

Analysts Course: Presentations and Activities

Module 1. General overview (Day 1) *General Goals:* Review the basis of SDMs and their assumptions, uncertainties, and limitations as they relate to the decision making process using current examples.

Presentation 1a: Introduction to SDMs: Their uses, ecological basis, and assumptions

Activity 1a: Discuss the assumptions behind SDMs, why they are made, and how to account for assumptions when using SDMs; could prompt with specific SDM

Presentation 1b: Understanding uncertainties inherent in SDMs

Activity 1b: Give participants several different ways of measuring and showing uncertainty for the same SDM and have them discuss the various methods and what they like/don't like about each. E.g., separate distribution and uncertainty maps, SDM map shaded by (un)certainty, map of no-analog climates, measure uncertainty with ensemble, etc

Module 2. Understanding and Assembling Model Input (Day 1) *General Goals:*

Review current sources of information for the different types of model inputs (occurrence and environmental variables) and understand important differences between each.

Presentation 2a: Understanding species occurrence data

Activity 2a: Give participants a list of datasets with metadata and have them evaluate what kind of occurrence data each set is: presence/absence vs. presence-only; random sample vs. non-random; spatially independent vs. spatially autocorrelated, etc

Presentation 2b: Review of occurrence data sources

Activity 2b: Participants will review online data sources of occurrence data and match each to a set of predefined modeling goals

Presentation 2c: Occurrence data preparation

Activity 2c: Participants will review raw occurrence data set(s) and assess/conduct data prep needs. May include downloading, summarizing, mapping, qualitative assessment, etc.

Presentation 2d: Understanding environmental data types and climate data sources

Activity 2d:

(a) Browse through several online climate sources and download some sample data.

(b) Examine a matrix of environmental variable correlations to be considered for

SDM and remove the appropriate variables depending on the correlations, species, questions, and number of occurrence records

Presentation 2e: Best practices for variable selection

Activity 2e: Participants will have several pre-defined parameters (species, goals, occurrence data, etc) and a set of candidate predictor variables to go through and select a final set of variables using various methods. May include, for example, a checklist of evaluation criteria and creating and assessing pair plots.

Module 3. Modeling Species Distributions (Day 2) *General Goals:* Review the different types of SDMs and the basic workflow for producing them including how to choose and develop appropriate inputs and parameters and evaluate the results using current best practices.

Presentation 3a: Overview of SDM types, goals, and their similarities and differences

Activity 3a: Discuss how the differences between models will affect the model output and usability; assess what SDM model to choose for current dataset.

Presentation 3b: Best practices for SDM testing

Activity 3b: Participants will evaluate the result of an SDM using multiple methods: testing-training split vs. cross-validated; AUC vs others

Presentation 3c: An overview of Maxent software

Activity 3c: Participants will set up and run an SDM using variables and occurrence data created during day 1

Module 4. Conservation planning reserve selection: Marxan (Day 3) *General Goals:* Review different uses, goals, and available types of reserve selection software. Go through a prioritization example workflow using Marxan

Presentation 4a: Review of reserve selection goals, appropriate uses, and tool types

Activity 4a: Participants review existing examples of how prioritization tools have been used to support management decisions. Goals and objectives set and decision for which tools to use are discussed for a new projects(s).

Presentation 4b: Introduction to Marxan

Activity 4b: Participants will set up and run through a Marxan example using output from module 3

Module 5. Conservation planning prioritization: Zonation (Day 3) *General Goals:*
Review goals and uses and run through a prioritization example workflow using Zonation

Presentation 5a: Introduction to Zonation

Activity 5a: Participants will set up and run through a Zonation example using output from module 3

Module 6. Modeling with rapid environmental change (Day 4) *General Goals:*
Understand unique issues, problems and challenges associated with modeling species distributions into the future and best practices for dealing with these.