

In the Shade of Deforestation

Objectives:

1. Define dry forest and recognize it as the most inhabited region of the Central America best adapted for agriculture and development.
2. Recognize at least 5 trees characteristic of a dry forest in Panama.
3. Discuss land use, deforestation and conservation in Panama.

Learning Skills: Observation, description, deduction, relating and reflection

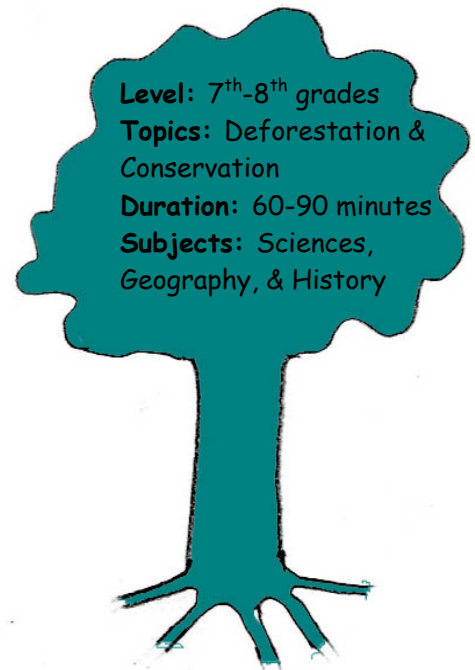
Information Base:

We can define a dry tropical forest as low-land vegetation with a marked dry season of 4-5 month duration with a few deciduous trees (Murphy & Lugo, 1986). Total precipitation varies between 800 and 1600 mm annually. Included are **savannas** (grassy with few trees), **deciduous**, **semi-deciduous**, and **mangroves**.

Dry tropical forests are common in Africa and on tropical islands. The total annual precipitation is proportionately larger than those observed in temperate regions. The years with little precipitation or drought shape the composition and structure of these dry forests.

Throughout the world, these areas are the most inhabited and are best suited for agriculture. They are cut down world-wide at an unprecedented rate. In many areas, the practice of clearing the land by burning, prolonged or excessive use of land, elimination of seeds and plants (and the animals that disperse them), formation of **pastures** and through the degradation and depletion of the lands' minerals have rendered it unsuitable for reforestation.

The dry forest is lower and less structurally and taxonomically complex than a rain forest. It contains half or less of the species numbers and the **deciduous species with compound leaves** are most common. As annual precipitation declines or its length decreases, dry seasons increase. The trees in the upper canopy become deciduous followed by those of the lower



canopy. Many of these trees flower during this period when they lose their leaves.

Dry tropical forests comprised more than half of the forests in Central America. Today, less than 0.1% of the 550,000 km² exists placing them in the category of most **endangered habitat** and near extinction (Janzen, 1986; see map).

Tropical dry forests and the dry mountainous forests occupy 10% of the territory in Panama although there is little left of the original vegetation due to mans preference for this area for settlement. (Low lands of Panama, Coclé, Herrera, Los Santos, and a small area in the Peninsula of Garachiné). Characteristic species of the dry tropical forest in Panama (not exclusive) are:

Cedro amargo, cedro espino, caoba, algarrobo, roble, **corotú, jobo, cabimo, harino, amargo, quira, guachapalí, cholo pelao, olivo, manca caballo, frijolillo, copa de oro o Copete**; The chumico and nance are found in the most degraded areas and different species of mangroves on the coasts (Tosi, J. 1971).

The species in bold type are found at CEM along with the **white and button mangroves**.

Recognition of these species enables us to become familiar with low-land vegetation which has played an important role in providing sustenance and habitat for Panamanians since before the Spanish conquest.

Learning about their use and relationship with animals help us to understand the consequences of deforestation and misuse of land, which can place animals, habitats and entire ecosystems in danger of extinction.

A little history about deforestation in Panama:

When the Conquistadors arrived they found a lot of "anthropogenic" savannas in the Peninsula de Azuero, the south of Panama and Darien that fed a population of approximately 500,000 indigenous people, the original panamenians, sustained this savannas using slash and burn techniques. The Indians rotated the planted areas to allow the land to rest before replanting.

Today the anthropogenic savanna covers twice the area found by the sapaniands (except in Darien where it has reverted to forest). Slash and burn is still practiced but there is a large difference in the agricultural use. Cattle were introduced, who trample the ground leaving it unusable, and new grasses were introduced to feed them. These grasses, like the "faragua"

are hardier than the native grasses and which were rapidly displaced. The land is being continuously degraded and depleted and production is becoming harder to maintain. The degraded land is also more difficult to return to its original state. As a consequence, agriculture has been slowly moving up toward the tropical rain forest, where the soil is not as fertile for agriculture nor is it easy to slash and burn. Erosion has become a problem in areas where there are steep slopes.

Vocabulary:

Low-land vegetation, dry forests, deciduous, perennial and succulent leaves, savanna, simple and compound leaves, latex, resins, fertile land, deforestation, ecosystem, dispersal, pollination, endangered.

Materials:

- ◆ 15-20 **clipboards** and pencils (15-20 groups of 2-3 children).
- ◆ Each clipboard contains **photos of the leaves (and bark)** of at least one of the 5 trees at Culebra and an observation worksheet.
- ◆ A compound leaf of "frijolillo" and a simple leaf from the "guácimo" that we can cut prior to their visit to show as an example.
- ◆ Biographical fact cards of these trees (along with photos).
- ◆ Chalkboard and chalk or poster paper and markers (with the comparison chart of the trees that will be used for today's activity; this should be done in advanced).
- ◆ Map depicting the range of dry forest in Central America before the arrival of man.

Note: there are 11 prepared fact cards of the trees.

Trees with 3 or more examples: corotú, jobo, guarumo, guácimo, cholo pelao, frijolillo, and copa de oro. Trees with two individuals: olivo. Trees with only one individual: manca caballo, majaguillo de playa, button mangrove.

2nd Note: You should give out at least 6 assignments. You can divide the groups into zones to be assisted by the docents and teachers if they collaborate (forest: corotú, jobo, guarumo, olivo - entrance to forest: frijolillo, copete, guácimo, guarumo - entrance path: cholo pelao, guácimo, manca caballo, copete, majaguillo, button mangrove, frijolillo).

Procedure:

1. Meet the children at the entrance to the dry forest, in front of the sign. After the welcome and introduction of the docents, ask them if they believe they can live without trees and which trees they know. Later ask the children around you if they have ever heard of a "dry forest" and what they believe that means. Let them express their ideas. Discuss that this is an area of high habitation used extensively for agriculture and is an ecosystem which is nearly extinct. To learn more about this region we will perform an investigation of the forest trees and later discuss why they are in danger of becoming extinct.
2. Briefly explain the methods: first they will divide into groups to find "their" tree and make notes on their observations. They will later receive a fact card to compare and discuss their observations in the shade of "their" tree. Lastly, the group will formulate their conclusions in the classroom.
3. Divide into groups of 2-3 students with a clipboard, observation worksheet and a clue (a picture of a leaf, the bark and the name of the tree)
4. Explain the observation worksheet, using simple language. Tell the students how scientists describe different species by their leaves, flowers, fruit, bark, and the substance they secrete. In this manner we begin to introduce terms such as simple and compound leaves (show an example), latex, resins, bark, and straight or branched trunk. Allow them to add any information or drawings that can help them to identify their tree. To help explain, fill out a sample worksheet with a leaf from the corotu and the frijolillo.
5. The search will include the entrance to the end of the dry forest. Docents and teachers should disperse among the groups to provide assistance and to assess their progress (see note above). Take 15 minutes in the search and completion of the worksheet.
6. When completed, give them the fact card or biography of the tree and a discussion sheet per group. They must present their completed observation forms and compare their observations with the data sheets. Each group shall discuss, in the shade of their tree, the questions on the discussion sheet. Conclusions should be written on this same sheet (15-20 minutes). Regroup at the "triangle" to return to the classroom for a discussion.
7. Begin by summarizing on the chalkboard the trees observed. Write down their names, if they have compound or simple leaves, deciduous, cultivated, and/or useful to man. Create a simple table to end by summarizing: "How many trees had simple leaves? How many with compound leaves? How many

lose their leaves during dry season and how many do not? How many benefit man? How many are cultivated?" Return to the definition of a dry forest keeping in mind that these trees are from a dry forest in Panama. Allow them to make deductions (20 minutes).

8. We are now ready to talk about the discussion worksheet. "Which of these trees are useful to man? How useful are they? Are they important? Why? Are the animals affected by the disappearance of these trees? Are the trees affected by the disappearance of the animals? Why?" Lastly, "Why do you think that the dry forest is almost extinct?" Allow them to express themselves guiding them toward the observation that an ecosystem is a web of relationships that affect one another.

9. Incorporate when appropriate from the discussion, the historical use of this region both before and after colonization. Discuss the introduction of cattle and the overuse of the land as the factors contributing to the irreversible damage to this situation. Use the map for additional guidance. We can also mention the advance of the agricultural zones toward zones that have higher rainfall (rain washes nutrients away) and of greater slopes.

10. Conclude by listing on the chalkboard, possible solutions to these problems.

Suggestions for the Docent:

If the group is large, or are not accustomed to working in groups, allow them to fill out the discussion worksheet in the classroom while the concepts are discussed among the groups.

Suggested Classroom Activities:

Create a mural depicting the consequences of deforestation and misuse of land: erosion, land degradation, species extinction, precipitation changes, and flooding. This mural should include examples of these consequences, preferably from Panama.

Evaluation:

There are two work levels:

- Observation - which is evaluated through the definition of a dry forest in context with the trees they found.
- Establishing a relationship - which is evaluated in the discussion of deforestation and conservation.

References:

Murphy, P. y Ariel Lugo. 1986. Ecology of Tropical Dry Forest. In *Ann Rev. Ecol. Syst.* 17:67-88.

Janzen, Daniel H. 1986. *Guanacaste National Park: Tropical Ecological and Cultural Restoration*. 1st ec. San Jose, Costa Rica: EUNED-FPN-PEA. 104p.

Tosi, J. 1971. Zonas de Vida: Una base ecológica para investigaciones silvícolas e inventariación Forestal en la Republica de Panamá. FAO, FO:SF/PAN 6 Informe Técnico No. 2

Jaen, Omar. *Hombres y Ecología en Panama*

http://bvs.sld.cu/revistas/pla/vol4_3_99/ple03399.htm

<http://www.hispanicus.com/drle/y.html>

<http://uicnhumedales.org/boletin/archivo/no3/proyecto11.htm>

<http://www.floraquide.es/arboles/Hibiscus2.htm>

<http://lead.virtualcentre.org/es/ele/conferencia2/biblio3.htm>

<http://www.ifas.ufl.edu/~broward/spanish/hortcomm/hc016.htm>

http://casa.univision.com/u_articles/es0058A41A.html

<http://www.inbio.ac.cr/bims/ubi/aves/ubiespejo/ubiid=3230&-find.html>

<http://www.argiropolis.com.ar/ameghino/abras/darwin/bea-c18.htm>

<http://www.colciencias.gov.co/seiaal/congreso/Ponen14/GOMEZ.htm>

http://www.hort.purdue.edu/newcrop/duke_energy/Conocarpus_erectus.html#Uses

Duke, J.A. and Wain, K.K. 1981. *Medicinal plants of the world*. Computer index with more than 85,000 entries. 3 vols.

Irvine, F. R. 1961. *Woody plants of Ghana*. Oxford University Press, London.

Little, E. L. Jr. 1983. *Common fuel wood crops: a handbook for their identification*.

McClain Printing Co., Parsons, WV.

Morton, J. F. 1981. *Atlas of medicinal plants of middle America*. Bahamas to Yucatan. CC Thomas, Springfield, IL.

N.A.S. 1980a. *Firewood crops*. Shrub and tree species for energy production. National Academy of Sciences, Washington, DC.

<http://www2.fpl.fs.fed.us/TechSheets/HardwoodNA/htmlDocs/conocarp.html>

In the Shade of Deforestation
Observation Sheet

Date: _____

Names: _____

Name of tree searched: _____

Location: Marine Education Center of Punta Culebra

Exact Location: _____

The tree is approximately _____ meters high

The trunk is approximately _____ centimeters in diameter

The canopy is approximately _____ meters in diameter

Does it have spines? Yes _____ No _____

Are the leaves Simple _____ Compound _____

Do they fall in dry season? Yes _____ No _____

Do they have an odor? Yes _____ No _____

If you break a leaf or twig, does it exude a substance? Yes _____ No _____

What Color is it? _____

The bark is Smooth _____ Rough _____

Thin _____ Thick _____

Falls off on its own _____ Does not fall off on its own _____

If it has flowers, describe them:

If it has fruits, describe them:

If you saw animals, describe them:

In the Shade of Deforestation

Discussion Sheet

Date:

Names: _____

Name of tree searched: _____

Location: Marine Education Center of Punta Culebra

Exact Location: _____

Instructions:

Read the tree's biographical data card. Compare, discuss, and analyze your observations. Answer the following questions with your group:

1. Did anyone in your group know this tree?
2. Is this tree useful to man?
3. Has it been extensively used?
4. Would animals suffer from insufficient trees like this one? Why?
5. Will this tree have problems reproducing itself naturally? Why?
6. What would disappear first, the tree or the animals associated with it? Why?
7. Why do you think the dry forest ecosystem is almost extinct?