

Notes in purple highlight the use of resources in planning.

Notes in red highlight how I center lessons on student thinking

LS2-6: UNIT PLAN

I. Information about the Unit

Topic

Ecosystems

I make sure that each unit builds on what was covered in the previous unit. This allows students to build on their existing knowledge and form new ideas.

Abstract

Before this unit students will be discussing energy flow in an ecosystem. This will set the stage for students understanding of the dependence of organisms in a system on other organisms for energy. This foundation will allow them to begin discussing what happens in ecosystems when different types of organisms increase or decrease. They can then make judgments on the outcome for the ecosystem as a whole with these changes. Following this unit students will be examining and finding solutions to reduce human impact on ecosystems. By discussing the interactions in an ecosystem with relation to movement of energy and ecosystem balance, they will be able to think of some solutions to a human impact that changes an ecosystem.

II. Clarifying Goals

Big Ideas

As I plan for a unit, I make sure to think through the important information including the big ideas and vocabulary that will be essential for students. I then use this as the basis for the topics that will be covered in the unit.

Within an ecosystem there are many organisms, each with their own niche.

The niche of an organism gives

information about where it may live in the ecosystem and the role it plays within the ecosystem. Because there are many organisms in an ecosystem, they interact in many complex ways. One type of interaction is competition. Species will compete other species for food, space, or any other limited resource. When there are two species in the same niche at the same time, they will compete. This is known as the competitive exclusion principle. Rather than compete species typically divide resources. This competition and division of resources helps to determine the number and types of species in a community and the role of a species in the community. There are also interactions in the form of relationships between organisms. Such relationships include predator-prey relationships and herbivore-plant relationships. In a predator-prey relationship the predator can affect populations of prey and where they live. In an herbivore-plant relationship, the herbivore can determine the size and distribution of a plant. There are also keystone species in the ecosystems. These are species where a dramatic shift in their population can cause large changes in an ecosystem. Within the ecosystem, species also depend on one another, called symbioses. There are three primary types; mutualism, parasitism, and commensalism. In mutualism, the interaction is beneficial to both species. Parasitism favors one species and is detrimental to another. During commensalism one species benefits while the other is neither harmed nor given a benefit.

When an ecosystem changes over time, succession occurs. Ecosystems will change over time, but happens especially after a large disturbance (whether natural or unnatural). During primary succession, there is an area with no remaining community that is first colonized by pioneer species. These are hardy species that can survive with minimal nutrients. These pioneer species

help to enrich the area and allows more species to grow and move into the area over time. Primary succession does lead to rebuilding of an ecosystem that is changed from the first but it takes a long period of time. Secondary succession is much quicker in the time that rebuilding takes. Here a disturbance occurs without destroying the ecosystem. This allows for plants to re-grow more quickly, which leads to a faster re-growth of the whole system.

Examples, observations, data

I relate what students are learning in class to the “real world” by providing examples of observable phenomena. These examples are used to drive student understanding.

Data: Students can examine the relationship between wolf and moose populations in the Upper Peninsula. This is an introduction from energy flow in a system as well as shows a pattern between organism populations in an ecosystem.

By incorporating data into the unit, students will practice analyzing and interpreting information.

Observations: The Great Thumb Fire of 1881- more than 3,900 square miles of the “Thumb” of Michigan were burned completely. Over time however, the area has seen the trees grow back and organisms return. The ecosystem looks different than it had before the fire. Succession allowed the repopulation of this ecosystem, but this causes a shift in the organisms that are present.

I incorporate observations that are relevant to students to increase their engagement.

Examples:

- Anemone and clownfish- mutualism
 - The anemone protects fish and the fish protects the anemone and also provides nutrients for the anemone
- African Oxpeckers and hippo, zebra, etc- commensalism
 - The bird eats bugs off back of hippo, but the hippo is neither harmed nor does it receive a benefit
- Tapeworm and host- parasitism
 - The tapeworm leaches nutrients from the host, and the host suffers from the loss of these nutrients

Student Practices

Scientific Practices:

- Analyzing and interpreting data
- Engaging in argument from evidence

I determine scientific practices using the Framework for K-12 Science Education. These practices are ones that students will need not only for science but they are practices that will help them become better world citizens.

Objectives for Student Learning

Content Objective	
National and State Standards	I use both national and state standards to outline learning objectives for students.
Next Generation Science Standards HS-LS2-6 Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	I know and actively utilize the new Next Generation Science Standards. Not only do the NGSS help me define standards for student learning but they also help me determine ways to assess student learning.
Michigan Merit Curriculum Requirements B3.4A Describe ecosystem stability. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages of succession that eventually result in a system similar to the original one.	
Michigan Merit Curriculum Requirements B3.4B Recognize and describe that a great diversity of species increases the chance that at least some living organisms will survive in the face of cataclysmic changes in the environment.	

Synthesized objectives

1. I can analyze the interactions between species in an ecosystem.
2. I can use data and evidence to argue that complex interactions in an ecosystem maintain stable conditions within that system.
3. I can argue that a change in an ecosystem may result in large changes within the system or a new ecosystem.

By combining the state and national standards, along with the Framework for K-12 Science Education I am able to create learning objectives for the unit. I then use these objectives to create formative and summative assessments to gauge student understanding.

III. Classroom Activities and Assessment

Assessment

<p>Driving Question: Over the last 100 years, the organisms found in the Great Lakes have changed considerably. What has caused this change?</p> <p>Students will write down their group hypothesis on a sheet of paper that will be hung around the classroom. As they learn new information they can modify their ideas using sticky notes.</p>		
<p>The driving question is used to guide the unit. At the beginning of the unit it is used to gain the interest of the students. Through the unit students will gain the knowledge and information necessary to answer the question. At the end of the unit students will demonstrate their knowledge by answering the question.</p> <p>I incorporate various tools that allow students to share and modify their ideas. They can see the development of their knowledge as we move through the unit and can see how each lesson connects to the previous lesson.</p>		
<p>Unit Objective</p>	<p>Formative Assessment</p>	<p>Summative Assessment</p>
<p>I can analyze the interactions between species in an ecosystem.</p>	<p>I begin each objective with a formative assessment. This allows students to share their ideas and helps me determine where there may be misconceptions and where their foundation knowledge is lacking. I use this information to guide my lessons.</p> <p>Consider your house to be your own ecosystem. Describe 3 interactions you have with different things around your house. For example, I interact with my Xbox by playing video games.</p>	<p>Having a clear assessment question at the beginning of the unit allows me to plan what to do in each lesson. Through this backward planning I am able to ensure that I will cover all of the information students will need.</p> <p>We have discussed many types of species interactions. Which do you think is most important to maintaining a stable ecosystem? Describe the interaction and support your answer by comparing it with at least 3 other types of interactions.</p>

<p>I can use data and evidence to argue that complex interactions in an ecosystem maintain stable conditions within that system.</p>	<p>What do you think would happen if there were no consequences for missing school?</p> <p>If students did not come to school as regularly, what do you think the school administration would do?</p>	<p>Think back to the Wolf-Moose activity that was done in class. As the wolf population dwindled and the moose population increased, what would happen to the population of ferns that the moose enjoy eating? Over time what would happen to the populations? Support your answer using your knowledge of the interactions in an ecosystem.</p>
<p>I can argue that a change in an ecosystem may result in large changes within the system or a new ecosystem.</p>	<p>Students will be shown a picture of an abandoned lot in Detroit.</p> <p>What has happened to this lot over time? Why do you think this happened?</p>	<p>Michigan used to be covered by glaciers. Describe the process of succession that would take place after the glaciers retreated. Your answer should include information on the organisms that would be present and how the ecosystem would change over time.</p>