# Repository: Model-based Impact Analysis of Climate Change and Land-use Intensification on Trohpic Networks

## Overview

The repository is divided into three parts:

* The input folder contains the already aggregated simulation output for each region and climate scenario (the original files were too large to upload to a repository).
* The analysis folder contains the scripts needed to run the analysis.
* The model run folder contains the scripts needed to run the original model simulations. In order to run this script, additional climate data must be provided by the user (as required by MadingleyR).
* The output folder contains all output figures and output tables created in the repository.

The climate data used in this study can be found here:

* [Historical climate scenario](https://doi.org/http://doi.org/10.22033/ESGF/CMIP6.4067)
* [SSP1-2.6 climate scenario](https://doi.org/http://doi.org/10.22033/ESGF/CMIP6.4067)
* [SSP5-8.5 climate scenario](https://doi.org/http://doi.org/10.22033/ESGF/CMIP6.4067)

Before the data can be used, they need to be pre-processed to meet the requirements of the MadingleyR package, for example as described in the supplementary material of the study (also available in this repository).

To give an insight into our simulations, we provide here an example of how the simulations in our study are performed with the MadingleyR package. To do this, we use 0.5 degree data (to match the region sizes of our original model simulations) from the standard MadingleyR input datasets.

We perform the example here with a

## Create the environment

First we have to create the environment that is necessary to perform the simulations.

1.) We need to install “MadingleyR”, following the [instructions](https://github.com/MadingleyR/MadingleyR/blob/master/README.md).

2.) We need to load MadingleyR for performing the simulations and some additional functions provided on Github for preparing data input.

library("MadingleyR")  
library("terra")  
  
#Source: Hoeks, S. (2022):   
#Function to crop spatial raster input of MadingleyR using spatial window  
source("https://raw.githubusercontent.com/SHoeks/RandomMadingleyRFunctions/master/crop\_spatial\_rasters\_to\_window.r")  
  
# download and load 0.5 degree inputs  
source("https://raw.githubusercontent.com/SHoeks/MadingleyR\_0.5degree\_inputs/master/DownloadLoadHalfDegreeInputs.R")

## Create MadingleyR inputs

envDIR = temp\_path <- gettemppath()  
  
#create MadingleyR model inputs  
#here, we just use standard spatial input of madingleyR to provide an example   
sptl\_inp = madingley\_inputs("spatial inputs")  
chrt\_def = madingley\_inputs("cohort definition")  
stck\_def = madingley\_inputs("stock definition")  
mdl\_prms = madingley\_inputs("model parameters")  
  
#check if hanpp layer is correctly loaded to madingley  
plot(sptl\_inp$hanpp, main="HANPP in gC/m^2/year")  
  
#crop the raster to spatial window extent (safe resources while running the model)  
sp\_inputs\_histo\_2014 = crop\_spatial\_rasters\_to\_window(inputs = sp\_inputs\_histo\_2014, spatial\_window = spatial\_window)  
  
#plot hanpp raster to see if cropping worked   
plot(sp\_inputs\_histo\_2014$hanpp)

plot(sp\_inputs\_histo\_2014$hanpp)

# References

Voldoire, A. 2019a. CNRM-CERFACS CNRM-CM6-1-HR model output prepared for CMIP6 CMIP historical (No. 20191021). doi: <https://doi.org/http://doi.org/10.22033/ESGF/CMIP6.4067>.

Voldoire, A. 2019b. CNRM-CERFACS CNRM-CM6-1-HR model output prepared for CMIP6 ScenarioMIP ssp126 (No. 20200127). doi: <https://doi.org/http://doi.org/10.22033/ESGF/CMIP6.4067>.

Voldoire, A. 2019c. CNRM-CERFACS CNRM-CM6-1-HR model output prepared for CMIP6 ScenarioMIP ssp585 (No. 20191202). doi: <https://doi.org/http://doi.org/10.22033/ESGF/CMIP6.4067>.