

Instructor Guide

This Place You Call Home: The Flora of Your County

Starting with questions about their home county, students will learn about the floristic composition and the geography of the land around them. You may decide to break the class into groups, or have them work individually on one aspect of the project. This activity can be modified to suit the needs of the instructor and the class.

The students will compile data about their county flora from an online herbarium database and will learn how to access additional sources of primary data to enhance their study of the local flora.

The specimen data available through the KSU herbarium is **primary scientific data**. This is the same information that scientists use in their research! It can be emphasized to students that these data have not been predigested for them, and they will get to work with the data and can draw new conclusions from what they find. While this activity does provide some guidance on how to search the data, students and their instructors will be asking the questions and summarizing their unique findings.

The student product: There are many ways to present data about the flora. Students can work on individual presentations, portfolios or posters, or they can work as a class to compile a booklet about their flora (each student could then have a copy). Another option is a class bulletin board that is set up to summarize data (showing student images, lists, graphs, etc.).

Vocabulary: bedrock, biodiversity data, ecoregion, flora, land cover, land use, locality, physiographic region, topography

Background Information: A flora can be defined as the plants of a particular habitat or region. Floras can be written for regions at various geographic scales, such as wildlife areas, counties, physiographic provinces (like the Flint Hills), states, countries, and continents (e.g. Flora of North America). Some floras include only the vascular flora (ferns, conifers, and flowering plants); some include only the flowering plants. There are numerous examples available on the internet (see the KSU BiodIS website <http://biodis.k-state.edu/digital-resources/> for an example of a state and county flora). Often, a flora will discuss the underlying landscape, the geology, the land use, the size of the area under study, as well as some summary statistics about climate such as average rainfall and temperature.

At the end of the instructor guide, a checklist is included. This checklist is based on content included in a county flora (Rolfmeier, 1988). This checklist can guide you and your students as you consider what extra information to include. You and your students may choose to include additional or different types of county data. Depending on how much time your students have, and how much you would like your students to incorporate other sources of data, this gives them an opportunity to work with multiple data sources and to generate graphs and tables to communicate what they have found.

Recommendation: Before starting this lesson, students would benefit from completing an introductory lesson about scientific collections and how to query data from KSU Herbarium database using the BiodIS website (www.biodis.ksu.edu), and the database tutorial lesson related to this lesson

(www.biodis.k-state.edu/blog/educational-resources/introduction-to-scientific-collections-and-museum-databases/). They should have some background on biological classification know the difference between the taxonomic ranks of family, genus and species.

Resources: It may be helpful to have maps, books about your region or state, brochures from city, state, or county parks, etc. for your students look at. There are also many useful county and state websites that will have data to supplement the herbarium data (see Resources section).

There are two ways to query the KSU Herbarium database, and this lesson uses the *Specify 5.3.2* software interface. This will allow you and your students to access data with collection dates. There is also a guide available that demonstrates a few ways to work with the data in Excel (Excel tips).

Suggested Outline for guiding students through project

1. **Introduce concepts**
2. **Brainstorm based on what they already know about their county**
3. **Work with herbarium specimen data:**
 1. Query the database by county
 2. Download data into a spreadsheet program
 3. Sort and explore data by finding answers to some initial questions about the data
 4. Encourage students to generate their own questions
 5. Create a species list for the county
 6. Determine which data can be represented graphically
4. **Create a county flora list**
 1. Export species list to a word document, or copy and paste as a table
 2. Determine which graphs and tables to include in final class product
 3. Supplement list with additional data about the county, images of selected species or sites (use “Parts of a flora” to get ideas of some information to include)
 4. Compile into final product
 5. Have students draw some conclusions about what they have studied

Optional follow up activities

- field trip to selected area in the county
- independent student collections
- focus on particular species or families

Brainstorm questions to start conversation

- Do you have any interesting scenic areas that you like to visit?
- Is your county mostly urban, suburban, or rural?
- What is the **topography** of your county like? (Does it have hills, mountains, sand dunes, canyons?)
- What do notice when you drive or walk around... farms, yards, open spaces, vacant lots, woodlands, grasslands, industrial sites, shops and malls? Does your county have several different types of land uses, or mostly one or a few of the type listed above. What are they?

Query the database and download the data

(See also the database tutorial and accompanying worksheet.)

1. Search on “KSU Herbarium” or type the following web address into your browser:
www.ksu.edu/herbarium/database.html
2. Select “[Query primary data for vascular plants \(North American\)](#)” under External Links to Herbarium data (Specify 5.2.3. Interfaces).
3. Select “Advanced Search” in blue font and underlined (located beneath the white search box)
4. Type in the name of your county in the “county” field
5. When the dataset for your county is returned, choose the format you would like (see the bottom right of the screen: “Download: CSV, Excel, XML.” If you have access to Excel, you can select “Excel” to download and save the file to your computer.

Manipulate the data

Depending on the questions that the students are asking and answering, they will manipulate the data in different ways. Two of the more useful things to do are to sort the data on various fields (Figure 1) and to count the number of records (Figure 2). A separate file is available that shows some suggested ways to work with the data in Excel (Excel tips). However, instructors and students with experience using spreadsheets may be comfortable using methods and functions not discussed here.

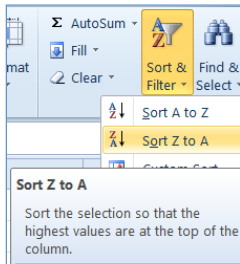


Figure 1. Students can try sorting data by date, or they can try a custom sort to organize data first by family, then by genus and species

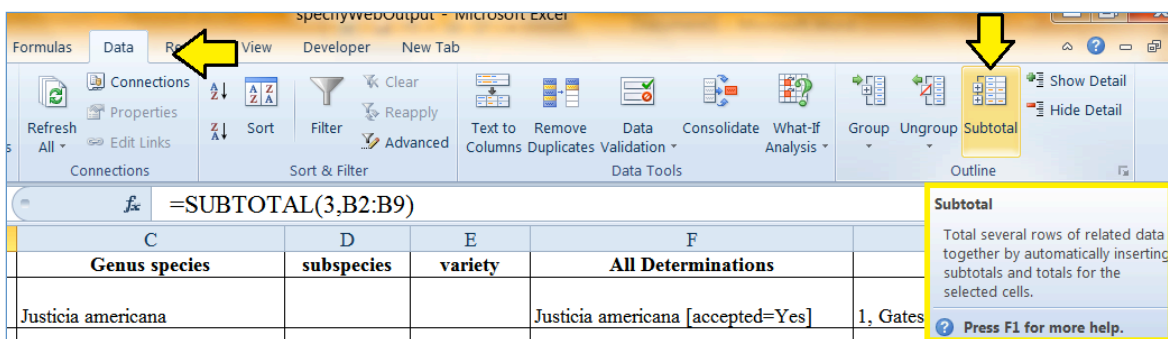


Figure 2. Count sorted records Under the “Data” tab, look for the “Subtotal” button (this may be found in a different location in your program). Be sure that before using “Subtotal” that you sort your records. Then press “Subtotal”. Your students can use this handy function to quickly count the number of species, the number of specimens gathered by individual collectors, etc.

You and your students may find that many records simply have the county name and not a particular locality listed. In that case, there may be many older (historic records). This data can be summarized in terms of the years when collections were made. Students may be interested in noting what time of year most of the collections were made: spring, summer, or fall (or by month); and they can show this variation on graphs. They can be prompted to address whether the data suggests that collecting has a temporal bias. For example, if most of the collections were made in September, what is known about the flora (based on specimens) and what is potentially unknown?

If there are records with more detailed locality data, students may be interested in checking if many records were collected in a particular town, or other locality. They may be able to show that certain parts of the county have been better collected than others. They will want to address what is known and unknown about their flora.

Generate a species list

Students will need to take the county dataset and eliminate duplicate records for each species. This will make it easier to count the number of species, rather than the number of specimens collected. There may be many specimens of any given species, so the students will have to scan the data. If there is a large amount of specimen data available for your county, it may be helpful to divide the dataset into smaller subsets to make the task manageable for your students.

For their subset of the data, students will need to sort by family, then by genus, and by species. They will determine if there is more than one specimen for each species. Some species may include subspecies or varieties, and students can eliminate duplicates of these as well (it is easiest to focus on diversity at the species level).

Suggestions for Instructor

To divide the data among the students, sort the specimen data by family, then by genus and species. Subdivide the data somewhat evenly by cutting and pasting into separate files that can be saved and assigned to each group. If your students are comfortable, they can alternately be directed to query a subset of the data on their own (e.g.: Geary County, Asteraceae; or Geary County all families starting with A-B; etc.) and export that to an Excel file.

Checklist of additional information that can be included

Location and size

- Where is the county located in the state?
- How large is it square miles, square kilometers?
- What counties border it?
- What physiographic region?
- What ecoregion?

Geology and Soils

- What is the uppermost bedrock?
- Were there glaciers in your county during the ice ages?
- Are there volcanic rocks, or limestone (deposited while under an ancient ocean)?
- Are there many different soil types found in your county?

Topography and drainage

- What kind of topography (rolling hills, canyons, flat) is found in your county? (you can divide your county into 4 quarters (NW, NE, SW, SE) and describe each quarter.
- What is the highest elevation? The lowest?
- What rivers run through your county? What lakes are found?

Climate

- What are the average monthly temperatures?
- Average monthly rainfall?

Flora

- How many specimens in the KSU Herbarium database have been collected from your county?
- When was the earliest collection made?
- When was the most recent collection made?
- Summarize the flora in terms of number of ten largest families (those with the greatest number of species present). For each one list the number of genera, and species (example below shows format).

Family Name	Genera	Species
Asteraceae	75	250
Poaceae	50	165
Fabaceae	35	78

Resources

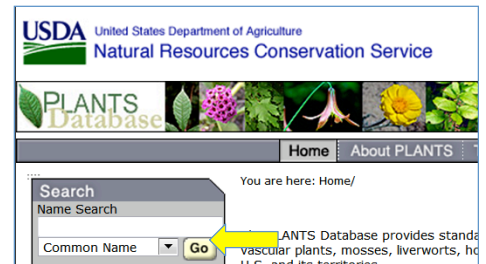
Web resources were selected from state agencies and organizations expected to have stable web sites. If for some reason the link is broken, try searching the agency name. This list of resources is also available in the “Student worksheet” file.

Common names of plants

USDA Plants Database

<http://plants.usda.gov/java/>

- This site is searchable by scientific name and by common name
- Pictures, maps and additional information are available here
- Students can cut and paste scientific names from their Excel tables to get back common names and often information about habitat and whether the plant is considered a federally listed noxious weed, or a rare plant.



Examples of Floras

Kansas State University Biodiversity Information System (BiodIS):

<http://biodis.k-state.edu/digital-resources/>

- Examples of a flora for Kansas, and a flora of Wabaunsee county are digitized and available to download

Flora of North American Project:

<http://fna.huh.harvard.edu/>

- Examples of a continent level flora (multiple volumes, in progress)
- Additional lesson plans for various grade levels

Pictures of KS wildflowers

Kansas Wildflowers and Grasses:

<http://www.kswildflower.org/>

- This site is can be accessed through the KSU BiodIS website or through the web address above
- Pictures can be searched by name or by flower color

Geology

Kansas Geological Survey:

<http://www.kgs.ku.edu/>

- Select “County Maps” under Geology to view digital geologic maps.
- Select “Bibliography” under Geology to search geologic reports and related literature. It is possible to search by county.
- Select “Photo library” under Education for a database of photographs. You can select photos by county, by Physiographic region, or by Highway. All photos are available for any non-commercial use.

Soil

United State Department of Agriculture (USDA), Kansas Natural Resources Conservation Service (NRCS):

<http://www.ks.nrcs.usda.gov/>

- This site has links to a number of resources including Kansas maps, distributions of soil types and information about soil classification.

USDA, NRCS, Kansas online soil survey manuscripts

http://soils.usda.gov/survey/online_surveys/kansas/

- Direct links to the soil surveys published for each county in KS.

USDA, Kansas NRCS

<http://www.ks.nrcs.usda.gov/>

- This site links to information explaining what a soil survey is, how to use it, and <http://soils.usda.gov/survey/>

Kansas State Soil (document): USDA Kansas NRCS

ftp://ftp-fc.sc.egov.usda.gov/KS/Outgoing/Web_Files/News/pub/ks_state_soil.pdf

- It is a general, non-technical, and informative discussion of the state soil “Harney Silt Loam” along with information on the importance of soil conservation.

Physiography

USDA, NRCS. Kansas Physiographic Provinces

<http://www.ks.nrcs.usda.gov/about/profiles/physiography.html>

Physiographic map from the Kansas Geological Survey

<http://www.kgs.ku.edu/Physio/physio.html>

Ecoregion

US Environmental Protection Agency:

http://www.epa.gov/wed/pages/ecoregions/ksne_eco.htm

- Ecoregion map (includes NE and KS). Includes the literature used, a pdf map, information about ecoregions, and instructions on how to interpret the map.

Kansas Native Plant Society:

<http://www.kansasnativeplantsociety.org/ecoregions.htm>

- Information about KS wildflowers, an ecoregion map showing vegetation types across the date (does not take into account current land use, but shows what the potential vegetation would likely be)

KS county data

Official Kansas website:

<http://www.kansas.gov/>

Kansas Data county report:

<http://www.ipsr.ku.edu/ksdata/kcced/profiles/>

- By selecting the county, students can access a pdf county report. At this site they will be able to get vital statistics, and information on number of farms, percent of population that is rural etc. (See Example for Instructor section).

Kansas Records and Statistics:

<http://www.kansas.gov/community/records-statistics/>

- Information is similar to above, and has links to other census related sites.

Land Use

Kansas Applied Remote Sensing:

<http://www.kars.ku.edu/geodata/maps/2005-kansas-land-cover-patterns-level-iv/>

- 2005 map showing land cover for the entire state of KS. Students can zoom and get a close up view of the county. One disadvantage is that it is visually complex at the county level and it may be difficult to determine what the most common land use for the county is.

Geographic Information System

K-State GIS commons:

<http://gis.ksu.edu/>

- If your students have access to Arc Map, or other GIS software, they can download datasets here.

References cited

Rolfsmeier, S. B. 1988. The vascular flora and plant communities of Seward County, Nebraska. **Transactions of the Nebraska Academy of Sciences** 16:91–113.

Further reading

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