# 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/Luca

Examples of all of the above

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)

## Fede/Luca

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 multiplyers (Wallace component)
    - Classification performance (Wallace component)
      * ROC (Receiver Operating Characteristic)
      * AUC (Area Under the ROC Curve),
      * OR (Omission Rates)
      * AIC (Akaike Information Criterion)
      * TSS
      * Specificity and sensitivity
      * … not one agreed on, perfect metric.

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
  + <https://conbio.onlinelibrary.wiley.com/doi/10.1111/cobi.12591>
* Students to produce SDM for threatened species

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

## Fede/Luca

* Extent Of Occurrence (EOO) R package « red »
* Area Of Occurrence (AOO)
* Case studies list ?
* Free workshop:
  + download threatened species occurrence (<https://www.iucnredlist.org/resources/spatial-data-download>)
  + Produce SDMs
  + Compare (visually) SDM with IUCN range

1. redo SDM 1 new sp. With R

2. EOO, AOO in R, copare with IUCN online

3. AOO with SDM, comparew ith IUCN download

Notes

* How to prepare computers?
  + Need to install R and R package “Wallace”.