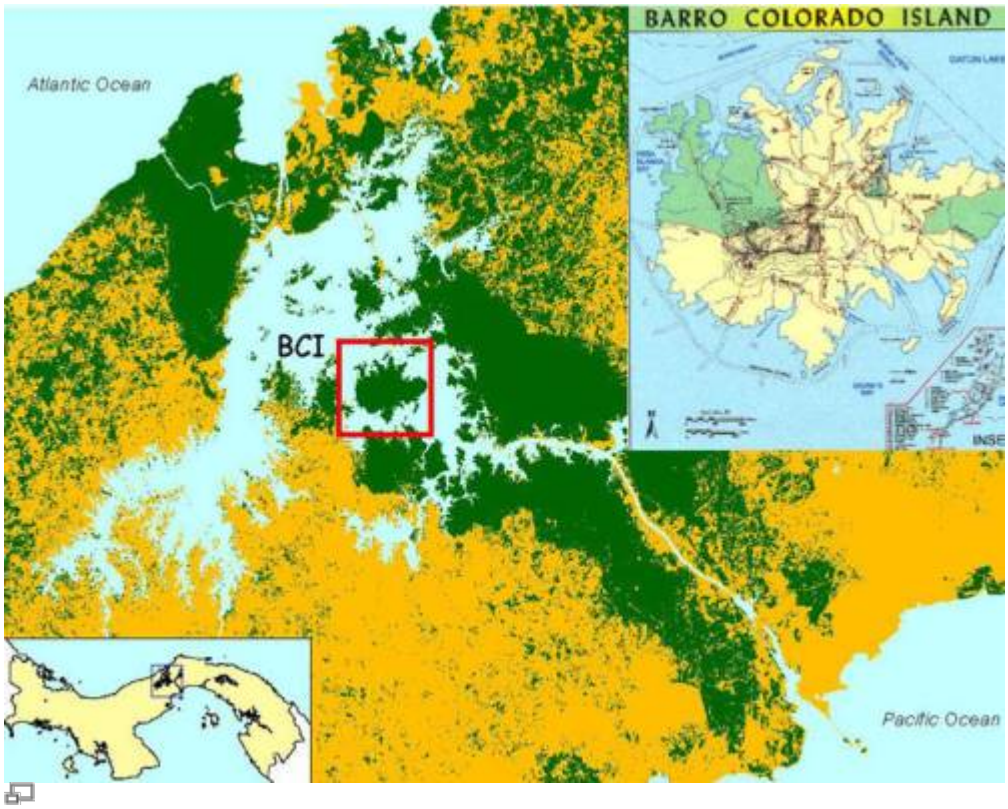
Tropical forest permanent plot in Barro Colorado Island (Panama)

Source of data

Vegetation and environmental data: Condit et al. (2002)[1)]

Soil chemistry data: Soil maps of Barro Colorado Island 50ha plot

Description of the dataset



Map of Barro Colorado Island in Panama (source: CTFS website)

Data from 50 ha permanent plot, established by Smithsonian Tropical Research Institute and Princeton University to study the dynamics of tropical forest vegetation. The available dataset contains 50 1-ha plots, which align with each other. In each plot were recorded numbers of individuals of all forest species (only individuals with DBH > 10 cm are available in this dataset) and several environmental variables (see the table below).

Soil chemical analyses are also publicly available for BCI plot. Original soil data have a form of soil maps, which have been created from 300 collected and analysed soil samples by kriging and can be accessed here; spreadsheet dataset, created as kriged estimates for 20×20 m plots, is available here. For purpose of this example data, the soil data from 20×20 m plots were lumped into 1-ha plots to make it compatible with the vegetation dataset.

Locality

Barro Colorado is an island in the lake Gatun in central Panama. Since 1923, the island is a place of intensive scientific research focused on ecology of lowland tropical forest, and from the floristic point of view it's perhaps the most explored tropical area (of similar size) in the world. The studied 50-ha permanent plot is surveyed periodically since 1980.

The file with coordinates, which can be opened in Google Earth: bci.kml[2] (source: http://cc.oulu.fi/~jarioksa/opetus/metodi/).



Photograph of Barro Colorado Island (author: Christian Ziegler/S.T.R.I., source: The New York Times).

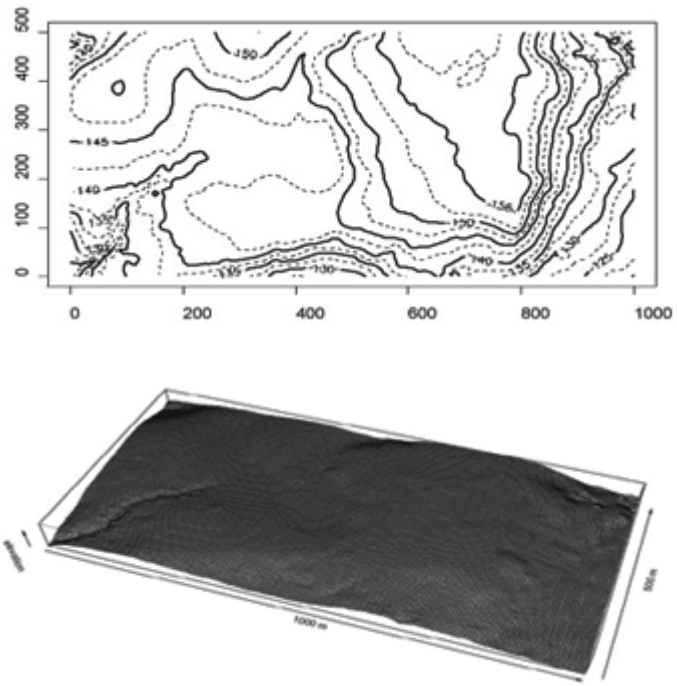
Environmental variables

Variables available in `BCI.env` dataset (originally from `BiodiversityR` library, Kindt & Coe 2005). Note that original variables, which have been in `BCI.env` dataset in earlier versions of BiodiversityR library (Precipitation, Elevation, Age.cat and Geology) and which were based on data published in Condit et al. (2002) were removed (they have been, so as so, of minor use, since they lack the resolution) and replaced by new topographical variables from De Caceres et al. (2012).

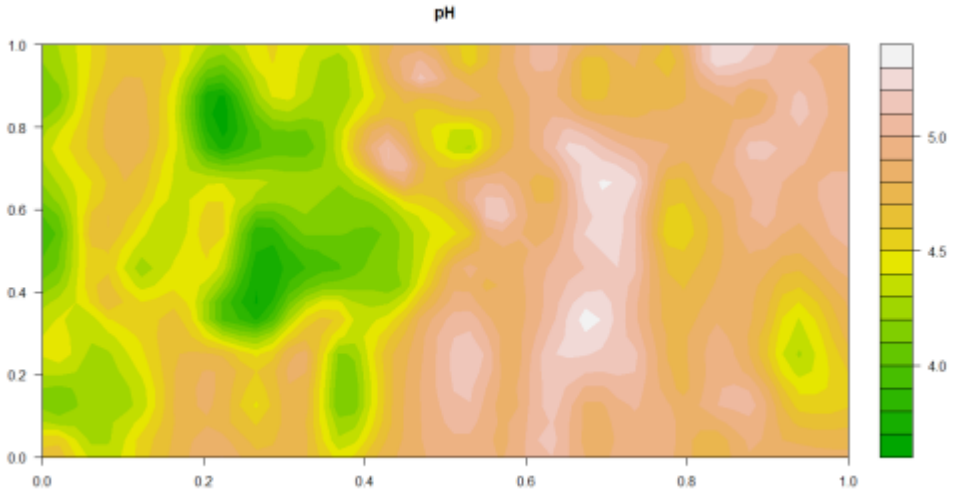
Name of variable	Description
UTM.EW	longitude [m]
UTM.NS	latitude [m]
elevation	mean of the elevation values of the four cell corners [m]
convex	convexity - mean elevation of the target cell minus the mean elevation of the eight surrounding cells
slope	mean angular deviation from horizontal of each of the four triangular planes formed by connecting three of its corners
aspectEW	deviation of aspect from east-west direction, calculated as *sin (aspect)*
aspectNS	deviation of aspect from north-south direction, calculated as *cos (aspect)*

Variables available in soil dataset (`BCI.soil`):

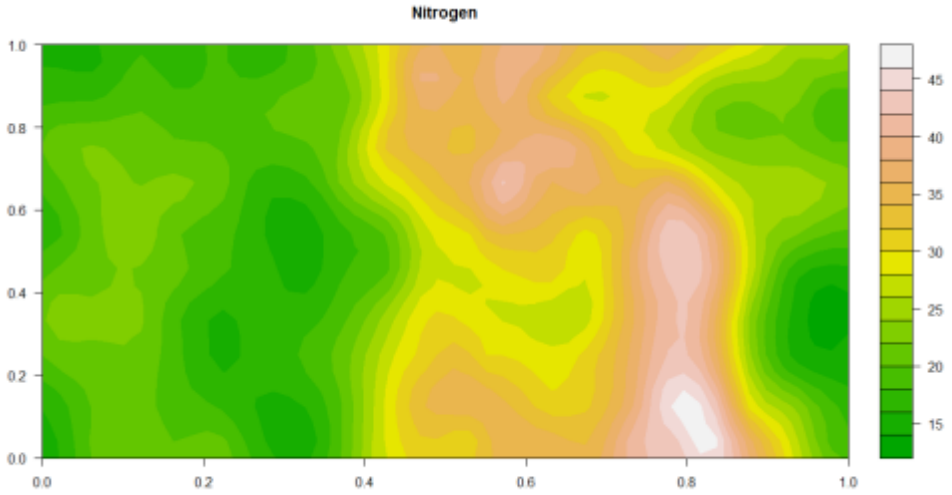
Name of variable	Description
x, y	Relative coordinates of the plots [m]
Al, B, Ca, Cu, Fe, K, Mg, Mn, P, Zn, N, N(min), pH	Measured soil chemistry variables[3]



Map of elevation of the 50ha forest dynamics plot. Note that data for this map have higher resolution than the elevation data in the `BCI.env` dataset. Source: CTFS website.



Soil map for pH. Note that the resolution of this map is 20×20 m, although the resolution 100×100 m is used for further analyses.



Soil map for nitrogen. Note that the resolution of this map is 20×20 m, although the resolution 100×100 m is used for further analyses.

y-axis										
450	5	10	15	20	25	30	35	40	45	50
350	4	9	14	19	24	29	34	39	44	49
250	3	8	13	18	23	28	33	38	43	48
150	2	7	12	17	22	27	32	37	42	47
50	1	6	11	16	21	26	31	36	41	46
	50	*150*	*250*	*350*	*450*	*550*	*650*	*750*	*850*	*950*
	x-axis									

Spatial distribution of individual subplots (numbers 1, 2, ..., 50 represent the row in the species composition and environmental table).

Data for download

File name	File type	Description
bci.soil.txt	tab-delimited txt file	Soil data (originates from CTFR website, for purpose of analysis presented here rearranged using this script)

Script for direct import of data into R

```
# you will need library (vegan) - you can install it using following:
# install.packages ('vegan')

library (vegan)
data (BCI)
BCI.env <- read.delim
('https://raw.githubusercontent.com/zdealveindy/anadat-r/master/data/bci.env.txt',
row.names = 1)
BCI.soil <- read.delim
('https://raw.githubusercontent.com/zdealveindy/anadat-r/master/data/bci.soil.txt')
```

Note: The script for the preparation of soil data and drawing soil maps can be found here.

References

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Note: access to the whole dataset could be applied using online form on website of Smithsonian Tropical Research Institute or National Center for Ecological Analysis and Synthesis.

1) part of freely available data included in libraries *vegan* and *BiodiversityR*

2) you need Google Earth installed on your computer to open this file

3) for details regarding soil chemistry analysis see protocol used for the sampling of the BCI plot

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