Extension to Spatial Analysis in QGIS and Excel

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INTRODUCTION

By completing the Spatial Analysis with QGIS exercise and this extension activity, you will learn how to use QGIS and Excel to analyze species distribution changes. Before you are ready for this step, you should have:

- Researched the synonyms of your species
- Downloaded your species data from iDigBio
- Cleaned your species data from iDigBio
- Downloaded your species data from iNaturalist
- Cleaned your species data from iNaturalist
- Combined your cleaned data sets into a Final Master file
- Learned how to use QGIS mapping on a sample data set
- Input your data into QGIS
- Created a shapefile of your data in QGIS *(you will need these to complete this exercise)*
- Created a basic map of your QGIS data

Congratulations! Take a moment and appreciate how much you have accomplished on this project so far! At the end of this exercise, you will be able to:

- Split one QGIS shapefile into multiple shapefiles
- Use the Concave Hull plugin in QGIS to create polygons of your distributions
- Calculate the area of your polygons to examine differences over time
- Use Excel or Google Sheets to compare latitudinal extent of your species over time

First, complete the Spatial Analysis with QGIS activity.

Doan, T., Dewey, T., Carroll, J., & Alter, L. (2022). Distribution CURE: Exploring species distribution changes and their drivers. BCEENET- Biological Collections in Ecology & Evolution Network, QUBES Educational Resources. https://qubeshub.org/publications/2349/1

GENERATE A LINE GRAPH

Show the change in area over time occupied by your chosen species (see example below). Make sure to use proper figure formatting with figure caption and axis labels.

Time period	Area (km^2)
1800	14999
1850	15032
1900	18944
1950	19562
2000	20945
2020	22923

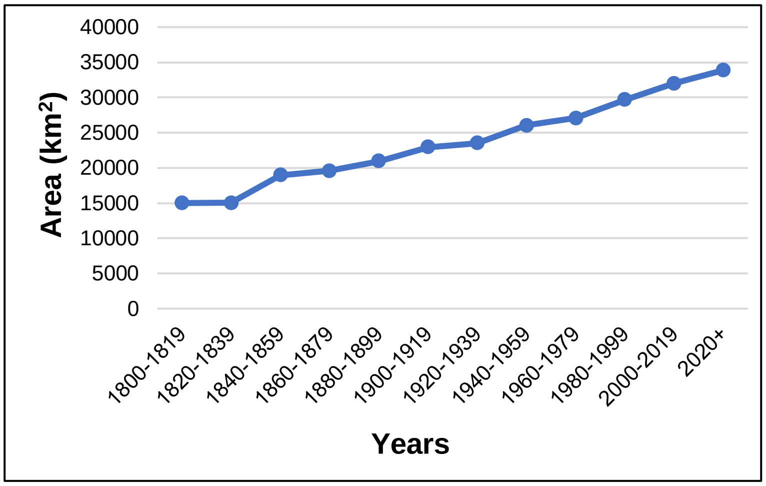

Figure 1. Area occupied by a species over time

CALCULATE NORTHERN AND SOUTHERN EXTENTS OF THE RANGE

1. Go back to your original Final Master csv file and open it in Excel or Google Sheets.
2. Highlight all of the columns of data.
3. Sort the data by going to the Data menu and click Sort. Sort by latitude.
4. Highlight the entire Year column and copy and paste it into another sheet.
5. Highlight the entire Latitude column and copy and paste next to the latitude on that new sheet. Be certain that the rows match up.
6. Now, highlight all of those data and make a scatterplot. We hypothesize that the year will determine the latitudinal extent of the species because of global warming. Therefore, year must be on the X-axis (independent variable) and latitude must be on the Y-axis.
7. Does there appear to be a correlation? If so, you should consider doing a formal correlation or regression test to add to your project. Discuss this with your instructor for help.

REFERENCES

Kerney, R., & Whitfeld, T. (2021). Spatial analysis with QGIS. BCEENET- Biological Collections in Ecology and Evolution Network. *QUBES Educational Resources*. https://qubeshub.org/publications/2761/1