**Science/Engineering Instructional Design Lesson Planning Template**

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Panama TREEES Curriculum Writing Project 2014

**What Is a Biome**

Lessons for the primary classroom

***Revised Summer 2014***

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| **Grade/Course:** K5 | **Topic:**  Botany/Zoology/Ecology | | **Lesson (number/title) & duration**  What is a Biome |
| **Brief Lesson Description:**  The goal of organizing these series of lessons is to ask the question “what is a biome”, moving the child from developing an appreciation and wonder about the variety of biomes towards the desire on how can we affect change that serves to protect and enhance all the of ecosystems in our world. | | | |
| **CONTENT** | | | |
| **Performance Expectation(s):**  The study of biomes can integrate many disciplines of life and physical sciences in a way that presents the world as systems of interdependency. Through this ecological view the child can use language, art and math as a way to understand our world, communicate its meaning, express its beauty and wonder and ultimately, work to sustain it. | | | |
| **Essential Question (Phenomena):**  “What is a Biome?” | | | |
| **Learning Intention(s):**  To learn what is a biome, and the characteristics of different types of biomes. | | **Success Criteri**a:  Through observations and conversations, mastery of the material will be determined. The child can self-assess through working with the material as well. | |
| **Academic Vocabulary:**  Biomes, Tropical Rainforest, Savannah, Desert, Chaparral, Grassland, Prairie, Temperate Deciduous Forest, Temperate Boreal Forest, Arctic and Alpine Tundra, Polar Regions  Names of Plants and Animals | |  | |
| **Prior Student Knowledge (Learning Progression):**  An understanding of the geographic world (knowledge of the globes, world map and continent maps) | | | |

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| **UNDERSTANDING** | | |
| **Science & Engineering Practices:**  ***(Understanding)***   * Asking questions (science) and defining problems (engineering) * Developing and using models * Planning and carrying out investigations * Analyzing and interpreting data * Using mathematics and computational thinking * Constructing explanations (science) and designing solutions (engineering) * Engaging in argument from evidence * Obtaining, evaluating, and communicating information | **Disciplinary Core Ideas:**  ***(Content)*** | **Crosscutting Concepts:**  ***(Understanding)***   * Patterns * Cause and effect: Mechanism and explanation * Scale, proportion, and quantity * Systems and system models * Energy and matter: Flows, cycles, and conservation * Structure and function * Stability and change   **Primary- Highlighted yellow**  **Secondary- Highlighted green** |
| **Possible Preconceptions/Misconceptions**  The students will most likely be unfamiliar with different types of biomes—may have real experiences with other types but could likely only know of them in the abstract. | | |
| **LESSON PLAN – 5-E Model** | | |
| **ENGAGE: Initiates the learning task - Activates prior knowledge and make connections between past and present learning experiences, and anticipate activities and focus students’ thinking on the learning outcomes of current activities. The learner should become mentally engaged in the concepts, practices, abilities, and skills of the curriculum unit.**  The students will engage with prepared nomenclature materials and be able to work individually on mastering each lesson. | | |
| **EXPLORE: Lesson Description – Provides students with a common base of experiences within which they identify and begin developing concepts, practices, abilities and skills. Students actively explore the contextual situation through investigations, reading, web searches, and discourse with peers.**  The students will explore their own biome by experiencing the natural world around them. Students will visit nearby natural resources such as Lake Michigan and Seminary Woods as well as going to the Domes and the Urban Ecology Center. Students will engage in scientific observations, collecting and examining samples and determine their conclusions based on evidence. | | |
| **EXPLAIN: Concepts Explained and Academic Vocabulary Defined– Development of an explanation for the situation students have been exploring. The learner verbalizes their contextual understanding and demonstrates their skills or abilities. Teachers introduce formal labels, definitions, and explanations for concepts, processes, skills, or abilities.**  Mastery of vocabulary will be a result of the students’ continued work with the developed materials. Students will be able to verbalize their understanding through conversations built into each lesson. | | |
| **ELABORATE: Applications and Extensions – Extends students’ conceptual understanding through opportunities for students to apply knowledge, skills, and abilities. Through new experiences, the learners transfer what they have learned and develop broader and deeper understanding of concepts about the contextual situation and refine their skills and abilities.**  Each lesson includes an extension. Students will also be free to choose to research any topic discovered why engaged in these lessons. | | |
| **EVALUATE: - Students assess their understanding and abilities and opportunities are provided for the teacher to evaluate students’ understanding of concepts and development of goals identified in learning outcomes.**  **Formative Monitoring (Questioning / Discussion):**  The Students will engage in numerous conversation guided by each, individual lesson.  **Summative Assessment (Quiz / Project / Report):**  The students will demonstrate their mastery through their work with the materials. Through teacher observation of that use, readiness for moving on to the next concept will be determined. | | |
| **Elaborate Further / Reflect:**  Through reviewing the teacher’s own observation notes, any kind of adjustments can be determined. Peer reflection and collaboration can assist in reflecting upon these lessons as well. | | |

**Materials Required for This Lesson/Activity**

Montessori Globes and Maps

Biome Maps

Nomenclature Cards and labels

Access to outdoor space

***“When one tugs at a single thing in nature, he finds it attached to the rest of the world.” --John Muir***

Connecting a young child with the natural world can prove difficult at times in an urban setting but doing so will result in great reward. From the early age of three the guide can help to inspire a reverence of nature, which in turn will transform into stewardship. This is the intention of the following lessons, beginning with introducing the child first to the broadness of the world and then offering the keys to unlock the world most near to them. Through the exploration and study of their own environment the child can then learn about other parts of the world, following their interest, all the time remembering the connection to home.

An effective way to achieve this is through the study of biomes. In Sharon Duncan’s collection of lessons entitled, “The World According to Biomes,” she asks, “What if the first impression children received of their world was of land and ocean, mountains and deserts, forests and grasslands, wetlands and frozen poles rather than abstract, divisive political boundaries?”

The study of biomes can integrate many disciplines of life and physical sciences in a way that presents the world as systems of interdependency. Through this ecological view the child can use language, art and math as a way to understand our world, communicate its meaning, express its beauty and wonder and ultimately, work to sustain it.

The goal of organizing these series of lessons is to accomplish just that beginning with the question “what is a biome” and moving towards the question, “can biomes change” as in, what causes change, what is the result of human interaction and can we affect change that serves to protect and enhance the variety of ecosystems in our world.

This collection of lessons comes from my album work from my Montessori training as well as additional classes I’ve participated in through Earth Partnership for Schools, Duncan’s The World According to Biomes previously mentioned and the collaboration and knowledge gained through working with the TREEES.

In all these presentations it is critical to remember the following:

* The child must be allowed to explore and follow their natural tendencies
* The child explores through all the senses
* There must be a connection between the materials in the classroom environment and the outside world.

Besides the lessons included here, below is a comprehensive list of various activities in each area of the classroom that can assist the child in the exploration of biomes:

Practical Life

* Plant care (introduce the child to plants from the local biome as well as other types of biomes)
* Composting
* Art or expression activities
* Gardening
* Providing outdoor space for walks and meditation
* Walking on the line outdoors
* Songs and games using nomenclature
* Hanging pictures of animals and plants on the wall and have examples of art that depicts plants and animals from local biome as well as other types.

Sensorial

* Working with globes and maps
* Botany cabinet
* Parts of a…puzzle
* Smelling bottles (examples of spices that are grown locally as well as ones from other parts of the world)

Language

* Cultural folders
* Spoken language materials
* Nomenclature cards of plants/animals from various biomes
* Literature related to specific biomes
* Introduction of cultural aspects of biomes—relating how humans live in and affect their biomes (and visa versa)

Math

* Charting and graphing bio diversity
* Measuring and calculating through scientific experiments such as “The Needs of a Plant”

**What is a Biome**

*(from “The World According to Biomes” by Sharon Duncan)*

**Materials** nomenclature cards for parts of a biome

**Purpose** To explore the different parts of a biome so that the children can understand the parts of the whole and how they interrelate

1. Invite an individual child or a small group of children
2. Say to them, “There is a biome outside.” Invite the children to explore it with you.
3. Gather outside in a sunny spot and ask the children to name everything they see, smell, feel and hear.
4. Prompt the children to name the air by having them wave their hand through it.
5. Move any vegetation you are sitting on to find the soil. Feel the moisture in the soil or notice the dew on the plants.
6. Announce to the children that there is a part of the biome that you cannot see. Have the children feel the sun. Move in and out of the shade if necessary to feel the difference.
7. Explain to the children, “The part of the biome you cannot see is the energy. That energy comes from the sun.”
8. Come back inside and brainstorm a list. Try to put things in the list under the following categories: water, soil, air, plants, animals and energy. As a variation for older children, you can imagine that you are visiting earth from outer space and go outside your ”spaceship” to make observations. Take photographs and samples to compile a group report
9. Present the nomenclature cards for the Parts of a Biome.

**Direct Aim** Introduce language of the parts of a biome

**Assessment** Children will be able to correctly arrange ‘parts of a biome cards’

**Age** 4 years and up. In order to do the nomenclature cards child should be able to read the labels.

**Related Next Generation Science Standard**

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive

Extension activities can be found in attached curriculum. Recommended lessons for primary age children include:

* All energy comes from the sun
* Planet collage
* Air ballet
* Land water and temperature
* Freshwater and salt water
* Water flows down hill
* Getting dirty
* Sand and clay
* Parts of the soil

**Biomes of the World**

**Materials** Biome world map and prepared labels

Writing box

Types of biomes nomenclature cards

**Purpose** To introduce to the child that the world contains many different kinds of biomes and to give them an impression of where in the world each type of biome exists.

**Prerequisite** The child should be familiar with globes and the world map and should be able to identify the continents.

“What is a Biome”

1. Invite the child or a small group of children
2. Bring out the continent map onto a rug
3. Introduce the world map of biomes
4. Ask the child/ren if they can identify similar shapes
5. Explain to child/ren that each color represents a different kind of biome.
6. Bring out the writing tray and write on a slip of paper the name of a biome. For example, write, “grasslands.”
7. Place the label on a part of the world where there are grasslands and give the definition. For example, for grasslands you would say, “grasslands are large, open terrains of grasses, flowers and herbs and usually very few trees. Throughout the world there are different kinds of grasslands such as prairies, savannahs and pampas. Some are wet grasslands, some are tropical and some are dry grasslands.”
8. Continue this with the other biomes
9. Introduce the prepared labels. Tell the child they can choose this work whenever they want, using these labels.
10. Depending on the child’s reading level you can introduce definitions as well

**Extensions** Introduce the child to the ‘Types of Biomes’ nomenclature cards.

**Direct Aim** The child will be able to identify different types of biomes and to be able to conceive of the world by ecological systems and not political boundaries alone

**Assessment** The child will be able to classify biomes on their own with the prepared labels

**Age** 4 years and up

**Related Next Generation Science Standard**

K-ESS3-1. Use a model to represent the relationship between the needs of the different plants and animals (including humans) and the places they live.bi

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**Biome World Map**

**Biome Folders**

**Materials** A set of folders, each containing 8 to 10 pictures of various aspects of different biomes, or major ecological community types. Each picture should have a description and location listed on the back. Sample biomes include: desert, grassland, wetland, aquatic, tundra, rainforest, seashore, swamp, barrier reef, pond, cave, savannah

**Purpose** To introduce the child and to develop a consciousness of various ecological communities.

**Prerequisite** Globes, puzzle maps and language

1. Invite the child or a small group
2. Choose a folder (such as ‘desert’)
3. Invite the child to choose a picture
4. Have a discussion about it
5. Remember the questions from reading analysis. Remember to ask open ended questions
6. Compare the picture to the child’s climate
7. Choose other pictures, as long as the child is interested
8. Invite the child to talk about that picture
9. Show the child how to put the picture away
10. Invite the child to show friends or repeat activity

**Direct aim** To stimulate conversation and help generate ideas

**Assessment** The teacher can reflect on the conversation after the lesson

**Age** 3 to 6 years

**Related Next Generation Science Standard**

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive

**The Biome in your Backyard**

**Materials** collecting containers for samples

sketch books and pencils

**Purpose** To have the children determine which biome they live in by looking at the parts of a biome and exploring the outdoors in the area.

**Prerequisite** What is a Biome, Parts of a Biome, Biomes of the World

1. Invite a small group of children
2. Announce that we will be going outside to figure out what biome is in our backyard.
3. Distribute collecting containers and review the parts of the biome you will be looking for outside. Find a spot where the children can find evidence to determine their biome. If necessary plan a field trip to a near by nature center in order to do this.
4. Collect a sample of the soil, some plant clippings, water (if possible), air and energy
5. Take a moment to do some sketching of other things the children will see that can’t be collected. Look for signs of animal life. Encourage the children to sketch plants. You can also take pictures and have these available for the children to talk about later.
6. When back in the classroom, discuss with the children their findings. You can create a table where you talk about the parts of the biome and use it to record notes about your findings. (see table attached)
7. Talk to the children about the temperature in their biome. What is the weather like today? What is it like other parts of the year?
8. Bring out the world map of biomes. Find the location of where the children live. Determine which biome you live in and see if that matches with your findings.

**Extensions** This lesson can be repeated during different parts of the year.

**Direct Aim** The child will be able to practice skills of observation and determine which type of biome exists around them

**Assessment** Through conversation and observation the teacher can determine the child’s understanding of the concept

**Age** 5 years and above.

**Related Next Generation Science Standard**

K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time

K-LS1-1. Use observations to describe patterns of what plants and

animals (including humans) need to survive

K-PS3-1. Make observations to determine the effect of sunlight on Earth’s surface

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| **energy** |  |
| **air** |  |
| **water** |  |
| **soil** |  |
| **plants** |  |
| **animals** |  |

**Biome Collecting Jars**

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**how to make a sun jar:**

**http://www.notmartha.org/tomake/homemadesunjar/**

**Biomes of North America**

**Materials** Map of North America Biomes, biome label cards, nomenclature

cards (flora and fauna)

**Purpose** To explore the variety of biomes in the child’s home continent

**Prerequisites** Biomes of the world, Biome in your Backyard, North American c continent map

1. Invite the child or a small group of children to a rug.
2. Bring out the North American continent map
3. Talk about continent—have the children identify countries they may be familiar with and point out significant land and water forms, mountain ranges, the oceans and other features.
4. Bring out the map of North American Biomes. Talk about each kind and where they are located.
5. Bring out a set of nomenclature cards—either flora or fauna. Have the children sort the cards according to the biome
6. Demonstrate matching the labels to each plant/animal
7. Introduce the control cards as the control of error
8. Invite the child/ren to continue to work with the material.

**Extensions** Biomes of other Continents

**Direct Aim** The child will be able to identify where different biomes exist and begin to learn the names of the different flora and fauna in various biomes.

**Assessment** The child will be able to match correctly the nomenclature cards

**Age** 5 years and above

**Related Next Generation Science Standard**

K-ESS3-1. Use amodel to represent the relationship between the needs of different plants or animals (including humans)

**Comparing Two Biomes**

**Materials** Two types of biome folders

**Purpose** The child will be able to discuss what makes biomes different from each other

**Prerequisites** What is a Biome, Biome folders, Biomes of the world

1. Invite the child or a small group of children
2. Bring two different biome folders to the rug
3. Take out the photographs of one folder and discuss what are the characteristics of that particular biome
4. Put those pictures to the side and do the same with the second folder
5. Ask the children if they notice anything that is the same
6. Ask the children if they notice anything that is different
7. Continue the conversation as long as the child/ren are interested

**Extension** Read stories or look at a variety of photographs from different biomes. Relate knowledge of the rain forest in Panama gained through sessions of the TREEES program.

**Direct Aim** The child will practice the critical thinking skill of compare/contrast and will be able to discuss biomes in a way that addresses multiple components

**Assessment** The teacher will be able to determine the child’s ability through conversation and observation

**Age** 4 years and up

**Related Next Generation Science Standard**

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive