**Habitat Suitability Modeling Workflow**

**1. Data Collection & Preparation**

To build a robust habitat suitability model, I first gathered and prepared various datasets:

* **Species Occurrence Data**: Population coordinates of the target species.
* **Environmental Variables**: Climate data, terrain attributes, and land cover types.
* **Anthropogenic Factors**: Roads, water bodies, and other relevant landscape features.

The datasets were processed and cleaned to ensure compatibility for machine learning algorithms.

**2. Pre-Processing in R & QGIS**

Using **R and QGIS**, I performed extensive pre-processing:

* **Spatial Data Preparation**: Loaded and cleaned occurrence data, removing duplicates and errors.
* **Environmental Layer Processing**: Standardized and formatted raster layers for consistency.
* **Overlay Analysis**: Mapped species occurrence points over environmental variables to identify spatial patterns.

This step ensured that all input layers were aligned, clipped, and resampled appropriately.

**3. Model Development in MaxEnt**

Since MaxEnt uses **presence-only data**, I used the processed raster layers and occurrence records to train the model:

* Uploaded the environmental layers and species occurrence data.
* Fine-tuned model parameters to improve accuracy.
* Generated output files, including:
  + **Habitat Suitability Maps (ASC files)**
  + **ROC Curves** (to evaluate model performance)
  + **Jackknife Tests** (to assess variable importance)
  + **Response Curves** (to analyze species-environment relationships)

**4. Post-Processing & Interpretation**

After running the MaxEnt model, I analyzed the results by:

* **Mapping habitat suitability in QGIS** using the output raster files.
* **Interpreting ROC curves** to assess model accuracy.
* **Examining response curves** to understand how species respond to different environmental factors.