SIZZLING DISCOVERIES

Reader Series | TOPIC #3

LAND & WATER USE

Imagine you're on a road trip from New York to California. Along the way, you pass through various states, and each state has its own unique features, like different types of trees, farmland, and maybe even deserts. Some areas have apple orchards, while others have fields of wheat. Seeing so much diversity makes you wonder how farmers in different places decide what to do with their land. Keep reading to find out more!

VOCABULARY WORDS

Habitats | Routine Burn
Invasive | Smoke Drift
Blue Water | Green Water
Ecosystems

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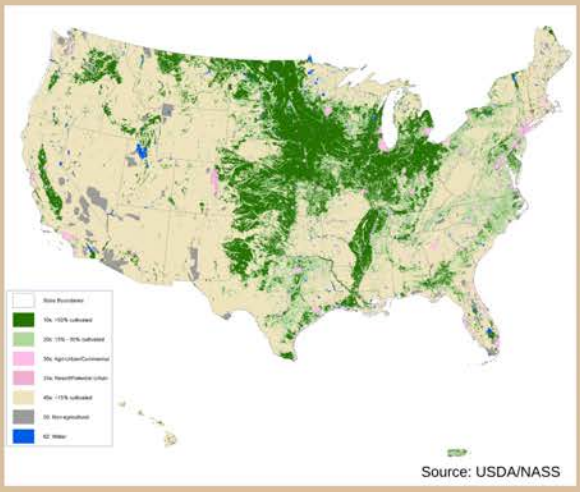
Maximizing Marginal Land Through Grazing



The United States has about 2.3 billion acres of land, according to the United States Dept. of Agriculture. Of all those acres, approximately 29% of the pasture and rangeland is not suitable for growing crops. So what can it be used for? That's right, cattle! Since almost a third of this land is too rocky, steep, or too arid for food crops that humans can consume, livestock such as cattle, goats, and sheep can call it home.

Grab a handout and create a Venn diagram using map data

Get interactive maps here!

DID YOU KNOW?

Cattle offer lots of advantages to humans and nature. In Kansas and Oklahoma, cattle play a role in controlling an **invasive** tree species called Red Cedars in the Flint Hills. If left unchecked, these trees would crowd out important native plants and flowers.

Why Do Some Ranchers Burn Their Pastures?

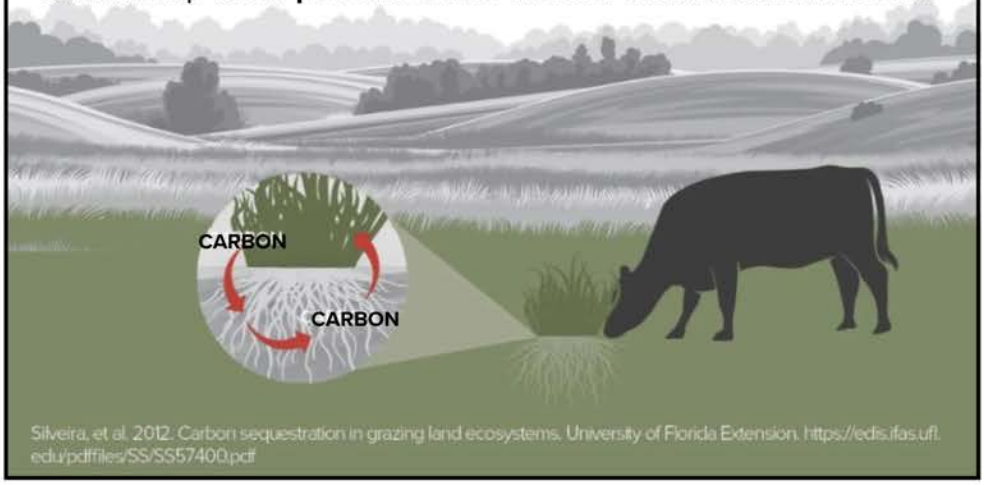
Use the QR code to complete the handout - "Why Ranchers Burn Their Pastures"

When cattle graze on the land, their manure enriches the soil, promoting plant growth and carbon sequestration. Allowing cattle to graze each year stores enough carbon to equate to taking **6 billion cars** off the road.

WHAT IS CARBON SEQUESTRATION? The process of capturing, securing and storing carbon dioxide from the atmosphere.

CARBON-SMART CATTLE

Beef cattle regenerate land and sequester carbon naturally, simply by grazing. **DID YOU KNOW** . . . the U.S. land where cattle graze contains up to **30 percent of the world's carbon stored in soil!**



Silveira, et al. 2012. Carbon sequestration in grazing land ecosystems. University of Florida Extension. https://edis.ifas.ufl.edu/pdffiles/SS/SS57400.pdf

BEEF SUSTAINABILITY: Ecosystems and Water

Cattle positively impact our daily lives. However, it's important to know that they also have significant effects on other **ecosystems** and water. You might have learned in your science classes that an ecosystem is a group of living organisms interacting with their environment and each other. They're found worldwide - from deserts to oceans to grasslands.

Just by living their normal lives, cattle act as "ecosystem engineers" offering a range of benefits like converting human inedible plant fibers into protein, recycling organic nutrients into soil, preserving wildlife **habitats**, and producing food on land unsuitable for crops. In the areas where cattle graze, you find a diverse community of insects, butterflies, ducks, deer, and more, contributing to the vibrant biodiversity of the region.

Water is crucial for all living things, including cattle. Water usage is categorized as blue, green, and gray. **Green water** (from rainfall) accounts for more than 90% of the water footprint in beef production. **Blue water**, found on the surface or underground, is mainly used for crop irrigation or as drinking water for animals. Lastly, gray water, which is essentially recycled water, is used for cleaning animal facilities and similar purposes. Further details on these water types will be explored in your upcoming reading investigation.

Water Footprint Assessment Tool Discussion

You will be exploring data on Green, Blue, and Gray water in the U.S. Follow these steps to get to the maps:

- Choose country and the United States.
- Zoom in on Kansas and click through the green, blue, and gray water tabs.
- Take time to explore and be prepared to discuss.

HELP WANTED

Explore STEM Careers Paths:

Wildlife Management | Conservationist | Hydrologist

Consider where your journey in sustainability and the topics discussed in Reader 3 could lead you. Use these Ag Career cards, to build a future resume for employment. Conduct some research on potential colleges, degree paths, trade schools, or hands-on experiences. Consider the skills related to these opportunities and complete the template provided by your teacher to showcase yourself for the job.

Water Colors and Changes

Three different colors of water were discussed and observed on page three. When it comes to cattle and beef production, over 90% of the water footprint is green water. Roughly 95% of the blue water used in beef production is for irrigating the crops that cattle eat, and the amount of blue water usage has decreased 37.6% from 1991 to 2019. This reduction is attributed to improved practices for irrigating crops, advancements in genetics, better animal welfare, and improved cattle management. Grazing lands, due to their nature, efficiently utilize water that might otherwise be wasted as runoff in more urban settings. Since farmers implement at least one water quality improvement practice, they play a vital role in using all three water sources as efficiently.

In the lab experience, you will evaluate how much gray water you might be using daily or yearly in your life. You'll be asked to collect data and to engineer possible solutions to create water quality and management changes.

Inside the Lab: Shades of Gray (Water)

From TeachEngineering.org

Materials:

- Shoebox (or any similarly-shaped box to support six funnels)
  - (optional) 8 Popsicle sticks (to make shoebox more sturdy)
  - (optional) duct tape (to make shoebox more sturdy)
- 6 funnels
- Plastic tubing that fits snugly on the ends of the funnels
- 2 large measuring cups marked in ml
- Marker
- Masking tape
- Scissors
- Box cutter

Procedure:

- Request your supplies and a detailed copy of lab instructions and worksheets from your teacher.

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