Socioeconomic Pathways (SSPs) scenarios for which there is harmonized land use data. For more on this topic, watch this space!

I will push the code to GitHub after completing the project. But if you would like to use this framework before then, please get in touch.

Dr Ricardo Gonzalez, MSc Imperial *College London*



Spatial projection of log (overall abundance) in 2005 relative to baseline; yellow=high, dark blue=low.

Current Students

Mark Titley

My project is investigating the impacts of deforestation on biodiversity and biological communities, and how these impacts may interact with climate change.
Using data collected before and after deforestation, I will analyse trends in biodiversity over time following deforestation. I am also looking at how communities' thermal affiliations change after deforestation: by analysing changes in CTI (Community Temperature Index) I aim to test whether deforestation may accelerate shifts in communities under climate change via changes in microclimate.

Call for data: For my project I am looking for datasets on species over multiple years, preferably before and after deforestation (e.g. before/after logging, clear-cutting or conversion to agriculture).

Juan Gallego Zamorano

I am analysing the effects of connectivity on flower-visitors in Europe.

Oliver Scott

I am focusing on using differences in basal metabolic rate and species abundance data of mammals, birds and plants between land use classes to identify patterns in spatial metabolic continuity.

Megan Brown

My project will combine data from PREDICTSv1 and PREDICTSv2 to form a shared analytical framework to look at how local biodiversity responds to agricultural expansion and intensification.

Curtis Moon

I am analyzing phylogenetic signal in Lepidopteran species' responses to land-use change.

Norah Berk

My project looks at how community management of land affect local biodiversity.

Well done to Jack and Kara who finished their MSc project with PREDICTS!!

Kara Taylor

I used landmass type (islands vs mainland) to comparatively analyse the effects of area and isolation on native and alien responses to land use change.

Jack Bonnick

My project focused on response of island species richness over time to land-use change and whether this response differed along with changing island characteristics, size and distance to mainland.

Recent publications:

Phillips, H.R.P., Newbold, T. and Purvis, A. (2017), "Land-use effects on local biodiversity in tropical forests vary between continents." Biodiversity and Conservation: 1-20.
Jung, M., Hill, S. L. L., Platts, P. J., Marchant, R., Siebert, S., Fournier, A., Munyekenye, F. B., Purvis, A., Burgess, N. D. and Newbold, T. (2016), "Local factors mediate the response of biodiversity to land use on two African mountains". Anim Conserv. doi:10.1111/acv.12327

Congratulations!

Congratulations to **Helen Phillips** on defending her PhD thesis successfully and on her **new synthesis postdoc at sDiv in Leipzig**, where she's helping to develop a global soil biodiversity database in the sWORM project and researching human impacts on earthworm diversity.

Congratulations too to **Susy Echeverria-Londoño** on both her recent marriage to Francesco Patacchini and her forthcoming **postdoc position at Kenyon College**, which she'll be starting later this summer. She'll be working with Andrew Kerkhoff and Brian Enquist, using the Botanical Information & Ecology Network database to analyse the macroecology of land-plant biodiversity.

#Predictsproject

Contact email: enquiries@predicts.org.uk

Thanks to Domenico Tozzi for producing the PREDICTS logo.