Discovering the Mangroves of Sarasota Bay

Grade Level: 4th – 12th, Grades
Subject: Science
Duration: 45- 60 minutes
Materials Part 1: Guide to Mangroves of Florida, Mangrove information Sheet, Venn diagram, Mangrove Comparison Chart
Materials Part 2: 7 sets of laminated mangrove leaves, Leaf Data Chart, Rulers (19 included in kit)

Next Generation Sunshine State Standards: SC4.N.2.1, SC.4.L.16.1, SC.4.L.16.2, SC.4.16.4, SC.4.L.17.2, SC.4.17.4, SC.5.N.2.1, SC.5.L.15.1, SC.5.L.17.1, SC.6.N.3.2, SC.6.L.15.1, SC.7.E.6.6, SC.8.L.18.1, SC.912.L.17.1, SC.912.L.17.1, SC.912.l.17.8

Overview: Mangroves provide food and a safe haven for many of our coastal and marine wildlife. Students will read about the different types of mangroves found in our estuaries then measure and graph the length of mangrove leaves.

Objectives: Students will:

- Compare and contrast the 3 different types of mangroves
- Measure length of a sample of mangrove leaves
- Graph the data and identify the different mangrove species

Background: Mangroves are tropical trees that are adapted to growing in salt water; three species are native to Florida's estuaries. The trees form a dense tangle of roots and branches. The mangroves grow up to a height of 25-40 feet and their canopies many span 25-30 feet. They are also found in the estuaries of Mississippi, Alabama, and Louisiana. Florida's mangrove forests (the most extensive in the US) cover more than 400,000 acres. Red and white mangroves only grow as far north as Tampa Bay. Black mangroves are more tolerant of cooler weather and are found as far north as Florida's Big Bend area. Mangrove forests fringe about 75% of the world's tropical coastline. Mangrove trees are also found in the tropical areas of South America, Central America, West Indies, Africa, Australia, East Indies and the Philippines.

Red mangroves *Rhizophora mangle* tend to grow furthest out into the salt water, directly on the shoreline. Black mangroves live in the mudflats that set back from the water and the White mangroves live the farthest back on dry land that is sometimes flooded by salt water. Red mangroves are identified by their bright green leaves and arched prop roots, which are reddish in color. The leaves have a rounded leaf tip and are covered by a thick layer of wax. Red mangrove trees get rid of the salt by filtering the salt from their roots. Any salt that is not removed

will end up in some of the leaves which then die and drop from the tree. These leaves become detritus, which is an important source of food for many estuarine creatures. Red mangroves have a whitish flower that germinates while still on the plant. It produces a long cigar shaped structure that falls off to become a new mangrove plant. These structures are called propagules.

Black mangroves *Avicennia germinans* have smaller and narrower gray-green leaves. The underside of the leaf is a lighter color. The leaves do not have a waxy layer and are therefore are of normal thickness. The trunk of the tree appears almost black in color. The mud they live in is often anaerobic (lacks oxygen). The Black mangrove roots have adapted to these conditions with **pneumatophores (breathing tubes)**: pencil shaped structures which can be up to 10 inches long that rise from the roots to absorb oxygen. Black mangroves excrete salt from the pores of their leaves; salt crystals can often be observed on the top of the leaf.

White mangroves *Laguncularia racemosa* have leaves that are green with a very broad notched leaf tip. The leaf petiole has two small bump-like glands. Because the white mangrove lives so far back from the saltwater, their roots have no special adaptations. They also excrete salt form the pores on the leaves.

Mangroves leaves when they are shed break down and become a primary food source in the estuary. As the fallen leaves decompose the detritus is consumed by small organisms that are then consumed by larger ones and so on up the food chain to humans. The canopy of branches and leaves provides a roost and rookery for many species of seabirds such as pelicans, roseate spoonbills, cormorants, egrets, night herons, great blue herons and wood storks. These birds nest closer to each other to provide protection for the eggs and young from predators such as snakes, rats and raccoons. The roots of the mangroves provide food and shelter for clams, whelks, crabs and other creatures. Mangroves also protect the shoreline from erosion during a storm. The roots slow the wind and tidal currents as well as storm waves. The roots also take up nutrients and chemicals, which aids in protection from pollution.

Human disturbances can have severe effects on mangrove populations. These effects result from dredging, filling, building of seawalls, oil spills, and runoff of fertilizers and herbicides. Some coastal development results in total loss of habitat. The remaining mangroves are essential to the health of our estuaries and must be protected.

Procedure Part 1:

1. Read the *Guide to the Mangroves of Florida* or *Mangrove Information Sheet* found in this kit.
2. Use the triple Venn diagram or the Mangrove Comparison Chart to compare and contrast the 3 different types of mangroves.

Procedure Part 2:

1. Give each group of students a bag of mangrove leaves.
2. Students are to use the information they have learned about mangroves to sort the leaves into groups by species (Red, Black or White).
3. Measure the length and width of each mangrove leaf and record on the Mangrove Leaf Data Chart.
4. Find the mean for both the length and width of each mangrove species.
5. Using a double bar graph, graph the mean length and width for each species.

Assessment:

- Draw and illustrate a food chain or food web that has the mangroves as food source. Include the producers, consumers, and decomposers.
- Research and hypothesize the effect of climate change on the existence of the mangroves in the Sarasota Bay Estuary.

Resources:

Mangrove Maniacs video
http://estuaries.noaa.gov/Estuarylive/VideoGallery.aspx?ID=111 (excellent introduction to Mangroves)
Migrating Mangroves and Marshes
http://estuaries.noaa.gov/Teachers/mangroves.aspx (additional projects)
Mangrove Biology; www.education.nationalgeographic.com, 2010
Ferguson, J. David, *Marine Adventures* .1996

Adapted from: Cruikshank,A,; Ferguson,J.D; Goodwin,S; Kicklighter,L; Warren,J,; Bone,D; *The Estuary and the Economy;* Manatee County Schools Environmental Education 1992