

MANGROVES: MANGROVES IN OUR COMMUNITY

Grade 3, 4, & 5

ESSENTIAL QUESTIONS: WHY ARE MANGROVES IMPORTANT?

- What are the physical characteristics of mangroves?
- What types of mangrove trees are most commonly found in local mangrove swamps? (gr. 3)
- What plants and animals are most commonly found in mangrove swamps? (gr. 4 & 5)
- How are the plants and animals connected with each other? (gr. 4 & 5)

LEARNING GOALS

What should learners know and be able to do by the end of the lesson?

Students will be able to:

- Make observations of mangrove swamps:
 - Gr 3 focus on mangrove trees (physical characteristics)
 - Gr 4 focus on plants (physical characteristics, height) and common animals
 - Gr 5 focus on plants (physical characteristics height), common animals, additional physical characteristics (e.g., height of water, turbidity, soil texture, salinity)
 - Use line transect as a method to collect data on the
 - Describe observations and data collection
- Create a report based on observations and collected data of mangrove swamp

Approximate Length of Lesson:

Three to Five 45-minute class sessions; one-day field trip to mangrove swamp

Approximate Number of Minutes: 135 to 225 minutes in classroom; 480 minutes of field trip

BENCHMARKS

Grade 3: Sci.1.3.1 Make observations about objects and events and share their findings with others. Sci 1.3.4 Work individually or in teams to collect, compare and share information, data, and ideas. Sci.1.3.7 Use a variety of methods to record information. Sci.4.3.4 Observe and identify common varieties of plants and animals around the school, home and elsewhere in the local environment, such as a forest, reef, or swamp.

Grade 4: Sci.1.4.2 Use drawings, charts and graphs to communicate experimental information. Sci.1.4.3 Compare and contrast similarities and differences between things they collect and observe. Sci.1.4.5 Record and communicate data clearly.

Mth.2.4.4 Use standard and non-standard units to determine length, volume, and weight and describe the characteristics of each type of measurement. Mth.4.4.1 Collect, organize, display and describe data systematically. Mth.4.4.2 Read and interpret data using pictographs, tables, or charts.

Grade 5: Sci.1.5.1 Compare and contrast different plants and animals across and within kingdoms. Sci.4.5.5 Differentiate between producers, consumers, herbivores, carnivores, omnivores, scavengers, and decomposers and their roles for life cycles to be sustained.

Mth.2.5.4 Measure length, area, volume, and weight accurately using appropriate tools. Mth.4.5.1 Collect data using observations, measurement, surveys or experiments. Mth.4.5.2 Organize data using tables and charts and construct pictographs, bar graphs, and line graphs.

SUMMATIVE ASSESSMENT

Illustrated observation report

FORMATIVE ASSESSMENT TOOLS

- Observations (gr. 3)
- Observations and measurements (gr. 4 & 5)
- Discussions on observations and measurements
- Discussions on plants and animals (gr. 4 & 5)

FOCUSED LANGUAGE FEATURES: VERNACULAR + ENGLISH

Language Functions	Related Sentence Structures / Patterns (Examples)	Vocabulary
Predict/Make a hypothesis	I/We think that _____. I/We predict that _____ because _____.	Grade 3: <ul style="list-style-type: none"> • Prediction • Names of different mangroves • Descriptive words for physical characteristics of mangroves Grade 4 & 5: <ul style="list-style-type: none"> • Hypothesis • Names of plants and animals • Observe • Female • Male • Descriptive words for describe physical characteristics • Measure • Height • Inch • Foot • Food web Gr. 5: <ul style="list-style-type: none"> • Turbidity • Texture
Describe living things (gr. 3)	_____ looks _____. _____ is _____.	
Differentiate things (gr. 4 & 5)	Male mangrove crabs look <u>different from</u> female mangrove crabs because _____. Male mangrove crabs _____, <u>but</u> female mangrove crabs _____.	
Measure things (gr. 4 & 5)	_____ is _____ inches tall.	
Compare things in height	This mangrove tree is the <u>tallest</u> . This mangrove tree is <u>shorter than</u> that mangrove tree. That mangrove tree is <u>taller than</u> this mangrove tree.	
Compare characteristics (gr. 4 & 5)	_____ is more _____ than _____. _____ is less _____ than _____. _____ is _____er than _____.	

LEARNING SEQUENCE

Lesson: Mangroves in the community

Prior to Lesson

- Visit local mangrove swamp. Select a landmark such as a mangrove tree as a starting point
- For Gr. 3:
 - Set up line transects (around 20 foot long each, with 1 foot mark along the line) from that starting point. The line transects should cover an area of the mangrove forest. Label each line transect (e.g., Line Transect 1, Line Transect 2).

	<ul style="list-style-type: none"> ○ There should be enough line transects to assign one line transect to each pair of students. E.g., if you have 30 students in your class, there should be 15 line transects. ○ Map out locations of line transects from starting point for future reference. ○ Refer to fact sheet #1 for reference.
Activate Prior Knowledge	<ul style="list-style-type: none"> • Read aloud the essential questions for this lesson. • Give students some time to think about the questions. Ask for volunteers to share their thoughts. • Read a loud a local story about animals found in mangroves. Ask students why did people create a story about animals? (to make a literary record of animals observed in the mangroves) • Explain they will be making scientific observations and measurements (gr. 4 & 5) at a mangrove swamp
Build Background	<p>Gr. 3:</p> <ul style="list-style-type: none"> • Introduce the word “observe” and explain meaning. • Explain to students that when we observe, we draw on the five senses (sight, sound, touch, taste, or smell). • Show pictures of different mangrove parts (roots, leaves) or real-life samples of real leaves from different mangrove trees. Make connection with learning from lesson 1 (different types of mangrove trees), and come up with descriptive words based on the five senses to describe them. Record the words. <p>Gr. 4 & 5:</p> <ul style="list-style-type: none"> • Introduce the words “observe”, “measure”, and “height” and explain meaning. • Show pictures of different animals found in mangroves, and come up with descriptive words to describe observations of these animals. Record the words. • Ask students what are some ways to measure height of the following objects: desk, door, a person. • Explain to students when we measure height, we can use different tools such as non-standard tools (mats, span of palm) and standard tools (rulers, measuring tape). Review the use of inch and foot as standard measuring units. <p>Gr. 5:</p> <p>Teach meaning of the words “turbidity” (cloudiness, haziness) and “texture” (feel, appearance, consistency)</p>
Prior to visit to local mangrove swamp, go over the purpose of their visit with students	<p>Gr. 3:</p> <ul style="list-style-type: none"> • Purpose: observe what the mangrove trees look like and different mangrove trees found at the mangrove swamp; record their observations on a template; draw a picture of observations. Discuss how to turn the purpose into guiding questions for their field trip. • Ask students what they predict to find at the mangrove swamp. Record their predictions. • Review observation template.

Gr. 4 & 5:

- Purpose: observe and measure mangrove trees (physical characteristics, height) and common animals. For gr. 5 students, observe and measure additional non-living characteristics: height of water, turbidity of water, soil texture. Discuss how to turn the purpose into guiding questions for their field trip.
- Ask students what their predictions/hypotheses are to those questions. Record their hypotheses.
- Demonstrate in classroom how to set up a line transect
- Review observation and measurement template.

At the mangrove swamp

- Ask students the following questions: what is your first impression of the mangrove swamp? What does the environment look like? How does it look similar to/different from what you expect?
- Gr. 3:
 - Demonstrate to students how to make observations along a line transect.
 - Pair up students and assign each pair to a line transect.
 - For each quadrant along the line transect, each pair counts the number of mangrove trees, observes the physical characteristics of mangrove trees, records their observations on template. When finished, they draw their observations along the line transect.
 - Monitor students and provide support if necessary.
- Gr. 4 & 5:
 - At the starting point, pair up students and give each pair string, nail, and cardboard/scrap wood to set up their line transect (20 feet long). Label each line transect and map out locations of line transects from starting point for future reference.
 - Gather all students together and go over how to collect data:
 - Gr. 4: count number and observe physical characteristics of mangrove trees, measure their height, observe animals. Record counting, measurement, and observations on template.
 - Gr. 5: count number and observe physical characteristics of mangrove trees, measure their height, observe animals, and observe non-living characteristics (height of water, turbidity of water, soil texture).
 - Record counting, measurements, and observations on template.
 - Have students work in pairs and make observations and measurements along their line transects. Monitor and provide support if necessary.
- When observations and measurements are completed, gather all students together. Point to the surroundings and discuss the following:

- Physical characteristics of mangrove trees (roots, leaves, size) and explain why they look the way they look (refer to fact sheet #1 for more information)
- Why mangroves grow in that area (brackish water)
- Why mangrove trees are very special trees (importance of mangrove trees to students and families; importance of mangrove trees for animals)

Reviewing and sharing of observations in classroom

Gr. 3:

- Review students' predictions.
- Have students share out their observations and add new descriptive words to word bank
- Discuss the different types of mangrove trees found in the mangrove swamp (if applicable. Refer to fact sheet #2 for reference)
- Compare observations made along the transect line and ask questions such as:
 - Which types of mangrove trees are most abundant? Where are they most abundant?
 - Does the number of mangrove trees change as we moved away from our starting point?
- Discuss the differences in height of the mangrove trees, and teach the language to compare height of the different trees (e.g., "This mangrove tree is the tallest. This mangrove tree is shorter than that mangrove tree. That mangrove tree is taller than this mangrove tree.")
- Review the benefits we get from mangroves, identified from lesson 1
- Make connections to any existing law that restricts the size of the mangrove trees to be harvested, and discuss why such law exists (to prevent overharvesting and destruction of the mangrove swamp)
- Based on the law, have students decide which of the mangrove trees they observed/measured would be ok to harvest, and which would not be.

Gr. 4 & 5:

- Review students' hypotheses
- Compare observations made along the transect line and ask questions such as:
 - Which types of plants and animals are most abundant? Where are they most abundant?
 - Does the number of (insert specific plant and animal) change as we moved away from our starting point?
- Discuss the different types of animals benefit from the mangrove (Refer to fact sheet #3 for reference)
- Show picture of two mangrove crabs ask students if the mangrove crab they observed look the same as this. Explain that the female and male mangrove crab look different, and discuss the differences (the abdomen on the underside is narrower in males and much wider in females). Teach and practice using the language to differentiate male and female crab (e.g., "Male

mangrove crabs look different from female mangrove crabs because _____. Male mangrove crabs _____, but female mangrove crabs _____.”)

Gr. 5:

- Discuss and compare observations made on height of water, turbidity, and soil texture, such as:
 - Where is the water the deepest? Where is the water the shallowest?
 - What is the soil texture where the water is deep? What is the soil texture where the water is shallow?
 - Does the water become clearer or cloudier as we moved away from the starting point?

Graphing Sampling Data

- Show students a sample graph (gr. 3 & 4: pictograph; gr. 5: line graph), and explain the meaning of x-axis, y-axis.
- As a class, pick one type of data observed (e.g., number of a type of mangrove trees in each quadrant). Label the graph accordingly (e.g., x-axis represents the quadrant number, and y-axis represents the number of trees) and plot the graph.
- Discuss the graph: what relationship does it show you? Does it show a pattern? What conclusion can you make about the type of mangrove trees in the mangrove swamp?
- Have students work with the same partner from the mangrove swamp to create graphs for their sampling data.
- Have each pair share and describe a graph with rest of class.

Connection Between Plants and Animals in Mangrove Swamp (Gr. 4 & 5)

- Refer to the animals found in the local mangrove swamp
- Have students get into small groups. Distribute pictures and descriptions of common animals found in mangrove swamps (from fact sheet #4). Have students work in groups to match picture with the corresponding descriptions.
- Go over matching together. At the end, ask how do the animals connect with each other? How do they connect with the mangrove trees?
- Have students first work in their groups to organize the pictures in a way to show the connections. Then, discuss as a whole class the connections between the animals, in relation to the mangroves. Introduce the word “food web” and add to word wall.

Report on Visit to Mangrove Swamp

- Have students work with the same partners as their mangrove swamp visit
- Write a short report on their visit to the Mangrove Swamp:
 - Summarize their observations and measurements
 - Create a graph to show relationship between plants/animals and the quadrants along the line transect (gr. 4 & 5)
 - Create a graph to show relationship between height of water and the quadrants along the line transect (gr. 5)
 - Include drawings from the observations

-
- Summarize learning from the discussion in classroom
-

Revisit K-W-L chart from lesson 2 and answer questions/record new learning

Essential Question

Review the essential questions for this lesson. Ask for responses based on what we have learned.

RESOURCES

- Local story on animals found in mangrove
- Gr. 3: measuring tool; pictures or real-life samples of different mangrove plant parts such as roots and leaves; observation template; pencils to record observations and draw
- Gr. 4 & 5: measuring tool; observation and measurement template; pencils to record measurement and draw; copies of fact sheet #4 with the animals and descriptions cut out and separated.
- Heavy string, nails, and cardboard pieces or scarp wood for line transects
- Fact sheets on line transect (fact sheet #1) physical characteristics of mangrove trees (fact sheet #2), types of mangrove trees (fact sheet #3), and different animals living in mangroves (fact sheet #4)
- Paper to write report
- K-W-L chart from lesson 2