

# GRADE 7: TROPICAL RAIN FOREST ECOSYSTEM BOOKLET

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## TO THE TEACHER

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Welcome! This booklet has been designed to help teachers enhance the educational value and enjoyment of the 'Tropical Rain Forest Ecosystem' workshop. We recommend that workshop visits coincide with classroom studies of interactions within ecosystems. This collection of activities has been designed to meet several expectations of the Grade Seven Science Curriculum. Our pre-visit activities have been designed to help students gain a foundation to help them more thoroughly understand what they will experience during the workshop. Additionally, follow-up activities have been provided to help students synthesize their observations and experiences. Most of the activities include working in cooperative groups, hands-on elements or provide a variety of choices in order to accommodate the needs of diverse learners. We hope you find this information useful and easy to incorporate into your classroom. Enjoy!

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## SCIENCE CONNECTIONS

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Strand: Life Systems  
Topic: Interactions Within Ecosystems  
Expectations Met:

### *Understanding Basic Concepts*

- ♦ identify living (biotic) and non-living (abiotic) elements in an ecosystem
- ♦ identify populations of organisms within an ecosystem and the factors that contribute to their survival in that ecosystem
- ♦ identify and explain the roles of producers, consumers and decomposers in food chains and their effects on the environment
- ♦ interpret food webs that show the transfer of energy among several food chains, and evaluate the effects of the elimination or weakening of any part of the food web

### *Developing Skills of Inquiry, Design, and Communication*

- ♦ formulate questions about and identify the needs of various living things in an ecosystem, and explore the possible answers to these questions and ways of meeting these needs
- ♦ use appropriate vocabulary, including correct science and technology terminology, to communicate ideas, procedures, and results

### *Relating Science and Technology to the World Outside the School*

- ♦ investigate the impact of the use of technology on the environment
- ♦ explain the long-term effects of the loss of natural habitats and the extinction of species

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## AGENDA

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Please note that the order or location of some of these activities may change due to construction, weather or animal health concerns.

<b>10:00</b>	Welcome to the Conservation Centre & outline of agenda. Define terms and introduce tropical rain forest ecosystem.
<b>10:30</b>	Americas Tour (e.g. pygmy marmoset, boa constrictor, white-face saki)
<b>11:30</b>	Group Activity (scenarios and questions)
<b>12:00</b>	Lunch. <b>Please have everyone bring a lunch.</b> <u>There will be no opportunity to go to the restaurant</u>
<b>12:30</b>	Introduction to Indomalaya
<b>12:40</b>	Indomalaya Tour (Sumatran tiger, reticulated python, white-handed gibbon)
<b>1:30</b>	Return to Conservation Centre and discuss effects of human activities
<b>2:00</b>	Certificate presentation and close of program

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## **PRE-VISIT ACTIVITIES**

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### **1. LOCAL BIODIVERSITY**

(Adapted from a lesson plan from [www.school.discovery.com](http://www.school.discovery.com))

As a class, go outside to a local natural area. Have the students observe the plants, insects or other animals they see and record the names of each different one. If they do not know the names of any living thing they see, have them sketch what it looks like. Return inside and share what you have found. If students have been observant, they will likely have found an incredible diversity even in their own 'backyard.' If there was not a large variety in the things observed, discuss why that might be. Has it always been this way in this area, or has the diversity decreased for some reason? You may choose to have the students collect (already dead) leaves for the plants they see. This way, they can bring them in and compare them with their friends. You may also go to a second area outside and determine whether there is a different diversity present there. It would be useful for the teacher to have a guide to plants (and animals) in the area, so as to help with identification. This activity can lead into a discussion on ecosystems and biodiversity.

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## **FOLLOW-UP ACTIVITIES**

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### **1. RESEARCH PROJECT**

As an independent or group project, students will choose a particular plant or animal within a tropical rain forest ecosystem and research the impact that human activity has had on it. You may want to focus on species that students saw during their tour of the zoo – a list of some species that students likely saw at the zoo is provided as an appendix. Several key questions should be answered, such as: what are the characteristics of the animal/plant? How is it adapted to live in its particular ecosystem? What human activities have taken place in its habitat? How has this plant/animal been affected by human activity? If there are harmful effects because of human activity, what can be done to eliminate them? The results of their research can be presented as a poster, a written report or a creative presentation, depending on teacher and student preference.

#### **Tying It All Together**

##### *Language Strand: Reading*

- plan a research project and carry out the research
- identify the main ideas in information materials, and explain how the details support the main ideas
- select appropriate reading strategies (e.g., skim text for specific information; record key points and organize them in a sequence)

##### *Language Strand: Writing*

- communicate ideas and information for a variety of purposes and to specific audiences, using forms appropriate for their purpose and topic
- organize information to develop a central idea, using well-linked and well-developed paragraphs

##### *Language Strand: Oral and Visual Communication*

- create a variety of media works (e.g., a class newspaper, a story board, a radio documentary)

#### **How To Assess**

- Topic well-chosen and well-researched
- Information is clearly presented
- Presentation is creative
- All relevant questions are addressed

## 2. MAKE A PHYSICAL FOOD WEB

Every student in the class is given an index card that has on it the name of an animal or plant present in the tropical rain forest ecosystem. Each index card also lists key facts about the role that that animal or plant plays in the ecosystem. The class then will physically represent the relationships in their ecosystem by connecting yarn between every connected thing. For instance, the flying dragon lizard would be connected to the vine snake (which preys on it), and to ants and termites (which it preys upon). Students will end up making a large physical food web which not only will help them to grasp how interconnected living things are, but also will be a lot of fun. While they are in the web, it is a good opportunity to briefly talk about food webs and the interdependence of living things.

Acting as a “human influence” such as a clear-cutter, beef-producer etc., the teacher can then remove certain students as their animal or plant becomes extinct. All students who were connected by string to that person are now affected and may also become extinct if that was their major food source. Alternatively, they may thrive because their main predator has just become extinct – one of the eliminated students could then join back in to represent the overpopulation of that species. The class can then discuss how they think that the extra numbers of one species would affect the web (their prey might be in danger). This activity cannot accurately represent the dynamics of the ecosystem, but it can be a great discussion-starter, and will hopefully let the class see the indirect effects of the loss of one species.

The Animals of the Rainforest website (see resources below) is a good source of information from which to develop food webs.

## 3. CREATE A NEW ECOSYSTEM

As a creative project, students work in groups to design their own ecosystem that is balanced and sustainable. Students must make sure there is food for everything in their ecosystem to eat, that there are producers, consumers and decomposers, and that the populations will be stable. This project will demonstrate the complexity of ecosystems, and the factors that need to be accounted for to ensure that the ecosystem is sustainable. Students may make up new animals and plants if they choose, and each project will be presented in a visual format (3D model, poster, etc.), with an accompanying oral presentation that explains their ecosystem and justifies the choices they made.

### **Tying It All Together**

#### *Visual Arts Strand*

- produce two- and three-dimensional works of art that communicate a variety of ideas (thoughts, feelings, experiences) for specific purposes and to specific audiences, using appropriate art forms

#### *Language Strand: Oral and Visual Communication*

- contribute and work constructively in groups
- express and respond to a range of ideas and opinions concisely, clearly, and appropriately

### **How to Assess**

- Ecosystem has appropriate representatives from all trophic levels
- Choice of biotic and abiotic elements of ecosystem shows that factors were considered thoughtfully
- Visual presentation is creative and well-designed
- Oral presentation is clear, engaging and instructive

## 4. LETTER-WRITING PROJECT

A large beef-producer wants more land for its cows to graze in, and is planning to cut down some of the Brazilian rain forest to use for this purpose. As a local activist, you are concerned about this, and you want to convince the company not to proceed with their plan. Your task is to write a two-page letter to the company to convince them not to pursue a plan that will harm the rain forest. In

order to convince them, you will have to offer sound alternatives, as businesses are unlikely to adopt plans that will hurt them financially.

Many other options for scenarios can be used, including real-life situations about Canadian ecosystems (i.e. logging of old-growth forests in British Columbia, draining wetlands for new subdivisions, or even putting in a paved walking path beside the local creek). If you use a real-life situation, collect all the finished letters and mail them together!

### **Tying It All Together**

#### *Language Strand: Writing*

- communicate ideas and information for a variety of purposes and to specific audiences, using forms appropriate for their purpose and topic
- use writing for various purposes and in a range of contexts, including school work
- organize information to develop a central idea, using well-linked and well-developed paragraphs

#### *Language Strand: Reading*

- decide on a specific purpose for reading, and select the material that they need from a variety of appropriate sources
- clarify and develop their own points of view by examining the ideas of others

### **How To Assess**

- Letter is coherently written with proper spelling and grammar
- Argument is well-organized and persuasive
- Evidence of research and thoughtful choice of points
- Letter is written with target audience in mind

## **5. ECOSYSTEM MYSTERY**

In this activity, students act like wildlife biologists to try to solve an ecosystem mystery. Find a real-life, or create a fictional, example of a species in a particular ecosystem that ran into trouble due to ecosystem changes caused by human activity (disease introduced, food source became extinct, etc.) Tell this story to the students without explaining the reason for the problem. Ask them questions and give them clues to figure out the cause of the problem and possible solutions. A fictional example, including questions and clues, can be found at <http://www.sd5.k12.mt.us/glaciereft/wild8-12.htm>.

After working through the mystery as a class, you may choose to discuss how wildlife biologists and others go through similar procedures to analyze the problems different species run into because of human activity.

Have the students create their own (fictional) ecosystem mystery, with enough clues that their classmates could solve it. Their mystery can be as creative as they like, but must involve the effects on a species because of human activity in its ecosystem.

### **Tying It All Together**

#### *Geography Strand: Natural Resources*

- demonstrate an understanding of how human activity affects people and the environment

#### *Language Strand: Writing*

- communicate ideas and information for a variety of purposes and to specific audiences, using forms appropriate for their purpose and topic

#### *Language Strand: Oral and Visual Communication*

- listen to and communicate related ideas, and narrate real and fictional events in a sequence
- express and respond to a range of ideas and opinions concisely, clearly, and appropriately

### How To Assess

- Student demonstrates understanding of ecosystems and human influence on them
- Sufficient, but not overly simple, evidence is provided to solve mystery
- Mystery is well-constructed and creative
- Proper writing skills are demonstrated

## 6. BUILD AN ECOSYSTEM

As a class project, build a terrestrial or aquatic ecosystem. This is a great way to get students to apply the things they have learned about ecosystems throughout the unit. When introducing the idea, discuss with students what their ecosystem will need to be self-sufficient. What carnivores and herbivores should we use, and how many of each? What kinds of producers and decomposers are appropriate? What kind of light will be needed? Throughout the remainder of the unit (and semester), discuss the reasons for the successes and failures of the ecosystem, and make decisions as a class to add or take away things from it as necessary. The more the students are in charge of this project, the better – be prepared and willing for the ecosystem to struggle, especially at the beginning.

If you have the resources and enthusiasm, build both an aquatic and a terrestrial ecosystem, and compare the roles played by the plants and animals in each. On the other hand this project can be as simple as filling a pickle jar from a local pond.

If you choose to do this in your classroom, be sure you are aware of any school rules on animals in the classroom, and be sure to model responsible ecological behaviour with the species you choose and how they are treated. Use species native to your area if possible, or, if you do use alien species, do not release them into the wild at the end of the term. The introduction of non-native species is one of the biggest reasons for species endangerment.

A local store that sells aquarium supplies will be able to give you advice on appropriate species and materials to use.

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## SUMMARY

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The following is a summary of the major concepts covered in the workshop.

### *Tropical Rain Forests*

Students are introduced to the tropical rain forest as a complex ecosystem. The largest remaining areas of tropical rain forest are in South and Central America, and Indonesia. The climate of tropical rain forests is generally Hot (average temperature is 27°C) and Wet (400-1000mm/yr, or much more in some cases). Unlike our ecosystem, tropical rain forests experience little variation between seasons.

### *Structure of a tropical rain forest*

Emergent Layer  
Canopy  
Understory  
Forest Floor

### *Trophic/Feeding Levels present in any ecosystem*

Producers  
Consumers  
Decomposers

### *Importance of tropical rain forests*

Tropical rain forests are useful in many ways, including:

- Produce vast amounts of oxygen and absorb potentially harmful carbon from the air.
- Recycle water
- Biodiversity
- Medicines
- Commercially useful products (i.e. rubber)
- Food

*Effects of human activities on tropical rain forests*

Human activities are rapidly destroying large portions of rain forest ecosystems around the world. Such activities include clear-cutting forests for timber, cattle grazing or to accommodate increasing human population, damming rivers, and polluting land, water and air, among others. Some of the environmental impacts of these activities include: disruption of the water cycle, loss of biodiversity, soil erosion, climate change, and lost access to resources useable for food, medicines and other products.

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## **VOCABULARY**

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Biodiversity	biological diversity – the variety of living things on earth.
Biome	a large geographic area with characteristic climate, flora and fauna.
Biosphere	the region of the earth in which life exists. The thin layer from the lower atmosphere to the bottom of the oceans. This includes some layers of rock.
Canopy	the second highest layer of a tropical rain forest – these tall trees reach a height of 30-60 metres. The crown of each tree often touches and intertwines with its neighbours preventing sunlight from reaching the lower layers.
Conservation	the act of protecting and preserving plants, animals, and their environment or habitat.
Consumer	a living thing that must eat other living things to survive.
Decomposer	a living organism that breaks down dead animals or plants in order to get food.
Emergent Layer	the highest level of trees in a tropical rain forest – these obtain the most sunlight, rain and wind
Forest Floor	the lowest level of the tropical rain forest – consists of herbs, fungi, leaf litter etc.
Producer	a green plant that makes food which is the first step in a food chain; photosynthesis is the process by which plants make and store food.
Understory	the second lowest level of the tropical rain forest – consists of shrubs, ferns and small trees that are able to thrive in the dimly lit dampness below the canopy.

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## **APPENDIX: SPECIES LIST**

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Though students undoubtedly saw many more animals than those listed below, the following list offers some of the animals that they likely saw on their tour:

- Pygmy marmoset
- Common marmoset
- Golden lion tamarin
- White-faced saki
- Golden agouti
- Two-toed sloth
- Boa constrictor
- Arrowana
- Red breasted piranha
- Poison arrow frogs, bromeliads
- Surinam toad
- Bird eating spider
- Giant Brazilian cockroach
- Sumatran tiger
- Sumatran orangutan
- Reticulated python
- White-handed gibbon
- Concave-casqued hornbill

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## RESOURCE LIST

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S = student friendly site / T = teacher appropriate site

### *General*

<http://www.science.ca/> (S&T)

Excellent searchable, Canadian website with a wealth of information. Includes current science news and events, the opportunity to interview a Canadian Scientist, an area to post questions on specific topics, an activities resource, and a 'questions of the week' section posted by Canadian students.

<http://www.aliexplorer.com/clipart/home.html> and [www.animal\\_clipart.com/](http://www.animal_clipart.com/) (T)

Animal and plant clip art.

<http://www.ipl.org/youth/projectguide/> (S&T)

A useful resource for students and teachers doing Science Fair projects. Site includes links to a variety of website resources that guide you through the necessary steps for completing a Science Fair experiment (e.g. the scientific method, choosing a topic, tips and tricks, etc).

<http://www.school.discovery.com> (S&T)

Curriculum resources, lesson plans for teachers. Activities, games and resources for students. A thorough and well-designed site. Science Fair Central section offers guidance and suggestions for science projects.

### *Tropical Rain Forests*

<http://www.bsrsi.msu.edu/rfrc/> (S&T)

Lot of information about tropical rain forests. Links to "virtual rain forest" and "tropical rain forest information center."

<http://www.rainforest.org/> (T)

Tropical Rainforest Coalition website. More general information. Has a "schools" link that gives ideas on how to get involved in helping to save tropical rain forests.

<http://www.ran.org/> (T)

Rainforest Action Network, Information Center. Teacher/Student resources as well as fact sheets.

<http://www.animalsoftherainforest.org/frames.htm> (S&T)

Excellent, easy-to-use resource. Select a rain forest animal from pull-down lists sorted by class to get photos, facts and population status.

### *Ecosystems*

<http://mbgnet.mobot.org/> (S&T)

Great site all about biomes/ecosystems. Easy to navigate, with in-depth information on 12 different land, fresh-water and marine biomes/ecosystems.

<http://www.sierraclub.org/ecoregions/> (T)

Profiles of 21 "ecoregions" in North America. Not as user-friendly as the "mbgnet" listing above, but offers specific information about North American regions. Discusses Sierra Club initiatives in each region in addition to giving an overview of the region.