

Introduction to the Rangeland Analysis Platform (RAP) & Part1 – Group Research Project

Introduction

Rangelands are areas of land comprised of **native vegetation** including grasses, grass-like plants, forbs or shrubs. Native grasslands, savannas, many wetlands, some deserts, tundra, and certain forb and shrub communities, alpine communities, marshes and meadows are classified as rangelands. In North America, rangelands provide grazing lands for livestock, habitat for wildlife populations, tourism, recreational uses, minerals and energy production. Rangelands also provide important ecosystem services, such as clean water and clean air. Currently, there are approximately 770 million acres of rangelands, (U.S. Forest Service). This is a lot of land, almost five times the size of the state of Texas!

Rangelands in North America were first managed by indigenous people, who often used fire to increase availability of desired plants, maintain habitat for wildlife used as food, and to drive game during hunts (McAdoo et al. 2013). After European settlement, livestock production expanded across the North American landscape and fire was suppressed in rangelands. In addition, over the past 100-200 years woody vegetation in grasslands and savannas has increased worldwide (Archer et al 2017). This pattern of woody vegetation in grassland landscapes is called, **woody plant encroachment (WPE)**. WPE is one threat to maintenance of rangeland ecosystems, thus exploring patterns of vegetative change on the landscape can help managers predict how to restore grasslands and identify areas of conservation action (e.g., fire management).

In our lab today, we will explore changes in vegetation, for a specific area of North America, by learning to use a free online application called the Rangeland Analysis Platform (RAP) (rangelands.app) that provides simple and fast access to geospatial vegetation data for U.S. rangelands. We will use a case study to explore conifer expansion in a portion of southern Nebraska called the Loess Canyons.

The Loess Canyons region has experienced rapid expansion by Eastern Red Cedar conifer trees into grassland habitats, a trend that has occurred in other areas of the Great Plains leading to significant changes in herbaceous biomass production and habitat quality.

Learning to use RAP to evaluate tree cover in the Loess Canyons

1. Go the site rangelands.app
2. Select “Launch RAP”
3. Next, in the “Search for a location” tab, type in North Platte, NE.
4. Click the word “Satellite” in the upper left corner of the screen to turn on the satellite data
5. You should also zoom out to focus on the landscape southeast of North Platte (Fig 1.), this region is called the Loess Canyons.

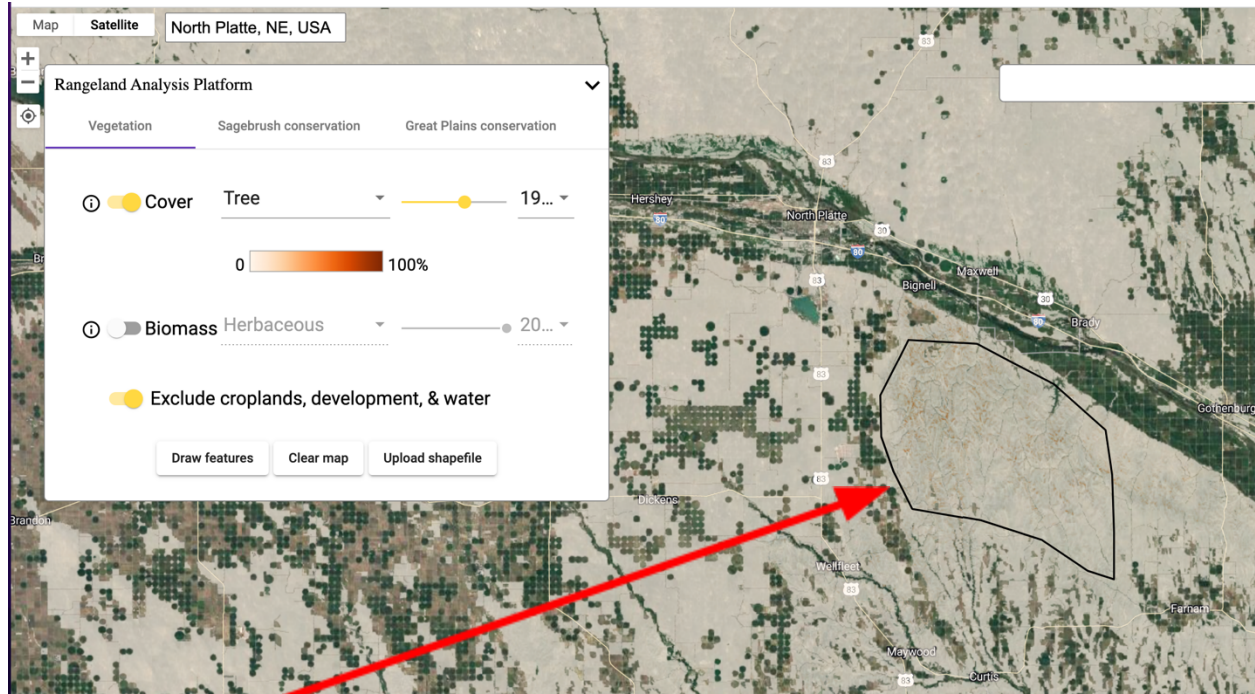


Figure 1. The polygon outlined in black represents a section of the Loess Canyons, southeast of North Platte, NE.

6. We will only use the Vegetation options. First select cover (should see a yellow circle), in the drop-down menu choose “Tree”, slide the transparency bar to 60, then choose the year 1990 in the next drop-down menu.
7. Next choose, “Draw features” to draw a polygon around a portion of the Loess Canyon.
8. After you draw your polygon, then you will get a new data window that shows Cover, Annual Biomass, and 16-day biomass. You can click on each set of data points to visually view the information. Finally, download the Excel data sheet when you have the Cover tab highlighted. We will use this data to make some inferences regarding tree cover over time in the area you selected.

Questions:

1. Compare tree cover in 1990 to that of 2019. What can you see?
2. Did annual precipitation differ from 1990 to 2019? If so by how much? How could you describe annual precipitation across years for this landscape?

3. Did annual temperature differ from 1990 to 2019? If so by how much? How could you describe annual temperature across years for this landscape?
4. What other things may have changed in this landscape with the changes you saw in percent tree coverage in this area?

Part 1: Group Research Project

Each lab group will conduct a small research project exploring a land region of your choice. Today, you will identify a focal region, turn in a group hypothesis about this region, and begin to think about the data you would like to explore within your RAP analysis.

1. Launch a new window in RAP
2. Discuss the type of area you would like to focus....family pasture land, friend's property, local park, state or federal wildlife management area....there are lots of different options
3. Identify some observations regarding vegetation coverage for the region you chose, what kind of vegetation do you expect over time? Why do you expect this type of vegetation? What changes in vegetation do you expect to see over time?
4. Identify specific tools with RAP that might help you test your hypotheses regarding vegetation coverage over time, within the region you chose. We looked at some examples of vegetation coverage during our exploration of the Loess Canyon.
5. Finally, as a group, identify some additional information, that may not be available on RAP, which might allow you further study the landscape you chose.

Assignment: Due before lab next week - Answers to the questions above will be submitted online via Canvas. This is a group assignment. Be sure to include names of all group members on your assignment.