

Everest Education Expedition Curriculum

Lesson 8: Climb into Action!



Created by Montana State University Extended University
and Montana NSF EPSCoR

<http://www.montana.edu/everest>

Overview:

Get involved! There are actions we can take at home, in our communities and at our schools that will help slow climate change and preserve Mount Everest and its glaciers, creatures, and people. Explore ways you affect the Earth's ecosystems and how you can make a difference. It's easier than you think!

Objectives:

Students will:

1. Explain factors of the carbon cycle that are causing climate change.
2. Describe how Mount Everest is changing as the world's climate changes.
3. Make a pledge to help reduce climate change.

Vocabulary:

atmosphere: a layer of gasses surrounding the Earth and retained by the Earth's gravity

carbon: a natural element found in every living thing

carbon cycle: a natural complex process that allows carbon to be recycled and reused throughout the biosphere and all of its organisms

carbon dioxide: an odorless, colorless gas made up of one carbon molecule and two oxygen molecules and produced by the decomposition of organic materials, respiration and combustion.

carbon footprint: the amount of greenhouse gases and specifically carbon dioxide emitted by one's activities or a product's manufacture and transport during a given period.

climate change: a significant change in the Earth's climate including temperature, precipitation and wind, as recorded over an extended period of time.

emissions: substances discharged into the air (as by a smokestack or an automobile engine)

fossil fuels: fuels containing carbon that were formed over millions of years through the decay, burial and compacting of vegetation on land, and of marine organisms on the sea floor.

global climate: the average climate around the world

greenhouse gas: fossil fuels, that when added to the atmosphere, create a 'greenhouse effect' and heat up the Earth.

pledge: a promise

Background Information:

The Earth's climate is affected by the oceans, the land, the air, the plants and animals, and the energy from the Sun. The Earth's climate is constantly changing, but in recent decades, the climate is changing more rapidly and in places like Mount Everest, more drastically. The average temperature of the Earth has been on the rise for many years. This temperature increase along with more droughts, changing rain and snow patterns, melting glaciers and increasing ocean temperatures indicate large-scale changes in the average climate around the world, called the **global climate**.

One of the main factors contributing to this global **climate change** is an increase of carbon in the Earth's **atmosphere**. **Carbon** is a naturally existing element that is found in all living things. The Earth has a natural **carbon cycle** that has kept carbon levels in the atmosphere in balance for millions of years. However, our actions including burning coal, oil, and natural gas for energy add more **carbon dioxide** into the atmosphere than can be naturally recycled reducing the Earth's ability to maintain a state of equilibrium. Too much carbon dioxide traps heat in our atmosphere and temperatures go up.

The Himalayan region, home to Mount Everest, has a fragile ecosystem and is more sensitive to climate change than other parts of the world. Increasing temperatures and unpredictable weather patterns are making it difficult for people, plants and animals. Glaciers are receding and melting. This causes flooding of glacial lakes and flash floods that destroy villages and farmland downstream. Lost farmland could lead to a reduction in crops for people living in the region threatening their sustainability. A loss of glaciers could cause the area's glacially fed rivers to dry up creating a water shortage for more than a billion people in India and China who rely on the fresh water stored in the Himalayan Mountains. Plants, animals, and other native species are being strained by the change in their habitat and may not be able to adapt as quickly as the climate is forcing them to do so. This may cause species extinction or upward migration. The effects of climate change on all organisms and parts of the ecosystem are still not fully understood and are being studied carefully by scientists from around the world.

Reducing **greenhouse gas emissions**, like carbon, is the key to slowing global climate change. A major way these gases get into the atmosphere is when people burn **fossil fuels**, like coal, oil, and natural gas for energy. By using energy wisely, however, we can *all* be part of the solution. Small, simple changes at home, in communities and schools, if done by many, make big differences and will have a positive affect on the Earth all its living organisms.

Activity 1: What is Climate Change?

Lesson Length: 10 minutes

Materials:

- *Computer with Internet access and projection system*
1. Tell your students that throughout this unit, they have been studying what makes Mount Everest unique and important. In this lesson, they will be learning how the Everest region and its ecosystem has changed since the first summit attempt and how it will continue to change in the future.
 2. Ask your students if they have heard the term "climate change." Have your students share their ideas of what climate change is. Explain that climate change is a significant change in the Earth's climate including temperature, precipitation and wind, as recorded over an extended period of time. It is different than the weather. The weather is what is happening outside your window right now. Weather is local and temporary. The Earth's climate is affected by the oceans, the land, the air, the plants and animals, and the energy from the Sun. This is called the 'global climate'. If something changes the Earth's global climate, it affects everything else on the planet.

3. To better understand climate change, its causes (including carbon emissions) and what we can do to help, watch the short video (4 minutes) from Environmental Protection Agency's Student Guide to Climate Change website with your students. (Vocabulary included in this video includes carbon, carbon cycle, atmosphere)
<http://www.epa.gov/climatechange/kids/basics/today/carbon-dioxide.html>

Activity 2: It's All Connected

Lesson Length: 15 minutes

Materials:

- *"It's All Connected" worksheet (one per student)*
http://www.montana.edu/everest/resources/worksheets/Worksheet_Lesson8_ItsAllConnected.pdf
- *Copies of Glacier National Park photographs from the Repeat Photograph Project (one per student or projected to view as a class) (optional)*

1. Have your students to think back to the Photograph Analysis activity in the "Ice in Action" lesson on glaciers. Ask your students to explain what is happening to the world's glaciers that is documented through photographs. (If you have not completed this activity or if your class needs a reminder, show your students historic images of glaciers and modern day images of the same glaciers from the same locations to show glacial melting and retreat.)

<http://www.montana.edu/everest/multimedia/index.htm#glacier>

<http://www.montana.edu/everest/multimedia/index.htm#timelapse>

Tell your students that shrinking glaciers are one of the most visible signs of change on Mount Everest.

2. Explain that all parts of an ecosystem are closely connected with different species and the land they live in depending upon each other. Remind students that they witnessed this connection during the Himalayan Food Web activity in the Everest Extremes: Biodiversity lesson. When one factor changes, like climate, every other part of the ecosystem is affected.
3. Use the "It's All Connected" worksheet to discuss how one change in the Everest ecosystem affects another. Ask guiding questions to help students capture the most significant changes.
 - a. Have your students draw arrows to show how different aspects of the Himalayan ecosystem are affected by climate change and how they are connected to one another.
 - i. Use a blue colored pencil to draw arrows from "More Intense Monsoons" to the other parts of the Everest ecosystem affected (including farms and rivers).
 - ii. Use a green colored pencil to draw arrows from "Glacial Melt" to the other parts of the Everest ecosystem affected (including climbers, farms, rivers, villages, and species).
 - iii. Use a red colored pencil to draw arrows from "Warmer Summers" to the other parts of the Everest ecosystem affected (including glacial melt, farms, and species).

- iv. *Optional: Students may be asked to write short descriptions of how one change affects another along the arrows they draw. For example, on an arrow drawn from “More Intense Monsoons” to “Farms,” students may write “monsoons flood farms, killing crops.”*
- b. Have students share their worksheet with a partner (or as a class) and discuss the arrows representing the connections within the ecosystem (and any descriptions they wrote).

Activity 3: What’s Your Carbon Footprint?

Lesson Length: 15 minutes

Materials:

- *Computers with Internet access (for student use)*
 - *Chart paper to record student carbon footprint data*
1. Ask your students if they think their actions here at home affect Mount Everest’s glaciers and its greater ecosystem and why.
 2. Tell your students that changes to the global climate are a result of everyone’s actions. The changes they have seen in the Everest region are affected even by our actions here in the United States.
 3. Explain to your students that one way to reduce the amount of harmful chemicals that are released into the Earth’s atmosphere (emissions) is to reduce their own **carbon footprint**. Tell your students that our carbon footprint is the amount of greenhouse gasses our daily activities are contributing to the atmosphere and therefore, contributing to climate change.
 4. Now that you know how carbon naturally exists in the world and how humans are contributing to it in excess, learn how you and your students can be part of the solution by reducing your carbon footprint.
 5. Have each student individually calculate his or her carbon footprint by using an online application. (Teachers’ note: The link above is from the UK. Ask your students to replace ‘U.S.’ for ‘U.K.’ in the carbon calculator.)
<http://www.cooltheworld.com/kidscarboncalculator.php>
 6. Have students write down their score for their individual carbon footprint.
 7. Record all students’ carbon footprint scores on chart paper. Keep this data to refer back to after students take the Change-A-Day Challenge.

Activity 4: Change-a-Day Challenge

Lesson Length: 10 minutes

Materials:

- *Computer/s with Internet*
 - *Chart paper or butcher paper*
 - *Markers*
1. With your students, watch a short video of Conrad Anker encouraging students to take action and help slow climate change, or you can read the transcript (see end of this doc).
<http://youtu.be/ZhMrr9tr134>

2. Tell students that reducing their individual carbon footprint can help slow the effects of climate change. Have your students brainstorm changes they can make everyday to reduce their carbon footprint. Make a classroom list of these changes.
(Examples include: turn off the water when you brush your teeth, turn off the lights when you leave a room, replace light bulbs with energy efficient bulbs, unplug appliances at the wall, walk or ride a bicycle to school, carpool whenever possible, turn down the thermostat and put on a sweater in the winter, turn up the thermostat when it's warm, use reusable bags when grocery shopping, recycle, buy used goods, repair broken things, and watch less TV.)
3. Explain to your students that as a class, they will be following Conrad Anker's request and will "climb into action" to help the Everest region. Ask each student to choose one change they can make that they do not already do. Tell your students that by trying to make this change every day, they will be fulfilling a **pledge**, or promise.
4. Create a classroom pledge using chart paper.
 - a. Title a piece of chart paper, Our Change-A-Day Challenge.
 - b. Under the title, begin your pledge: "We, the class of _____ pledge to..."
 - c. List the changes each student has promised.
 - d. Have each student sign the bottom of the chart paper.
5. Display your classroom pledge somewhere prominent in the room. Refer to it frequently and check in with your students daily to see how they are doing.
6. Challenge students throughout this unit to discuss their changes. Encourage them to take on another change. take the challenge yourself and share your own successes!
7. *(Optional) Send a letter home to families sharing the pledges your students made in the effort to reduce their carbon footprint and ask for them to do the same!*
8. One week after creating this pledge, have your students measure their carbon footprint for a second time to see if they were able to reduce their carbon footprint and help slow climate change.
<http://www.cooltheworld.com/kidscarboncalculator.php>

Teachers' note: The link above is from the UK. Ask your students to replace 'U.S.' for 'U.K' in the carbon calculator.

Tying it All Together:

Use the following ongoing activities to check for student understanding of each lesson's concepts. Grade for completion, management of data collection, effort and participation throughout unit.

1. **"Mount Everest and Me" Worksheet**

http://www.montana.edu/everest/resources/worksheets/Worksheet_EverestandMe.pdf

This worksheet will be an ongoing activity for your students. In a table format, the "Mount Everest and Me" Worksheet compares Mount Everest, Granite Peak (the highest peak in Montana), and your hometown. Using comparisons, the worksheet reinforces the lesson's content while helping students put this knowledge into perspective by comparing their home state and hometown. Have your students fill in the correlating rows of the table after completing each lesson. This can be completed as a class or individually.

2. Everest Education Expedition Vocabulary Crossword Puzzle

http://www.montana.edu/everest/resources/worksheets/Worksheet_Lesson8Crossword.pdf

This crossword puzzle reinforces vocabulary presented in each lesson. Have your students fill in the correlating vocabulary words for each lesson's puzzle after each lesson.

Taking it Further:

Expand Your Change-A-Day Challenge

Facilitate a discussion amongst your class about additional challenges they can take on as a class or school to help reduce carbon emissions. Your parent council may want to get involved or have resources to help you do one or more of the following: start a school recycling club, plant a school garden, make your school a 'no idle zone,' create a 'bike to school' program, install a bike rack, or create a no garbage lunch program.

Climate Change in the Arctic

Learn how another ecosystem, similar to the Everest region, is affected by a changing climate.

<http://www.kqed.org/education/educators/clue-into-climate/ecosystems.jsp>

Everest Climate Change in the News

Have your students read current online news articles about the changing conditions on Mount Everest caused by climate change.

Video Transcripts:

Conrad Anker Encourages Kids to Take Action

<http://youtu.be/ZhMrr9tr134>

Climbing Everest is a big goal.

It takes a lot of determination, communication, perseverance, and luck to make it to the summit.

In the same way that we're trying a big goal, I'm encouraging you to make a difference in your life.

Global warming and climate change is a problem that affects all of us

By taking small steps in your personal lives you, too, can make a difference.

Whether it's recycling, switching off lights or encouraging your parents to carpool, each of these actions when done on a small scale collectively make a big difference.

So join us as we climb Everest and you take on your own challenge-a-day program.