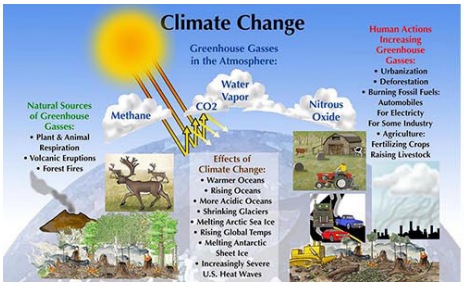
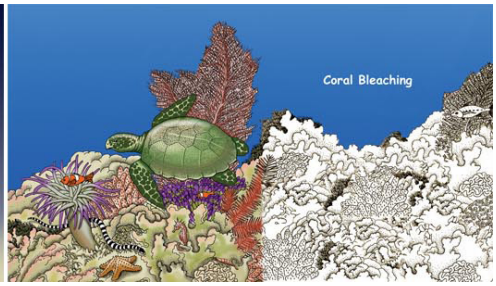
Earth Day Activity Bundle - Reading, Diagrams, Labeling, Activities





This bundle includes 27 age-appropriate resources about Earth Day: Reading, Color Diagrams, Activities and Assessment (45 pages total).

Resources included in this Bundle include:

• Next Generation Science Standards associated with Earth Day Activities

1) An Earth Day Look at Ecosystem Dynamics, Functioning, and Resilience Reading (1 page)
2) How Do Humans Affect Their Environment? Critical Thinking Activity (color - 1 page)
3) Humans Affect Their Environment - Poster Making Activity (1 page)
4) Natural Resources and Humans Mini-Poster (color - 1 page)
5) Biodiversity and Humans - Matching with Answer Key (color - 2 pages)
6) Environmental Changes - Authentic Performance wit Answer Key (color - 2 pages)
7) Which Resources Do YOU Use - Critical Thinking Activity (color - 1 page)
8) Build a Rain Garden (2 pages)
9) Rain Garden Poster (color - 1 page)
10) Our Fragile Coral Reefs Reading (1 page)
11) Protecting Coral Reefs Mini-Poster (Color)
12) Our Fragile Coral Reefs - Vocabulary Cut and Paste with Answer Key (2 pages)
13) Protecting Coral Reefs Poster-Making (color - 3 pages)
14) Ocean Animals Food - matching (1 Page)
15) Keystone Species - The American Alligator Reading (1 page)
16) Keystone Species - The American Alligator Mini-Poster (color - 1 page)
17) Keystone Species - The American Alligator - Vocabulary Cut and Paste with Answer Key (2 pages)
18) Keystone Species - Descriptive Brochure - Performance Task (color - 2 pages)
19) Changing Ecosystems - Matching Activity with Answer Key (color - 2 pages)
20) Seed Dispersal - Investigation (color - 1 page)
21) Seed Dispersal Animal - Model Making (color - 1 page)
22) Acid Rain Reading and Diagram (color - 2 pages)
23) Acid Rain - Demonstration (color - 1 page)
24) Nurse Log Study with Data Sheet (color - 2 pages)
25) Nurse Log Study Practice Sheet (1 page)
26) Smog Alert! Activity - What Conditions Cause Smog to Form? (color - 2 pages)
27) Build an Earth Day Poster (color 4 pages)

Earth Day - NEXT GENERATION SCIENCE STANDARDS

Disciplinary Core Ideas

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

• When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4)

LS4.D: Biodiversity and Humans

• Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

ESS2.E: Biogeology

• Plants and animals can change their environment. (K-ESS2-2)

ESS3.C: Human Impacts on Earth Systems

• Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (secondary to K-ESS2-2)

• **ETS1.B: Developing Possible Solutions** - Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

Performance Expectations:

Students who demonstrate understanding can:

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. *[Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]*

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.*
[Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

What is Earth Day?

On April 22, 1970, we celebrated the first **Earth Day.** More than 20 million people took part with parades, clean ups, and environmental awareness talks and songs. This was the beginning of the ***environmental movement***. People began to become more aware of how we were affecting the Earth. The second Earth Day was not for 20 years, but this time more than 100 million people worldwide took part. Now people celebrate Earth Day every year on April 22nd. What will you do this year?

We are all interconnected. The things you do to help the environment, help everyone on Earth. It is never a waste to save, recycle and protect. Air pollution blows and water pollution flows across borders into other states and countries. Resources can be used up and wasted, including oil, clean water and even land for planting food. Our landfills are overflowing with wasted stuff. It's important to respect the Earth for all of us. Here are some activities you can do as a class or family to contribute to Earth Day awareness and drive for change.

1) Organize an Earth Day Party! Make recycled paper pinwheels, pinecone wind mobiles, animal totem stones. Eat earthworm dirt cups. Ask everyone to bring a can of food to donate to the local food shelf. For party favors send everyone home with a tree seedling in a cup to plant in their yard.

2) Start Paper Recycling at School: Have everyone in your class bring in a cardboard box. Cut the top flaps off. Decorate the boxes by drawing colorful trees, flowers, mountains and lakes on the sides. Then write in big, block letters, "Save Trees – Recycle!" Deliver the boxes around the schools to the classes who want to take part. Start a contest to see which class can recycle the most paper. Give out baby trees as prizes! You can also start a bottle collection to raise money to buy trees to plant at your school. Make up a cool notice to put up at school and around town about it. This has a double advantage. You recycle and you plants new trees.

3) Adopt a roadway. Your class can adopt a roadway or park to keep clean. It is a great way to teach about community service while picking up litter. Once your class does it, maybe other classes will want to adopt a road to keep clean too. For details, contact your county Department of Transportation.

4) Have a "Protect the Environment" poster contest. To raise awareness about environmental issues have a poster contest. Students can choose from topics like coral reef protection, air, water or ocean pollution, climate change, acid rain, over-fishing in the ocean, endangered species, alternative energies, deforestation, etc. Give organic chocolate as the prize.

5) Join an environmental group as a class! Here are a few you can try:

The Cousteau Society	www.cousteausociety.org
Earthwatch	www.earthwatch.org
Environmental Defense Fund	www.edf.org
Friends of the Earth	www.foe.org
Greenpeace, USA	www.greenpeaceusa.org
Keep American Beautiful, Inc.	www.kab.org
National Audubon Society	www.audubon.org
National Wildlife Federation	www.nwf.org
The Nature Conservancy	www.nature.org

An Earth Day Look at Ecosystem Dynamics, Functioning, and Resilience

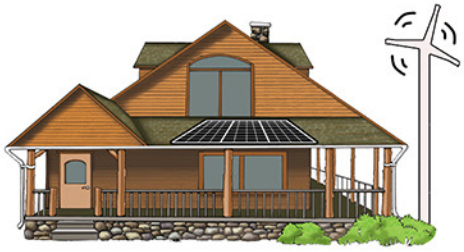
Over time, most ecosystems change. Some change through a natural process, called **succession,** as plants grow up and give way to more mature species. Some changes result from **weather** events, such as volcanoes, hurricanes, windstorms or mudslides. As the human population grows, most ecosystems have been affected by our development, agriculture and recreational use of land and waterways. Ecosystem changes resulting from human actions include **deforestation,** where we have cut down and burned millions of acres of rainforest, deciduous and boreal forest for lumber, agriculture and to make way for human development. This has displaced countless animals, driving some, such as tigers, gorillas, chimpanzees and some many birds species, to the bring of extinction. Humans have also caused **desertification** from allowing livestock to overgraze grasslands to diverting water to farms and cities. As the grasslands change to desert, whole herds of wildlife (such as elephants, zebra, gazelles, giraffes, wildebeests, etc.) are forced to find new sources of food and water, traveling further and further from their normal migration routes. We have caused **coral bleaching**, a symptom of damaged and dying coral reefs, from pollution, physical damage from tourism and over-collection of animals. We have **over-fished** whole areas of the ocean disrupting food webs. **Ocean pollution** (especially of plastic waste) has become a global crisis as sea animals become tangled or choke on the growing mass of floating waste. Industrial emissions from smokestacks release so much carbon and nitrogen into the atmosphere that it mixes with rain water and falls as **acid rain** on ecosystems downwind. Acid rain stunts the growth of trees and kills fish, frogs and other aquatic life. Physical development of wild lands for agriculture and housing has resulted in extensive **habitat loss** in every ecosystem on Earth. While some animals have adapted to ecosystem changes and even thrive in urban areas, such as raccoons, opossums, pigeons, falcons, rats, and squirrels, many animals have disappeared.

The following reading, activities, investigations, and performance tasks are meant to focus our thoughts about how we affect our envrionment in celebration of **Earth Day**.

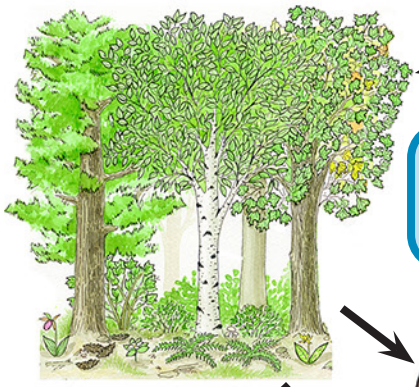
How Do Humans Affect Their Environment? Critical Thinking

Draw a house on the board. Talk to students about how the things that people do to live comfortably can affect the world around them. What are some choices we can make that would reduce our impacts on the environment? Lead students through reasoning out these choices.

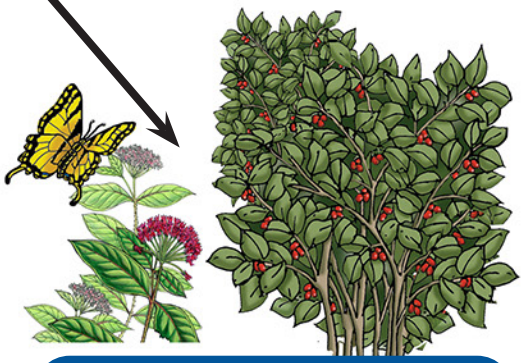
Building a new house.



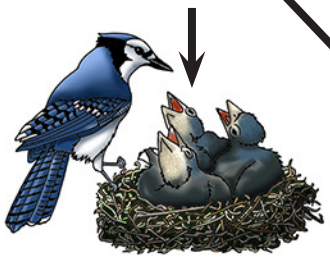
Use green energy sources when you can, instead of burning oil or coal.



Leave as many trees as you can and plant more.



Animals will eat and collect the trees' many seeds.



Plant a garden that will benefit birds, butterflies, bees and other animals.

Birds will build nests in their many branches.

Don't use pesticides or herbicides in your yard.

Some of the seeds buried by animals will sprout into new trees.

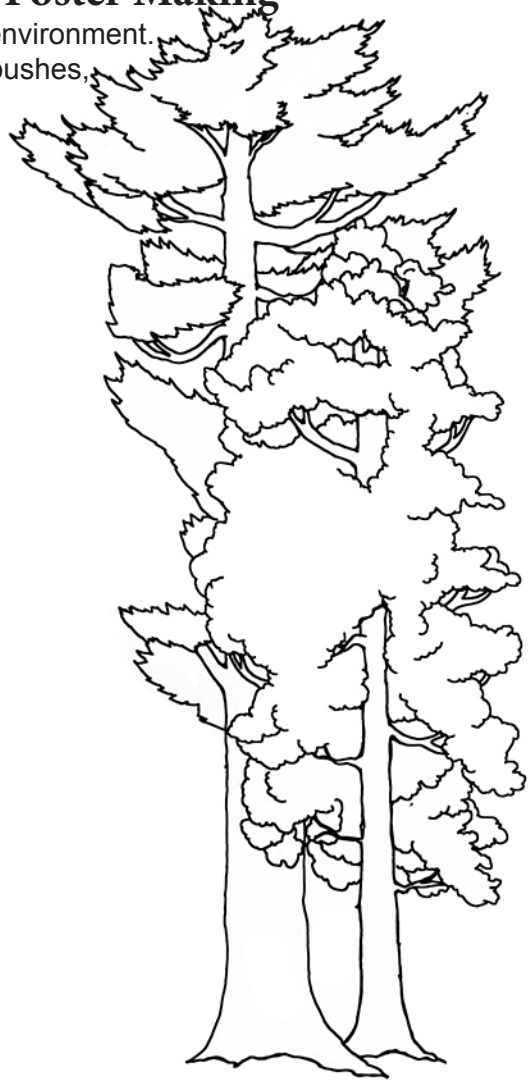
Allow wildlife to take shelter in your yard to hide from predators and raise young.

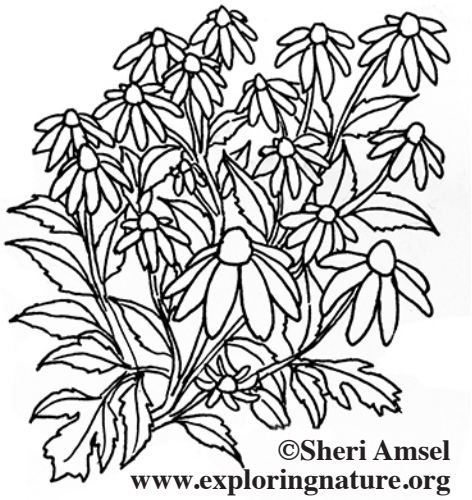
Recycle, compost, try to avoid single-use plastics and never litter.

ESS3.C: Human Impacts on Earth Systems - Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.

Humans Affect Their Environment - Poster Making

Draw a house and yard, showing the things people do that affect their environment. (Hint: vegetable or flower garden, someone mowing lawn or trimming bushes, garbage cans, dog house, parked cars, bird feeder, toys, litter, etc.)





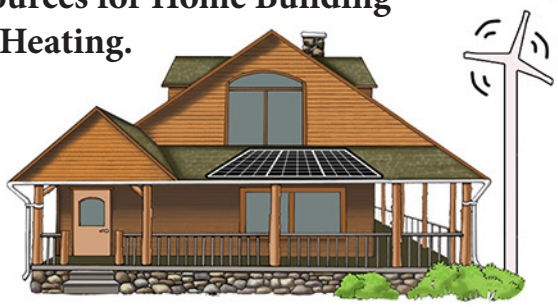
ETS1.B: Developing Possible Solutions - Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

Natural Resources and Humans

Read aloud about how humans use natural resources and discuss it with your students.

Humans live in all habitats. We use natural resources to build our homes. We pull water up from underground waterways into wells or reservoirs. We raise plants and animals for food and clothing. We fish the ocean and lakes for food and sport. We mine for metals to make vehicles and building supplies. We drill for oil and gas and dig for coal to heat our homes, run our cars, pave our roads, and run countless industries around the world. We cut down trees for lumber and paper products. As our World population grows and resources around the world run low, we may have to make changes – use less, recycle more, increase our use of renewable resources, such as wind and solar power. What else can we do?

Resources for Home Building and Heating.

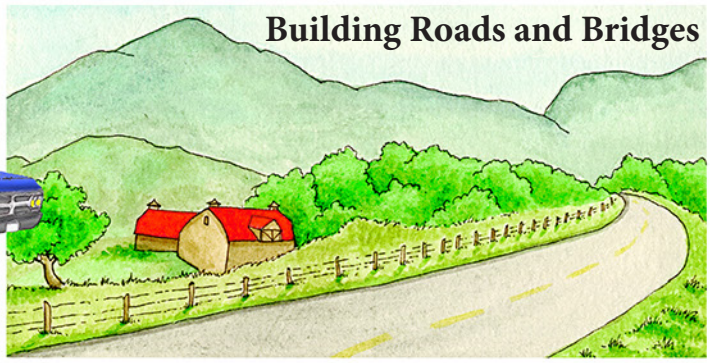


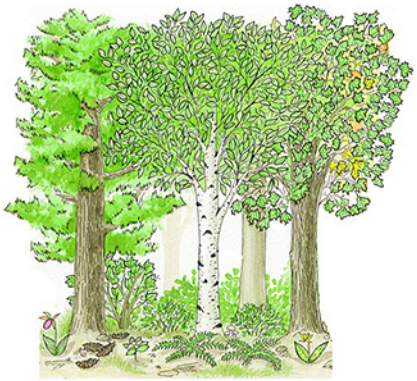
Raising Animals for Food, Clothing and Recreation.

Fishing for Food and Recreation.

Mining Metals.

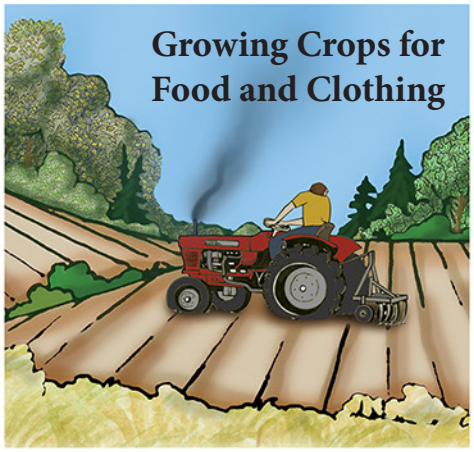
Building Roads and Bridges





Cutting Trees for Lumber/Paper Products

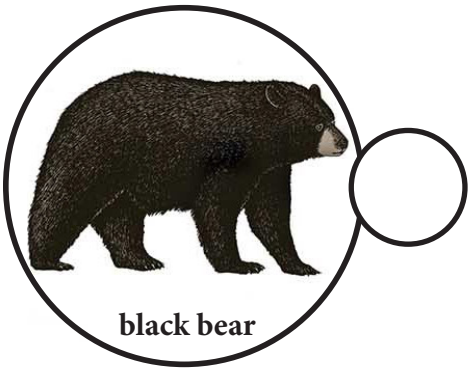
Growing Crops for Food and Clothing



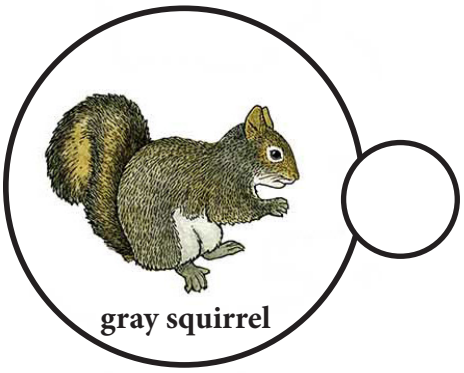
ESS3.A: Natural Resources - Humans use natural resources for everything they do.

Biodiversity and Humans - Matching

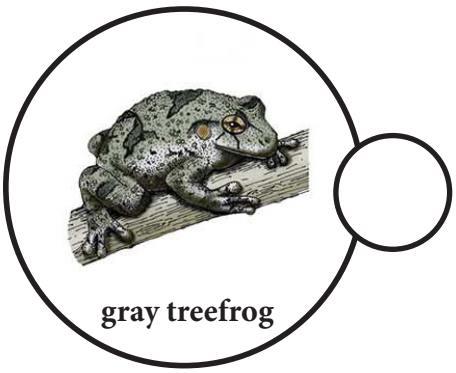
When a forest is cleared for a housing development, it displaces the animals that live there. Yet some animals can live in humans communities and still survive and reproduce. Match the animals to what you think would happen to them in this changed environment.



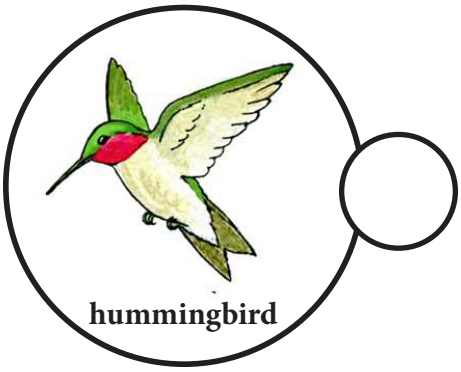
black bear



gray squirrel



gray treefrog



hummingbird

(S) Would **survive** and reproduce well in the changed environment.

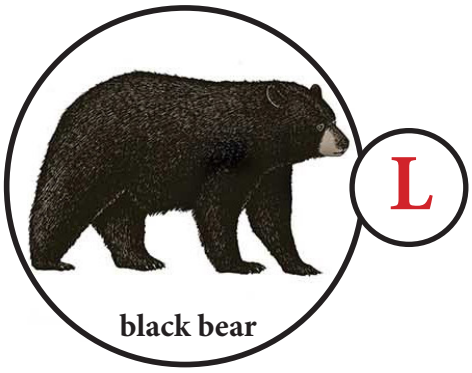
(L) Would **leave** and find a new forested location.

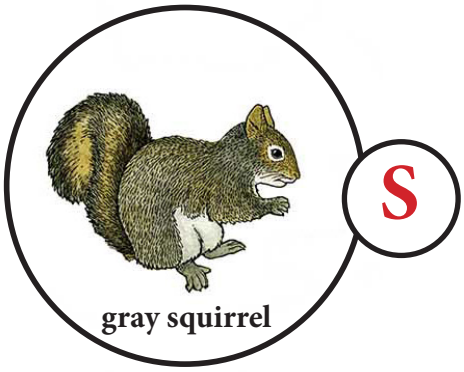
(M) Would **move** into the changed environment from elsewhere.

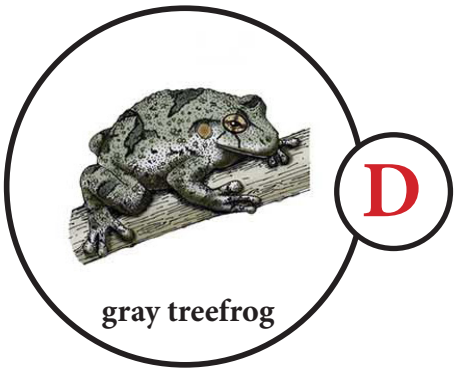
(D) Would **die** during the change to the environment.

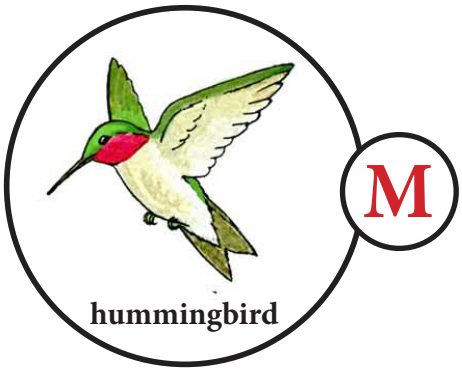
Biodiversity and Humans - Matching KEY

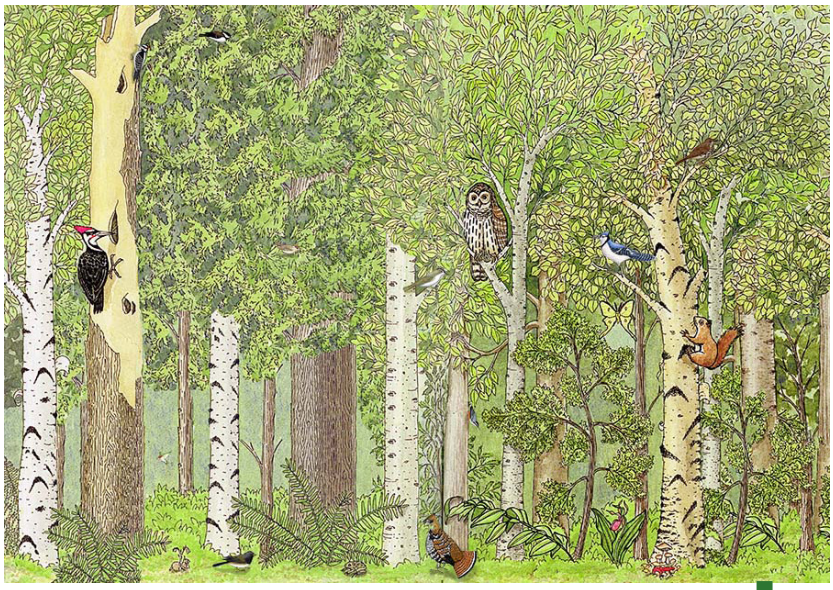
When a forest is cleared for a housing development, it displaces the animals that live there. Yet some animals can live in humans communities and still survive and reproduce. Match the animals to what you think would happen to them in this changed environment.











(S) Would **survive** and reproduce well in the changed environment.

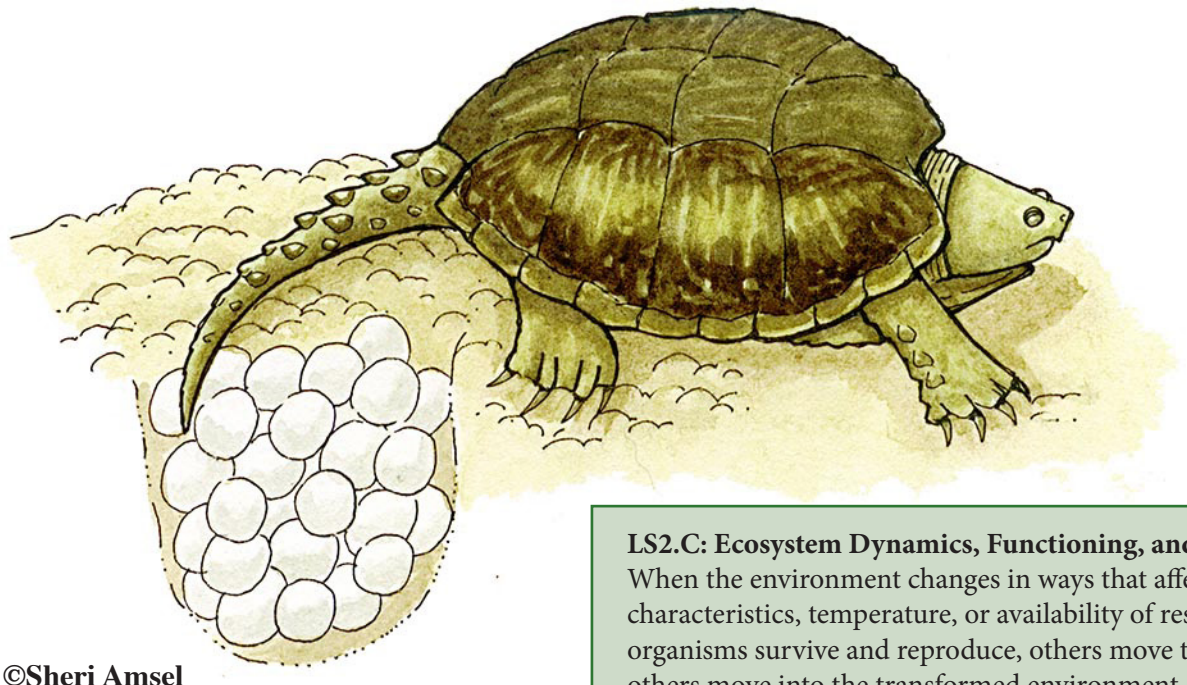
(L) Would **leave** and find a new forested location.

(M) Would **move** into the changed environment from elsewhere.

(D) Would **die** during the change to the environment.

Environmental Changes - Authentic Performance

You are a zoologist (an animal specialist) who works for an animal park that features a large pond with turtles of all shapes and sizes. The landscaping department wants to replace the sandy banks around the pond with a decorative rock garden covered in a thick layer of pretty stones and sculptures. Using what you know about how turtles lay their eggs in the sandy banks around their pond, how would this change to the turtle's environment affect their life cycle? If they decide to make the change, how do you expect to see the population of turtles change over time?

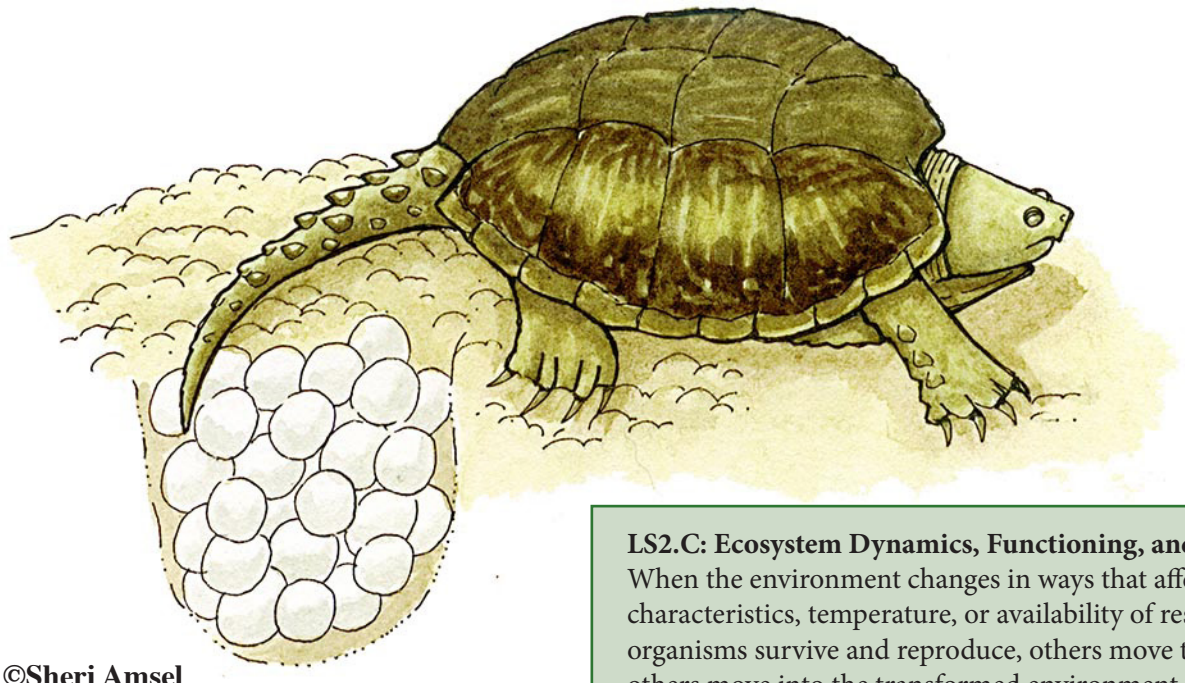


LS2.C: Ecosystem Dynamics, Functioning, and Resilience - When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.

Environmental Changes - Authentic Performance

You are a zoologist (an animal specialist) who works for an animal park that features a large pond with turtles of all shapes and sizes. The landscaping department wants to replace the sandy banks around the pond with a decorative rock garden covered in a thick layer of pretty stones and sculptures. Using what you know about how turtles lay their eggs in the sandy banks around their pond, how would this change to the turtle's environment affect their life cycle? If they decide to make the change, how do you expect to see the population of turtles change over time?

Turtles lay their eggs on land, digging down into the soft soil or sand near the water's edge. If the landscaping department lays down rock on the banks of the pond, the turles will have to travel further away seeking soft soil for burying their eggs. If they cannot find a place to lay their eggs in the confines of their enclosure, there will be no baby turtles that year. Over time the turtles will die out.



LS2.C: Ecosystem Dynamics, Functioning, and Resilience - When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.

Which Resources Do YOU Use - Critical Thinking

Have students keep track of what they do in one day by checking off the boxes. Then talk about what natural resources they may have used throughout their day.

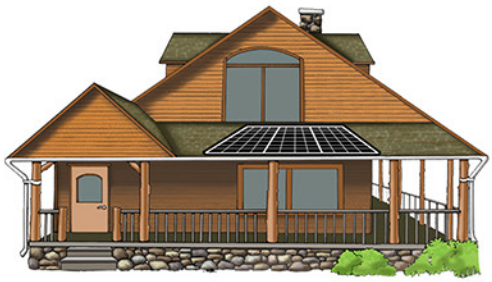
Ate a meal or snack.

Played with toys.

Rode in a bus or car.

Put on or changed clothes.

Went inside a house, school, store or other building.



ESS3.A: Natural Resources - Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1)

Build a Rain Garden - Instructions

1. First **pick a dry, sunny spot** in the yard. It shouldn't be too close to the house (or building). It should be kind of flat. **Test the ground** by digging a hole. Then fill it with water and leave it over night. If the hole is still full of water the next day, this is not a good spot for the rain garden. Rain gardens need sandy soil that will drain water away in a few hours.

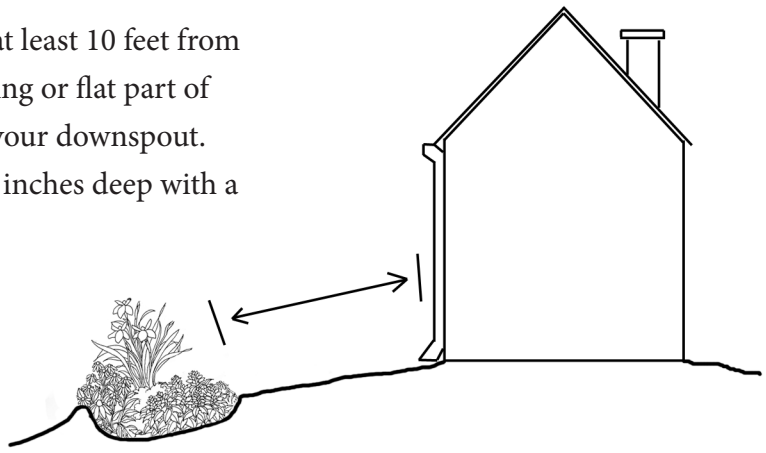
2. **Mark the edges** of where the rain garden will be. Start with a spot that is about ten feet wide. Kidney bean-shape is a nice shape for a rain garden. Use a shovel to **dig out the grass**. Pile the clumps of grass neatly around the edges of the rain garden in a u-shape, like the walls of a fort. This is called a berm. **The berm will hold the water** in the garden after the rainstorm until it has time to drain away into the ground. Leave the side facing the house open so it will that catch water that flows from the house, driveway and sidewalks.

3. Dig down a few inches and **loosen up the dirt**. This will make it easier for the roots of the plants to grow.

4. **Go to the local nursery** to look for bushes, trees and plants that live in your area. These are called native plants. Native plants are used to our weather - wet or dry. Pick out plants that will bloom at different times in the summer. Plant some plants on the berm and some plants in the rain garden itself. This is where the water will pool after each storm. These plants need to able to sit in water from time to time. Plants can be chosen to attract butterflies and birds.

5. For the first season **pull up weeds** and **give it the garden water.** By the next summer the rain garden will be on its own. The flowers will bloom. Butterflies and bees will come to pollinate them. Birds will come to find nest materials. When it rains, the rain garden will fill up with water and be a little pond. Then, after a few hours, the water will drain away and it will be a garden again.

Rain gardens should be located at least 10 feet from your foundation in a gently sloping or flat part of your yard where you can direct your downspout. Your garden should be around 6 inches deep with a berm on the downhill side.



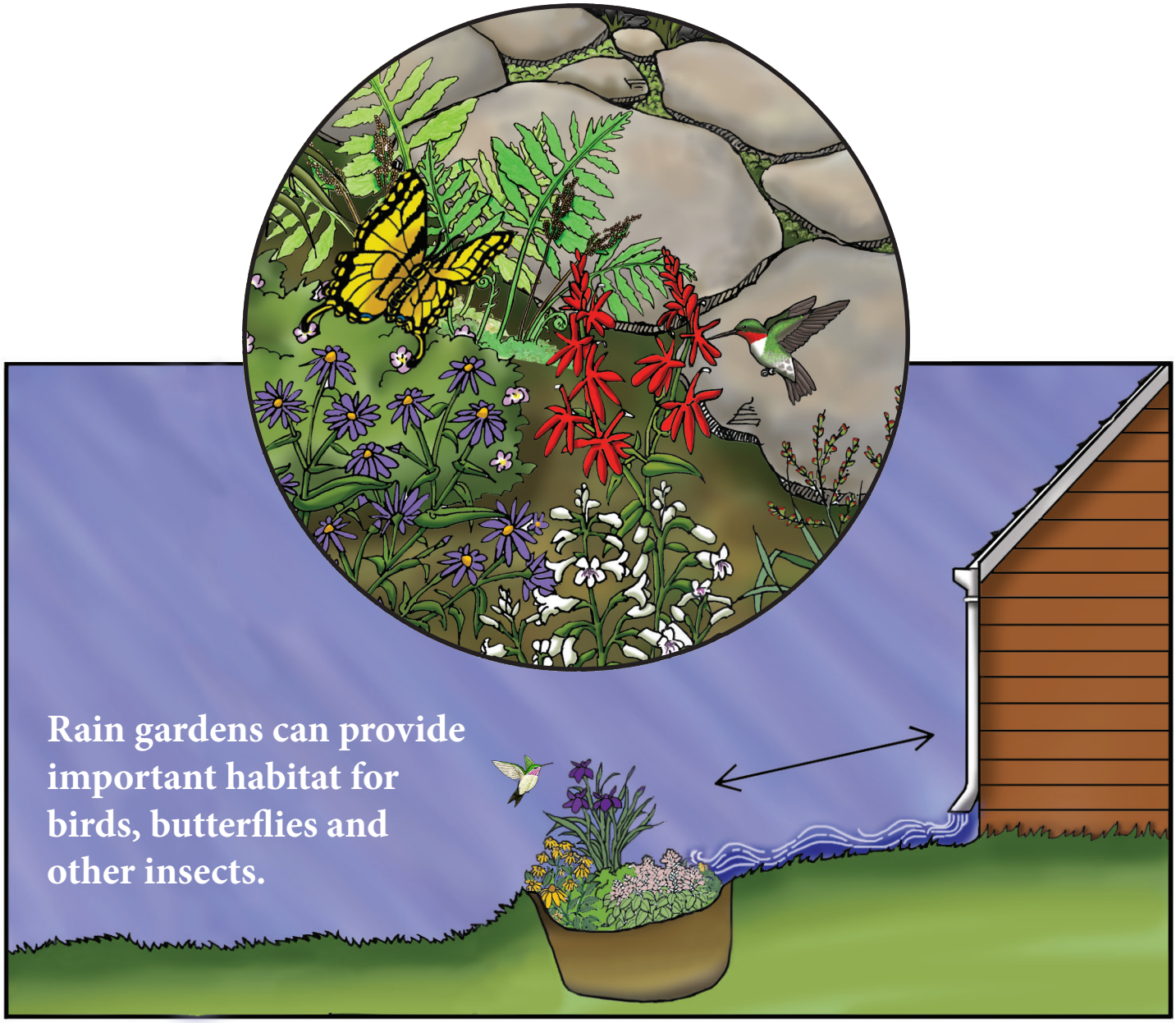
Why Build a Rain Garden?

1. Rain gardens **help collect rainwater** that flows off roofs and paved areas in cities and suburbs, so it doesn't flood the streets. Paved surfaces don't absorb water so build up runoff until the flow is large enough to cause erosion and damage. So they reduce erosion after storms.

2. Rain gardens **help stop rainstorm runoff** from carrying pollutants into streams and lakes. Storm water is polluted by picking up debris, chemicals, dirt and litter off of paved surfaces and carrying them along with it. They can even pick up bacteria from septic systems and carry it toward where people get drinking water or swim.

3. Rain gardens **allow more water to drain back into the ground**, filtering out pollutants and refilling important underground aquifers.

4. When planted with native plants, rain gardens can provide **important habitat** for birds, butterflies and other insects - and they're pretty!



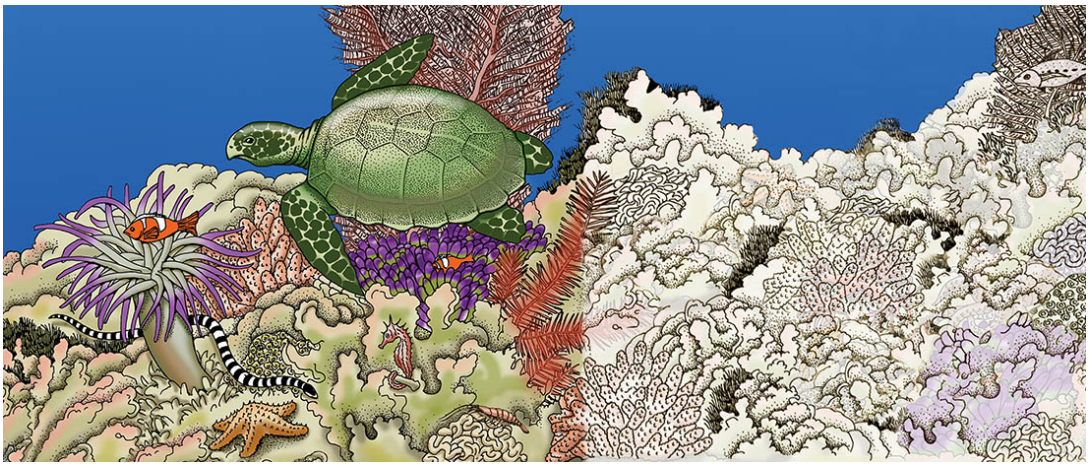
Rain gardens are landscaped depressions that are designed to capture and filter stormwater from roofs, driveways, and other hard surfaces. By collecting water and allowing it to slowly soak into the ground, rain gardens reduce the potential for erosion and minimize the amount of pollutants flowing from your lawn into a storm drain, and eventually into our lakes, rivers, and streams. Planting your rain garden with native plants not only enhances the beauty of your yard, but also provides valuable habitat for birds and butterflies.

Our Fragile Coral Reefs - How Can We Protect Them?

Coral reefs lie along coasts of many tropical locations. They are home to an abundance of ocean life – so are rich in **biodiversity**. They are sensitive to changes and need a **salty, warm** environment between 68° and 82° F. They also need to be constantly **churned by waves** to shower them with bits of food and stir up the **oxygen** they need. The waves also **keep sand from building up**. Coral is an animal that is anchored to the sea floor and cannot survive if buried in sand.

Coral has a partnership with a single-celled algae called **zooxanthellae,** which lives in the coral tissue itself. Coral gives the algae a safe place to live and grow. Zooxanthellae, in turn, gives food and **oxygen** to the coral, while taking up the carbon dioxide that the coral releases. Zooxanthellae also gives coral its many pretty colors. Like the coral in which it lives, zooxanthellae is very sensitive to changes in its environment. A violent storm that causes **water temperature changes** or an **increase in wave churning** can hurt the coral and the algae. If the **zooxanthellae dies**, the coral loses its pretty colors. This is called **coral bleaching**. It is a sign of an unhealthy coral reef. The fish and other reef animals will abandon it over time. If the bleaching is not too bad, the coral can recover, but ongoing stress will cause coral death.

Some of the more serious and ongoing things that affect coral reefs are caused by **humans**. **Poachers** harvest the colorful corals and fish to sell to collectors. **Snorkelers** walk on the fragile coral and other animals and plants that live there. **Boaters** dump trash or dirty water (bilge) near a coral reef and sometimes anchor on the fragile coral itself. Public awareness of the importance and fragility of coral reefs may be one of the most important ways to protect this vital habitat. How can you help?



Protecting Coral Reefs

Coral reefs are rich in biodiversity, but senstitive to environmental changes.

Coral reefs have a partnership with a single-celled algae called zooxanthellae, which gives coral its many pretty colors.

Changes in temperature and other stressors can cause zooxanthellae to die resulting in coral bleaching.

When boating, never dump trash or dirty water (bilge) near a coral reef or anchor on fragile coral itself.

When snorkeling, never step on (or collect) fragile coral or the other animals and plants of the reef.

Never buy coral for your fish tank unless it's been stamped with the Marine Aquarium Council (MAC) stamp. This makes sure it was raised for aquariums and is not from a wild reef.

Our Fragile Coral Reefs - Vocabulary Cut and Paste

After reading about ***Our Fragile Coral Reefs***, cut and paste what you learned about them.

1) Coral reefs are home to an abundance of ocean life – so are rich in _____

2) They are sensitive to change and need a _____ environment.

3) They also need to be constantly _____ for food and oxygen.

4) Coral has a partnership with an algae called _____

5) Zooxanthellae gives food and _____ to the coral.

6) A violent storm that causes _____ **changes** or can hurt the coral and algae.

7) If the **zooxanthellae dies**, the coral loses its pretty colors, which is called **coral** _____

8) Some of the more serious and ongoing things that affect coral reefs are caused by _____

Cut and paste the right words to complete the facts about forest fires.

biodiversity.	**oxygen**
bleaching.	**warm, salty**
churned by waves	**water temperature**
humans.	**zooxanthellae.**

Our Fragile Coral Reefs - Vocabulary Cut and Paste KEY

After reading about ***Our Fragile Coral Reefs***, cut and paste what you learned about them.

1) Coral reefs are home to an abundance of ocean life – so are rich in **biodiversity.**

2) They are sensitive to change and need a **warm, salty** environment.

3) They also need to be constantly **churned by waves** for food and oxygen.

4) Coral reefs have a partnership with an algae called **zooxanthellae.**

5) Zooxanthellae gives food and **oxygen** to the coral.

6) A violent storm that causes **water temperature** **changes** or can hurt the coral and algae.

7) If the **zooxanthellae dies**, the coral loses its pretty colors, which is called **coral bleaching.**

8) Some of the more serious and ongoing things that affect coral reefs are caused by **humans.**

Cut and paste the right words to complete the facts about forest fires.

biodiversity.

oxygen

bleaching.

warm, salty

churned by waves

water temperature

humans.

zooxanthellae.

Protecting Coral Reefs - Poster Making

Much of coral reef destruction is caused by humans. Create an educational poster that will raise public awareness about how to protect this vital habitat. Be sure to use the specific facts you learned from your reading. You can use the facts boxes and graphics provided below or create your own.

Protecting Coral Reefs

Coral reefs are rich in biodiversity, but senstitive to environmental changes. Changes in temperature can cause coral bleaching.

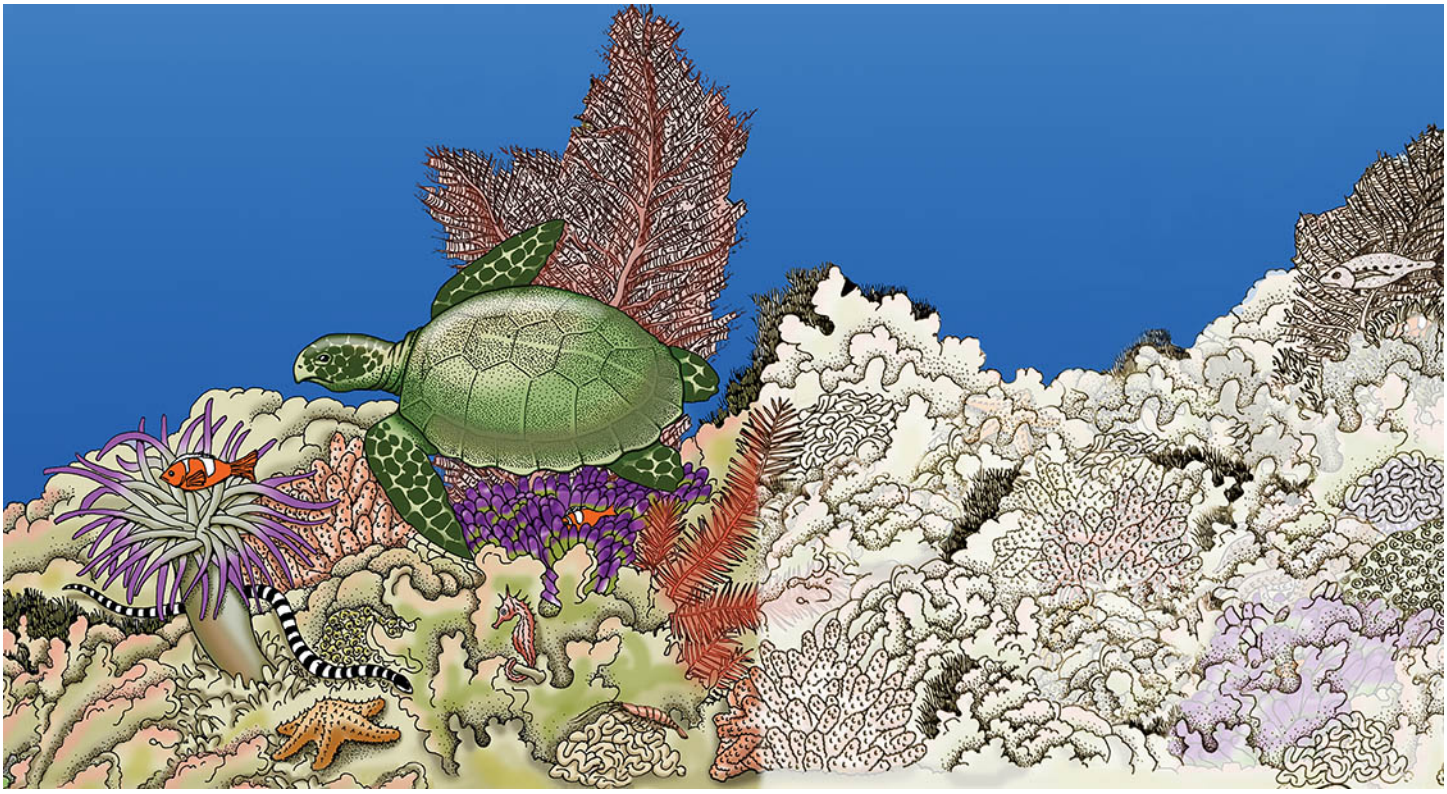
Coral reefs have a partnership with a single-celled algae called zooxanthellae, which gives coral its many pretty colors.

Never buy coral for your fish tank unless it's been stamped with the Marine Aquarium Council (MAC) stamp. This makes sure it was raised for aquariums and is not from a wild reef.

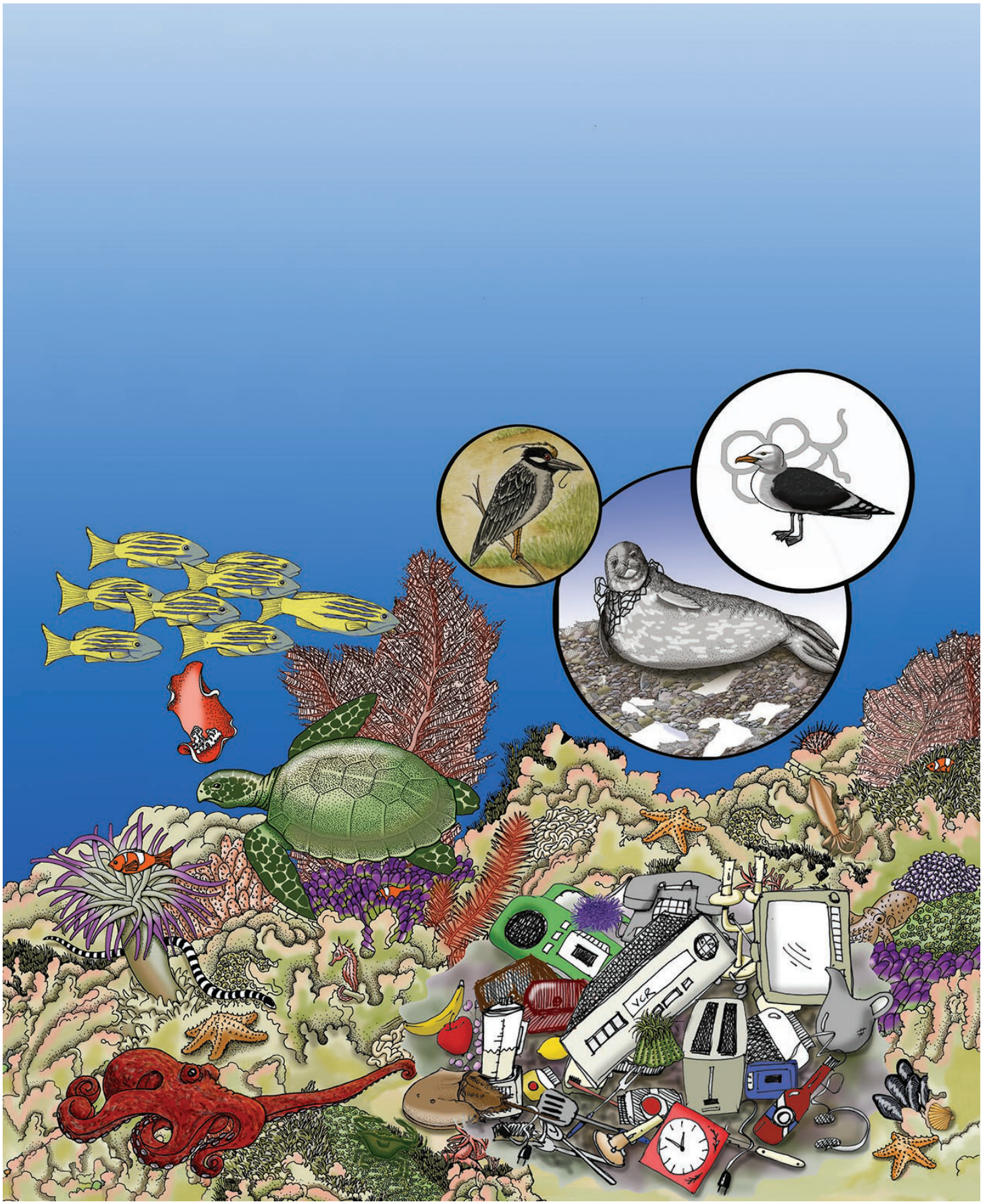
When snorkeling, never step on (or collect) fragile coral or the other animals and plants of the reef.

When boating, never dump trash or dirty water (bilge) near a coral reef or anchor on fragile coral itself.

Protecting Coral Reefs - Poster Making Graphics



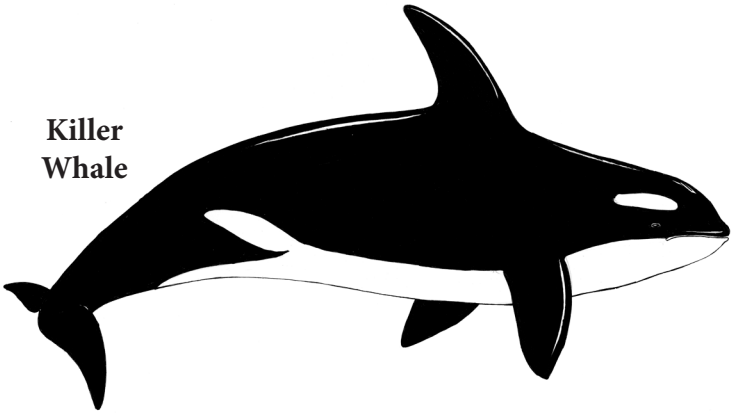
Protecting Coral Reefs - Poster Making Graphics



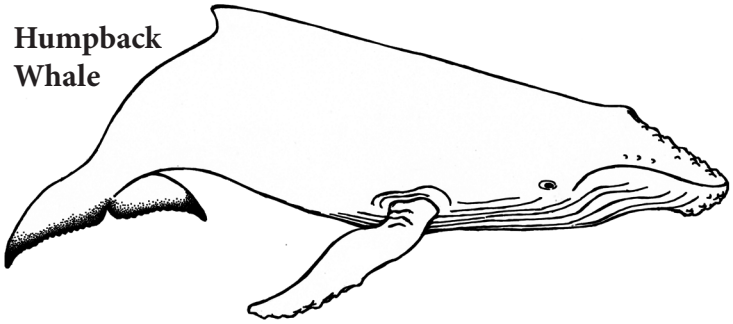
Match the Ocean Animals To What They Eat

A healthy ocean is important so all ocean animals have the foods they need to eat.

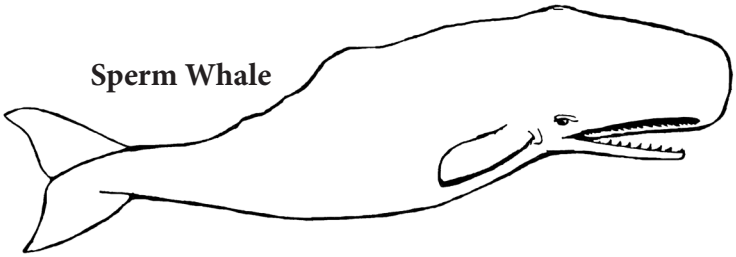
Killer Whale



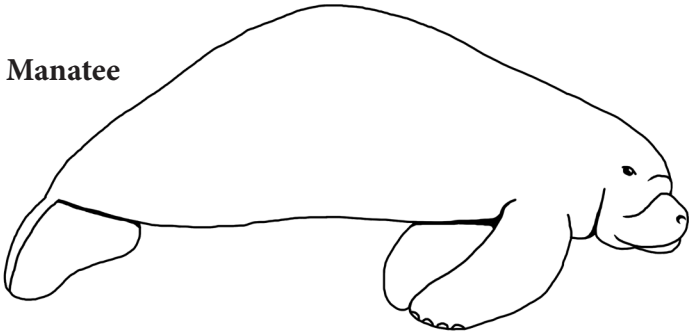
Humpback Whale



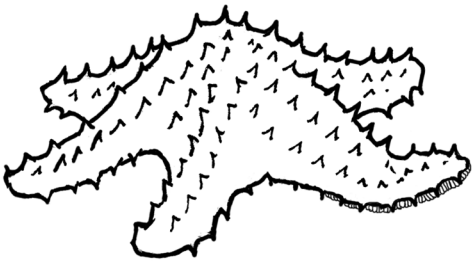
Sperm Whale



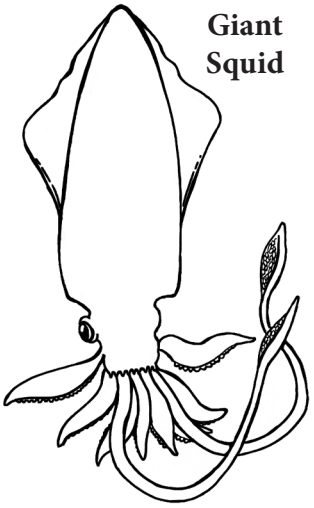
Manatee

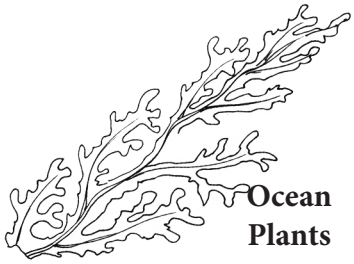


Starfish

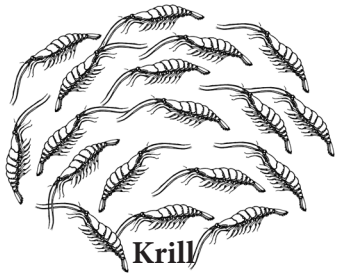


Giant Squid

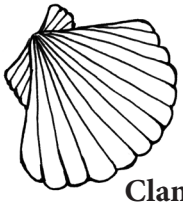




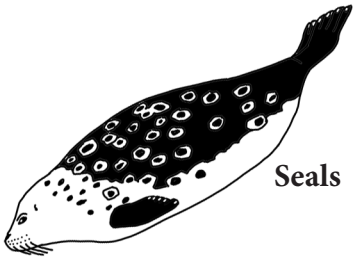
Ocean Plants



Krill



Clams



Seals

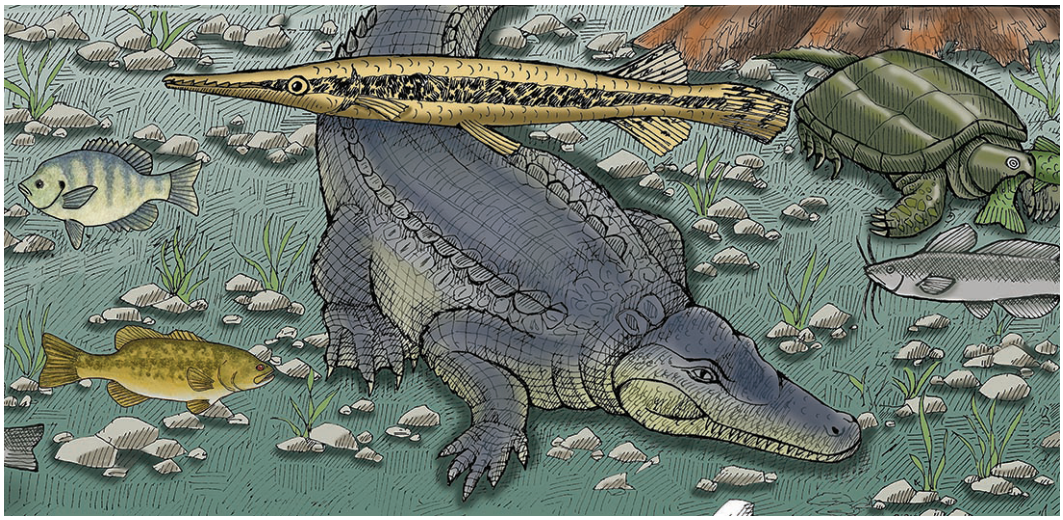
Keystone Species - American Alligator - Why Are They important?

The American alligator was once thought to be a dangerous pest. Found in the southeastern U.S., they are the biggest reptile in North America – reaching 15 feet long and 1,000 pounds. They were showing up in people's swimming pools and on golf courses. Fishermen worried that they were eating all the game fish that *they* liked to catch. People also valued their skin for making leather. So, they were hunted. They were hunted so aggressively, that by 1965, they became an **endangered species** on the verge of **extinction**.

Then, as the alligators disappeared, something unexpected happened. People began to notice that instead of better fishing, all the game **fish** they liked to catch seemed to be disappearing. If the alligators where gone, what was eating them? Biologists confirmed that the alligators' favorite food, a large fish, called a gar, had been having a population boom. With no alligators to eat the gar, their numbers were rising and *they* were eating all the game fish. The loss of the alligator had changed the **ecosystem**. Biologists now call the American alligator a "**keystone species**." This means that it has a major influence on balancing its ecosystem.

In 1967, the American alligator was put on the **endangered species list** and protected from all hunting. Over time, their numbers began to recover. As the alligator **population** came back, the number of gar decreased. Then the game fish came back. The balance had returned to the alligators' ecosystem. By 1987, the alligator population had recovered so well, that it was removed from the endangered species list.

It's important to understand how an animal affects its ecosystem if we want to protect our wild habitats over time.

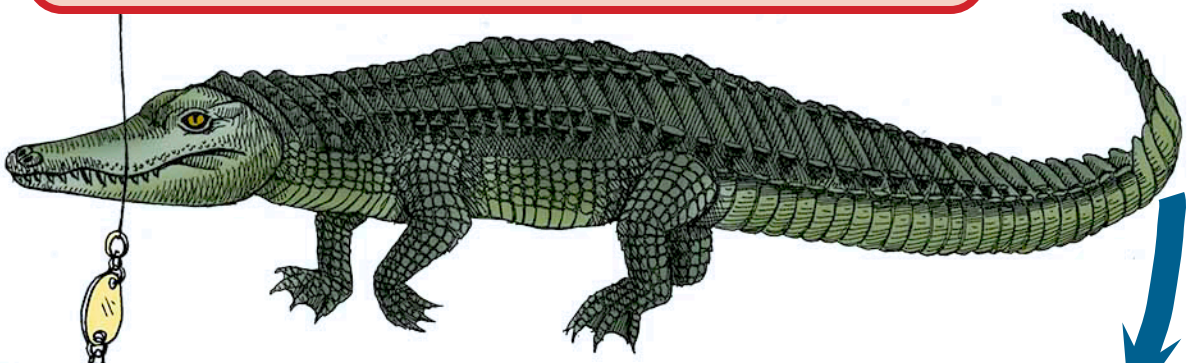


Keystone Species - The American Alligator

The **American alligator** was once thought to be a dangerous pest.

Found in the southeastern U.S., they are the biggest reptile in North America – reaching 15 feet long and 1,000 pounds. Alligators were showing up in people's swimming pools and on golf courses. Fishermen worried that they were eating all the game fish that *they* liked to catch.

So, alligators were hunted. They were hunted so aggressively, that by 1965, they became an **endangered species** on the verge of **extinction**.



As the alligators disappeared, something unexpected happened. People began to notice that instead of better fishing, all the game fish they liked to catch seemed to be disappearing. **What was eating them?**

Biologists confirmed that the alligators' favorite food, a large fish, called a **gar**, had been having a population boom. With no alligators to eat the gar, their numbers were rising and *they* were eating all the game fish. The loss of the alligator had changed the **ecosystem**.

Biologists now call the American alligator a "**keystone species**." This means that it has a major influence on balancing its ecosystem.

Keystone Species - The American Alligator
- Vocabulary Cut and Paste

After reading about the ***American Alligator***, cut and paste what you learned about them.

1) The American alligator is the bigggest _____ in North America.

2) The American alligator were hunted so aggressively, that by 1965, they became an _____ species.

3) Then, as the alligators disappeared, the _____ disappeared.

4) With no alligators to eat the _____ *they* were eating all the game fish.

5) The loss of the alligator had changed the _____

6) Biologists now call the American alligator a _____ **species**.

7) In 1967, the American alligator was protected from all _____

8) By 1987, the alligator _____ had recovered so well, that it was removed from the endangered species list.

Cut and paste the right words to complete the facts about the American alligator.

ecosystem.	**hunting.**
endangered	**keystone**
fish	**population**
gar	**reptile**

Keystone Species - The American Alligator
- Vocabulary Cut and Paste KEY

After reading about the ***American Alligator***, cut and paste what you learned about them.

1) The American alligator is the bigggest **reptile** in North America.

2) The American alligator were hunted so aggressively, that by 1965, they became an **endangered** species.

3) Then, as the alligators disappeared, the **fish** disappeared.

4) With no alligators to eat the **gar** *they* were eating all the game fish.

5) The loss of the alligator had changed the **ecosystem**

6) Biologists now call the American alligator a **keystone** **species**.

7) In 1967, the American alligator was protected from all **hunting.**

8) By 1987, the alligator **population** had recovered so well, that it was removed from the endangered species list.

Cut and paste the right words to complete the facts about the American alligator.

ecosystem.

hunting.

endangered

keystone

fish

population

gar

reptile

Keystone Species

Descriptive Brochure - Performance Task

Keystone species are animals that have a major influence on **balancing their ecosystem**. After reading about the keystone species you have chosen, create a descriptive brochure about them. Describe where to find them (range), in which kinds of habitats, what they look like (physical traits) and eat (diet). Include how they affect the people who live near them - benefits and dangers. Most importantly, include the vital role they play in their ecosystem and if they are endangered or have recovered from being endangered. Some suggested keystone species are:

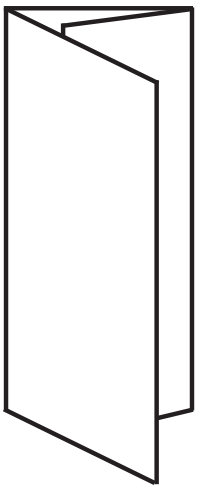
- **American Alligator**
- **Sea Otter**
- **African Elephant**
- **Yellowstone Wolves**
- **Prairie Dogs**

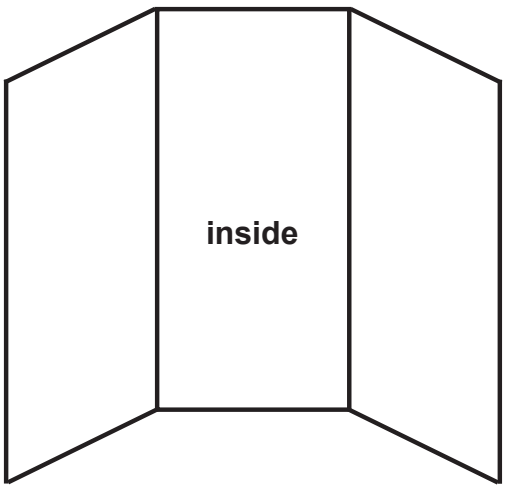
Brochure Layout

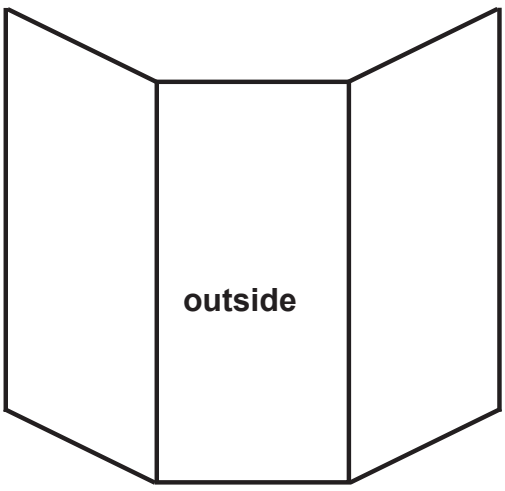
To create your brochure, take a regular sheet of paper and fold it twice to create a 3-panel brochure template. Look closely at the template below so you can see what the folded brochure shape looks like. Here are some tips about how to put your information into your brochure.

1) Create a “dummy” brochure first to map out where you want everything to go.
2) Arrange your information into sections in an organized way in each panel.
3) You can cross panels with pictures and diagrams as needed.
4) Make the titles of each section clear and short.
5) Each section title text should be bigger than the informational text, so it stands out.
6) The biggest title should be on the front panel.
7) Include a small picture on the front panel.
8) Leave a margin between text and the edge of each panel.

folded brochure



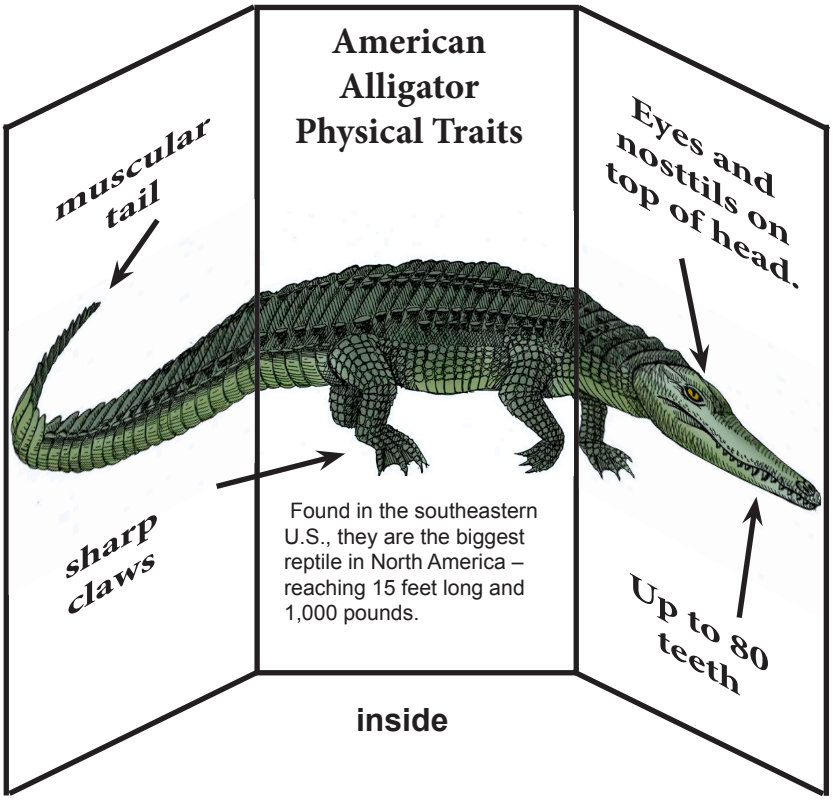




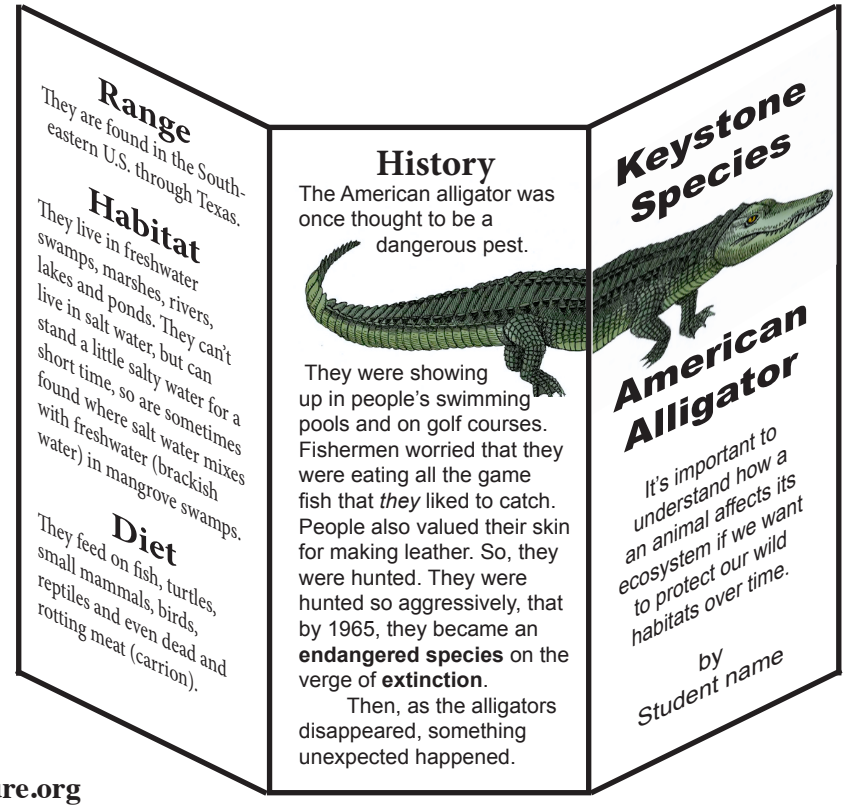
Brochure Diagram - Example

Here is an example layout for making a keystone species brochure (or any performance task brochure). Follow the directions in the "**Description Brochure - Performance Task**" instructions.

folded brochure



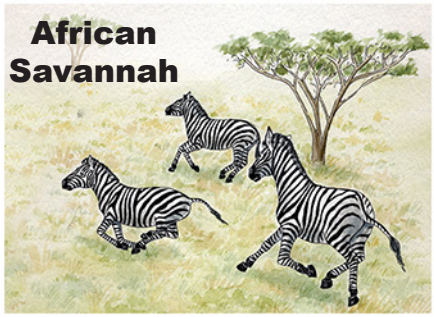
inside

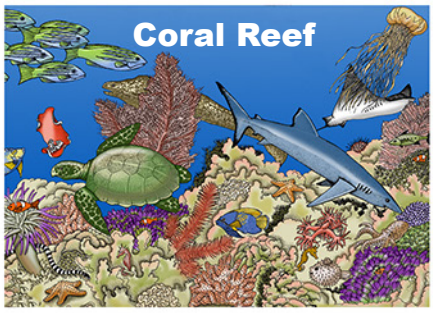


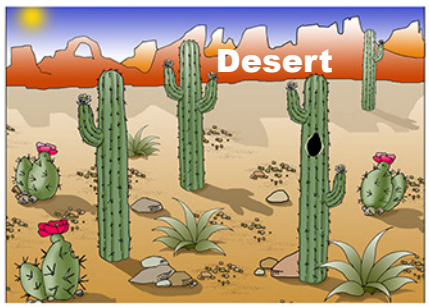
outside

Changing Ecosystems - Matching

Draw an arrow from each habitat to the environmental changes that are affecting them world wide. (Hint: Some may have more than one.) How will this affect the animals and plants that live there? Expand your critical thinking about this topic - try the ***Changing Ecosystems Short Answer Quiz***.







Coral Bleaching: pollution and changing water temperatures kill the algae that gives the coral reefs its lovely color and vitality.

Deforestation: trees are being cut down for lumber or slashed and burned for agriculture at historic rates.

Over-collection: animals and plants are stripped away to sell to collectors until they are endangered or extinct.

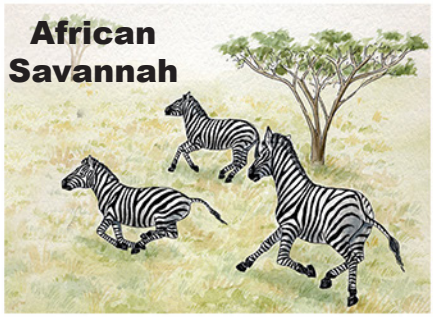
Desertification: overgrazing and over harvesting strip away so much vegetation that the land dries out, erodes and becomes more desert-like.

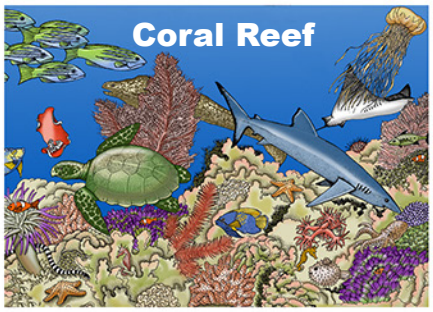
Over-Development: environment is cleared of natural plants and animals and the land is farmed or filled with houses and roads.

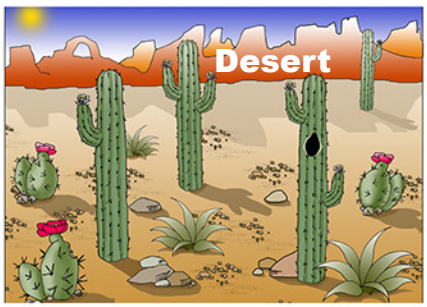
LS2.C: Ecosystem Dynamics, Functioning, and Resilience - When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.

Changing Ecosystems - Matching KEY

Draw an arrow from each habitat to the environmental changes that are affecting them world wide. (Hint: Some may have more than one.) How will this affect the animals and plants that live there? Expand your critical thinking about this topic - try the ***Changing Ecosystems Short Answer Quiz***.







Coral Bleaching: pollution and changing water temperatures kill the algae that gives the coral reefs its lovely color and vitality.

Deforestation: trees are being cut down for lumber or slashed and burned for agriculture at historic rates.

Over-collection: animals and plants are stripped away to sell to collectors until they are endangered or extinct.

Desertification: overgrazing and over harvesting strip away so much vegetation that the land dries out, erodes and becomes more desert-like.

Over-Development: environment is cleared of natural plants and animals and the land is farmed or filled with houses and roads.

LS2.C: Ecosystem Dynamics, Functioning, and Resilience - When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.

Seed Dispersal - Investigation

Try this ***Seed Dispersal Investigation*** to see for yourself some of the interesting adaptations plants have developed to spread their seeds. This can be done in June, but seed development makes this a more effective September activity, depending on the location of your school.

Prepare for Experiment:
Read the: Plants - Read Aloud
Study the: Spreading the Seeds Mini-Poster
Try the: Spreading the Seeds - Matching

Objective: Learn about seed dispersal by performing an experiment mimicking a dispersal technique found in nature.

Materials: scissors, old white socks, plant mister, flower pot full of damp potting soil, uncut grassy field in June-September.

Procedures:
1. Students take turns putting a sock on one hand and walking through the tall grass, sweeping the sock-covered hand through the tall grass.
2. After all the students have had a chance to "collect seeds", cut the sock up one side and spread over the pot full of damp soil.
3. Mist the sock until it is damp every day (not soaking wet). Place pot in a sunny spot.
4. Over the next couple of weeks, mist the sock every day and note if there is any green growth.
5. After a few weeks, look at the plant growth on the sock and talk about how the seeds got there.

Conclusions:
Talk about the physical structures seeds might have to help them be spread from one place to another - hooks, sticky fluid, fruit, nut, etc. Talk about how burrs stick to your clothes (and animals) when they are touched.

Performance Expectations - Students who demonstrate understanding can:
2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Seed Dispersal Animal - Model Making

This is a good fall activity because you can access actual seeds in the woods. Look for beech tree seeds, burdock, thistles, cocklebur, etc. You can also purchase sticky seeds ahead of time from a garden store online.

Goal: Students will think about and come to understand how some seeds are adapted to attach themselves to animals.

Materials: You can ask parents to donate some of these materials.

- pieces of felt, old socks
- rubber bands, tape, glue, pipe cleaners
- markers, construction paper
- sticky seeds, bird seed, found seeds
- magnifying glasses
- stuffing (pillow stuffing, dried beans, old socks, tissue paper)

Procedures:

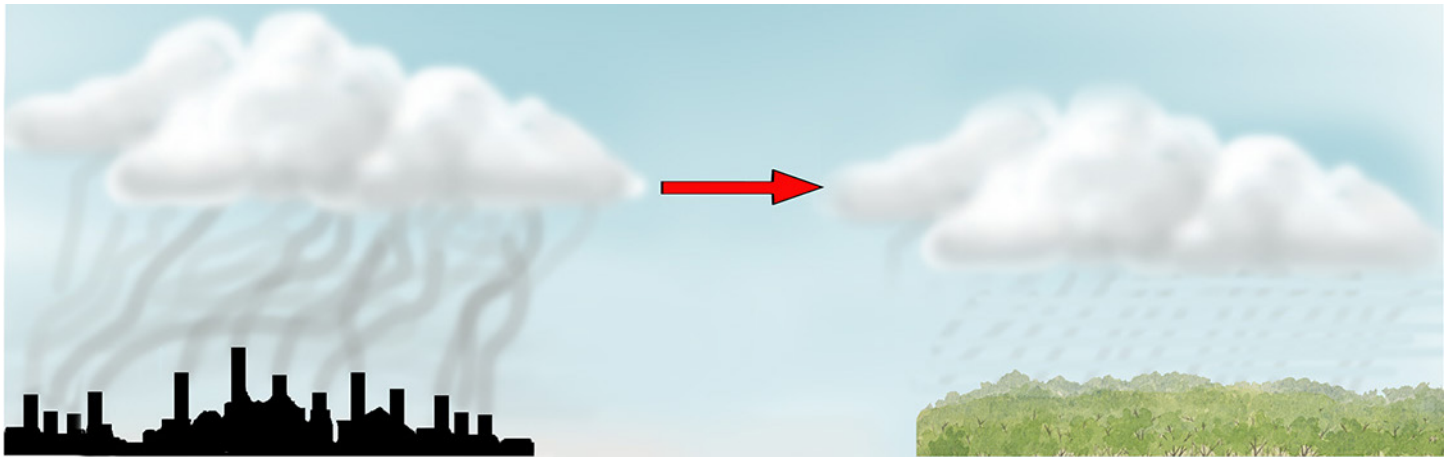
1. Have students look at the seeds with the magnifying glass to see how they are structured to cling to animals.
2. Each student (or team) should build an animal using socks, and other materials (see model below).
3. Then they can attach the seed to them. If you cannot get sticky seeds, they can use glue and bird seed.
4. Display their seed dispersal models.

Discussion:

Discuss how animals get the seed off their fur (disperse them).

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Acid Rain



What makes acid rain?

The burning of coal, oil and gasoline gives off sulfur, nitrogen and carbon that combine with water vapor in the air to make acids, like sulfuric acid, nitric acid and carbonic acid. These mild acids fall to earth as rain or snow. When they land in lakes and streams they can make the water so acid that fish and frog eggs won't hatch. Soon those lakes have no fish or frogs left in them. Acid rain can also cause building and statues to rot away. It can build up in the soil and slow the growth of some trees and kill others.

How acid is acid rain?

In the Adirondacks and throughout the northeastern U.S. and southeastern Canada, the pH of falling rain can be as low as 4 or 5. This is much more acid than normal rainfall.

The pH is the measurement of whether something is acidic or alkaline (base). The number scale used to measure pH is from 1 to 14 with 1 being the most acidic and 14 being the most alkaline (base). 7 is considered neutral, neither acid or base. The normal pH of rainwater is about 5.6, which is slightly acidic. This is because the rain combines with carbon dioxide in our air. This makes a very mild form of carbonic acid naturally. Each pH number represents 10 times the acidity of the number before it. So if rainwater goes from the normal 5.6 to 4.6 it is 10 times more acid than normal.

Where does the acid rain falling on northeastern U.S. come from?

It is carried by the wind. The wind patterns of North America carry pollutants from cities, factories and industrial centers in the Midwestern part of the United States and Canada and drops them on the northeast.

Why doesn't the environment protect itself from the acid, like it does with the natural acids in rain?

The soil naturally contains calcium carbonate, a substance that is alkaline, and mixes with the normal acid of rain and as it washes into lakes and stream and cancels the acid effect out. These are called "buffers." As the rain becomes 10 times more acid than normal the buffers aren't strong enough to counteract the acid and it flows freely into our waterways.

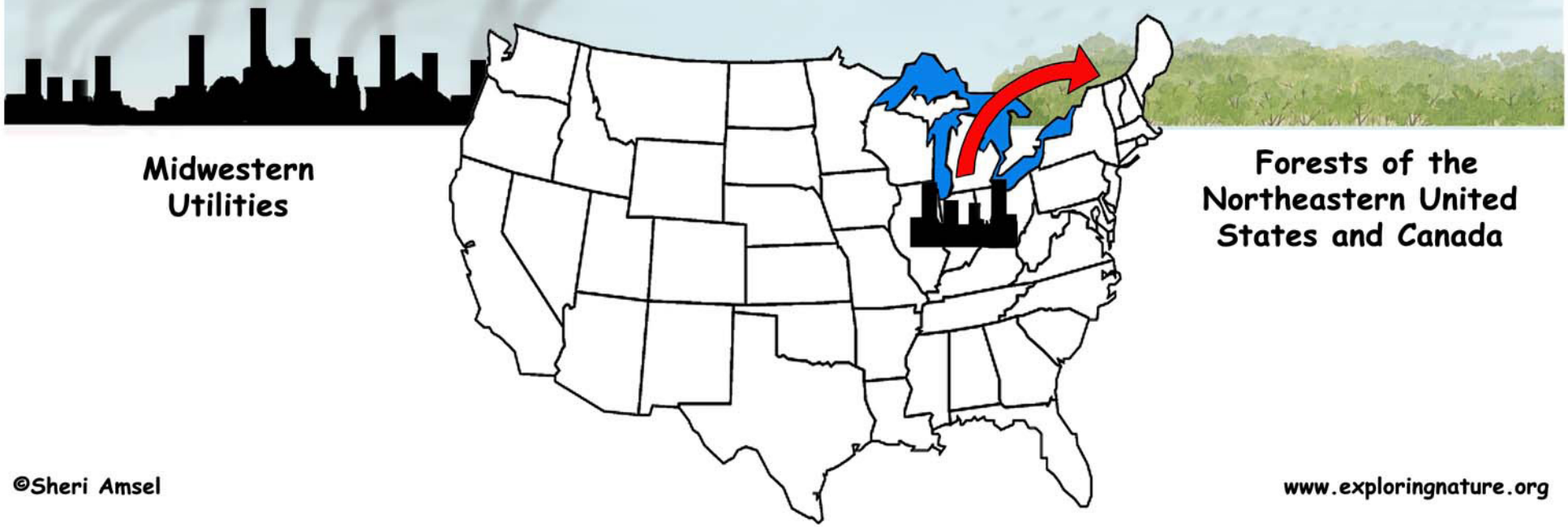
Is acid rain always man-made?

Not all air pollutants are man made. A volcanic eruption can push millions of tons of acidic debris into the air and have a similar effect on the rain and snow. Though intense following a volcanic eruption, this effect is not long term in this case.

Acid Rain's Deadly Journey

Burning coal, oil and gasoline gives off sulfur, nitrogen and carbon into the air. This mixes with water vapor in the clouds making acid – sulfuric, nitric and carbonic acid.

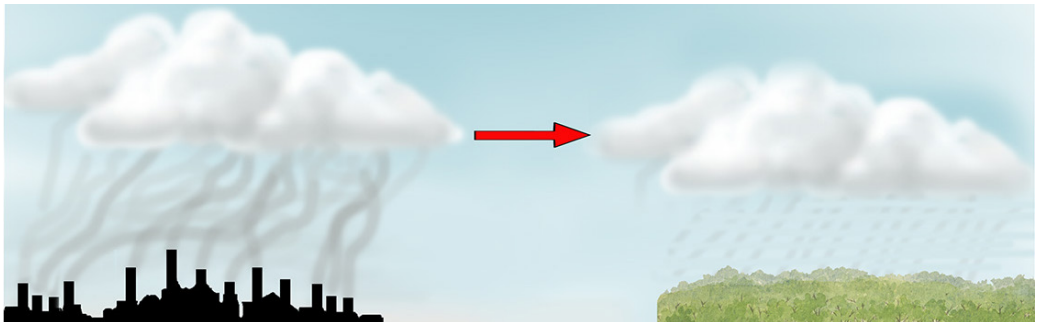
Prevailing winds carry the acidic clouds thousands of kilometers before they release their acidic rain or snow.



Midwestern Utilities

Forests of the Northeastern United States and Canada

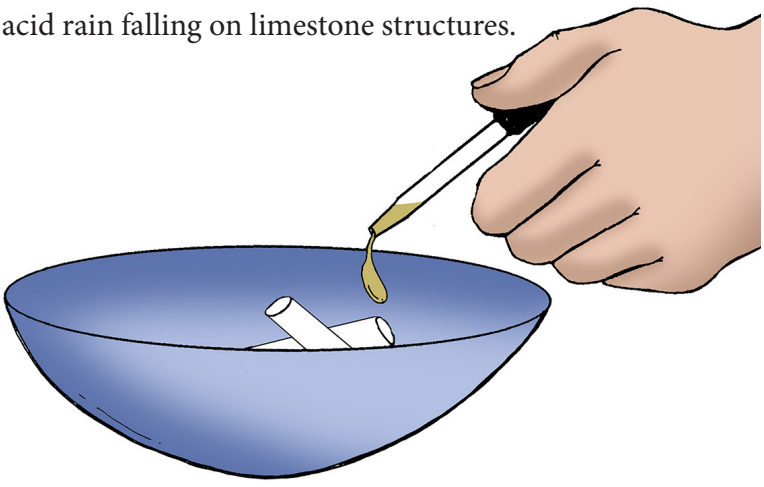
Acid Rain - Demonstration



Acid Rain is created when a large industrial facility burns coal or oil which gives off sulfur, nitrogen and carbon into the air. Their smokestacks carry these waste gases into the clouds where they mix with water vapor to form weak acids – sulfuric, nitric and carbonic acids. When the moisture in the clouds grows heavy enough, it falls as rain - ***Acid Rain***. These toxic clouds are often carried by the prevailing winds for hundreds of miles before they drop their acidic rain or snow. The forests and communities of the northeastern U.S. have been the victim of acid rain that started as air pollution from Midwestern utilities for the last 100 years. Acid rain also corrodes limestone buildings, walkways and statues. Try this ***Acid Rain Demonstration*** to see for yourself how acid rain might affect a region.

Objectives: Students will:
1) Learn the effect acid rain has on buildings, walkways or statues.
2) Be able to discuss what acid rain is.
3) Know where it comes from and what effect it has.

During this investigation, students will be able to:
1. See the chemical reaction of acid on limestone through the vinegar and chalk reaction.
2. Describe what they are seeing and how it relates to acid rain falling on limestone structures.
3. Discuss what causes acid rain and how it gets here.
4. Think about solutions to acid rain.



Supplies:
vinegar, chalk, eye dropper or teaspoon, bowl
Search internet for photos of old statues.
Print any showing acid rain corrosion

Activity:
1. Put chalk piece in the bowl.
2. Using eyedropper or teaspoon, dribble vinegar onto the chalk.
3. The chalk will fizz when vinegar touches it and with enough vinegar added, will then disintegrate.

Discussion: How might acid rain affect:
1) Fish, frogs and salamander eggs in lakes and ponds?
2) Seedling and wildflowers growing in the forest?

Nurse Log Study

Dead trees play an important role in the forest. By the time an old tree dies, it has usually been invaded by insects and fungi, pounded by woodpeckers and escalated by birds and mammals for nest holes. When it finally falls to the forest floor, it has lived a long, productive life. Yet, even then, a rotting log or stump provides a soft, fertile place for seeds to root and grow into plants and trees. Like a sponge, rotting logs absorb water in heavy rain and hold moisture during droughts. Lying on the moist ground, beetles, worms, fungi and microorganisms invade them and begin to loosen up their wood. Moss blankets their surface and ferns and mushrooms take root. Animals dig under and inside them to make burrows. A squirrel, breaking apart a pine cone for its seeds perches up top to watch for predators. It drops a seed into the moss and next spring a baby tree may sprout there. This is why rotting logs are often called "**nurse logs.**" They nurse new life along with their nutrients.

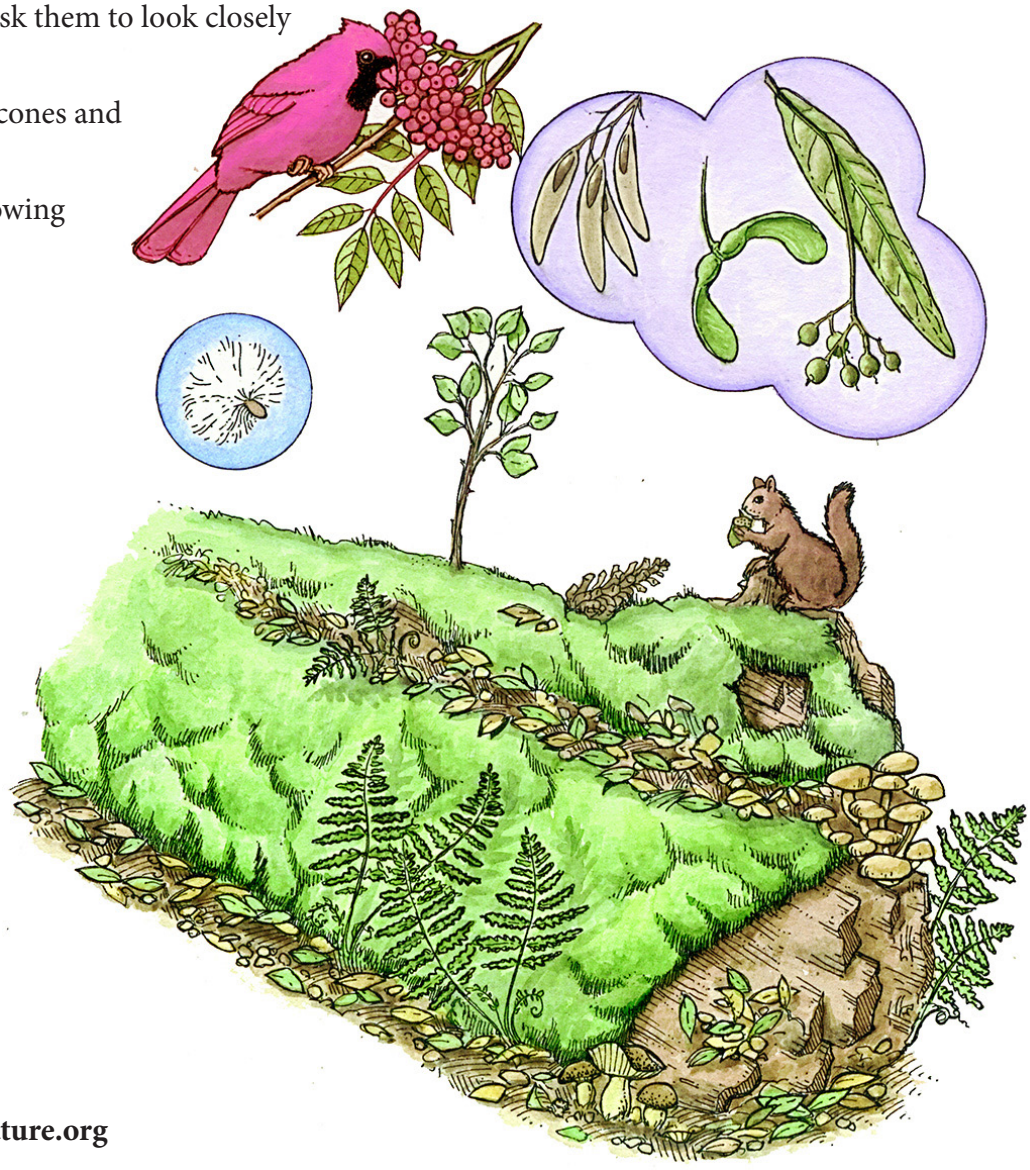
Nurse Log Study Instructions:

1. Have students do the **Nurse Log Study Practice Sheet**. Explain that this shows the kinds of things they will be looking for when they do their own nurse log study.

2. In the schoolyard, or a local forested park, have students look for fallen logs that have started to soften and grow moss. These are nurse logs. Ask them to look closely and find:
a) where animals may have fed on cones and left seeds.
b) moss, mushrooms or fungus growing (and breaking down the wood).
c) animal holes or signs of insects, salamanders or frogs.
d) any new seedlings growing.

3. Have them use the **Nurse Log Study Data Sheet** to record what they see and draw a diagram of their nurse log.

4. Have students share the different things they found and talk about how their nurse log is helping the forest ecosystem.



Nurse Log Study Data Sheet

Describe the things you see on your nurse log:

Discarded seeds _____

_____

Moss, mushrooms or fungus _____

_____

_____

Animal holes, scats or other animal signs _____

_____

_____

New seedlings growing _____

_____

_____

Anything else? _____

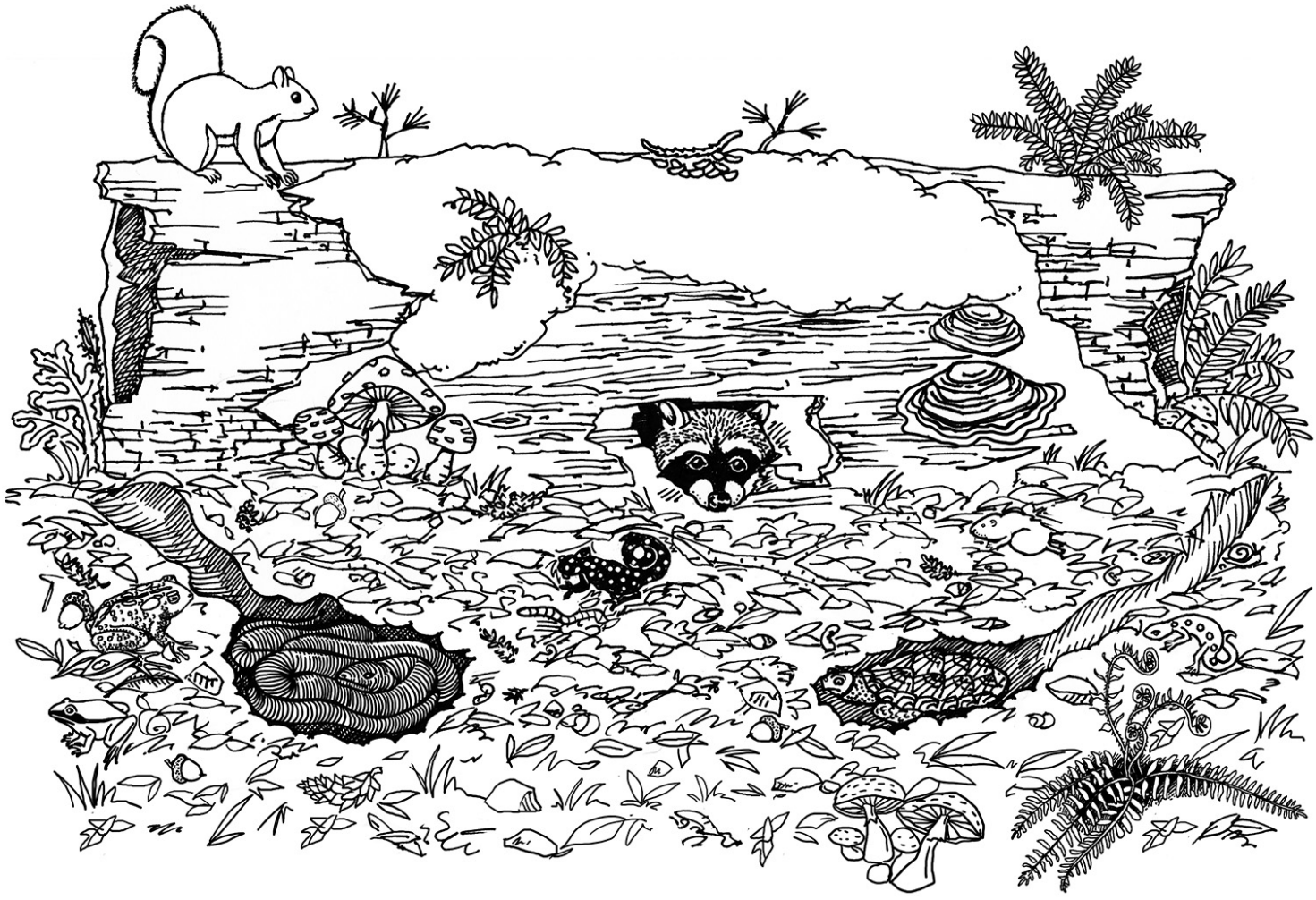
_____

Draw your nurse log and where the above features are on it.

Nurse Log Study Practice Sheet

Find the following things on and around the nurse log below, then color it:

- ☐ pine cone stripped of seeds
- ☐ 2 tree seedlings
- ☐ 2 conch fungus
- ☐ 2 burrowed reptiles, name them _____
- ☐ 10 plus mushrooms
- ☐ 5 batch of ferns
- ☐ toad
- ☐ 2 salmanders
- ☐ earthworm
- ☐ woodfrog
- ☐ 3 mammals, name them _____
- ☐ snail



Smog Alert! Activity - What Conditions Cause Smog to Form?

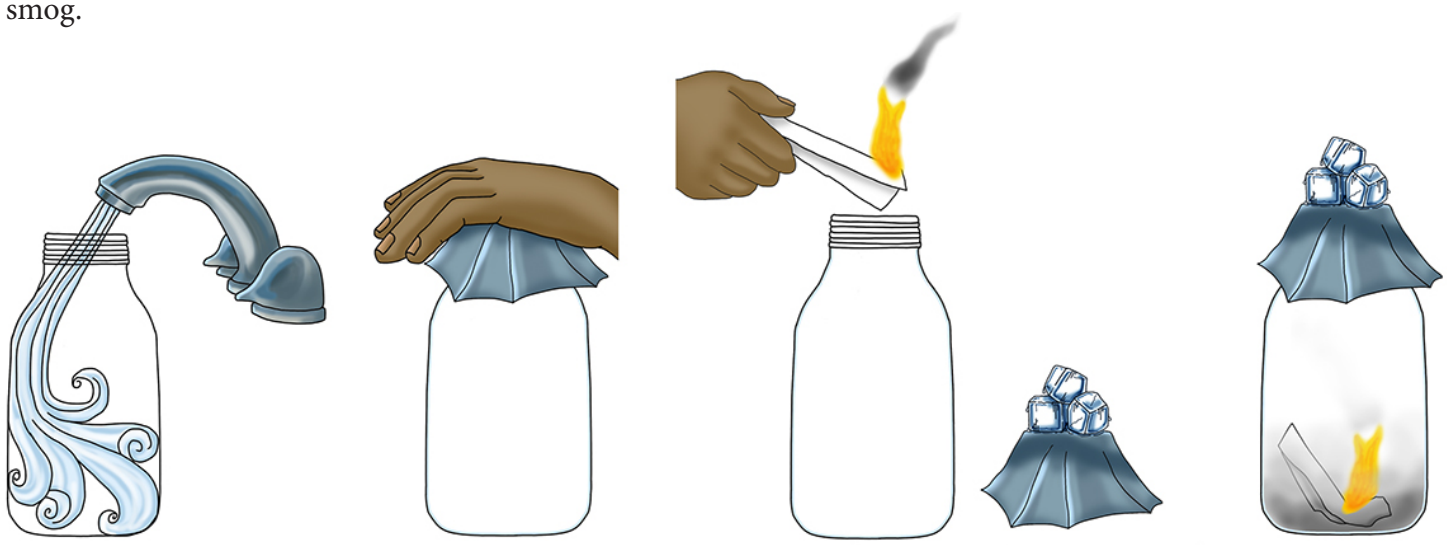
Though ozone in the atmosphere protects the earth from the sun's powerful ultraviolet, when it forms on the ground it can be harmful to people, animals and plants. This is called **smog**.

Ozone forms on the ground when the exhaust from cars, factories and chemicals mix with hot temperatures and strong sunlight. All these things together make smog. Smog is becoming common in cities like Los Angeles and can cause serious health issues. Some cities have ozone alerts where they ask people to stay indoors when smog levels are high. To help understand smog, we will create smog in a jar.

Objectives: We will create the same conditions in a controlled environment to demonstrate how smog is formed.
Supplies: jar, aluminum foil, paper, matches, ice cubes, water, help from an adult.
Procedures: To make smog, everything has to be done fast – so have everything on hand and ready.

1. First, rinse the jar out – so the sides are coated with water.
2. Make a lid with the foil.
3. Set it aside with the ice cubes on top to cool.
4. Have your adult helper light the paper on fire and drop it in the jar.
5. Quickly put on the cold foil lid and put the ice cubes back on top.
6. Look into the jar.
4. Do you notice how the smoke sits on the bottom of the jar? This is the way smog forms.
5. Don't breathe it in when you release your smog outside. It's bad for you!

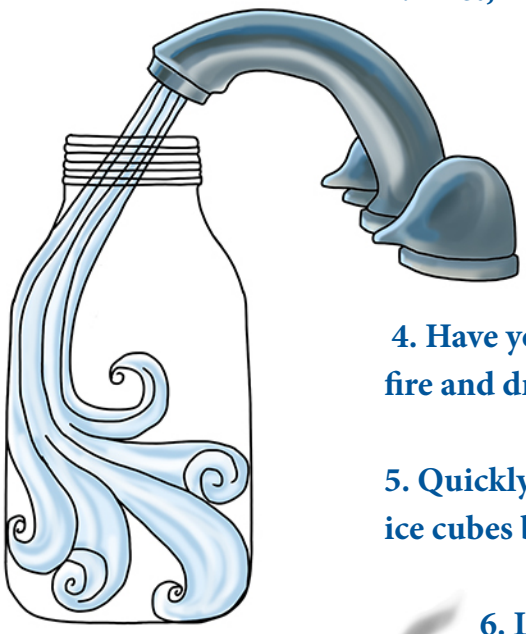
Explanation: You just created the conditions for smog. You added air pollution (smoke) to a closed environment (the jar – the city). Adding the ice cubes on top mimicked the heat of the city trapped under a cooler atmosphere. This didn't allow the smoke to rise into the atmosphere and break up. Instead it sat on the ground – as smog.



Smog Alert! Activity - Diagram

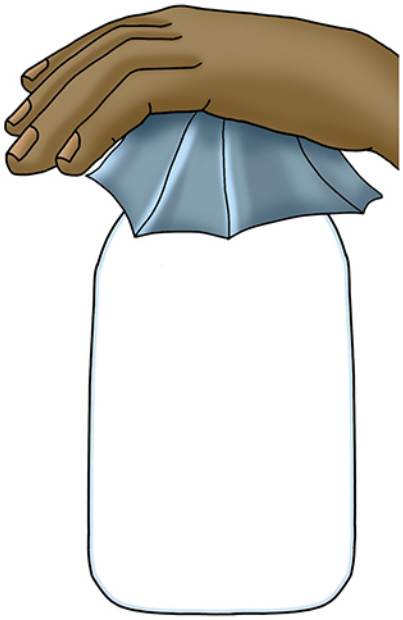
Procedures: To make smog in a bottle, everything has to be done fast – so have everything on hand and ready.

1. First, rinse the jar out – so the sides are coated with water.



2. Make a lid with the foil.

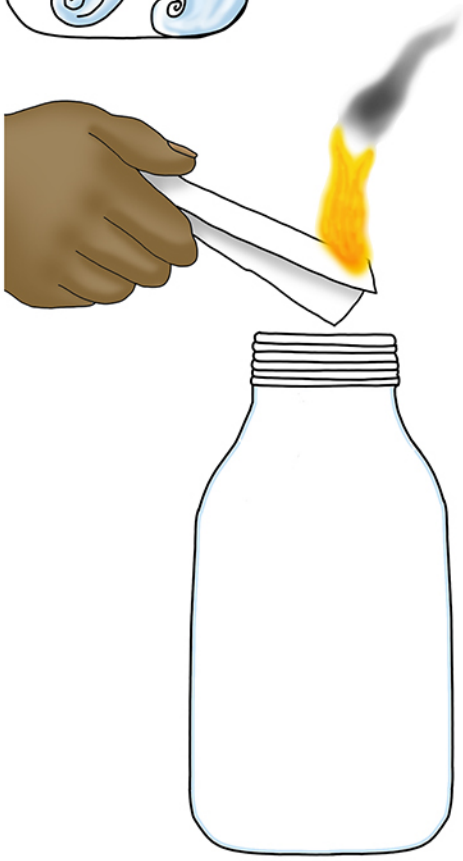
3. Set it aside with the ice cubes on top to cool.



4. Have your adult helper light the paper on fire and drop it in the jar.

5. Quickly put on the cold foil lid and put the ice cubes back on top.

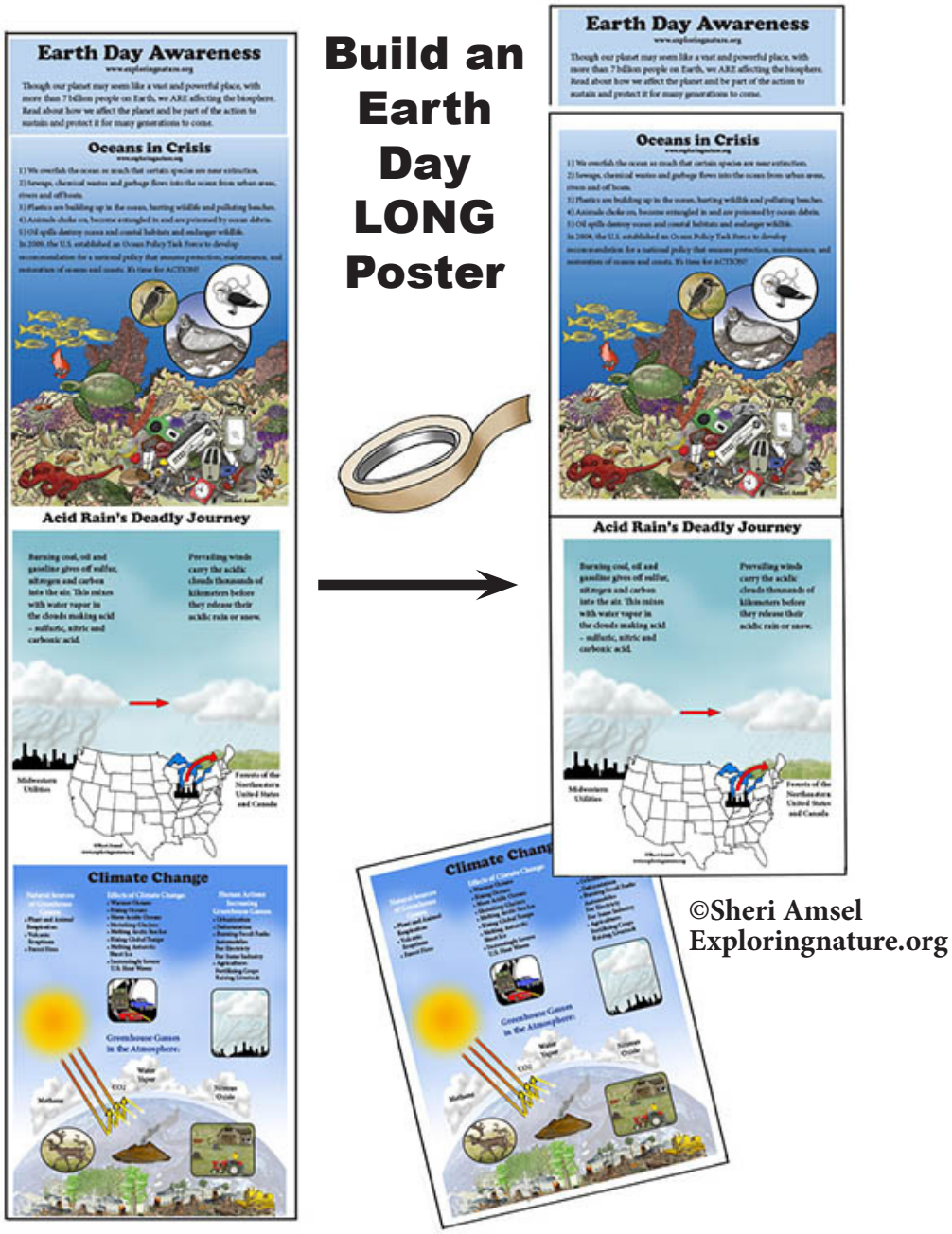
6. Look into the jar.



4. Do you notice how the smoke sits on the bottom of the jar? This is the way smog forms.

5. Don't breathe it in when you release your smog outside. It's bad for you!

Explanation: You just created the conditions for smog. You added air pollution (smoke) to a closed environment (the jar – the city). Adding the ice cubes on top mimicked the heat of the city trapped under a cooler atmosphere. This didn't allow the smoke to rise into the atmosphere and break up. Instead it sat on the ground – as smog.



Earth Day Awareness

www.exploringnature.org

Though our planet may seem like a vast and powerful place, with more than 7 billion people on Earth, we ARE affecting the biosphere. Read about how we affect the planet and be part of the action to sustain and protect it for many generations to come.

Oceans in Crisis

www.exploringnature.org

1) We overfish the ocean so much that certain species are near extinction.

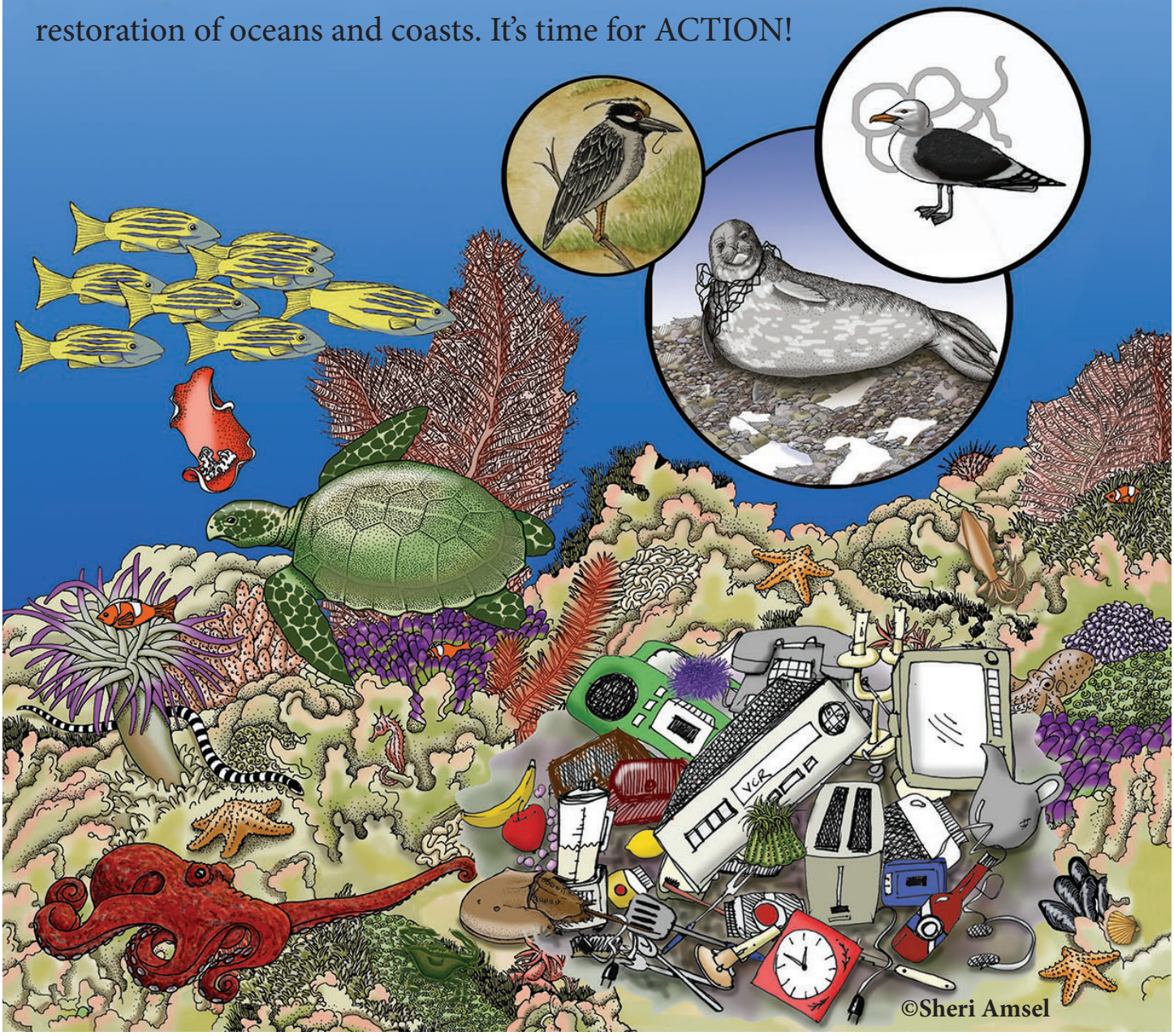
2) Sewage, chemical wastes and garbage flows into the ocean from urban areas, rivers and off boats.

3) Plastics are building up in the ocean, hurting wildlife and polluting beaches.

4) Animals choke on, become entangled in and are poisoned by ocean debris.

5) Oil spills destroy ocean and coastal habitats and endanger wildlife.

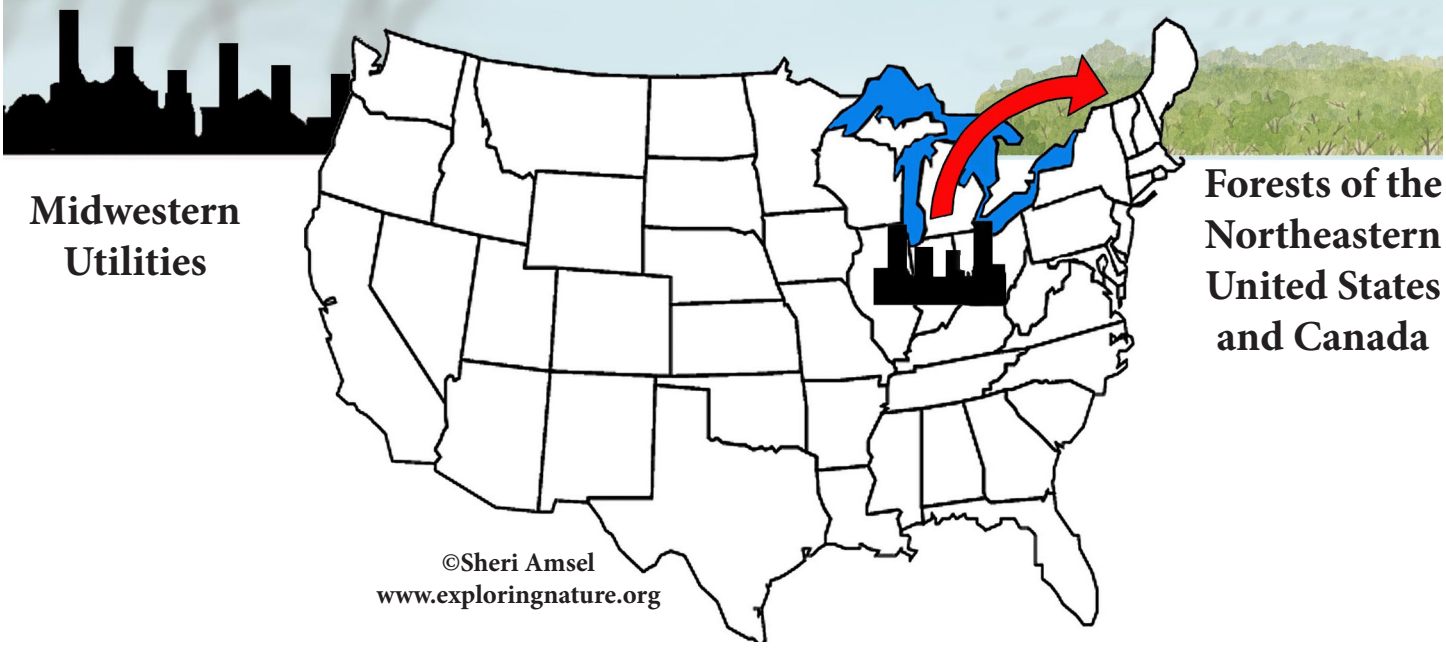
In 2009, the U.S. established an Ocean Policy Task Force to develop recommendation for a national policy that ensures protection, maintenance, and restoration of oceans and coasts. It's time for ACTION!



Acid Rain's Deadly Journey

Burning coal, oil and gasoline gives off sulfur, nitrogen and carbon into the air. This mixes with water vapor in the clouds making acid – sulfuric, nitric and carbonic acid.

Prevailing winds carry the acidic clouds thousands of kilometers before they release their acidic rain or snow.



Midwestern Utilities

Forests of the Northeastern United States and Canada

Climate Change

Natural Sources of Greenhouse Gasses:

- Plant and Animal Respiration
- Volcanic Eruptions
- Forest Fires

Effects of Climate Change:

- Warmer Oceans
- Rising Oceans
- More Acidic Oceans
- Shrinking Glaciers
- Melting Arctic Sea Ice
- Rising Global Temps
- Melting Antarctic Sheet Ice
- Increasingly Severe U.S. Heat Waves

Human Actions Increasing Greenhouse Gasses:

- Urbanization
- Deforestation
- Burning Fossil Fuels:
  Automobiles
  For Electricty
  For Some Industry
- Agriculture:
  Fertilizing Crops
  Raising Livestock

Greenhouse Gasses in the Atmosphere: