

Future Fuels from Forests - Teaching Unit Rubric

Unit Overview

This unit will inform students about GIS and how it can be used to pick an appropriate site for a biofuel plant. I want students to know about geographical information systems, how it works, and, who uses it. Students will then work on a group project using GIS while investigating using Aspen trees for biofuel. This unit will be used in my environmental science class when we discuss renewable and non-renewable resources.

Sources Consulted- Ann Maclean, Sinan Abood, and Lucas Spaete, were the instructors for GIS Technology at the Future Fuels from Forests Institute at MTU. The websites that were helpful are:: www.Michigan.gov/cgi , www.gisdatadepot.com , www.esri.com , google earth. There is a student copy of the ArcCatalog and Arc Map available for \$100, but I did not purchase it. Other information for biofuels came from the Future Fuels from Forests Institute July 7-11,2008.

Learning Objectives

Students will gain information about Geological Information Systems.
Students will learn of careers that utilize this technology.
Students will be introduced to the idea of producing ethanol from trees.
Students will use GIS to complete a project.

State or National Benchmarks Addressed-

World History, Geography-

General Social Studies Knowledge, Processes, and Skills

P2.3 Know how to find and organize information from a variety of sources; analyze, interpret, support interpretations with evidence, critically evaluate, and present the information orally and in writing; report investigation results effectively.

English Language Arts-

CE.4.1.1 Use sentence structures and vocabulary effectively within different modes (oral and written, formal and informal) and for various purposes.

CE 4.1.5 Demonstrate use of conventions of grammar, usage and mechanics in written texts, including parts of speech, sentence structure and variety, spelling, capitalization, and punctuation.

Science-

E.1.1A Generate new questions that can be investigated in the laboratory or field.

E1.1D Identify patterns in data and relate them to theoretical models.

E1.1E Describe a reason for a given conclusion using evidence from an investigation.

E1.2A Critique whether or not specific questions can be answered through scientific investigations.

E1.2B Identify and critique arguments about personal or societal issues based on scientific evidence.

E1.2D Evaluate scientific explanations in a peer review process or discussion format.

Five days of Classroom activities-I teach on an 80-minute block schedule. I see my students every other day. This unit will take 3-4 blocks.

Unit Assessment-Students will present their project information to their class. This will include the 5 step process for GIS and also their reasoning for the location of their ethanol plant.

Suitability for Dissemination- This unit is on a disc.

A Guide To Geographic Information Systems

A student centered learning opportunity.

Teacher page

by Dana Crudo

[Home](#) | [What is GIS](#) | [GIS Showcase](#) | [Implementing GIS](#) | [GIS Education](#) | [Careers in GIS](#) | [GIS Blog](#)

What is GIS?

- [Main](#)

Key GIS Concepts

- [Why Use GIS?](#)
- [What Can You Do with GIS?](#)
- [Answering Questions with GIS](#)
- [Related Learning Links](#)

GIS References

- [Glossaries](#)
- [Directories](#)
- [Periodicals](#)

GIS in Every Walk of Life

GIS in Every Walk of Life

"The application of GIS is limited only by the imagination of those who use it."

—Jack Dangermond, President of ESRI

[GIS in Everyday Life](#)

This animated story shows how geography affects everyday life for all of us.

[ESRI Map Book Gallery](#)

An excellent way to see the breadth of how GIS and other geospatial technologies are used in everyday life.

[GIS Development's Histories of Mapping and GIS](#)

The importance of geographical thinking and information is centuries old.

This is the web page for gis.com. I think that students would retain this information better if they had to investigate for themselves. I am not going to give them any information about GIS before they go to the computer lab. I would like students to extract their own information in regards to GIS technology. I will have students go to the computer lab and complete the following worksheet. They can find all their answers on this webpage. Next, we will discuss their responses. Finally, I will go to the GIS in, Every Walk of Life, and I will go to all three links and show these on a projector to the whole class. They give a good descriptions and example of where GIS is used in life, in every profession, and the history of mapping. I will have students take notes on their own. I am planning for an 80 minute block.

I did not make an answer key for this assignment. All the answers are on the website.

A Guide To Geographic Information Systems
A student centered learning opportunity.

Please answer the following questions thoughtfully, and in complete sentences.

1. What is GIS? _____

2. What can GIS do? _____

3. GIS can be viewed in 3 ways. State what they are and describe them.

4. There are 6 specific “jobs” GIS can accomplish. Name them and give an example of each.

5. When answering questions with GIS, there is a process that needs to be followed. What are the five steps of the process?

6. Explore a related link(GIS), and share what you learned.

Ethanol Plant
Teacher page

Vocabulary: ethanol, sustainability,

Materials: map of Michigan, internet use, colored pencils or crayons

Other: Students will work in groups of 3-4. They will gain information from the internet and plot information onto their Michigan map.

Possible websites: www.Michigan.gov/cgi , www.gisdatadepot.com , www.esri.com , google earth

Time: 2-3, 80-minute blocks

Students now have an understanding of GIS and the power it has. The problem that students will have to solve is to pick a spot in Michigan to build an ethanol plant.

Background information:

Scientists and Engineers at Michigan Technological University are working on a project to make ethanol. They are using Aspen trees to make an ethanol fuel that can be used in American car gas tanks. This is good news for America which wants to gain independence from foreign oil and reduce the CO₂ that is being emitted into the atmosphere from automobiles. Michigan wants to do its part in this global problem and happens to have an abundance of Aspen trees. Through proper forest management and a sustainability frame of mind , Michigan could keep producing ethanol for decades, and decades and not deplete the supply of Aspen trees.

Student Task:

Pick a location for a new ethanol plant. The new plant needs to be in a location that satisfies various conditions. The Aspen trees need to be at least 5 miles from a paved road in order for the loggers to log the area. Loggers will only log on a 10 acre plot or more. Loggers will charge extra if they have to travel more than 50 miles to deliver the Aspen to the plant. The plant also needs to be close to a freeway or railway, for transportation and supply purposes.

Ethanol Plant

Student page

Congratulations, your firm has been selected to build the new ethanol plant for Michigan. You will be using GIS technology to help

you with this task. There are a few parameters to keep in mind when choosing your spot. The details will follow.

First of all, let me give you some background information. Scientists and Engineers at Michigan Technological University are working on a project to make ethanol from renewable resources. They are using Aspen trees to make an ethanol fuel that can be used in American car gas tanks. This is good news for America which wants to gain independence from foreign oil and reduce the CO₂ that is being emitted into the atmosphere from automobiles. Michigan wants to do its part in this global problem and happens to have an abundance of Aspen trees. Through proper forest management and a sustainability frame of mind, Michigan could keep producing ethanol for decades, and decades and not deplete the supply of Aspen trees. This is an exciting time for Michigan and you are now a part of it.

When selecting a site for the new ethanol plant there are a few things to consider. The new plant needs to be in a location that satisfies various conditions. The Aspen trees need to be at least 5 miles from a paved road in order for the loggers to log the area. Loggers will only log on a 10 acre plot or more. Loggers will charge extra if they have to travel more than 50 miles to deliver the Aspen to the plant. The plant also needs to be close to a freeway or railway, for transportation and supply purposes.

You will be working in groups of 3-4. You will have 2 blocks to gather your information and complete the task. You need to name your company and split the work load between your staff. You will need to follow the 5-step process of GIS. There is a wealth of information on line that you will be able to access. You will be given a map of Michigan to plot the information that you will be accumulating. You will be supplied a work sheet to record information.

Good luck and have fun

Future Ethanol Plant

Company Name _____

Current Employees _____

Step 1 -----

Step 2 -----

Step 3 -----

Step 4 -----

Step 5 -----

Plant Location -----

Please hand in map with this worksheet. Be prepared to present your information to the class. Your presentation, worksheet and map together, will be worth 50 points.