

BIO789P Written Assessment

Madagascar is one of the most biodiverse places in the world with outstanding levels of endemism. More than 80% of its flora is native to Madagascar. Habitat degradation is high as well due to a combination of human activities (e.g. grazing, agriculture, fires, etc) and some natural factors such as droughts. The country has recently increased its protected areas network and strengthened the work with local communities aiming for a larger conservation impact. This is challenging because Madagascar is within the top ten countries with the highest levels of poverty (70%), according to the World Bank.

You will use species distribution models (SDMs) and maps to model and describe the current distribution of a plant species occurring in Madagascar. You will identify and explain factors that might explain the survival of that species and whether the current protected areas system is adequate or not to conserve areas where this species exists.

You will need to:

1. Download the R project, scripts, data and html tutorials from GitHub. Follow the README guidelines to download all the GitHub files here
http://github.com/idmwhite/2022_MSc_Spatial_Course
2. Find the species that is assigned to you at this link
https://docs.google.com/spreadsheets/d/1mQNTdlbr4o4OtnpMquFfUAj4Apc_VIz7nJ7IOxW0yzc/edit?usp=sharing
3. Download species occurrence from GBIF using the R script (1_Species_localities.R).
4. Clean species occurrence records and model their distribution (using R scripts and R markdown provided during the practical session) (1_Species_localities.R and 2_Species_distribution_model.R and associated Rmd files).
5. Incorporate external information to support/complement your results
6. Write up your project report using the structured template provided in R Markdown (3_Student_Report_Template.Rmd), which will be explained in the first afternoon of the module

Project report template

SUMMARY /ABSTRACT (150-200 WORDS)

Question / hypothesis / problem / Malagasy species distribution

Data and method used

Main result / implication / importance / interest / uniqueness

INTRODUCTION (200-300 WORDS)

Malagasy species: information / interest / uses / IUCN rating / why is it important to map this species' distribution?

METHODS (400-700 WORDS)

This will be assessed on the justification of the parameters chosen for cleaning and modelling the species

- a. Pre-processing steps
Data Sourcing and cleaning: GBIF, Coordinate Cleaner, Filtering parameters
Justify selection of parameters.
- b. Processing steps
Justify selection of spatial thinning thresholds and pseudo-absences/background points (consequences on model evaluation and predictions).
Justify selection of environmental variables and correlation thresholds used.
Justify selection of training vs. testing groups.
- c. Post-processing steps
Compare and justify different criteria to evaluate the model and thresholds used to convert probability maps into presence-absence maps

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Note: there are specific questions and prompts in the R-Markdown Template, which will help guide some of your writing for the methods, results and discussion.

RESULTS (FIGURES, TABLES, DESCRIPTION OF RESULTS) (400-700 WORDS)

1. GBIF data distribution
2. Malagasy modelled species distribution (probability and binary presence-absence output).
Compare model outputs: variable importance, model performance, response curves.
3. Explore geography / protected areas / region / climate / topography / data issues / features of data and how this may link to the ecology/physiology of the species.

CONCLUSION / DISCUSSION (400-700 WORDS)

1. Species distribution
2. Would the species benefit from further protection based on its distribution and life history?
3. Are there related topics that this research feeds into?
4. What are the wider subjects that this research could help investigation?
5. How would you research this further beyond the scope of your current analysis?

Sample Literature / Resources:

GBIF

<https://www.gbif.org/>
<https://www.gbif.org/resource/search?contentType=literature>

Worldclim

<https://www.worldclim.org/data/bioclim.html>

<https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/joc.5086>

SDMs

Is my species distribution model fit for purpose? -

<https://onlinelibrary.wiley.com/doi/full/10.1111/geb.12268>

The effect of sample size and species characteristics on performance of different species distribution modeling methods

<https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.0906-7590.2006.04700.x>

CoordinateCleaner: Standardized cleaning of occurrence records from biological collection databases

<https://doi.org/10.1111/2041-210X.13152>

Spatial thinning and class balancing: Key choices lead to variation in the performance of species distribution models with citizen science data

<https://doi.org/10.1111/2041-210X.13525>

Sample selection bias and presence-only distribution models: implications for background and pseudo-absence data

<https://doi.org/10.1890/07-2153.1>

WDPA

<https://www.protectedplanet.net/en/thematic-areas/wdpa?tab=WDPA>

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Word limit: Each section has a word limit that you must adhere to. Word counting does not include the code, only the text.

Submission Deadline <https://powcoder.com>

Please submit your work to QM Plus by 23:59 pm on Sunday 18th of December. This written assessment accounts for 50% of the mark for BIO789P.

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Mark (%)	Criteria
85 – 100	Exceptional project report showing very broad understanding of the project area and outstanding knowledge of the relevant literature. Exemplary presentation and analysis of results, logical organisation and ability to evaluate critically and discuss results with insight and originality.
70 – 84	An excellent project report showing evidence of wide reading, with clear presentation and thorough analysis of results and an ability to evaluate critically and discuss research findings. Clear indication of insight, understanding and originality. An extremely competent and well-presented report overall, excellent in most aspects.
60 – 69	A good project report which shows a clear understanding of the problem and sound knowledge of the relevant literature. Sound presentation and analysis but perhaps not exploiting the results to the full. Relevant interpretation and critical evaluation of results, though with some limitations regarding the scope. Good general standard of presentation and organization.
50 – 59	A satisfactory project report which shows some understanding of the problem but limited knowledge and appreciation of the relevant literature. Presentation, analysis

	and interpretation of the results at a basic level and showing little originality or critical evaluation. Some weaknesses in the organization and presentation of the report.
0 – 49	Marks will be given for fulfilling all the criteria and content listed in the template. You must use the headings and structure listed above.

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