

Doing Our Part

Objectives:

After this activity, students will be able to:

1. Identify their impacts on the planet.
2. List at least five specific ways they can take action on climate change.
3. Connect the actions they can take to benefits for society, individuals or local communities and wildlife.
4. Communicate with others the importance of “doing our part” to reduce impacts on the planet.

Background:

The climate is changing, and evidence indicates that most of the recent warming trends and changes in climate can be attributed to human activities.¹ We burn fossil fuels for a whole host of daily activities: driving cars, producing energy to turn on our lights and heat and cool our homes and schools, harvesting and transporting food to our grocery stores and many other things. Burning fossil fuels like coal, oil, and natural gas releases greenhouse gases (mostly carbon dioxide). The elevated levels of greenhouse gases are causing global warming which in turn is causing our climate to change.² These changes impact wildlife.

There are many things each of us can do to reduce our carbon footprint, many of which have benefits beyond helping to slow climate change. For example, getting more energy from power sources that produce less CO₂ would reduce risk from pollutants associated with fossil fuels. In North Carolina our primary energy source is coal. When we burn coal, we trap the most harmful pollutants like mercury with scrubbers, technology that “scrubs” the pollutants out of the smoke leaving power plants. The toxic ash left behind has to be stored somewhere, and is often put in giant pits near rivers and streams which leak into nearby waterways. The 2014 spill in the Dan River basin in North Carolina polluted over 70 miles of the river with 39,000 tons of coal ash, which will negatively impact wildlife like fish and aquatic insects for years to come.³ Choosing to use less energy, and thus less coal, or other types of energy, we will reduce greenhouse gases, and will reduce the amount of toxic coal ash stored in pits around North Carolina. A big way to save energy is to use public transportation, walk, or ride bicycles to places we would normally travel to with an automobile when it is safe and close enough. This decision reduces greenhouse gas emissions, but also creates many local benefits. It makes us healthier and reduces smog that causes asthma and is dangerous to young children and older people. It makes our roads less crowded, reducing the money we need to spend for building and maintaining new roads and driving cars. Fewer cars on the road also reduces the amount of oils and salts on roads that drain into nearby water killing sensitive species like salamanders and fish when it rains. Other actions like turning off the lights when we leave a room, putting on a sweater instead of turning up the heat, taking shorter showers, or trying to produce less waste may help reduce emissions, but they also may lower our energy and water bills and cause less pollution that may be harmful to wildlife. It is impossible to eliminate our impact on Earth but by working

Content areas:

Science and social studies

NC Essential Standards:

6.L.2.3., 7.E.1.6, 8.E.1.4

Common core:

R1, R3, S&L4, W7

NGSS:

MS-ESS3.A, MS-ESS3.C, MS-ESS3.D, MS-LS4.D

Materials:

- Computers or tablets with internet access (one per student)
- Student sheets (one per student)
- Materials for posters (one set per group)

Activity Time:

1 45 minute period.

Setting:

Classroom or outside, computer lab for extension.

together, small steps to mitigate our impact can make a big difference for wildlife.

Many of these actions also help us be more resilient to climate change. Because CO₂ lasts for many years in the atmosphere, doing something about climate change requires more than reducing the amount of CO₂ we produce. Most scientists agree that the earth will warm past 2050 even if we stopped producing greenhouse gas emissions today. That means we need to contribute to making ecosystems more **resilient**. Resiliency refers to the ability to resist damage and recover quickly when change happens. Some of the things we do to reduce greenhouse gas emissions actually help make ecosystems more resilient. For example using water saving toilets and taking shorter showers reduces CO₂ emissions by reducing the amount of energy required for cleaning and pumping water. It also allows more water to remain in natural rivers and streams where it can benefit wildlife. Another way to help conserve water and help protect habitats is by replacing inefficient landscaping (e.g., turf grass lawns) with native plants that can survive through tough droughts and heat waves without extra water or fertilizer. Similarly, protecting and restoring coastal wetlands can provide habitat for both commercial and recreational fish, improve water quality, and can limit storm damage associated with hurricane-driven storm surges. All of these actions help both mitigate global warming and build resiliency to climate change impacts.

Getting ready:

1. Reserve the computer lab or access laptops or tablets for students to use. It is best if each student has his or her own computer or tablet.
2. Make enough copies of the student sheets “Ecological Footprint” for each student.
3. Gather materials to make posters.

Procedure:

1. Review with students that much of the recent climate change we are seeing and expect to see is due to human activities. Discuss what activities these are (energy usage, emissions from transportation, deforestation). List several ways students recognize that their actions may be contributing to climate change (their own energy usage, water usage). Brainstorm ways that students’ actions may have an effect on wildlife (overuse of water may be draining local watersheds, using more energy may mean more emissions or more environmental degradation associated with energy production). Explain that today students will examine their own impact on wildlife and come up with ways they can reduce that impact and act to help wildlife.
2. Explain that they will start by calculating their ecological footprint. This is a measurement of their impact on Earth.
3. Guide students to the footprint calculator website: <http://footprint-calculator.islandwood.org/>. There are many similar calculators online. This one focuses on ways students can help.
4. Distribute student sheets and have students fill out these sheets as they complete the footprint activity.

Discussion and assessment

1. Give students the opportunity to share their calculations and impacts. Poll students to see where the class needed room to improve the most. Vice versa, have the class discuss where they felt they did the best. Brainstorm as a class some ways in which students could change other behaviors not mentioned in the calculator.

2. In groups, have students make a poster to place around the school. The focus of the poster should highlight how specific actions students can take will help in conserving wildlife.

Extensions:

1. Instead of a poster, have students organize a Public Service Announcement (PSA). Have students write a script, film the PSA, and deliver it to the entire grade level or school. Consider structuring it as a contest and broadcast the winner to a larger community audience.

Sources and other resources

¹ IPCC. (2014). Summary for Policy Makers. In O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadne, K. Seyboth, ... J. C. Minx (Eds.), *Climate Change 2014, Mitigation of Climate Change*. Cambridge, U.K. and N.Y., USA: Cambridge University Press.

(also see this video summarizing the report: <https://www.youtube.com/watch?v=XnUXqhMS2bo>)

² National Aeronautics and Space Administration. (2014). Climate Change: Vital Signs of the Planet: How do we know? *Global Climate Change: Vital Signs of the Planet*. Retrieved October 27, 2014, from <http://climate.nasa.gov/evidence/>

³ Rivin, G. (2014). Dan River Coal Ash Spill Timeline. *North Carolina Health News*. Retrieved October 27, 2014, from <http://www.northcarolinahealthnews.org/dan-river-coal-ash-spill-timeline/>

Ecological Footprint Student Sheet

Name: _____

Navigate to <http://footprint-calculator.islandwood.org/> and begin the footprint calculator. As you go through each question, fill out the table below.

Activity <i>List the activity featured on the screen</i>	Interesting Fact <i>Read the "Did you know?" section and give at least one interesting fact.</i>	Potential impact on wildlife <i>List at least one impact this activity may have on wildlife.</i>	How I can reduce this impact? <i>Give at least one way you can reduce this impact. If you are stumped, there will be hints at the end of the activity.</i>

1. What is your ecological footprint? _____ city blocks.
2. What is the US National average? _____ city blocks.
3. If every person in the world had the same footprint as you, how many earths would it take to sustain the population?

*** Be sure to scroll down to check all the ways you can reduce your impact***

4. How can using less water help reduce greenhouse gas emissions? Can you think of other reasons why using less water is a good idea?

5. How can shopping at a thrift store help reduce greenhouse gas emissions? Can you think of other benefits of buying used clothes or other products?

6. How does transportation (walking vs. driving, for example) relate to climate change? What other benefits are available from walking and biking over driving?

7. What if you live far away from school? How else could you help reduce greenhouse gas emissions if you can't walk or bike?

8. How are recycling and climate change connected? What are benefits to recycling besides helping with greenhouse gas emissions?

9. What are three things you can do help reduce greenhouse gas emissions and thus, climate change, starting this week?

Ecological Footprint Answer Key

Name: ___Key_____

Navigate to <http://footprint-calculator.islandwood.org/> and begin the footprint calculator. As you go through each question, fill out the table below.

Activity <i>List the activity featured on the screen</i>	Interesting Fact <i>Read the "Did you know?" section and give at least one interesting fact.</i>	Potential impact on wildlife <i>List at least one impact this activity may have on wildlife.</i>	How I can reduce this impact? <i>Give at least one way you can reduce this impact. If you are stumped, there will be hints at the end of the activity.</i>
Showering	The average person spends 182 days in the shower over the course of a lifetime. That's an average of 10 minutes a day, and 9,125 gallons of water per year	Municipal water comes from surface or ground water which draws from the same creeks, rivers, and lakes that wildlife live in. Overuse by people means less for wildlife.	Take shorter showers.
Turning off the tap while brushing teeth	You can conserve 20-30 gallons per week by turning off the tap while brushing your teeth	As above, water conservation is good for wildlife. Also, producing and pumping potable water requires a lot of energy. Energy use is tied to climate change and the location of wildlife habitat.	Turn off the water while brushing my teeth.
Flushing the toilet	We flush between 6,338-12,775 gallons of water down the toilet every year.	Same as above.	Don't flush every time if that's an ok house rule, or encourage your parents to use high efficiency toilets or put a container full of water in the back of the toilet.
Buying new clothes	Reusing clothes greatly reduces the amount of energy needed to produce new ones.	Less energy and materials means fewer emissions (which are directly tied to climate, which we know affects wildlife), less fiber is needed (which means less habitat and water used to grow things like cotton). Also, reusing clothes means fewer clothes that end up as waste, reducing the need for landfills.	Shop at thrift stores, use clothing swaps, etc.
Walking, biking, or	American use 400 million gallons of	Transportation emissions are linked to climate change, which we know will	Carpool, walk, bike, or take public transportation.

public transport	gasoline every day	affect wildlife. Also, air quality and oil and other pollutants on roads directly adversely affect wildlife.	Turn off the car instead of idling.
Choosing food with less waste	Average person generates 4 lbs of trash every day	Solid waste means more land needed for landfills and more waste that ends up where wildlife lives.	Use Tupperware instead of individually packaged foods. Recycle.
Recycling or compost	Recycling cans save 95% of the energy used to make new cans.	Energy conservation means fewer emissions, and less solid waste means fewer landfills and solid waste pollution,	Recycle, start a compost bin
Turning out the lights when you leave a room	Lighting makes 15% of the electric bill	Less energy means lower energy bills and fewer emissions. Emissions are connected to climate, which is connected to wildlife.	Always turn off lights when leaving a room, use natural light instead of electric lights, use LEDs or CFLs
Eating habits	Animal agriculture produces 18% of global greenhouse gases.	Emissions are linked to climate change, which is linked to wildlife. Factory farming can also impair water quality, which can harm aquatic wildlife.	Eat less meat, or eat meat that has been locally or sustainably raised.
Leftover food	More than 20 lbs of food are wasted each month for each of 311 million Americans	Wasting food means more food needs to be produced, and agriculture can have a big impact on wildlife. Also, the food you throw away goes to the landfill.	Try to only select the amount of food you know you can eat. Compost leftover food.

1. What is your ecological footprint? _____ city blocks. (answers will vary)
2. What is the US National average? ____12.38_____ city blocks.
3. If every person in the world had the same footprint as you, how many earths would it take to sustain the population? (answers will vary)
4. How can using less water help reduce greenhouse gas emissions? Can you think of other reasons why using less water is a good idea?
Producing water requires energy, which if produced using fossil fuels, means more greenhouse gas emissions. Other big reasons are that fresh water is a scarce resource that wildlife share. If we overuse water, less water is available for wildlife.

5. How can shopping at a thrift store help reduce greenhouse gas emissions? Can you think of other benefits of buying used clothes or other products?

Less energy to produce clothes means fewer emissions. Vintage clothes are also cheaper, and reusing clothes produces less waste. If we need less fiber for clothes then we need less land to grow things like cotton.

6. How does transportation (walking vs. driving, for example) relate to climate change? What other benefits are available from walking and biking over driving?

Most motorized transportation contributes to greenhouse gas emissions. Avoiding driving means less crowded roads, healthier people, less oil on the roads that can wash into water systems and affect wildlife.

7. What if you live far away from school? How else could you help reduce greenhouse gas emissions if you can't walk or bike?

You could try to take public transportation or carpool. If this isn't possible, you can focus on other actions such as conserving water or energy.

8. How are recycling and climate change connected? What are benefits to recycling besides helping with greenhouse gas emissions?

Reusing or recycling avoids the need to make new products from scratch. Making new products requires much more energy, which usually means more emissions. Recycling also means less waste in the landfill.

9. What are three things you can do help reduce greenhouse gas emissions and thus, climate change, starting this week?

Answers will vary.