

Adapted from Clementi & Terrill. (2013). *Keys to planning for learning*. ACTFL

# MANGROVES: ENVIRONMENT; ORGANISM ADAPTATION; MARINE ORGANISMS; ECOSYSTEMS

Grade 3, 4, & 5

## ESSENTIAL QUESTIONS: WHY ARE MANGROVES IMPORTANT?

- What do humans and other living things get from mangrove ecosystems?
- What kinds of things can harm mangrove ecosystems?
- How is a mangrove ecosystem related to other ecosystems?
- 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)
- What does a healthy mangrove ecosystem look like?
- How can we share the importance of healthy mangroves with the community?

## LEARNING GOALS

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

Students will be able to:

- Identify mangrove ecosystems on their islands
- Describe the relationship between a mangrove ecosystem and ecosystems on the island, using a common feature such as water
- Describe characteristics and physical features of a healthy mangrove ecosystem
- Name the benefits and services provided by a mangrove ecosystem
- Explain importance of mangroves
- Explain how certain things and actions can harm mangrove ecosystem
- State cause and effect of harms done to a healthy mangrove
- Share new learning on mangrove ecosystem with others

**Approximate Length of Unit:** 2 ½ to 3 weeks  
(twelve to fifteen 45-minute class periods; one day field trip)

**Approximate Number of Minutes Weekly:** 225 minutes per week

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## BENCHMARKS

Gr. 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.1.3.5 Identify cause and effect relationships.
- 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.
- Sci.5.3.1 Name and describe living things that are found in the ocean, reefs and swamps.

Gr. 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.
- Sci.4.4.3 Recognize factors that cause or contribute to rapid changes in the environment and describe the impact of such rapid changes on animal and plant life.
- Sci.5.4.1 Describe the variety of life forms found in the sea and in fresh water.
- 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.

Gr. 5:

- Sci.1.5.1 Compare and contrast different plants and animals across and within kingdoms.
- Sci.1.5.2 Explain cause and effect relationships in nature, for example, that a lack of rain results in plants being stressed and sometimes dying.
- Sci.4.5.4 List and explain some of the negative human activities that have long-term effects on plants and animals.
- Sci.4.5.5 Differentiate between producers, consumers, herbivores, carnivores, omnivores, scavengers, and decomposers and their roles for life cycles to be sustained.
- Sci.5.5.3 Describe that global warming is causing sea levels to rise, and explain how sea level rise can impact marine ecosystems.
- 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.
- ELA.3.5.1 Use grade-appropriate pre-writing strategies before writing.
- ELA.3.5.3 Write for specific purposes.
- ELA.3.5.4 Demonstrate writing skills by revising and editing own writing and those of others.

## FOCUSED LANGUAGE FEATURES: ENGLISH

Language Functions	Related Sentence Structures / Patterns (Examples)	Vocabulary
State the location	The mangroves are located <u>at/near/close to</u> _____ .	high island adapt environment (gr. 3 and 4) ecosystem (gr. 5) swamp brackish water benefits harm healthy roots adjectives and nouns to describe characteristics and features verbs and nouns to describe benefits and services vocabulary for observation and measurement turbidity (gr. 5) texture (gr. 5) ETC.
Describe relationship	from, to	
Describe characteristics and physical features	Mangroves have _____ . We can find _____ in mangroves. Mangrove trees look like _____ . Mangrove trees have _____ for _____ . Their _____ is/are _____ .	
Explain importance of mangroves/how things and actions can cause harm	because, as a result of, this leads to, if...then	
Ask and answer questions about mangroves	Who/What/When/Where/Why questions	
Differentiate/Distinguish 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 _____ . A healthy mangrove _____ . <u>On the other hand</u> , an unhealthy mangrove _____ .	

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<b>Measure things (gr. 4 &amp; 5)</b>	_____ is _____ inches tall.	
<b>Compare things in height</b>	This mangrove tree is the tallest. This mangrove tree is shorter than that mangrove tree. That mangrove tree is taller than this mangrove tree.	
<b>Compare characteristics (gr. 4 &amp; 5)</b>	_____ is more _____ than _____. _____ is less _____ than _____. _____ is _____er than	
<b>State cause and effect</b>	If <u>cause</u> , then <u>effect</u> . <u>Effect</u> because <u>cause</u> . <u>Cause</u> so <u>effect</u> .	
<b>Suggest ideas</b>	What if we _____? I suggest we _____.	
<b>Agree with others</b>	I agree that _____. I think _____ is right.	
<b>Ask for clarification/more information/help</b>	What does _____ mean? How do I _____? Could you help me with _____?	
<b>Present information to others</b>	My _____ is about _____.	

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## SUMMATIVE PERFORMANCE

Students will complete the following end task(s):

Gr. 3: mural of a healthy ecosystem

Gr. 4: science fair presentation

Gr. 5: narrative on a day in the life of a living thing from the mangrove ecosystem; reading aloud to lower grade students

## LEARNING SEQUENCE

**Lesson 1: My Mangroves— what do humans and other living things get from mangrove ecosystems? What kinds of things can harm mangrove ecosystems?**

*One 45 to 60-minute class session*

<b>Key Activities</b>	<ul style="list-style-type: none"> <li>• Imaginary walk</li> <li>• Interview video</li> <li>• Poster</li> </ul>
<b>Formative Assessment</b>	<ul style="list-style-type: none"> <li>• Responses to essential questions at beginning of lesson</li> <li>• Student drawings of mangrove environments</li> <li>• “Temperature check” questions</li> </ul>
<b>Benchmarks</b>	<p>Gr. 3: Sci.5.3.1 Name and describe living things that are found in the ocean, reefs and swamps.</p> <p>Gr. 4: Sci.4.4.3 Recognize factors that cause or contribute to rapid changes in the environment and describe the impact of such rapid changes on animal and plant life.</p> <p>Gr. 5: Sci.4.5.4 List and explain some of the negative human activities that have long-term effects on plants and animals.</p>
<b>Resources</b>	<ul style="list-style-type: none"> <li>• Word wall vocabulary cards</li> <li>• Pictures of different mangroves and organisms</li> <li>• Mangrove elder interview video</li> <li>• Drawing supplies - paper, markers or crayons, UHU</li> </ul>

**Lesson 2: Mangroves: Mangroves on the Island**

*Two 45-minute class sessions*

<b>Key Activities</b>	<ul style="list-style-type: none"> <li>• Show pictures of different mangroves and complete K-W-L chart on mangroves</li> <li>• Read high island book and discuss the different types of ecosystems. Refer to illustrations from High Island book to describe the relationship between a mangrove swamp and other environments/ecosystems on the island               <ul style="list-style-type: none"> <li>○ Where do mangroves grow?</li> </ul> </li> </ul>
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	<ul style="list-style-type: none"> <li>○ How is the mangrove swamp connected to other ecosystems?</li> <li>○ Where does the water come from? Where does the water flow to?</li> <li>● Create a model and demonstrate the water flow in and out of mangrove using the following materials: modeling clay or mud to build land with slope, a tray of salty water with sand that connects to “land”. Use fresh water and create a “river” going downhill of the slope. Ask students what they think will happen to the area where the fresh and salty water meets (brackish water)</li> <li>● Create an illustration with labels to indicate the water flow to and from the mangroves</li> <li>● Revisit K-W-L chart and answer questions/record new learning</li> </ul>
<b>Formative Assessment</b>	<ul style="list-style-type: none"> <li>● Responses to comprehension questions</li> <li>● K-W-L chart</li> </ul>
<b>Benchmarks</b>	<p>Grade 3: Sci.5.3.1 Name and describe living things that are found in the ocean, reefs, and swamps.</p> <p>Grade 4: Sci.5.4.1 Describe the variety of life forms found in the sea and in fresh water.</p> <p>Grade 5: Sci.1.5.2 Explain cause and effect relationships in nature, for example, that a lack of rain results in plants being stressed and sometimes dying.</p>
<b>Resources</b>	<ul style="list-style-type: none"> <li>● Flash cards</li> <li>● UHU</li> <li>● IREL’s <i>Our High Island Home</i> (gr. 3-5)</li> <li>● Pictures of different mangroves</li> <li>● K-W-L chart</li> <li>● Materials to demonstrate water flowing in and out of mangrove swamp: modeling clay, mud, small rocks, tray, salt water, sand, grass</li> <li>● Paper to create illustration</li> <li>● Markers</li> </ul>
<p><b>Lesson 3: Mangroves: Mangroves in Our Community-- 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 &amp; 5) How are the plants and animals connected with each other? (gr. 4 &amp; 5)</b></p> <p><i>Three to five 45-minute class sessions; one-day field trip</i></p>	
<b>Key Activities</b>	<ul style="list-style-type: none"> <li>● Visit a local mangrove swamp and make observations and measurements on the following: <ul style="list-style-type: none"> <li>○ Gr 3 focus on mangrove trees (physical characteristics)</li> <li>○ Gr 4 focus on plants (physical characteristics, height) and common animals</li> </ul> </li> </ul>

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	<ul style="list-style-type: none"> <li>○ Gr 5 focus on plants (physical characteristics height), common animals, additional physical characteristics (e.g., height of water, turbidity, soil texture, salinity)</li> <li>● Use line transect as a method to collect data</li> <li>● Discuss and compare observations, and graph sampling data</li> <li>● Gr. 4 &amp; 5: Matching living things commonly found in mangrove swamps with their characteristics; discuss connections through food web</li> <li>● Write an illustrated report of the observations and measurements</li> <li>● Revisit K-W-L chart and answer questions/record new learning</li> </ul>
<b>Formative Assessment</b>	<ul style="list-style-type: none"> <li>● Observations (gr. 3)</li> <li>● Observations and measurements (gr. 4 &amp; 5)</li> <li>● Discussions on observations and measurements</li> <li>● Discussions on plants and animals (gr. 4 &amp; 5)</li> </ul>
<b>Benchmarks</b>	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>
<b>Resources</b>	<ul style="list-style-type: none"> <li>● Local story on animals found in mangrove</li> <li>● 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</li> </ul>

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- 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

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**Lesson 4: Mangroves: Healthy Mangroves—What does a healthy mangrove environment / ecosystem look like? What can harm a healthy mangrove environment/ecosystem?**

*Two 45-minute class sessions*

<b>Key Activities</b>	<ul style="list-style-type: none"> <li>• Review of characteristics of a mangrove swamp</li> <li>• Review of interview from lesson 1</li> <li>• Scenarios of different actions done towards mangrove as a result of their benefits/services, and discussion on the impact</li> <li>• Create a cause/effect flow chart to show how certain things and actions can harm mangrove swamps</li> <li>• Drawings of healthy and unhealthy mangroves</li> <li>• Perform or write and perform a song to describe characteristics of healthy mangroves and things that can harm healthy mangroves</li> <li>• Revisit K-W-L chart and answer questions/record new learning</li> </ul>
<b>Formative Assessment</b>	<ul style="list-style-type: none"> <li>• Vocabulary review</li> <li>• Responses to discussions</li> <li>• Student drawings of healthy and unhealthy mangroves</li> </ul>
<b>Benchmarks</b>	<p>Grade 3: Sci.1.3.5 Identify cause and effect relationships. Sci.5.3.1 Name and describe living things that are found in the ocean, reefs, and swamps.</p> <p>Grade 4: Sci.4.4.3 Recognize factors that cause or contribute to rapid changes in the environment and describe the impact of such rapid changes on animal and plant life.</p> <p>Grade 5: Sci.1.5.2 Explain cause and effect relationships in nature (for example, that a lack of rain results in plants being stressed and sometimes dying). Sci.5.5.3 Describe that global warming is causing sea levels to rise, and explain how sea level rise can impact marine ecosystems.</p>
<b>Resources</b>	<ul style="list-style-type: none"> <li>• Pictures of mangrove forests</li> <li>• Fact sheet #5 on sea level rise and mangroves</li> <li>• Cause/effect flow chart</li> <li>• Paper for drawing</li> </ul>



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- Pencil and markers for drawing
  - Scenarios
  - Song about mangroves
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### Lesson 5: Grade-Level End Task—How can we share the importance of healthy mangroves with the community?

*Four to five 45-minute class sessions*

#### Key Activities

- Review the L-column of the K-W-L chart

##### *Grade 3: Mural of a healthy mangrove*

- Determine location of mural: school? local building? public space?
- As a class, decide what the healthy mangrove will look like and consist of
- Create a draft mural on poster paper
- Assign students to work on specific parts of the mural

##### *Grade 4: Science Fair*

- Have students work in small groups to create science fair presentation, focusing on presenting their line transect data and learning about why mangroves are important

##### *Grade 5: Narrative on a day in the life of a living thing from the mangrove ecosystem*

- Mini-lesson on writing a narrative and personification
- Each student picks a living thing, and writes about a day in the life of that living thing in a mangrove swamp, including events that correspond to the essential questions and include 2 to 3 facts about the living thing. Audience for narrative: lower grades (gr. K-2)
- Participate in a buddy reading event where students read their narratives to students from lower grades

#### Formative Assessment

Drafts of products  
Peer and self feedback  
Products from end tasks

Gr. 5: Responses to discussion; personification chart; completed storyboard; feedback to other storyboard

#### Benchmarks

Grade 3: Sci.1.3.4 Work individually or in teams to collect, compare, and share information, data, and ideas.

Grade 4: Sci.1.4.2 Use drawings, charts and graphs to communicate experimental information. Sci.1.4.5 Record and communicate data clearly

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Grade 5: Sci.4.5.3 Describe how animals depend on plants to survive and carry on their life functions and how plants depend on animals from continuation of their life cycles.

ELA.3.5.1 Use grade-appropriate pre-writing strategies before writing.

ELA.3.5.3 Write for specific purposes.

ELA.3.5.4 Demonstrate writing skills by revising and editing own writing and those of others.

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**Resources**

Gr. 3: songs and drawings from lesson 4; data and graphs from lesson 3; paint; poster paper; wall space

Gr. 4: K-W-L chart from lessons 2, 3, and 4; data and graphs from lesson 3; template to outline content for science fair presentation; materials to create science fair presentation

Gr. 5: K-W-L chart from lessons 2 to 4; data and graphs from lesson 3; personification Chart: Living Things from the Mangrove Swamp; story board template to outline narrative

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