3.0 Apply scientific skills and principles in natural resources: Students who demonstrate learning can:

- 3.01 Describe the environmental resources (soil, water, air) necessary for agriculture production
    - **Soil: Soil is the basis of life on earth. With world population and food production rising, ensuring soil health and productivity is of utmost importance. Improving and restoring soil health is an important agricultural practice.**
    - **Water: Water is used in agriculture to grow fresh produce, sustain livestock, and many other uses. Water makes it possible to grow fruit and vegetables, raise livestock, and other important staples of our diet. Water is also used for irrigation, pesticides, fertilizers, and other uses. According to the United States Geological Survey, water used for irrigation accounts for 65% of the world's freshwater usage.**
    - **Air: Air pollution from agriculture includes tractor and farm vehicle emissions is present, while animal agriculture also contributes to the pollution levels.**
    - Discussion on how soil types have an impact on what commodity is grown where just as much as climate does throughout the world
    - Discussion on anthropogenic effects to our water supply and how it affects production. As an example, increasing salinity in the aquifer brought on by overpumping makes it difficult to crop salt sensitive crops in many areas of Florida.
    - Look at how Lake Okeechobee Army Corps regulations affect the water supply to much of south Florida growers
    - Competition for water resources between ag and public supply with Florida's rapidly growing population
- 3.02 Classify resources used in AFNR systems as renewable or nonrenewable
    - **Non-renewable**
        - **Oil**
        - **Natural Gas**
        - **Coal**
        - **Nuclear**
    - **Renewable**
        - **Bioenergy**
        - **Geothermal Energy**
        - **Hydrogen**

        - **Hydropower**
        - **Marine Energy**
        - **Solar Energy**
        - **Wind Energy**
    - Paper is renewable, so many people think that printing something is bad, but it helps support our silviculture industry
- 3.03 Discuss the management of renewable vs. non-renewable natural resources
    - **Management practices:**
        - **Reduce, reuse, recycle**
- 3.04 Describe various Florida ecosystems as they relate to the agriculture industry
    - **<u>Coasts & Oceans</u>**

        - **Florida has 1,800 miles of coastline and comes in second only to Alaska with more than 8,460 miles of tidal shoreline.**

    - **<u>Forests & Uplands</u>**

        - **Nearly half of Florida's land area is covered by forests. 25,000 square miles of forests provide habitats for many species and tourism opportunities for residents and visitors to the state. Forests are also essential to Florida's environmental health.**

    - **<u>Wetlands & Rivers</u>**

        - **In Florida, you will find 11,000 miles of waterways crisscross the state.**

- 3.05 Examine the effects of environmental regulations on ANFR industries.
        - **Clean Water Act**
        - **Endangered Species Act**
        - **Federal Insecticide, Fungicide, and Rodenticide Act**
        - **Food Safety Modernization Act**
        - **Immigration and labor regulations**
        - **Federal Land Policy and Management Act**
    - Cost and time considerations for required record keeping of water and fertilizer use, but also look at the impacts if these regulations weren't in place

    - Impacts of bans on certain chemicals, methyl bromide fumigant, glysophate (Round-Up) controversy
- 3.06 Research Best Management Practices that sustain the natural environment
        - **Best Management Practices include four major areas:**
            - **Nutrient Management: Fertilizers**
            - **Pest Management: Pesticides**
            - **Water Management: Use and discard water**
            - **Sediment management: How sediments on the property are managed**
    - Recommend picking a commodity and developing a nutrient budget – inputs to the land vs. what the crop takes up, pick a location and see which BMPs would apply etc.
- 3.07 Examine how land use decisions (development, conservation, agriculture production etc.) impact the environment.
    - Land use changes constantly and has a great effect on air and water quality, waste, wildlife habitat, and human health.
    - Land development:
        - Creates structures such as roads, parking lots, and other structures.
        - Contributes to nonpoint source water pollution.
        - Affects water flow, which contributes to erosion.
        - Increase stormwater runoff.

    - **Agricultural land uses affect the quality of water and watersheds.**
    - **Agricultural Uses:**
        - **Type of crops, tillage, and irrigation can influence water usage.**
        - **Livestock grazing can change conditions around streams and ponds.**
        - **Runoff from pesticides, fertilizers, and animal waste.**

- 3.08 Explore career opportunities in natural resources.
    - **Take some time to go outside! Natural resources such as water, forest, and environmental science are all sectors of natural resources management. Careers in this pathway maintain, develop, and manage these resources.**

- **Cornerstone Task:** Ecosystem Development Project

Students are going to work in a group to develop a large parcel of land. The development project will incorporate real world economic, social, and environmental issues. The loan for your team to build this project has already been approved. The teacher will become both an advisor and the judge who decides who will win the development project. The project will include a minimum of three posters. A large written report will be produced to detail the proposal.

Groups:

Each member of the group is expected to complete his or her fair share of the project. All group members are expected to compromise, collaborate and share information and ideas. The project can be broken down into sections and each member can be assigned to a section. If a student does not complete their section, other team members will need to pick up the slack. These students will earn extra credit and the underperforming student will be docked points. The sections are:

- Environmental survey and drawing the food web & energy pyramid poster
- Environmental impact assessment
- Economic / social benefits and drawing the blueprint poster
- Ecosystem management plan and drawing the carbon, nitrogen, water cycle poster

Background Info:

In your city, there will be a vote at the next city council meeting on the proposed sale of a large area of land that has a creek or canal, wetlands, and a farm. Your project must first go through the planning commission (all requirements below) and then to the city council (your teacher).

Each group represents a development company with different ideas on how to best

develop the land. All bidding interests will be required to present an environmental

impact assessment, a blueprint of land development, and a statement of the social and economic benefit for the community. Additionally, each project bidder must establish an ecosystem management plan to improve and maintain the land not developed in the project. The city council will determine which bidding party will develop the land based on the best interest of the community.

Your city is interested in a monetary gain that would be realized with the development of the property. Pollution from external sources is a concern for the city residents and some open space is desired regardless of which plan is accepted.

Your choice of projects includes:

- Power Plant - A power plant large enough to provide 50% of the electricity for surrounding area.
- Amusement Park - A family-oriented theme park.
- Residential District - A mix density residential community.
- Zoo – A large zoo.
- Mall - A cooperation of locally owned stores in one location.
- Amphitheater - A large outdoor arena for music concerts.
- Office Park - A large office park for multinational companies.
- Oil Refinery - A fossil fuel refining factory focusing on high quality fuel for cars.
- Farm – A locally owned agricultural company.
- University – The state university wants to open a campus extension here.
- Factory – A large factory where something is manufactured.
- Sports Stadium – Build a large sports field for sport or sports of your choice.

- Park / Open Space – Used for both wildlife and recreational activities.

Order of Progression:

1st: Research animals and plants for the environmental survey and your type of development. Example – if you are going to build an amusement park, research Six Flags resorts to get an idea of what you are going to need to build.

2nd: Discuss and draw a rough copy of the blueprint to generate ideas of everything that you are going to build. Make estimates of proportions of what you are going to build in relation to the entire plot of land. Create a data table for the environmental survey.

3rd: Finish the environmental survey

Ecosystem management plan

Environmental impact assessment

Economic and social benefits

Posters: food web, food pyramid, 3 cycles

Final blueprint

Written Report:

The written report will include four sections: environmental survey, environmental impact assessment, ecosystem management plan, and economic and social benefits.

Environmental Survey: Before you develop the land

The object of this survey is to show the people that you have carefully examined

what currently exists at and around the development site. The items that are part of your survey are:

1. Make a data table of plants, mammals, birds, insects, and endangered species

present in this type of ecosystem. Columns include the common name, species

name, habitat, food source, and autotroph / heterotroph. Provide 20 different

species total.

2. Explain the features of the biome of your site. Explain about the climate of the

area.

3. How does the fertilizer from the farm affect the creek/canal's water quality? How

do the wetlands affect the creek/canal's water quality?

Ecosystem Management Plan: open space on your land after you develop.

Part of the parcel needs to be maintained as open space to help the environment. Your

team gets to decide how much land to set aside from development. You also need to

create a management plan for this open space. The management plan should incorporate:

1. Pest control – Are you going to use pesticides, herbicides, fungicides, or bat

houses for insect control?

2. Native or non-native plants – Which will you plant? Are you going to try to control non-native plants?

3. Animal management – Is the land large enough for big animals? Will you allow hunting to control population size?

4. Water usage – Are you going to irrigate the trees and lawn, drill for wells or put the creek into a pipe and cover it?

5. Recreational use – Are you going to have hiking trials, a sports park, or parking?

Environmental Impact Assessment: After you develop the land.

The local people will be very interested in what effect your planned development will have on their environment and quality of life. A careful, scientific presentation of the facts will help to make the best decision. Although you are doing research and presenting

the impact of your fictional development, you must use real facts. The preparation of this

Environmental Impact Assessment goes hand in hand with the drawing of the blueprint for your planned development. Include the following items:

1. A list of the main things you will be building on the parcel.

2. How will the development affect the traffic on neighboring highways, freeways

and roads?

3. List the types of garbage and waste materials produced by your development and explain how you will dispose of them. How are you going to use the 3 Rs concept (reduce, reuse and recycle).

4. How will your development affect the surrounding ecosystems, the creek/canal, and the quality of air and water in the city?

5. How much electricity, heating, cooling and water will your development need and how are you going to supply this demand?

6. Explain how your development will affect city services like police, fire, schools, sewage, and health care. What you are going to do to lessen the impact?

7. Make-up a birth rate, death rate, immigration rate, emigration rate, and current population size of one animal species in the ecosystem before you develop. Explain how each rate is changed because of the development.

8. A review of the impact of this development on any endangered or threatened species found at the site. Use one species as an example.

Economic and Social Benefits: benefits the community receives after you develop. The main reason why we develop is to provide either an economic or social benefit to society. In what way will your development provide a benefit? Listed below are some of possible benefits.

- Make estimates on each economic benefit and explain how you arrived at that

amount. Economic benefits would be things that will bring:

o Increased tax revenue for the city: Estimate how much your development will make in a year

o Jobs: what kind of jobs, how much will each pay, what kind of benefits will you offer?

o Increased land value – does this attract people to move here or to leave? Explain

o Lower the impact on city resources (water, sewage, energy).

• Social benefits would include things like:

o Entertainment and relaxation

o Education

o Health care

o Provide shelter, day care, clothing, or food for families

o Improve the quality of life for youths or elderly residents