CTA-069-Mangrove Trees

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MANGROVE TREES

What are mangroves?

Mangroves are trees that are adapted to live in areas that are often flooded by water, places called wetlands. In these areas there are three types of mangroves: red, black and white that live in saltwater wetlands. Each has a different tolerance for the amount of salt and water they can live in.

Why mangroves are important?

1. All mangrove roots trap sediment washed from hillsides during rain, especially from cleared land. This keeps our ocean water clear and protects our reefs and seagrass beds. Mangroves are often called landformers since the soil they trap causes the shoreline to grow seaward over time. The mangroves continue to grow out on the edge of this expanding shoreline while terrestrial plants colonize the land behind the mangroves.

2. Black mangrove pneumatophores not only act as a "snorkel" for the roots to breath, they trap sediment and may remove chemicals from water running into the sea. Many people view these areas as wasted land and would like to fill them with soil to make them productive. This covers the pneumatophores and kills the trees.

3. Red mangrove roots underwater serve as a nursery area for most coral reef fish and many invertebrates. Most fish caught by fishermen on reefs need this important habitat to grow up in, safe from predators and with a good food supply. These roots also protect our shorelines from wave erosion during storms.

4. A lot of terrestrial wild life such as hummingbirds, pigeons, herons and iguanas either nest, rest or feed in mangroves over water to be safe from predators.

5 The red mangrove leaf is dark green and shiny. The fruit is called a "pencil" and is actually a baby tree that sticks in the mud and grows when it falls from the tree. It may also float great distances to colonize other areas.

6. The white mangrove has adapted to living in wet, salty soils by excreting excess salt through pores at the base of each leaf. Look for these bumps with a little hole on top.

7. Black mangrove leaves are long and narrow and covered with salt crystals underneath. This is how they have adapted to living in salty soils and ridding themselves of excess salt.

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8. Since mangroves often occur in protected bays, they are ideal sites for marinas and boat facilities. Tying your boat to mangroves in a storm is considered OK, but as a long-term mooring method it can damage the bark and kill the tree.

9. Many people think of mangroves as smelly places suitable for dumping trash and other unwanted material. This can damage the roots and harm the crabs and birds that live here. Dispose of your garbage properly.

10. Decaying leaves and twigs in the water under mangroves provide a rich source of nutrients for other nearby marine ecosystems such as seagrasses and coral reefs.

In general, mangroves have been found to be useful in a variety of ways. Red mangrove wood is heavy and durable. The bark is used for tanning and medicinal purposes. The bark, leaves and shoots yield various dyes. The leaves have been used for cattle feed and contain high amounts of protein.

The flowers of most mangroves yield high grade honey and the woods are used for charcoal production. Through careful management all of the values and uses of mangroves can be maintained.

Mangroves are indigenous to the tropics and subtropics worldwide with most of the species found outside of the Americas. There are three species of mangroves growing on Ambergris Caye and throughout Belize, the red, the black and the white. Since some of the soils on Ambergris Caye are poor in nutrients many of the mangroves are relatively small. In good, nutrient rich soil the red mangroves can reach 60 feet in height. Some of the mangroves that are growing on the edges of Mayan sites and on the southern part of Ambergris Caye in richer soil, attain heights of 40 to 50 feet. The reason that most of the soil on Ambergris Caye is so poor is that it is forming as a result of weathering limestone and carbonate sand with very little organic matter. The carbonate sand (of which the beaches are made) is composed of broken skeletal fragments of the organisms that live in the reef and on the sea floor behind the reef. The limestone consists of similar skeletal fragments that have been cemented together with calcite to form a rock.

MANGROVES AND ISLAND GROWTH

The mangroves are probably the most important trees on Ambergris Caye for several reasons. They help add dry land to the island, protect the shoreline, provide shelter for juvenile marine life and are the beginnings of a food chain for some marine life.

Mangroves growing along the shoreline have an extensive root system that helps to trap and hold mud and sand brought to shore by normal wave and current action. These sands and muds accumulate until they are extensive and thick enough to support other plants and trees. Eventually dry, or almost dry land has been added. On parts of Ambergris Caye, especially the southern part, the island is slowly growing partially due to mangrove colonization. This type of land growth can be quite spectacular. A seaward migration of mangroves of 115 yards per year has been recorded in Sumatra and almost 180 yards per year in Java.

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Once established, mangrove thickets protect the shoreline from erosion due to normal storms and tides. They act as a buffer to dampen and break up wave action, lessening erosion. Even in large storms an extensive mangrove thicket can provide some protection for both the shore and inland areas.

MANGROVES AS SHELTER

The root system of the red mangrove, the one that grows in the most seaward position, provide shelter for much marine life including juveniles. Many of the fish and crustaceans of Ambergris Caye find protection here in their vulnerable early growth period. Although no studies of Ambergris Caye have been popularly published, Florida and the Tortugas provide one example of how important this can be in the case of the pink shrimp. The millions of pounds of pink shrimp caught off the Tortugas spend part of their life cycle in the Everglades mangroves. It is estimated that 250 acres of mangroves produced 4 tons of shrimp a year. Numbers of finfish are smaller, but the Florida mangroves alone contribute millions of pounds to the commercial catch (Wiley, 1985). In addition to juveniles that shelter here, many marine forms live on the root system itself. Barnacles, oysters, tunicates and a variety of other organisms encrust them, sometimes to a thickness many times the diameter of the root.

BEGINNING OF A FOOD CHAIN

The beginnings of a food chain start when the mangrove drops its leaves into the water (the trees concentrate salt in their leaves and then drop the leaves to rid the plant of excess salt). As soon as the leaf reaches bottom it is colonized by algae, bacteria and fungi and it begins to decompose and break up. One celled protozoa come to eat the bacteria and fungi and the leaf fragments covered with protozoa are now nutritious food for many species of small fish, crustaceans, worms and many other invertebrates. Algae growing on the prop roots of the red mangrove also serve as food for small invertebrates. These in turn are the prey of larger fish, crabs, birds, etc. that live in the mangrove swamps. In fertile areas, such as river deltas, mangroves can contribute more than 3 tons per acre per year of organic material. The smaller mangroves growing on Ambergris Caye contribute much smaller but still significant quantities of organic material to the food chain.

MORE MANGROVE FACTS

Although mangroves are halophytes, they can also do quite well in fresh water. Mangroves, watered with fresh water, have lived on dry land for 50 years at the U. S. Botanical Garden in Washington. Mangroves apparently evolved from earlier land plants which developed a tolerance to salt but did not come to depend on it. All three species of mangrove are native to Belize and Ambergris Caye.

The mangroves apparently originated in the Old World, in the area of Malaysia and spread out from there. In the Pacific there are more than 60 species of mangroves while in the new world there are only 12, but Florida and Belize have only three species.

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Mangroves provide firewood, charcoal, lumber and a source of tannin, the natural chemical used in tanning leather, not Only to modern man, but, in the past, also to the Maya.

Red Mangrove: local name "mangle", Mayan name "tap-che": Rhizophora mangle: Family Rhizophoraceae The red mangrove can tolerate normal marine sea water, hypersaline water (seawater concentrated by evaporation) or fresh to brackish water and is known as a facultative halophyte (it can live in saline water but is not limited to it). This mangrove has a complex system of prop roots and lower branches that form a nearly impenetrable thicket. The roots make graceful arcs from the trunk to the ground. The bark of these roots is red, especially when wet; Also, the leaves turn yellow and then red as they die and fall off. The leaves are much larger than those of the other two species of mangroves. Since the roots of these mangroves are in seawater and muds where no free oxygen is present (anaerobic), the trees have developed specialized branches to remove oxygen from the atmosphere. In the red mangroves these consist of flexible air roots hanging down from the trunks and lower branches. These air roots, which have no leaves, have special pores (lenticels) that are covered with loose waxy cells that allow air in but not water. If an air root reaches the soil, it will become a prop root. Lenticels also occur on the prop roots. The red mangrove flowers all year with small yellow flowers that have 4 petals.

All three species of mangroves are viviparous, which means the embryonic plants develop while attached to the parent plant. Known as propagules, these young plants drop off the parent plant into the water to be carried where ever the currents are going. The propagules of the red mangrove are 8 to 10 inches long and look rather like long thick brownish coloured green beans when they drop from the parent plant. Called hypocotyls, they drift until they touch bottom and then send down roots and sprout leaves. The small trees you can sometimes see growing by themselves in shallow water offshore, are young red mangrove trees. All going well they will grow and add more plants and eventually help establish a new shore line.

Black mangrove: locally "mangle negro": Avicennia germinans (formerly A. nitida): Family Avicenniaceae The black or honey mangrove does not have prop roots like the red mangrove but sends a line of numerous vertical pneumatophores (they look like small flexible bare sticks) tip through the mud from its shallow root system. The pneumatophores stick up above the mud bottom to an inch or so above the average spring tide level (highest monthly tide) and have lenticels on their tips for breathing. The tree leaves are normally elliptical with a rounded tip and are smaller than the leaves of the red mangrove. The bark on some of the branches can be very dark, almost black. The flowers of the black mangrove produce abundant nectar that bees can convert into excellent honey. The black mangrove has glands on its leaves that can excrete salt, and if it has not rained recently, small cubic salt crystals reflecting the sunlight can be seen on the leaves.

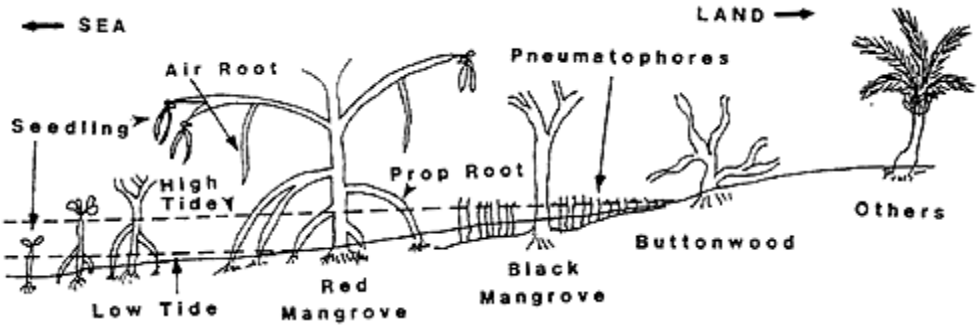
BEACHCOMBERS *TIP*:
Ask your guide to be SURE of your identification. One can taste the large amounts of salt exudate by licking the leaves.

The propagule of the black mangrove is shaped like a lima bean and is up to an inch long. After it drops from the parent plant into the mud or water, it splits open and sends out a root. Then the two sides unfold all the way to

become leaves, exposing two smaller leaves inside. When it touches bottom it sends roots down into the mud and continues growing.

White mangrove: locally "mangle blanco", in Mayan "za-calcom": Laguncularia racemosa. Family Combretaceae The white mangrove also lacks the prop roots of the red mangrove and sends up pneumatophores which are smaller diameter (often pencil diameter and less abundant than those of the black mangrove. The leaves of the white mangrove are elliptical, usually pointed, and midway in size between those of the red and black mangrove. The bark on most of the branches and upper trunk is white. The lenticels on the white mangrove are on the trunk. The white mangrove also excretes salt through glands on its leaves, although to a lesser extent than the black mangrove.

When these mangroves reach sufficient height (as they do on the southern part of Ambergris Caye) they are used for masts in sailing boats and as lumber for construction. The upright posts and cross beams of some of the open buildings with thatch roofs in San Pedro are from the white mangrove.



Idealized sketch of the distribution of the red mangrove, black mangrove and the buttonwood trees.

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*The only thing necessary for the triumph of evil is that good men do nothing"….**Edmund Burke***