

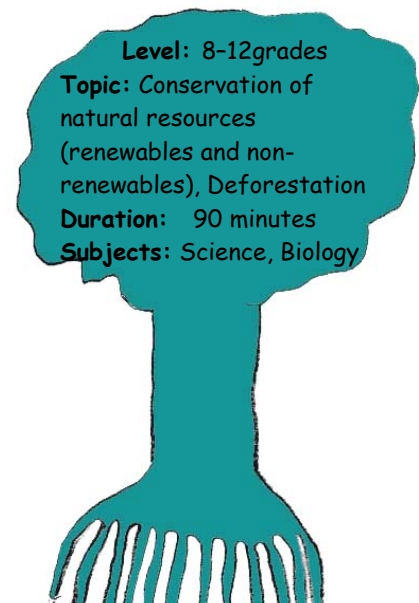
Mangroves in Panama: Living on the Edge

Objectives:

1. To learn and identify the general characteristics of a mangrove
2. To understand the interconnectedness between the improper removal of bark from mangroves and the loss in economic and natural resources
3. To consider some solutions to the commercial loss of mangroves

Learning Skills: co-operative learning, classifying, comparing and contrasting, problem solving

Background: Mangroves exist in all parts of the world both in tropical and subtropical habitats. There are around 50 types of mangroves worldwide. However, Panama has three common types: the red mangrove, the black mangrove, and the white mangrove. The most common mangrove in Panama is the red mangrove because it is the easiest to see and identify. Where are mangroves found in Panama? Mangroves are found along the coasts of both the Pacific Ocean and Caribbean Sea. Mangroves need certain conditions to survive. Warm, clean shallow water and a sufficient amount of fresh water from a river, a lake or rain are necessary. Mangroves have developed interesting adaptations for survival in their habitat including tolerance of brackish or salt water, ability to excrete excess salt, and thick, spongy leaves and root systems for survival in a habitat which is periodically flooded with salt water. Although mangroves can live in salt water, they normally live in tidal areas where fresh water plants cannot live. What distinguishes mangroves from most other plants? The ability to obtain fresh water from salt water separates them from most other plants. How do mangroves keep the salt content in the soil? Mangroves either excrete excessive salt through specialised salt glands or by "filtering" salt out with their roots, or both. Mangroves also need to help prevent the loss of their freshwater supply. They have a waxy covering to help prevent loss of their fresh water supply. Mangroves depend on well-adapted root systems for oxygen delivery since the root systems are submerged in poorly aerated soils. There are two methods from which



oxygen is obtained: 1) through aerial roots which grow down into the sediment from branches (red mangrove) 2) or by pneumatophores (finger-like projections) arising from underground roots and extending well above the soil (white or black mangroves). What is the ecological importance of mangroves? There are extensive root systems that help stabilise shoreline and reduce inland flooding during severe storms. The root systems also help preserve water quality and reduce pollution by filtering suspended material and assimilating dissolved nutrients. The maze of roots provides an excellent habitat and cover for fish and invertebrates. As the leaves decompose, they fall into the water providing an extremely important food source for a wide variety of animals. Mangroves serve as an excellent nursery area as they provide both cover and food. The majority of commercially valuable fish and shellfish depend at least part of their life in the mangrove like snappers, Roncos, shrimps, snails, oysters, lobsters, and octopus. Many waterbirds such as the brown pelican, white ibis, and great blue heron, rely on the mangrove system for nesting.

Vocabulary: mangrove, habitat, tidal areas, filtering salt, aerial roots, and nursery area

Materials: mangroves field guides, easel, big paper, writing instruments, newspaper clipping situational model.

Methodology:

1. Docents will introduce themselves and give a brief overview of the Marine Exhibition Centre.
2. Low tide permitting, docents will take students down to sandy beach shore and will ask if there is an unusual phenomenon occurring on the rocky shores. Let students individually come up with responses.
3. Walk down to mangroves and let students individually observe the root systems and leaf texture of mangroves (5 minutes).
4. Let them discuss their observations in groups of three for 5 minutes.
5. Docents will listen to student's discussions.
6. Docents will then clarify comments made by students and discuss the characteristics of different mangroves to entire group. These characteristics will include mangrove's root systems, leaves, seeds and flowers (if seasonal).



7. Students will be asked to identify mangrove type (red, white or black) found on Culebra's rocky and sandy shores using field guides (10 minutes). Docents need to explain use of field guide.
8. Students will discuss why they believe the mangroves are a particular type by using the chart to verify their results (5 minutes).
9. Following this activity, students will be given a newspaper clipping entitled "Mangrove Bark Extraction in Azuero was suspended" (this activity will take place in bunker).
10. Students will form groups of three and discuss mangrove bark stripping. Each student will come up with his or her own problem-solving idea and how to conserve this natural resource.
11. Docents will categorise and list solutions on big paper using easel. Then end with a conclusion or conservation message.

Extensions in classroom:

1. Have students compare white mangrove to other types of mangroves
2. Have students explain how pollution affects the commercial value of mangroves

Evaluation: Have students complete situational model

References: Teacher's Guide to Miami Sea aquarium, Marine Botany Textbook (STRI Library), La Prensa News Article, August, 1 2000.



Situational Model

Mangrove Bark Stripping: Is There a Solution to the Problem?

La Prensa, August 1, 2000

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Mangrove Bark Extraction in Azuero was Suspended

The Azuero region, a coastal region of Panama, is known for its mangrove population. Recently, there has been a suspension of mangrove bark extraction because adequate conservation measures are not being taken. However, adequate measures can be taken to remove the bark properly and this natural resource can be protected. What has the mangrove bark suspension meant to the Azuero region? So far, five tanneries have been affected because it has interrupted the process of tanning due to damaging the bark of the mangroves. According to the Tannery Union, this has represented economic losses to 40 heads of families and this does not include those dedicated to the workmanship of saddles, leatherstraps, sandals, furniture and other activities. The entire country depends on the Tannery Union for its important leather supply. Consequently, solicitation of permission has allowed for the processing of the mangrove bark in the zone that ANAM (Autoridad Nacional del Ambiente) thinks is convenient. La Pesera, the Guarare district, is one of zones that has the greatest population of mangroves in the Azuero region. The communities where the mangrove bark is most exploited are La Hondita, Estero, Hondo y Las Garitas. As every day passes, the losses are greater. Furthermore, the processing of mangrove bark is slow, around 45 days.

As citizens of the community, how would you find a solution to this problem? How can mangroves be preserved?

