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Introduction

The lessons in this book attempt to raise awareness of the country, environment, and people of Brazil. It explores the burden civilisation places on the natural world, focusing especially on the challenges faced by the jaguar and the rainforest.

The jaguar and the rainforest share similar threats. The greed of individuals and corporations have endangered both. The jaguar has been hunted for its fur. It has also been killed by cattle farmers protecting their own livestock. However, the most significant threat to the jaguar is the loss of habitat, mainly the rainforest.

The rainforest suffers from massive deforestation. There are several reasons for this. First, the worldwide demand for hardwoods found only in the rainforest leads to deforestation. Second, the Amazon nations are cutting roads through the forest, bringing settlers who destroy more of the forest. Also, hydro-electric dams flood thousands of hectares to produce energy. Finally, Brazilian law states that $\frac{1}{3}$ of the land must be farmed. This law was enacted to encourage agricultural development in days gone by. Brazil's economy is now fuelled by many other industries, although farming is still important.

Deforestation is often a by-product of the immediate needs of people and industry. Therefore, it must be recognised that environmental issues are not created in a vacuum. That is why this text blends nature with an understanding of the surrounding culture.



What Is a Rainforest?

Use with page 29.

All living things require three things to survive: food, moisture and warmth. All three are in abundance in the rainforest. As a result, there is a greater variety and density of life in the rainforest than anywhere else in the world. For example, there are over 1800 species of butterflies in the Amazon rainforest alone. In fact, every time scientists venture into the Amazon, they bring back more unclassified species. Biologists are unable to identify or catalogue 30% of the fish caught for markets like that in the Brazilian city of Belém.

Once destroyed, it is nearly impossible to replace the rainforest. The reason for this is the unique nature of the layers of trees.

Emergent layer: Looking down from the air, the rainforest looks like a huge green carpet. Poking up through that carpet is the emergent layer, the tallest trees in the forest. This is where competition for sunshine literally reaches new heights.

Canopy layer: This is the green carpet of leaves seen from the air. Usually 20 m to 40 m above the forest floor, this is where leaves, flowers, fruit and seeds compete for sunshine. This is the layer that does most of the work for the rainforest, where photosynthesis takes place. As a result, it is teeming with life feeding on the flowers, fruit and seeds. This in turn attracts those animals that feed on the life eating the plant life. Unfortunately for biologists, it is so far above the ground that it is difficult to observe or identify. The canopy is home to most of the birds and monkeys of the Amazon.

Understory: This is a vaguely defined area between the canopy and the shrubs and bushes. Epiphytes (plants that grow on other plants) grow in this layer and in the canopy. Every place a tree grows

branches becomes a nesting spot for orchids, bromeliads and other plants. Even the creases in the bark of a tree become the homes for a wide variety of plants.

Shrub layer: Bushes and saplings that grow up to 5 metres constitute the shrub layer. Very few of the seeds that fall to the forest floor grow into saplings. Those that do take root compete for the scarce light that reaches through the canopy. Saplings will often grow across the forest floor until they find a spot of sunlight and then grow towards the sky. Competition is fierce and only the strongest survive.

Forest floor: The soil of the rainforest is poor and contains very few nutrients. It is covered by a thin layer of humus. The humus is manufactured from the dead bodies of millions of plants and animals broken down by armies of termites, fungi, bacteria and other organisms. Only the hardiest of plants survive on the forest floor because less than 2% of the sunlight reaches it. Lichens, which require a minimum of light, are found in abundance. This layer is so fragile that if the protective trees were cut down, the rain would wash the humus and topsoil into the river in a few days.

River: The Amazon is the longest river in the world. It begins in the Andes Mountains, 5200 metres above sea level. It travels over 6400 kilometres and carries $\frac{1}{5}$ of the world's fresh water. It is so deep that oceanliners can travel 1600 kilometres up river. Seventeen of its tributaries are over 1600 kilometres long. The mouth of the river is over 200 kilometres wide and even 1600 kilometres upriver, it is 11 kilometres wide.

The river is home to thousands of unique fish, including the flesh-eating piranha.



What Is a Rainforest? (Cont.)

Use with page 28.

Fortunately, these aggressive fish usually eat other fish and rarely mammals. Occasionally, an electric eel is seen in the river. It is capable of generating 500 volts of electricity to stun its prey.

The river is often red and acidic from forest run-off. The biggest threat to the Amazon is the mercury run-off from gold-refining operations.

Identify the layers of the rain forest.





Rainforest Experiments

Crooked Stems

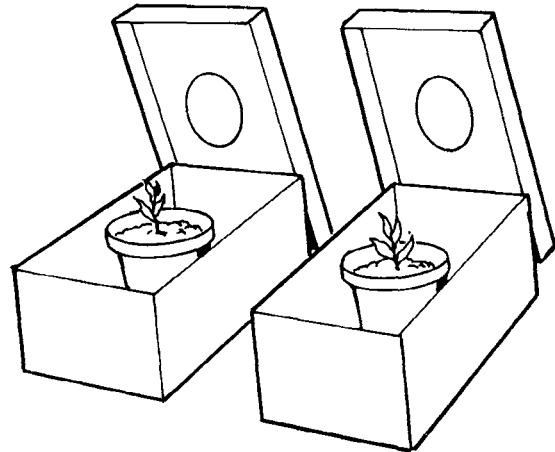
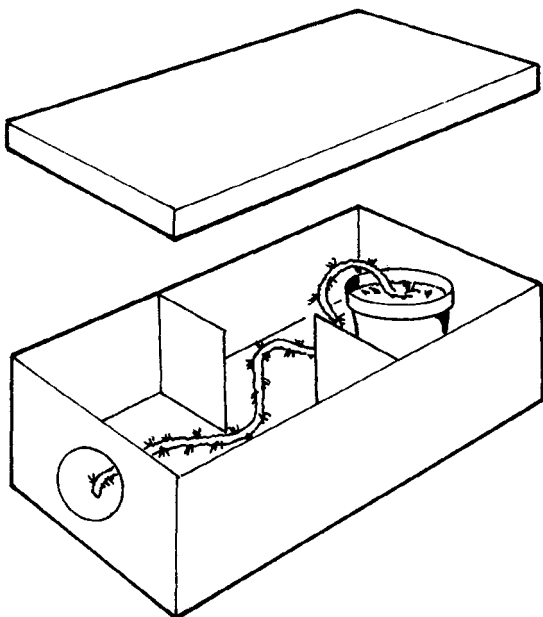
Materials

2 small flower pots filled with potting mix
seeds of a fast-growing plant (oat, radish, bean or mustard)

2 shoe boxes

Directions

1. Plant the seeds in the two pots.
2. Allow plants to grow until they are about 2.5 cm high.
3. Place each plant in a shoe box.
4. Cut a hole in the lid and place in the window.
5. Observe and record the growth of each plant.



Winding Potato

Materials

1 sprouting potato
1 small flower pot with potting mix
1 shoe box
2 pieces of cardboard, each 1/2 the width of the box
transparent tape

Directions

1. Tape cardboard inside to create baffles (barriers).
2. Cut hole in one end of the shoe box. (See picture.)
3. Plant potato in a small pot and place in end of shoe box furthest from the hole.
4. Cover box and place in window.
5. Observe and record the growth of the potato.

Extension

Place other 'potato boxes' in the window and cover opening with different colours of cellophane. Red, yellow, blue and green are good choices.

Observe and record the growth rates of the various potatoes. How does this plant behaviour relate to competition for scarce light in the rainforest?