Title: *Can we predict invasive species?*

Author(s):
Elizabeth Miller
Pace High School
milleree@santarosa.k12.fl.us

Abstract:
Invasive species can harm the environment, the economy, or even human health. How can an invasive species so easily take over? Can we predict invasive species? In this activity students will use QGIS and Maxent software to model niches and distributions of a chosen species in their native habitat. The model expresses a probability distribution where each grid cell has a predicted suitability of conditions for the species. Students will then analyze other regions using the same bioclimatic variables to determine if their chosen species could potentially inhabit the new region or become invasive.

Subject, Grade, Level:
Grades 9-12
On-level, Honors, AP
Biology
Environmental Science

Learning objectives:

Students will be able to model species niches and distributions.

Students will be able to analyze and compare probable distribution maps.

Students will be able to draw clear and appropriate conclusions supported by evidence.

Timeframe:

Two 50 minute class periods

List of materials:

Internet browser

Excel (or similar)

QGIS

ENMTools

Maxent

Procedure and general instructions (for instructor). REQUIRED.

Students can work either in pairs or individually.

- *Assign or let student pairs choose a species they would like to model. Some background research should be done on what region is the species' native habitat, scientific name, and its suitable climate conditions.*

- *View the four part guide "Ecological Niche Modeling" for step by step instructions.*

https://vimeo.com/idigbio/videos

At the end of this tutorial, students should have a model expressing a probability distribution where each grid cell has a predicted suitability of conditions for the species.

- *Have students identify a region where they would like to investigate if climate conditions are suitable for their species to inhabit.*

  - ***QGIS-*** *Go to Raster in the menu > extraction > clipping. Students should clip the new region on the map. Follow the same instructions for the output file to save each layer "bio1-bio19" in a new folder.*

  - ***Maxent-*** *follow the tutorial to setup your model. The files you saved for the new region should be selected in "Projection layers directory/file." Run Maxent.*

  - *To view results go to the output file and select the avg.asc file.*

- *Students should answer the reflection questions and prepare to explain/display their model to the class.*

Student Instructions:

https://docs.google.com/document/d/1HNwyNrQ99MarKUrG_I6QXfEEKroyuBsueFUvIvQtxQY/edit?usp=sharing