

Transdisciplinary Nature Conservation: the IUCN Red List of Threatened Species from evaluation to practice

Morning (9:00 - 12:30)

- Theoretical introduction
- Step by step SDM workflow tutorial with Wallace

Introduction (9:00 - 9:30)

Antoine

- What are SDMs?
- What are SDMs used for?

SDM workflow (9:30 - 10:30)

Fede

- Occurrence Data (Wallace component)
 - Data types (5 min)
 - Presence only; Presence/absence; Detection/non-detection
<https://onlinelibrary.wiley.com/doi/10.1111/ecog.02445>
 - Biases (5 min)
 - Sampling
 - Detectability FR: is detectability « bias » ? Perhaps we should also give a second of info on bias and how we define it
 - Taxonomic biases
- Process Occurrence Data (Wallace component) (5 min)
 - Dealing with biases
 - Data filtering FR: isn't « data filtering » the same as « spatial thinning » ?
 - Replicating bias in background locations
 - Model bias
 - Spatial Thinning (Wallace component)

Morning break (10:30 11:00)

SDM workflow (11:00 - 12:30)

Luca

- Environmental Data (Wallace component) (10 min)
 - Matching our rationale
 - Typical kinds of layers
 - Climate
 - Geology
 - Podology
 - Hydrology
 - Land use/cover
 - Distance to ... □ proxies of a process
 - Moving windows □ landscape moderation of local ecological processes
 - WorldClim (Wallace component)
 - Alternatives: CHELSA, ESA-CCI-LC,...
- Process Environmental Data (Wallace component) (5 min)
 - Niche truncation
 - Variables correlation

Fede

- Partition Occurrence Data (Wallace component) (5 min) - Model validation -
Spatial partition (Wallace component) (10 min)
 - Modelling algorithms
 - MaxEnt (Wallace component)
 - Feature classes (Wallace component)
 - Regularisation multipliers (Wallace component)
 - Classification performance (Wallace component)
 - ROC (Receiver Operating
 - AUC (Area Under the ROC Curve)
 - OR (Omission Rates)
 - AIC (Akaike Information Criterion)
 - TSS
 - Specificity and sensitivity

Luca

- Visualise (Wallace component) (10 min)
 - Response curves
 - Map predictions

- Raw and Logistic outputs (Wallace component)
- Binary output (Wallace component)
- Project (Wallace component) (10 min)
 - New locations
 - Future environmental variables
 - Multivariate Environmental Similarity Surface (MESS) (Wallace component)
- Extracting R code (Wallace component) (5 min)

Fede

- Defining our rationale (10 min)
 - What are you modeling, and why?
 - Predicting distribution (maps for present or future), inferring species-environment relationships
 - “Where are potential breeding sites?”
 - “Where are potential sighting locations?”
 - Mobile/sessile species
 - Home range sizes
 - “How will distribution change in the future?”
 - Examples of all of the above
- Theory (10 min)
 - Niche theory <https://onlinelibrary.wiley.com/doi/10.1111/j.1461-0248.2007.01107.x>
 - BAM diagram
https://www.researchgate.net/publication/255722125_Variation_in_niche_and_distribution_model_performance_The_need_for_a_priori_assessment_of_key_causal_factors
 - Implications of theory
- Choosing appropriate resolution (10 min)
 - Temporal
 - Spatial
 - Thematic (https://ace-lab.ca/assets_b/Riva-Nielsen2020_Article_SixKeyStepsForFunctionalLandsc.pdf)

Lunch break(12:30 - 14:00)

Afternoon

- Theory on SDMs as Red List assessments tools
- Students to produce SDM for threatened species

SDMs for Red List assessments (14:00 15:30)

Theory

- Extent Of Occurrence (EOO)
- Area Of Occurrence (AOO, 2x2 km grid)
- SDMs as AOO

Exercises

1. Redo SDM with one new species With R
2. EOO, AOO in R, compare with IUCN online
3. Area Of Habitat (AOH) for mountain tree (e.g. *Larix decidua*)
4. Compare SDM with IUCN AOO and EOO (and AOH if for *Larix decidua*)