

SOS PLANET



TEACHING GUIDE

Dear Educator,

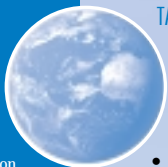
The survival of our planet is in jeopardy—and the dangers are more immediate than we might expect and originate from some unexpected sources. The new film *SOS PLANET* shows us how pollution, deforestation, global warming, and destruction of habitats are bringing our planet to the threshold of environmental disaster. It is a wake-up call for deeper awareness and for action by all concerned—the media, politicians, governments, environmental groups, and individuals. In *SOS PLANET*, the difficulties facing our complex interconnected ecosystems are uniquely presented through the eyes of animals, sending a straightforward message: We must act now, before it is too late!

SOS PLANET is a 40-minute, 3D/2D documentary that combines live-action and computer-generated imagery. It was produced by nWave Pictures in association with World Wide Fund for Nature—Netherlands. Walter Cronkite is the on-screen host and narrator. *SOS PLANET* uses a special venue attraction created by the WWF Netherlands as its focal point. The venue captivates and entertains audiences while also informing them about key conservation issues. Messages about the greenhouse effect, destruction of marine habitats, and deforestation of tropical rain forests are presented at the venue in an innovative 13-minute 3D movie with 4D in-theater effects.

SOS PLANET expands these messages about the three key environmental issues covered in the venue, and sets forth the tremendous difficulties of getting ample coverage of serious environmental issues to the public in today's highly commercial mass media.

We at nWave Pictures are pleased to bring you this guide with activities that focus on the environmental themes of *SOS PLANET*. The point of the film is particularly significant for today's students, whose lives will be directly affected by the consequences of global warming, overfishing and deforestation—unless they become aware of the problems now and learn to take action.

Sincerely,
Ben Stassen
CEO, nWave Pictures



TARGET AUDIENCE

This guide has been designed for students in both grades 3-5 (ages 9-11) and grades 6-8 (ages 12-14). Each age level has its own student activity masters on facing pages in the guide.

CONTENTS

- Teacher's guide, including answer key
- Three activity masters per age level

FOR TEACHERS: HOW TO USE THIS GUIDE

If necessary, modify activities to suit your curriculum and the interests and abilities of your students. While it is not necessary to see *SOS PLANET* to use these activities, viewing the film will greatly enhance your students' understanding of the issues. *Note:* The answers given apply to either age group, as the activity masters parallel each other in content but differ according to expected difficulty for the age level. The estimated time to complete each activity will depend on students' prior knowledge and ability level. You may wish to skip a portion of an activity if it is not suitable for your students.

OBJECTIVES

- To learn how the greenhouse effect works, why it is necessary for life on Earth, and how increased greenhouse gases are causing ongoing global warming.
- To develop an understanding of the cause-and-effect relationship between some consequences of global warming and other factors in the environment.
- To understand the cause and nature of overfishing and its tremendous impact on marine ecosystems and the well-being of society.
- To appreciate the tremendous biodiversity of the rain forests and understand how their destruction not only adversely affects local ecosystems and people, but the world's environment as well.
- To learn some solutions to prevent the destruction of ocean habitats, an increase in greenhouse gases, and deforestation of the rain forests.

SCIENCE CONCEPTS

Composition of atmosphere, greenhouse gases and greenhouse effect, ultraviolet and infrared radiation, coral reefs, pollution, interdependence of parts of an ecosystem, biodiversity, rain forests, global warming, ozone, species depletion

CURRICULUM AREAS

Biology, ecology/environmental science, marine biology, earth science

SKILLS COVERED

Predicting, inferring, researching, graphing, interpreting data, seeing cause-and-effect relationships, using maps, constructing concept maps

CONTENT OUTLINE OF THE FILM *SOS PLANET*

- Views of Earth from space, showing environmental problems
- Introduction of the environmental issues and the difficulties faced in communicating them to the public
- Presentation of *SOS PLANET*
- The greenhouse effect
- Destruction of marine habitats
- Deforestation of tropical rain forests
- Actions individuals can take to help the environment

TEACHER'S GUIDE FOR ALL ACTIVITIES

The film of *SOS PLANET*, along with the material covered in this guide, is designed as a call to action for the young people of today, whose lives will be directly affected by the environmental issues raised in the film unless action is taken now. It is made very clear that if global warming, depletion of the oceans and destruction of the rain forests are left unchecked, the consequences could be extremely serious. Governments and international governing bodies must be responsible for making and enforcing environmentally sound laws and regulations, but each of us must also take immediate actions to help. *SOS PLANET* leaves us with the message: We as individuals have the power to change the world.

As you work with the guide, keep in mind the following activities that can be tailored to your interests and those of your students. Discussion of each, or all, of the three environmental topics covered in *SOS PLANET* can be used as a springboard for individual or community action. Here are some ideas:

Make a list of simple things students and their families can do. Then, as a class, select a few actions and devise a plan to help implement them. Your class could:

- make reminder posters for recycling, turning off lights, conserving water, etc.
- have a "save paper" program for students, teachers, and the school office

ANSWERS TO ALL ACTIVITIES

LIVING IN A GREENHOUSE

ACTIVITY 1

ANSWERS FOR GRADES 3-5 (AGES 9-11)

Part B. Atmosphere Models

For the demonstration of the atmosphere in **Part B**, follow the instruction given in the beginning of **Part B** on the activity master for older students (page 5).

Part C. Draw It

The drawings should show the Sun's rays entering but being blocked from escaping, inside both the greenhouse and the atmosphere. Both models should show a temperature increase.

ANSWERS FOR GRADES 6-8 (AGES 12-14)

Part A. Like a Greenhouse

Greenhouse Gases Cause Global Warming: Greenhouse gases let the high-energy solar radiation pass through but block the infrared rays given off by the warmed surfaces of Earth. Heat is trapped and the temperature rises. The greater the greenhouse gas concentration, the more heat is blocked, and the hotter it gets.

Ozone Depletion: CFCs are responsible for ozone depletion. CFCs are used in refrigerators, air conditioners, polymer foams, and propellants for spray bottles. CFCs were invented about 60 years ago. Some U.S. companies have developed CFC-free ways of manufacturing hairsprays and other aerosol items.

- The ozone depletion seems greatest in Antarctica and the Southern Hemisphere during a 4-6 week period that starts in September. It is also seen most during the winter in the Northern Hemisphere and mid-latitudes.

- sponsor a drive to reuse items that might ordinarily be thrown away
- organize "no car," "save electricity," "save water" weekends for families in your class or school
- become educated consumers of products made from sustainable rain forest resources
- eat less seafood from the overfished categories
- reduce use of lawn fertilizers, which ultimately are washed into the ocean and help destroy coral reefs
- buy products with less packaging
- use products made through recycling
- recycle as much as you can in your home or school
- organize a litter clean-up in your community
- support tree planting programs locally and a "Save the Rain Forests" program internationally
- Find out what is being done about a specific community environmental issue. What else needs to be done? How can students help?
- Conduct a "mock" town meeting about deforestation. Have students research the issue from many positions—those of government officials, logging company executives, local farmers, environmentalists, indigenous tribespeople, a pharmaceutical company representative, concerned citizens groups, or consumers who want fine furniture made of tropical wood.

- Ozone depletion will lead to more ultraviolet rays reaching Earth. This can damage cells in all living things, causing an increase in skin cancer and cataracts in humans, and increasing Earth's temperature.
- Further depletion can be prevented by making and enforcing international bans on CFCs.
- Greenhouse gas concentrations have increased rapidly since the beginning of the industrial period because humans have increased the burning of fossil fuels, production of cement, use of CFCs and some polymer foams, rice cultivation, raising of livestock, creation of landfills, and clearing and burning of forests.

Part B. Atmosphere Models

- The bottle with the cover should get somewhat warmer than the uncovered bottle. Students may or may not be able to predict this.
- The light source is the Sun, the soil is Earth's surface, the bottle with its air is the atmosphere, and the plastic cover represents the greenhouse gases. This model has parts comparable to those involved in the greenhouse effect.
- The windshield and glass let the solar energy in, but the heat from the warmed interior can't get out. The inside gets very hot, very quickly. Pets and children left inside the car can die in a very short time.

Part C. Our Future or Science Fiction?

Mars: Without ample greenhouse gases, Earth would be a cold, frigid planet with an average temperature of -20°C or -4°F . At this temperature all water would be frozen and conditions on Earth would be too cold to support life.

Venus: The atmosphere of Venus contains high concentrations of carbon dioxide—the major greenhouse gas on Earth. An increased surface temperature can occur on Earth if greenhouse gas concentrations continue to rise.

MUCH MORE THAN A FISH TALE

ACTIVITY 2

ANSWERS FOR GRADES 3-5 (AGES 9-11)

Answers to both age level questions can be found by topic below. Older students do not use the net materials listed as follows:

Activity Setup for younger students (materials per group; to be done in groups of two or three students):

- 2 different-sized sifters, sieves or netting meshes (mesh onion, fruit or potato bags, or soccer netting)
- collection of objects, ranging from very small (like rice or sand) to stones or other items (to represent a range of fish sizes)

Part A. Fish vs. Fishing Nets

Status of Fish: Below is a list of overfished species. Those mentioned in *SOS PLANET* are indicated by a *. Read this list to students or write it on a chalkboard:

King Crab	Bluefin Tuna*	Shrimp
Atlantic Cod	Yellowfin Sole	Haddock*
Albacore Tuna	Whales	Sea Turtles
Atlantic Salmon*	Atlantic Lobster	Red Snapper
Swordfish*	Blue Marlin*	Flounder*
Sharks*	New England Cod*	Halibut*

Accept reasonable answers for the terms *abundant*, *steady*, *overfished* and *depleted*, but make sure students see that they indicate a relative decrease in populations towards extinction. “Depleted” means it is no longer profitable to fish for a species throughout most of its range.

Mesh Sizes: All but the smallest objects get trapped in the small mesh net, but many of the smaller objects go through the large-sized mesh. Only the larger objects get trapped in the large mesh.

If larger mesh nets are used to catch larger fish, most small fish and creatures will escape, but if small mesh nets are used, most fish and sea creatures will get caught.

“Bykill” and “Bycatch”: These terms refer to the unintentionally caught non-target fish and other creatures. This can include not only fish, but crabs, lobsters, sharks, whales, dolphins, sea birds, etc.

Environmental Consequences: Overfishing can upset the balance of marine food webs. A bottom trawl kills all bottom species in its path, disrupts habitats and destroys spawning grounds. Depletion of either predators or their prey can disrupt the necessary predator-prey relationship and disturb population balances.

Social and Economic Consequences: Overfishing can result in the collapse of fishing and fishing-related industries, adversely affecting jobs, income, tourism, and recreational fishing. In many coastal nations, fish supply the protein for human diets; without it, public health is affected.

Solutions include the use of marine aquaculture to raise popular salt-water fish, shellfish and crustaceans and to grow seaweed; enforced international agreements and fisheries laws to monitor and check catch limits, catch size, gear and net sizes; use of excluder devices on small mesh nets to save larger animals; a return to the use of biodegradable net materials, and less demand for consumption of overfished species.



Part B. Barriers to the Reef

Importance: It is estimated that over one-quarter of all marine species depend on a healthy coral reef for shelter, nutrients, and breeding grounds. Coral reefs provide a source of food for millions of people and form natural wave barriers for beaches and coastlines. Some valuable medicinal chemical compounds can be produced from coral reef inhabitants. Coral skeletons have been used as bone substitutes in reconstructive bone surgery.

Bottom Trawling: Bottom trawl nets indiscriminately crush all plant and animal life in their path—even scooping up foraging marine mammals. The sea floor is scraped, gouged and leveled, rocks and boulders are upturned, and corals are broken. All reef or ocean-floor inhabitants—vertebrates and invertebrates—are endangered by a bottom trawl. Turtles, whales, sharks and dolphins are among those often trapped in large-area fishing nets. Small juvenile fish and other animals are caught in small mesh nets.

Other Destructive Fishing Methods: All of these methods destroy not only commercial target fish but noncommercial, non-target marine life as well:

- A solution of sodium cyanide is squirted into the water near the target fish, causing them to lose their equilibrium and become easy prey. This poison has been found in dead sardines, dolphins and whales.
- Dynamite or blast fishing kills anything in the blast impact zone.
- Muro ami involves a group of people pounding on the coral with instruments to drive fish into nearby nets. Any fleeing animal is netted and the corals are damaged.

Destructive Human Activities: Industrial pollution such as oil, pesticides and fertilizers poison the corals. Sediment and soil from poor land management smother and block sunlight needed by the corals. Collecting specimens for souvenirs and tropical fish for aquariums take their toll on the reefs. Careless divers and snorkelers trample and crush corals. Dredging for new coastal developments destroys the reef habitat and often sewage from coastal villages and cities is dumped into the reef.

Solutions include establishment of protected marine areas, sanctuaries, and preserves; prohibiting removal and collection of dead or live corals; regulation of the trade in sea plants and animals from the reef; coastal zone management to ensure proper land use and sewage treatment, and environmentally sound engineering and construction practices.

LOSING THE FOREST FOR THE TREES

ACTIVITY 3

ANSWERS FOR GRADES 3-5 (AGES 9-11)

Part C. Where in the World?

See the answers listed below at the beginning of **Part B**.

Part E. Putting It All Together

See **Part D**, below right, for suggested linkages.

ANSWERS FOR GRADES 6-8 (AGES 12-14)

Part A. The Cycle of Gases

Carbon Dioxide-Oxygen Cycle: Destruction of rain forests means less photosynthesis takes place, which in turn means more carbon dioxide build-up and less oxygen to breathe.

Other Gases Produced: Burning produces carbon dioxide, carbon monoxide, methane and other trace gases such as nitrous oxide. Methane is produced by livestock, their manure, and rotting organic debris. Deforestation can lead directly to global warming since carbon dioxide is one of the major greenhouse gases that trap heat. Both methane and nitrous oxide destroy ozone in the stratosphere.

Part B. Going, Going, Gone?

Percentage of Rain Forests on Earth and Rate of Destruction: Rain forests ring the planet in the tropical regions. The Amazon rain forest encompasses the countries of Brazil, Colombia, Peru, Venezuela, Ecuador, Bolivia, and the three Guyanas. Other areas include the Philippines, Malaysia, Ivory Coast, Nigeria, Thailand, India and Ethiopia.

In 1950, about 15% of Earth’s land surface was covered by rain forests; today it has been reduced to about 7%. The current rate of loss is about 1 1/2 acres per second. As much as 20,000 square miles are lost each year in the Amazon alone.

Reasons for Destruction: Rain forests are being destroyed for financial reasons, with commercial logging as the main culprit. The rain forests are seen by governments and multinational companies as valuable only for their timber, which is cut to meet the demands of the industrialized countries for wood products—teak, mahogany, and rosewood for fine furniture and building materials, pulp for paper and cardboard, charcoal, and wood for fuel. Many developing countries use income from logging to reduce their national debt. In the Amazon, there are also mining operations, road building, hydroelectric facilities, and military operations. Subsistence farming has long been a destructive force and continues to be so as peasants and landless settlers move into the wilds to claim and clear land by old slash/burn methods.

CONSEQUENCES OF DEFORESTATION OF RAIN FORESTS

Plants and Animals: It has been estimated that between 50% to 90% of the world’s species live in rain forests—more specifically, 70% of vascular plants, 30% of land vertebrates, and 90% of arthropods. Harvard biologist Edward O. Wilson estimates the loss of 137 plant and animal species every day, totaling 50,000 species annually.

Medicines: Currently about 25% of Western pharmaceuticals are derived from rain forest ingredients. As much as 90% of the population in developing countries relies on rain forest-based remedies. Of plants found to have anti-cancer properties, 70% are found only in the rain forests. With less than 1% of tropical plants and trees tested, many more useful compounds are still to be found.



Native Tribes: Indigenous populations are often decimated or evicted. In some cases they are forced to work for logging companies at very low wages.

Environment: Other environmental concerns are soil erosion; water pollution from runoff of oil, mercury and other industrial chemicals and from farm wastes, and strip mining.

Actions for Governments and International Agencies:

- Create global awareness of the urgency of the problem.
- Significantly increase the number and size of protected areas where no logging or resource extraction would be allowed.
- Plant hardwood trees that could be harvested in 8-10 years.
- Plant and harvest sustainable medicinal plants, fruits, nuts, oils, rubber, chocolate, etc.
- Show communities, land owners, governments and companies viable financial reasons to protect, not destroy, the rain forests.

Actions for Citizens:

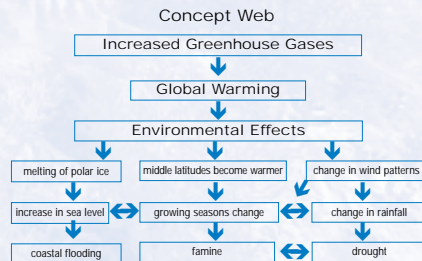
- Decrease demand for wood and paper.
- Do not buy tropical hardwood furniture.
- Purchase products and hardwoods only from sustainable-growth programs.

Part C. Write About It

Accept any creative projects based on sound information.

Part D. Putting It All Together

See the activity master for Grades 3-5 (Ages 9-11), **Part E**, for a list of events caused by global warming. Accept any logical arrangement and linking of these consequences, as shown below:



LIVING IN A GREENHOUSE

ACTIVITY 1

GRADES 3-5 (AGES 9-11)

Our Earth is surrounded by a thin blanket of gases called the *atmosphere*. Greenhouse gases in the atmosphere keep our planet warm enough to allow plants and animals to live. Certain gases cause this warming, creating the “greenhouse effect.” The film *SOS PLANET* talks about what this is doing to our Earth.

Part A. Like a Greenhouse

If you have ever been inside a greenhouse, you know that the air inside is warmer than the air outside. The glass of the greenhouse lets the Sun’s rays in, but the glass will not let any of the heat out. It becomes trapped inside, making it even warmer.

There are gases in the atmosphere that act like the glass on a greenhouse. They are: water vapor, carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons (CFCs). What do they do to the Sun’s heat?

An increase in these gases causes global warming—an increase in the annual average temperature on Earth. Why?

What could happen if an increase in temperature affected the polar ice caps?

Ultraviolet rays from the Sun have enough energy to burn skin and damage human cells, but many are filtered out by ozone, a special form of oxygen gas in the Earth’s atmosphere.

Scientists have discovered that the ozone is being destroyed by some of the greenhouse gases and by other manufactured chemicals called CFCs used in refrigerators, air conditioners, some plastic foams, and in some spray cans. The ozone layer is becoming much thinner—and that is a real concern for human survival.

How could the loss of ozone affect people and plant and animal life?

What can we do to help stop the loss of ozone?

Part B. Atmosphere Models

Your teacher will prepare two soda bottles that show how our atmosphere works. Watch the demonstration and answer these questions:

Which bottle do you expect to get hotter?

Why? _____

What does the light source stand for? _____

• the soil/sand? _____

• the bottle and the air in it? _____

• the plastic cover? _____

Which bottle became hotter? _____

Was this what you predicted? _____

How is this a good model for the greenhouse effect? _____

Children or animals should never be left in parked cars during the summer—not even for a few minutes. Why not? What could happen?

C. Draw It

Use one color to draw arrows to show what happens to the Sun’s rays when they hit both the glass of the greenhouse and the atmosphere surrounding Earth. Use another color to draw arrows to show what happens to the heat from inside the greenhouse and Earth’s surface. What is happening to the temperature in both the greenhouse and on Earth?



Greenhouse



Atmosphere

LIVING IN A GREENHOUSE

ACTIVITY 1

GRADES 6-8 (AGES 12-14)

Our Earth is surrounded by a thin envelope of gases called the *atmosphere* that controls our temperature and helps keep the planet warm enough to support life. This is referred to as the “greenhouse effect.” The new film, *SOS PLANET*, calls the greenhouse effect the most talked-about environmental issue in recent history.

Part A. Like a Greenhouse

Even without a heating system, the temperature inside a greenhouse is warmer than it is outside. The greenhouse glass lets the shorter wavelengths of solar energy pass through to warm the surfaces inside. These heated surfaces give off longer, infrared waves, trapping heat inside that the glass will not let escape.

Water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and chlorofluorocarbons (CFCs) in the atmosphere are called *greenhouse gases* because they behave much like the glass on a greenhouse. What do these gases do to the incoming solar radiation?

What do they do to the infrared radiation from Earth’s surface?

How can the increase of these gases lead to global warming?

Ultraviolet rays are short waves from the Sun. They have enough energy to burn skin and damage DNA in cells, but many never reach us. They are filtered out by ozone, a special form of oxygen gas found in the stratosphere. In recent years scientists have discovered that the ozone is being destroyed by some of the greenhouse gases and by other manufactured chemicals called CFCs. These are used in refrigerators, air conditioners, some plastic foams, and in some spray cans. The ozone layer is becoming thinner and thinner—and that is a real concern for human survival.

Work with your classmates to research ozone depletion. Use the other side of this sheet to answer these questions:

- What materials and chemical processes are responsible for the ozone depletion? How are they related to human activity?
- Does ozone depletion appear to be worse in some geographic locations? In some seasons?
- The depletion of ozone is a serious environmental concern. Why?
- How can further ozone depletion be prevented?
- What human activities are increasing greenhouse gases?

Part B. Atmosphere Models

Try the following experiment to create your own model of the atmosphere and the greenhouse effect:

1. Remove the necks from two plastic soda bottles and put a cup of soil in each.
2. Wrap the bulbs of two thermometers with a paper towel or cloth. Tape them just above the level of the soil so they are at the same location on the side of each bottle, facing outward toward you for easy reading.
3. Leave one bottle uncovered. Cover the other bottle tightly with clear plastic and secure it with a rubber band.

4. Two of you should work with one bottle and two with the other bottle, as you position a light source between the bottles, with each bottle about 1/2 to 1 inch (2-3 cm) away from the light. The bottles should not be close enough to burn.

5. Record the reading of each thermometer as you start. Now turn on the light and take a temperature reading every two minutes for at least 20 minutes.

Which bottle do you expect to get hotter? _____

Why? _____

Record your data here:

Time (min.)	Temp F° or C°—uncovered bottle	Temp F° or C°—covered bottle
Start		
2 min.		
4 min.		
6 min.		
8 min.		
10 min.		
12 min.		
14 min.		
16 min.		
18 min.		
20 min.		

Describe any difference in the temperature change in each bottle.

Which one became hotter? _____

Was this what you predicted? _____

These bottles model the atmosphere. What is represented by the light?

• by the soil/sand? _____

• by the bottle and the air in it? _____

• by the plastic cover? _____

Parents and pet owners are told never to leave children or animals in parked cars during the summer—not even for a few minutes. Why not? What could happen?

Part C. Our Future or Science Fiction?

SOS PLANET describes scenarios where Earth might become like Mars or like Venus. With a partner, brainstorm how each of these futures could happen. Do research if necessary. Now write a short science fiction story for each scenario detailing how and why such a fate befell Earth and what life is now like on our planet. Share your story with your classmates.

MUCH MORE THAN A FISH TALE

ACTIVITY 2

GRADES 3-5 (AGES 9-11)

Throughout history, people have fished for food, recreation, adventure and as a way of life, thinking that the seas would never run out of fish. There were no laws or regulations about how to fish or what to take from the sea. In recent years, more fish have been caught than nature can replace. The film *SOS PLANET* shows entire species of fish disappearing or being diminished. It also shows the drastic effects of a net being dragged over the coral reef.

Part A. Fish vs. Fishing Nets

Can you imagine the sea without any fish in it? Many fish are caught for seafood. They supply protein for our bodies. Write the names of at least three ocean fish that people eat:

Now your teacher will read a list of overfished species. Are any of those you named on this list? Which ones?

People used to fish with spears, hooks and very small nets, but today they use sonar, radar and satellite devices to help locate and track fish. Huge factory ships use nets the size of football fields and other gear that has very small mesh.



Sardine

Tuna

Your teacher will supply you with pieces of two different-sized meshes and objects of various sizes to represent different-sized sea creatures.

Place all the objects in the smaller mesh net. What happens? Why?

Now place all of the different-sized objects into the larger mesh net. What happens? Why?

How can a larger mesh net be beneficial to very small fish like sardines?

How could trawling with very long, strong mesh nets with small openings be harmful to large fish like tuna and sea creatures such as turtles and dolphins?

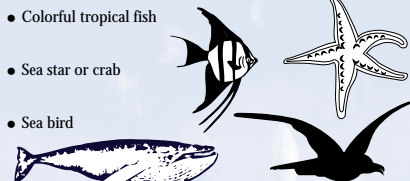
Pretend you and your classmates are members of an international group that has been asked to make rules to prevent overfishing. Brainstorm some ideas you think can be helpful in doing this. Tell how each one is beneficial.

Part B. Barriers to the Reef

Coral reefs have been called the rain forests of the deep. A single coral reef may be home to as many as 3,000 different species of fish. Coral reefs are important to humans, too, as a source of food and some medicines—yet, reefs also are endangered.

In one sequence of *SOS PLANET*, a turtle swims with a seahorse on a coral reef when suddenly a huge dragnet from a fishing boat sweeps across the reef floor. This is called bottom trawling. Bottom trawling is not the only threat to life in the reef. Another fishing method squirts poison around the reef, and dynamite is often used to blast fish out of the water.

Pretend you are a reef fish or another creature from the list below:



- Colorful tropical fish
- Sea star or crab
- Sea bird
- Sea mammal feeding on the bottom as the net comes by

Describe the danger to you and your habitat by:

- the dragnet: _____
- the poison: _____
- the blasting: _____

Some scientists predict that 70% of reefs may be destroyed in the next few decades. The human activities listed below are harmful to coral reefs. Form a group and have each member select a different activity from the list, then write a TV or radio news segment about the kind of damage it causes. Have two group members think of some solutions to protect, save and rebuild reefs. Present your news program to the class.

- Diving and snorkeling
- Building along the coasts
- Collecting of souvenirs and tropical fish
- Farming coastal land

MUCH MORE THAN A FISH TALE

ACTIVITY 2

GRADES 6-8 (AGES 12-14)

Throughout history, people have fished for food, recreation, adventure and as a way of life—thinking that the seas hold a never-ending supply of fish. The film reminds us that ocean fish catches increased 25 times in the 20th century. The World Wildlife Fund estimates that two-thirds of the fish stocks that supply the global market have been over-exploited or fished to maximum capacity. Try this activity to get a better idea of how overfishing occurs.

Part A. Fish vs. Fishing Nets

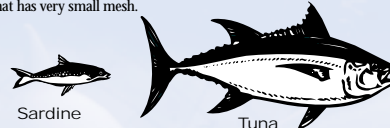
A fish population is often categorized as abundant, steady, overfished or depleted. Discuss what you think each of these terms means:

- abundant
- steady
- overfished
- depleted

Working with a partner, research two overfished species. For each, give its geographic fishing grounds, what the fish is used for, where it fits into the marine food chain, and what has led to its current status. Use the table below to record your information:

Fish	Location	Use	Food Chain Information	Cause of Status

People used to fish with spears, hooks and very small nets, but today they use sonar, radar and satellite devices to help locate and track fish. Huge factory ships use nets the size of football fields and other gear that has very small mesh.



Sardine

Tuna

How can a larger mesh net with a 12- to 18-inch opening (30-45 cm) be beneficial to very small fish like sardines and others that are only 2 to 4 inches (5-10 cm) long?

How could trawling with very long, strong mesh nets with openings of 2 to 4 inches (5-10 cm) be very harmful to large fish like tuna and sea creatures such as turtles and dolphins, which are often more than 3 feet (1 meter) in length?

Most modern fishing methods are also wasteful because much of what is caught is thrown away. This is called "bykill" or "bycatch." We see a dramatic example of this in *SOS PLANET*. What are some sea creatures that might be "bycatch" in small nets?

In larger mesh nets?

Form a group to produce a TV or radio news segment about overfishing and how to prevent it. Research the following consequences of overfishing and destruction of ocean habitats:

- Environmental impacts
- Social impacts
- Economic impacts

Others in your group should pretend they are members of the government and research helpful marine conservation regulations. Present your news segment to your class. Use graphics and props and, if possible, videotape your presentation.

Part B. Barriers to the Reef

Coral reefs—the rain forests of the deep—have thrived on Earth for over 50 million years. By some estimates a single coral reef may be home to as many as 3,000 different species of fish. Coral reefs are important to humans, too, as a source of food and some medicines—yet, reefs also are endangered.



Why are reefs important to the ocean ecosystems, the land, and the people living nearby?

One sequence in the film *SOS PLANET* shows a turtle swimming with a seahorse on a coral reef when suddenly a huge dragnet from a fishing boat sweeps across the reef floor. What kind of damage can a dragnet do to the reef, the ocean floor, and the creatures?

The World Wildlife Fund estimates that more than half the world's coral reefs are threatened by human activity. Some scientists predict that 70% of reefs may be destroyed in the next few decades if immediate, effective action is not taken.

Form a team to research destructive fishing methods and harmful human activities that affect coral reefs. Then compare your team's answers to those of other teams in your class.

LOSING THE FOREST FOR THE TREES

ACTIVITY 3

GRADES 3-5 (AGES 9-11)

More plants and animals live in rain forests than in any other place on Earth, yet rain forests are in grave danger. As *SOS PLANET* opens, we see dark smoke plumes rising from various areas across Earth, showing destruction taking place nonstop. What happens in the rain forests affects the atmosphere and, in turn, the world climate.

Part A. The Cycle of Gases

Look up some information on tropical rain forest destruction to answer the questions below. Use the back of this paper if you need more room.

Through photosynthesis, plants take in carbon dioxide and release oxygen. Why is this so important to all of us?

What happens to the amount of carbon dioxide when forest plants are destroyed? _____ What happens to the amount of oxygen? _____

Why? _____

After valuable timber has been cut, cattle ranches are built in the cleared areas, adding greenhouse gases to the atmosphere. What are the threats to world climate from these added gases?

Part B. Going, Going, Gone?

The narrator in *SOS PLANET* tells us that if deforestation continues, the world's rain forests will disappear within 50 years. Work in teams to research the information below.

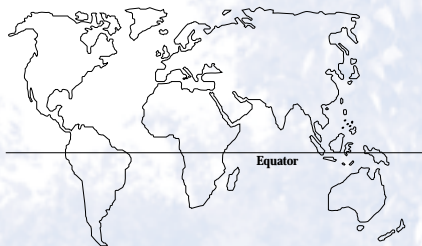
Why are the rain forests being destroyed?

Many medicines today are made from rain forest products, even though scientists have only tested 1% of what is there. How will destroying the rain forests affect our supply of medicine?

What do you think some solutions to this problem are?

Part C. Where in the World?

Many countries on and near the equator have rain forests. Your teacher will give you some names to locate on the map above. The Amazon rain forest is the largest in the world. Name the countries that make it up:



Part D. Write About It

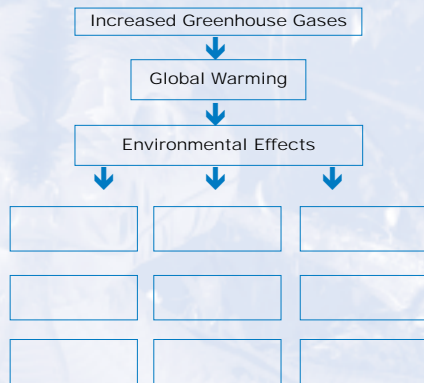
Pick one of the following writing projects for yourself or to do with a group of classmates. Share your work with the class.

- A poem about the rain forests
- A letter in the voice of a plant or animal in the affected habitat
- A poster or slogan about the rain forests

Part E. Putting It All Together

Our atmosphere, oceans, land, and biosphere form a system—a change in one affects the others. An increase in greenhouse gases in the atmosphere can cause other changes.

The concept web below lists three events. Write the rest of the events on the web, showing where they go in terms of the results they could cause. Try to see how the events might be linked to each other and then draw arrows to show connections.



List of Events

- Changes in rainfall
- Changes in wind patterns
- Growing seasons change
- Increase in sea level
- Coastal flooding
- Melting of glaciers and polar ice caps
- Middle latitudes become warmer
- Droughts
- Famine

LOSING THE FOREST FOR THE TREES

ACTIVITY 3

GRADES 6-8 (AGES 12-14)

Tropical rain forests are very complex ecosystems, richer in species than any other habitat on Earth. They serve a vital function in natural biological cycles, and support diverse human cultures.

Yet these giant storehouses of plants, animals and people are in grave danger. As the film *SOS PLANET* opens, we see dark smoke plumes rising from various areas across Earth, symbolizing the widespread destruction of rain forests taking place nonstop today.

Part A. The Cycle of Gases

What happens in the rain forests affects the atmosphere in several ways which, in turn, affects the world climate. Research rain forest destruction with your classmates to answer the questions below.

The Amazon rain forests have been called "the lungs of the planet." Their plants use vast amounts of carbon dioxide and release oxygen in the process of photosynthesis. By some estimates, as much as 20% of Earth's oxygen is produced in the Amazon rain forests. What happens to the carbon dioxide-oxygen cycle when the rain forest plants are cut down? How does this affect us? Why?

After valuable timber has been cut and removed, the remaining rain forests are often burned and cleared. First farms and then cattle ranches are established in the cleared areas. Burning and ranching further add to the levels of harmful atmospheric greenhouse gases.

What gases are produced by these activities?

What are the threats to world climate from these gases?

Part B. Going, Going, Gone?

The rain forests are being destroyed at an alarming rate. The narrator in *SOS PLANET* tells us that if the current rate of deforestation continues, the world's rain forests will vanish within 50 years—when you are middle-aged. That may seem like a long way off, but it's not. Research information about rain forests to answer these questions about them.

How much of Earth was originally made up of rain forests? _____

How much is rain forest today? _____

What are some countries that have tropical rain forests?

At what rate are the rain forests being destroyed?

Why and how are the rain forests being destroyed?

See how much you know about rain forests by filling in this chart:

Effect of the destruction of rain forests on each of these

- Plants _____
- Animals _____
- Indigenous People _____
- Environment _____
- Medicines _____

Pretend you and your classmates are experts on the subject of deforestation of the rain forests. You have been hired by an international agency to develop solutions to the problem. On the other side of this sheet, write a list of actions for each of these groups to take—citizens, young people, and governments.

Part C. Write About It

Pick one of the following writing projects to do on your own or with a group of your classmates. Share your work with the class.

- A descriptive poem about a before-and-after habitat
- A letter to humans, an involved corporation or government, in the voice of a plant or animal in the affected habitat
- A protest ad for a newspaper or magazine in the name of the affected life form (include illustrations or graphics)
- A poster or slogan to express your feelings about the rain forests

Part D. Putting It All Together

The *SOS PLANET* narrator tells us that the destruction of the rain forests could cause unknown effects on Earth's climate and eliminate a majority of plant and animal species from the planet. Our atmosphere, oceans, land, and biosphere function as a system—a change in one affects the others.

Research information on greenhouse emissions and construct a concept web to show what some of the major consequences could be and what, in turn, is affected by each consequence. Think about the impacts not only on weather, climate, land forms, oceans, plants, and animals, but also on humans.

Draw your web on the other side of this sheet of paper and prepare a group presentation of your findings and the reasons behind them. List the references you used.

SOS PLANET

Resource Listing

<http://www.nwave.com/sosplanet>
<http://www.wnf.nl> (Click on link next to SOS PLANET logo for English text.)
<http://www.wwf.org> (World Wide Fund for Nature home page)
http://www.tropicalhardwoods.com/html/main/tropical_rainforest.htm (rain forests)
<http://www.rain-tree.com/facts.htm> (rain forests)
<http://www.seaworld.org/infobooks/Coral/habdiscr.html> (corals and coral reefs)
<http://www.coralreefalliance.org/aboutcoralreefs/> (The Coral Reef Alliance home page)
http://seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/peril_overfishing.html (overfishing)
<http://www.epa.gov/globalwarming/impacts/health/index.html> (U.S. Environmental Protection Agency: global warming)

Credits

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