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Life Science Curriculum Map

The experiments in this topic fall under eight topics that relate to two aspects of life science:

1. Interactions within Ecosystems in the
2. Environment, and Plants for Food and Fibre.

In each lesson, you will find teacher notes designed to provide you guidance with the learning intention, the success criteria, materials needed, a lesson outline, as well as provide some insight on what results to expect when the experiments are conducted.

Suggestions differentiation are also included so that all students can be successful in the learning environment.

The activities in this module have two intentions: to teach concepts related to life science and to provide students the opportunity to apply necessary skills needed for mastery of science and technology curriculum objectives.

Throughout the experiments, the scientific method is used. The scientific method is an investigative process which follows five steps to guide students to discover if evidence supports a hypothesis.

LESSONS

Lesson 1 - Ecosystem and Biomes

Learning Intention: Students will learn about the characteristics of an ecosystem and the major biomes of the world.

Success Criteria:

- define the meaning of ecosystem and identify specific examples of ecosystems
- recognize an ecosystem, determine what makes it an ecosystem
- identify some common characteristics of ecosystems
- identify and describe the major biomes of the Earth
- research a biome to determine its location(s), its climate, vegetation, animals home to it
- research and report three interesting facts about a chosen biome

Lesson 2 - Ecosystem at Work

Learning Intention: Students will learn about biotic and abiotic components and how they interact within ecosystems.

Success Criteria:

- define the meaning of biotic and abiotic components within an ecosystem
- recognize the biotic and abiotic components in an ecosystem
- describe how biotic and abiotic components interact within an ecosystem
- conduct a field study to discover an ecosystem, determine how the components interact
- record observations and conclusions about the components in an ecosystem using diagrams and written descriptions

Lesson 3 - Roles in the Natural World

Learning Intention: Students will learn about different roles in food chains, and about the balance plants and animals provide in the world's ecosystems.

Success Criteria:

- identify some producers, primary consumers, secondary consumers, and decomposers
- create a composter filled with organic matter
- recognize the role of worms in creating rich soil for plants
- explain the uses and importance of compost to our environment and food chains
- recognize and explain the connection between photosynthesis and the carbon cycle
- conduct an experiment to determine the presence of carbon dioxide
- determine 'true facts' and 'false facts' about living things in the natural world

Lesson 4 - Food Chains and Webs

Learning Intention: Students will learn about and build food chains and food webs consisting of different living things.

Success Criteria:

- describe the connection of living things, beginning with the sun
- create food chains using pictures and written descriptions

- create a food web using pictures and written descriptions
- identify biotic and abiotic components within an ecosystem, explain their interdependence
- determine the producers, primary consumers, secondary consumers, and decomposers existing within a particular ecosystem
- create a food web to illustrate how animals live in balance with one another in an ecosystem
- record factors that could affect the balance of nature in an ecosystem

Lesson 5 - Ecological Succession

Learning Intention: Students will learn about primary and secondary succession; how to create an ecosystem that is able to sustain and grow.

Success Criteria:

- create a terrarium for an ever changing ecosystem to exist in
- document changes in the terrarium over time, using diagrams and written descriptions
- explain how the water cycle works to provide moisture for soils and plants
- describe primary and secondary succession, giving examples of its occurrence
- research and record examples of how animals/insects impact succession

Lesson 6 - Human Actions and Technology

Learning Intention: Students will learn about the impact human actions and technologies have on ecosystems in the environment, and the organizations that are working to make a difference.

Success Criteria:

- identify human actions that alter balances and interactions in the environment
- identify the technologies that alter balances and interactions in the environment
- determine if human activities or technology is having a positive or negative impact
- create two dioramas that respectively depict the 'before' and 'after' of human and/or technological interference
- recognize the costs and benefits of human and technological involvement
- research, record, and share information about an ecosystem that is being affected by human activity or technology

- research, record and share information about an organization that works toward ecological sustainability
- create a pamphlet to inform the public about the efforts of the organization

Lesson 7 - Plant At the Roof of it

Learning Intention: Students will learn about the importance of plants in our daily lives and the links between technologies, products, and impacts.

Success Criteria:

- identify the uses of plants in our daily lives
- participate in a food chain game
- describe how pesticide use can affect food chains
- define bioaccumulation and biomagnification, describing its effects on ecosystems
- describe how land use is changing and the effects of this on ecosystems
- research and describe a method used by farmers to increase crop yields

Lesson 8 - Soils and Plant Growth

This lesson has a link to google slides

Learning Intention: Students will learn about the components in soils, their compaction and moisture content; they will learn about the main parts of a plant, seed germination, and how plants grow to maturity.

Success Criteria:

- make and record observations of the components of different soil types
- investigate the compaction and moisture content of different soils
- make a conclusion about the components and characteristics of soils
- determine the materials or technologies that can enhance soils
- describe the function of the roots, stem, leaves, and flowers on a plant
- examine and identify plant roots as either tap or fibrous
- observe and illustrate the germination process of a bean seed
- track and graph the growth of a bean plant
- describe life cycle of seed plants
- research and describe how seeds germinate and grow to maturity in the natural world
- research and describe techniques used in the farming industry to germinate and grow plants in mass quantities
- identify working parts of a microscope and view prepared slides under a microscope

ECOSYSTEMS AND BIOMES

LEARNING INTENTION:

Students will learn about the characteristics of an ecosystem and the major biomes of the world.

SUCCESS CRITERIA:

- define the meaning of ecosystem and identify specific examples of ecosystems
- recognize an ecosystem, determine what makes it an ecosystem
- identify some common characteristics of ecosystems
- identify and describe the major biomes of the Earth
- research a biome to determine its location(s), its climate, vegetation, animals home to it
- research and report three interesting facts about a chosen biome

MATERIALS NEEDED:

- a copy of “Defining an Ecosystem” worksheet 1, 2, and 3 for each student
- a copy of “What Makes It An Ecosystem?” worksheet 4 for each student
- a copy of “Biomes of the Earth” worksheet 5, 6, and 7 for each student
- a copy of “Researching a Biome” worksheet 8, 9, and 10 for each student
- access to the internet or local library
- dictionaries
- clipboards, pencils, pencil crayons, markers, chart paper
- access to a printer (*optional*)
- modeling clay, construction paper, glue, scissors, shoe boxes for dioramas (*optional*)

PROCEDURE:

***This lesson can be done as one long lesson, or be done in four or five shorter lessons.**

1. Divide students into pairs and give each pair worksheet 1. They will engage in a ‘Think-Pair-Share’ activity to discuss the definition of an ecosystem. Then come back together as a large group to discuss and record their ideas on chart paper.
2. Give students worksheets 2 and 3 to complete. They will need to work with a partner again to complete a section on worksheet 2. An option is to come back as a large group to orally share ideas of examples of specific ecosystems.
3. Give students worksheet 4, and a pencil and clipboard. With access to the internet, students will search for an example of an ecosystem (diagram or picture). They can either illustrate it on the worksheet space provided, or print out a copy and paste it in place. They will share and compare their drawings with a classmate, then discuss the common characteristics of an ecosystem. Students should realize that:
 - an ecosystem contains living and non-living things
 - it is ever changing, growing, reducing, without limits
 - there are different types of ecosystems in different areas, each with a purpose
 - it is an integration of living and non-living things, dependent upon each other
 - it is a functional unit, working to meet needs



4. Using worksheet 5, 6, and 7, do a shared reading with the students. Along with the content, discussion of some vocabulary would be beneficial for students so they can understand the passage.

Some interesting vocabulary words to focus on are:

climate	semiarid desert
equator	greenhouse gas
characterized	coastal desert
tropical	coniferous forest
tundra	hibernation
nourishing	deciduous forest
humid	vegetation
savanna	temperate grasslands

5. To enhance students' learning about the Earth's biomes, have them watch either 'Biomes Our Earth's Major Life Zones (fixed)' or 'Biomes of the World for Children: Oceans, Mountains, Grassland, Rainforest, Desert'. Both episodes can be accessed at www.youtube.com.
6. Give students worksheets 8, 9, and 10. They will choose a biome that they would like to learn more about. They will describe its location(s), indicate it on a world map, describe the climate, identify two types of vegetation and two animal species that are native to the biome. They will research three interesting facts about this biome. Students may need to access the internet or local library to obtain information. A follow up option is to have students share their fast facts with a classmate or small group.

DIFFERENTIATION:

Slower learners may benefit by:

- working in a small group with teacher direction to complete worksheets 1 and 2. Students' responses about the meaning of an ecosystem and specific examples could be recorded on chart paper. An option is to share these responses with the large group for added discussion.
- a reduction of expectation by either eliminating worksheet 10, or requiring these students to research only one interesting fact

For enrichment, faster learners could design a representation of the biome they chose on worksheet 8. This could be done by making a diorama. Dioramas could be displayed in the classroom, or somewhere in the school for others to observe. Students could also provide a written component to accompany their dioramas, which would detail the location(s), climate, and interesting facts about it.

Defining an Ecosystem

Think Pair Share

With your partner, do some thinking and sharing of ideas about the question below.



“What is an ecosystem?”

Record Your Thinking!

Use a dictionary to look up the meaning of the word 'ecosystem'. Record the definition below.

Ecosystem: _____

With your partner, continue to brainstorm some *specific examples* of ecosystems. Record your ideas in the box below.

Is this an ecosystem? Explain your thinking.



Is this an ecosystem? Explain your thinking.



What Makes it an Ecosystem?

Access the internet to look for examples of ecosystems. Once you find one, illustrate it in the box below, or print a picture of it and paste it in the box below.

Share and compare your image with a classmate's findings.

What are some common characteristics of ecosystems that you notice?

Biomes of the Earth

A community of plants and animals existing in a region of the Earth, within a certain climate type is called a **biome**. Biomes can be compared to very large ecosystems, in which, are smaller ecosystems. There are many different biomes on our Earth. Some of the major ones are deserts, forests, grasslands, tundra, and aquatic biomes.



These are sand dunes of the Sahara Desert in Morocco, Africa. These landforms can shift by wind in desert storms.

Only plants and animals that are suited to a region will grow and live there. For example, only plants and animals that can live in a dry climate with lack of rainfall, will survive. **Deserts** are characterized as getting very little rainfall. There are different kinds of deserts.

There are hot, dry deserts such as the Sahara Desert in North Africa. There are semiarid deserts like in Nevada, USA. There are coastal deserts like the Atacama of Chile. There are also cold deserts which are found in the polar areas of the world, like Antarctica. While some of these desert areas may experience pleasant daily temperatures, and cool nightly temperatures, they all have very little annual rainfall, and therefore are considered desert biomes.

Forests form another major biome of our planet. There are many types of forests. Each has its own climate, plants, and animals. Near the equator, where it is always very hot and rainy, are areas of thick tropical forests, called rainforests.

In the **rainforest**, the temperature is always above 18°C and the rainfall is about 250 – 450 mm annually. Rainforests are very humid because of the great amounts of water in the air. In some rainforests, it rains every day. Rainforests have very thick vegetation and most of the trees have broad leaves.



Rainforests are important because they absorb carbon dioxide, a greenhouse gas, and produce oxygen. Rainforests produce nourishing rainfall all around our planet.

Most of the forests that cover North America, Europe, and Asia are **coniferous** and **deciduous forests**. In a coniferous forest, conifer trees such as cedar, fir, and pine trees get their name from the fact that they grow cones which are filled with seeds. Many animals of a coniferous forest feed on these cones. Deciduous trees have trees growing with broad leaves that fall in autumn. Maple, oak, birch, and poplar are some types of deciduous trees.

Grasslands are another of the Earth's biomes. These are large, flat, or gently rolling areas covered with grass. There are many types of grasslands around the world, all with their own kinds of weather.

The grasslands in the cool regions of the world are called temperate grasslands. Temperate grasslands have very few trees because there is not enough rain. In North America these grasslands are called prairies or plains.

Prairie grasslands of Alberta, Canada



Savanna grasslands in Africa



The grasslands in the middle of Eurasia are called steppes. In the middle of the large southern continents, where it is very hot, the grasslands are called savannas.

A savanna is covered in bushes and tough grasses. There are very few trees because most of the year, there is little rain.

The grassland area of South America is called the pampas. It receives very little rainfall and is very dry due to its cold, dry winds.

The top and bottom of the world where there is always snow and ice are the Polar Regions. The climate is always icy cold and there is not vegetation. The animals living there depend mostly on ocean plants and other animals for their food.

Just below the polar areas is the tundra. The **tundra** is characterized as a huge treeless plain. There are three types of tundra worldwide, these being the Arctic tundra, the Antarctic tundra, and the Alpine tundra.

The Arctic tundra, which reaches from the Arctic Ocean to the northern forests, is windy and freezing cold most of the year. The water and land are frozen.



There are only about twenty mammal species living in the Arctic tundra due to the extreme winter temperatures. Most mammals living there must stay active throughout the winter to survive. Hibernation is not an option for them. Only the Arctic ground squirrel is able to hibernate and survive the low winter temperatures in this biome.

Trees will not grow in this area of the world because the earth is permanently frozen beneath the thin active layer (which is only 25 – 100 cm deep). Only when the land thaws a little in the summer can grasses and small shrubs, grow in the active layer of soil. Plants such as mosses, lichens, and grasses grow and provide food for much of the tundra wildlife.

Ecologists also divide the **waters** of the Earth into three biomes. These are the **salt waters**, the **fresh waters**, and the **wetlands**. The salt waters are the oceans and seas. The fresh waters are rivers, lakes, streams, and ponds. The wetlands are bogs, swamps, and marshes.



North Pacific Ocean



Colorado River, Grand Canyon



Wetland area

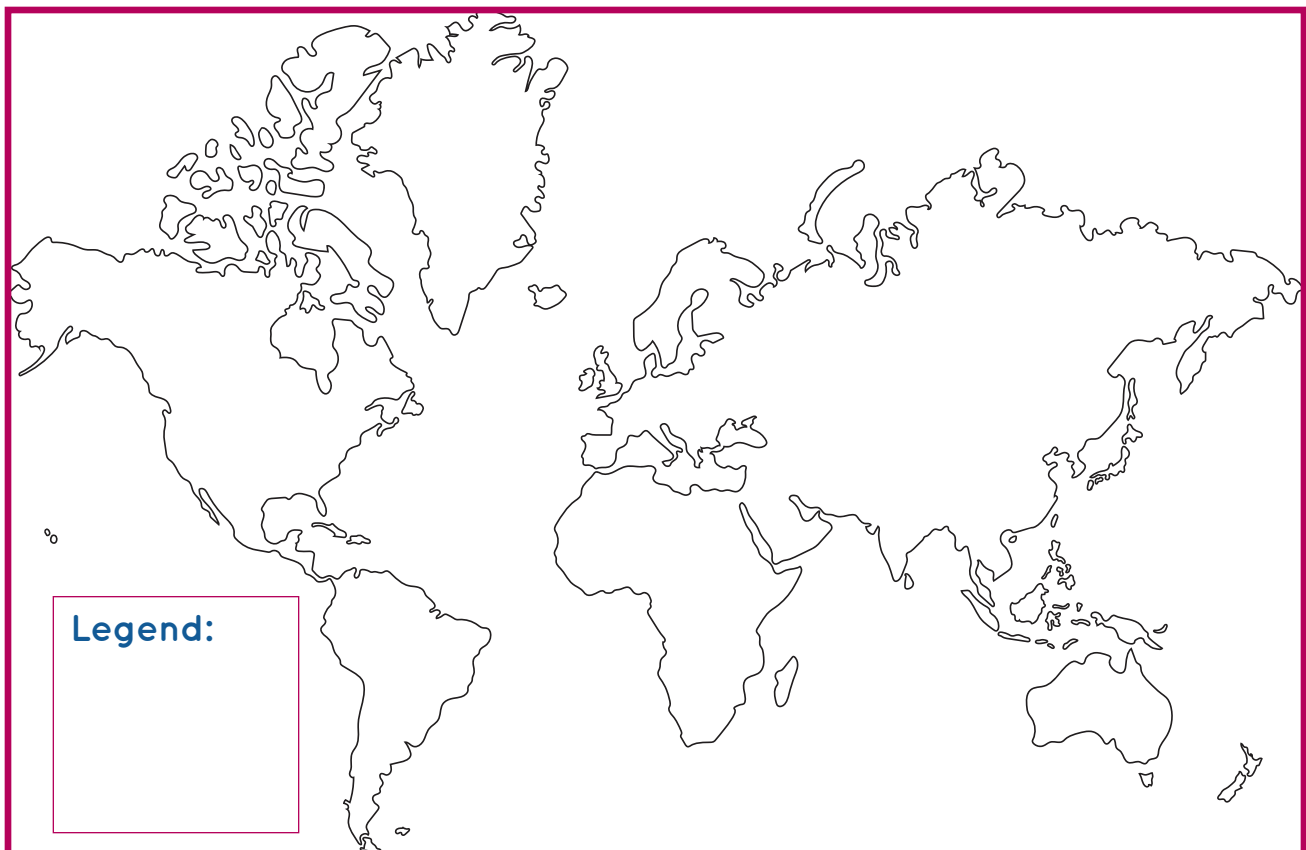
Researching a Biome

Choose a biome that you would like to learn more about. Access the internet or your local library to find out its location(s) on the Earth, describe the climate, and identify some vegetation and animals that are native to the location you chose to focus on.

Biome: _____

Describe its location(s) on Earth.

Indicate the location(s) of this biome on the world map below, include a legend.



Describe the climate in the exact location of the biome that you chose.

Illustrate and label two types of vegetation that can be found in this biome.

Illustrate and label two kinds of animals that can be found in this biome.



FAST FACT!

Research three interesting facts about the biome you chose.

Fact #1

**Fact #2**

**Fact #3**



Share your facts with a classmate!