

Our Ecological Footprint

Objectives

- Students will understand what is meant by the term ecological footprint.
- Students will reflect on their personal impact on the environment.
- Students will come up with ways they can reduce the size of their ecological footprint.

Motivational Set

- 1) Invite students to trace around their own foot (shoe on or off), on graph paper.
- 2) Have students calculate the area of their footprint.
- 3) Discuss that we all leave marks on our environment. Our shoe prints are only one of the outward signs of our being on the earth. We affect our environment in many other ways. Explain to the students that an ecological footprint is a way to measure our impact on the environment. The larger the footprint, the more negative effect on the Earth.
- 4) Invite the students to paste pictures of ways they affect our environment on their paper footprints.
- 5) As a class, share their ecological footprints.

Lesson 1

- 1) Explain to students that there are approximately 6.5 billion people on the planet Earth. The Earth has about 1.8 hectares of productive land available per person for human use. This excludes deserts, oceans, ice caps, mountains and areas already covered by pavement. Canadians on average use 7.5 hectares apiece. The World average is only 2.2 hectares. If the entire population of the Earth used as much as Canadians do we would need 4 Earths to support us.
- 2) To get a clearer picture of our impact on the planet, you could measure out 7.5 hectares and compare it to 2.2 hectares. A hectare is 100 meters by 100 meters.

- 3) In the next lesson we will look into 5 of the areas that are used to calculate our personal ecological footprints. These are water, transportation, energy, food and garbage.
- 4) Give students "Student Footprint Surveys" to fill in for the next class. The information the students collect should be based over an entire day. Assure the students that this information will be kept confidential.

Lesson 2 What Size is My Ecological Footprint?

- 1) Today the students will compile the information collected from the "Student Footprint Surveys". Collect the surveys to help keep information confidential. Each student should be given a sheet to help record the information.
- 2) Analyzing 5 areas of our ecological footprint
Water
 - a) Read out the number of flushes, so that the students can record them. You may choose to also record on an overhead, smartboard or chart paper, for the students to follow along with.
 - b) Finish the rest of the worksheet with the students, or have them work on them individually for a few minutes.

Transportation, Energy, Food and Garbage
Follow the procedures used for "water".

- 3) Reflection on data found for the 5 areas - may want to do as a class discussion or as small group discussions. This may take more than 1 class.
 - a) Water
 - What is the mean number of flushes for this class?
 - The average toilet uses 13 litres per flush, although some older toilets use up to 20 litres. How much water was used by the class based on this mean?
 - How much water could be saved, if each toilet flush was reduced by 1 litre?
 - What can you do to reduce the amount of water your toilet uses? (install dams (pop bottle filled with water/rocks), replace, etc.)
 - Why should Canadians use less water, when there is so much fresh water available to us?

b) Transportation

What are the pros and cons of each mode of transportation used by this class. See attached chart as an example.

| Mode | Effect on the environment | Energy or fuel needed | Speed | Cost to you/your family | Land consumed | Pros |
|--------------------|---------------------------|-----------------------|-----------|-------------------------|---------------|------------------------------|
| Walking | Not much | Energy for body | Slowest | n/a | n/a | Fun with friends |
| Bike | | | | | | |
| Bus/public transit | Materials to make bus | Fossil fuels | Stop & go | Bus fare | Roadways | Reliable – runs all the time |
| Car | | | | | | |

c) Energy

Which device did the class use the most?

100 years ago, how do you think people your age entertained themselves? Do you think their ecological footprint was larger or smaller than yours, why?

How does your choice of entertainment affect your ecological footprint?

d) Food

-Which food groups do you think contribute to a larger ecological footprint? Why? Examples: Meats, because they require the plants to eat, which have already used land, water and sunlight, and take up land.

Processed and frozen foods because they require additional processes/energy to keep them on the shelf longer.

- What kinds of foods are in the "other" category?

- What relationship do you see between the "other" foods and foods that contribute to larger ecological footprints?

-What are some ways you could reduce your "food footprint"? Follow the "5 n's" (Candace Savage, Eat Up! Healthy Food for a Healthy Earth, (Vancouver: Douglas & McTntyre, 1992))

Nutritious - Choose foods that nourish and help you stay healthy. Generally, nutritious foods have fewer additives and are less processed. ex. Yogurt versus ice cream

Natural - Choose foods that most closely resemble what the food looked like when it was first harvested. ex baked potato versus crinkle-cut French fries - less processing and fewer additives

Near - Choose foods that are grown in your area. 'Near' is a relative term; choose foods produced in your own country rather than from across the world. ex. An apple versus a mango Less travel time for the food to get to you, therefore less fuel burned, fresher product, generally cheaper, and you're supporting local economy.

Now (closely related to "near") - Choose foods that are in season, or in winter canned or frozen - Less travel time as the item does not need to be imported from afar and is less likely to have additives added to be kept fresh.

Naked - Choose foods with little or no packaging ex. Chicken nuggets (even though highly processed) packaged in a plastic bag over nuggets packaged in bag and cardboard, or fruit by the piece instead of in protective hard plastic casing.

e) Garbage

Of the items thrown away by your class, which type had the most pieces? What percentage of the total items thrown away was this? If you took all the garbage your class threw into the garbage, which category would take up the most space? Why do you think so? Look at the garbage data for your class. How can you reduce your "garbage footprint"?

Of the total items, what percentage was thrown away? What percentage was recycled? How much was diverted?

How would items diverted from being thrown away lower the Ecological Footprint?

- 4) At this point you may want the students to actually calculate their ecological footprint. Listed are several web sites they can do this.

http://www.ecovoyageurs.ca/en/page.cgi?tplate=footprint_wide&stage=footprint/calc

http://www.royalsaskmuseum.ca/gallery/life_sciences/footprint_mx_2005.swf compares your footprint to other countries

http://www.zerofootprintkids.com/kids_home.aspx?restart=yes breaks results into areas - an easier footprint calculator

http://www-heb.pac.dfo-mpo.gc.ca/community/education/lessonplans/ecofootprint/downloads/ecofootprint_handout_e.pdf a pdf version for handouts
<http://www.footprintnetwork.org/en/index.php/GFN/page/calculators/> a bit involved - maybe for teachers

Lesson 3 What Can I Do?

Students will be devising their own "ecoplans" to help reduce ecological footprints. This should be given a few class periods to complete. You may choose to have the students carry out their plans (ideal) or you may only want them to devise the plans. If the students are to carry out their plans, make sure you give them a time frame, so they can choose a project that fits their time allotted.

- 1) Group the students into small groups, should have at least 5 groups - 1 for each of the aspects of our ecological footprints. (water, transportation, food, garbage, energy)
- 2) Assign or allow each group to decide which area they are going to develop an ecoplan for - water, transportation, food, energy, garbage.
- 3) Hand out worksheets to help lead the students through the development and implementation of their ecoplans.
 - a) Choosing an "ecoplan"
 - b) How to Do it (includes a checklist)
 - c) Group Evaluation
 - d) Self Evaluation and Reflection
- 4) Give students time to present their findings. Some interesting ways to present findings could include an oral presentation, or stand-up posters, or science fair style, where students could field questions about their plans.

Our Ecological Footprint Student footprint Survey (Lesson 1)

Water

In the next 24 hours, record how many times you flush the toilet. ____

Transportation

How do you usually get to school?

Energy

List all the home entertainment devices in your house. Record how many hours you personally use each on in the next 24 hours.

| Device | Hours used |
|-------------------|------------|
| Mp3 player | |
| Stereo | |
| Radio | |
| Video game system | |
| DVD | |
| Computer | |
| Cell phone | |
| Television | |
| Other | |
| Total: | |

Food

Record everything you eat at lunch.

How many servings of each food group did you eat? (example: ham & cheese sandwich = 2 grain, 1 meat, 1 dairy)

- | | |
|--|--|
| <input type="checkbox"/> Meat Alternatives (beans, nuts, etc.) | <input type="checkbox"/> Grain Products |
| <input type="checkbox"/> Meat | <input type="checkbox"/> Fruits/Vegetables |
| <input type="checkbox"/> Dairy Products | |

Garbage

Many items in your lunch come in some sort of packaging. List these.

Now go through your lunch and fill in the chart below. List the items that you threw away (sandwich bag), recycled (juice bottle) or reused (paper bag).

| | Threw Away | Recycled | Re-used |
|---------|------------|----------|---------|
| Plastic | | | |
| | | | |
| | | | |
| Glass | | | |
| | | | |
| | | | |
| Metal | | | |
| | | | |
| | | | |
| Paper | | | |
| | | | |
| | | | |
| Food | | | |
| | | | |
| | | | |
| Other | | | |
| | | | |
| | | | |

Ecological Footprint Reflection (Lesson 2)

Water

How many times did your class flush the toilet in the past 24 hours?

| # of flushes | # of student (tally) | # of students |
|--------------|----------------------|---------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

1) What is the mean (average) number of toilet flushes for this class?

2) An average toilet uses 13 litres, although older toilets use up to 20 litres of water per flush. How much water was used by the class yesterday, based on the mean?

3) If each toilet used 1 litre less of water, how much water would have been saved by this class, based on the mean?

4) What can you do to your toilet to use less water?

5) Why should Canadians use less water when there is so much fresh water available for us?

Ecological Footprint Reflection (Lesson 2)

Transportation

How do you normally get to school?

| Modes of transportation | # of Students (tally) | # of Students |
|-------------------------|-----------------------|---------------|
| Walk | | |
| Bike | | |
| Bus/public transit | | |
| Car (3+ people) | | |
| Car (2 people) | | |
| Other | | |
| Total | | |

1) Complete this chart using ideas from you group or class discussion.

| Mode | Effect on the environment | Energy or fuel needed | Speed | Cost to you/your family | Land consumed | Pros |
|--------------------|---------------------------|-----------------------|-------|-------------------------|---------------|------|
| Walking | | | | | | |
| Bike | | | | | | |
| Bus/public transit | | | | | | |
| Car | | | | | | |

Ecological Footprint Reflection (Lesson 2)

Garbage

Tally the types of items that your class threw away, recycled or reused from your lunches.

| | Threw Away | Recycled | Reused |
|---------|------------|----------|--------|
| Plastic | | | |
| Glass | | | |
| Metal | | | |
| Paper | | | |
| Food | | | |
| Other | | | |

1) Of the items thrown away by your class, which type had the most pieces? What percentage of the total items thrown away was this?

2) If you took all the items your class threw away at lunch, which type of item would take up the most space?

3) Look at the garbage data for your class. What ways can you reduce your Garbage Footprint?

4) Of the total items, what percentage was thrown away? What percentage was recycled? How much was diverted?

5) How would items diverted from being thrown away lower the Ecological Footprint?

Ecological Footprint Reflection (Lesson 2)

Food

What food did your class have for lunch today?

| Food Consumed at Lunch | # of Servings (tally) |
|------------------------|-----------------------|
| Meat alternatives | |
| Meat | |
| Fruit/Vegetables | |
| Grain Products | |
| Dairy Products | |
| Other | |

1) Which food groups do you think contribute to a larger Ecological Footprint? Why?

2) What kinds of foods were in the “other” category?

3) What relationship do you see between the “other” category and foods that contribute to larger ecological footprints?

4) What are some ways you could reduce your Food Footprint?

Ecological footprint Reflection (Lesson 2)

Energy

List all the home entertainment devices in your house. Record how many hours you personally use each on in the next 24 hours.

| Device | # of device in for class (tally) | Time Used |
|-------------------|----------------------------------|-----------|
| Mp3 player | | |
| Stereo | | |
| Radio | | |
| Video game system | | |
| DVD | | |
| Computer | | |
| Cell phone | | |
| Television | | |
| Other | | |

1) Which device did the class use the most?

2) 100 years ago, how do you think people your age entertained themselves? Do you think their Ecological Footprint was larger or smaller than yours? Explain.

3) How does your choice of entertainment affect your Ecological Footprint?

Our Ecological Footprint Our “Ecoplan” Choosing a plan (Lesson 3)

- 1) In your groups, choose (or you will be assigned) an area of your footprint you would like to see change. Write this area down.

- 2) Brainstorm a list of 5 -10 projects your school, your family, or your community could do to reduce their individual footprints in this area. (The internet is a rich resource for this.) Record your ideas.
- 3) For each project, ask yourselves the following questions:
 - a) Whose footprint will be reduced after we do this project? (ours, our families', our school's, our community's) Projects that reach out to the school and to the community may be more complicated, but they can help more people and have a greater environmental impact.
 - b) Which projects are the most interesting to your group? If the project is interesting to you, it will likely be more successful.
 - c) How long will each project take? Figure out how much time you have to do your ecoplan and which ideas will work within that time frame. *Note* Projects often take longer than expected.
 - d) How complicated would each project be? It is better to work with a smaller chunk of a project than something that is too complicated.
 - e) What is the goal of each project? How will you know if you have affected the footprint? You should be able to measure the change in your footprint at the end of the project.
 - f) Will you be able to easily get the information and resources needed?
 - g) Will you be able to get the help you need to do each project? Think about all the people you will need to complete the project.
 - h) Who might resist your plan? Why? How can you include these people?
- 4) Now that you have gone through each project, list the top three. Discuss these with your group and teacher.

- 5) From your discussion, choose the best Ecoplan and complete the following:
Our Ecoplan is
-
-

Our Ecological Footprint Our “Ecoplan” How Do We Do it? (Lesson 3)

Now that you have decided on an EcoPlan, it is time to start planning.

- 1) What environmental challenge will your EcoPlan focus on?
- 2) Describe the goal of your project and your strategy to accomplish it.
- 3) What are the approximate start and end dates for your EcoPlan?
- 4) List everything that needs to be done to reach your goal. Who should you tell about your project? (parents, principal, mayor, etc.) Write down the steps to reach your goal on the chart attached. Beside each step record
 - a) the date you can finish the step by
 - b) the names of people responsible for this step
 - c) what you will need for each step
 - d) names of people/organizations that may have useful information or might be able to help
 - e) how you will publicize and/or get support for your project
 - f) how you will measure the success and completion of each step.

Now you are ready to put you planning into action. It's time to reduce you Ecological Footprint! Here are some tips to help keep you organized.

As you work through your EcoPlan, collect or record:

- what you have done
- people contacted and why
- newspaper items that relate to your EcoPlan
- sketches
- letters to the editor
- maps
- photographs
- cartoons
- data
- graphs
- research collected

Remember:

You may need to change your goals or steps. This is normal in working through a project.

Our Ecological Footprint Our “Ecoplan” How Did We do? (Lesson 3)

Now your team has completed the “ecoplan”. How do you think you did?

- 1) Meet with your group and discuss your feelings about your “ecoplan” as well as what you learned.
- 2) Use the following chart to evaluate the success of your plan, your participation during the project and how well your group worked together.

Evaluation Chart Success of our EcoPlan

| | No | | | Yes | | |
|---|-----|---|---|-----|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Did your team reach your EcoPlan goal? | 0 | 1 | 2 | 3 | 4 | 5 |
| Is there an improvement in the Ecological Footprint because of your EcoPlan? | 0 | 1 | 2 | 3 | 4 | 5 |
| Did you learn anything new while carrying out your plan? | 0 | 1 | 2 | 3 | 4 | 5 |
| Did your experience encourage you to want to do more to help the environment? | 0 | 1 | 2 | 3 | 4 | 5 |
| Do you think small groups of people can help reduce the size of our Ecological Footprint? | 0 | 1 | 2 | 3 | 4 | 5 |
| Total | /25 | | | | | |

Our Ecological Footprint Self Evaluation and Reflection Form (Lesson 3)

Student Name:

EcoPlan:

1) What skills did I develop or improve while completing this project?

2) What I contributed the most to this group was . . .

3) The most important thing I learned from this project was . . .

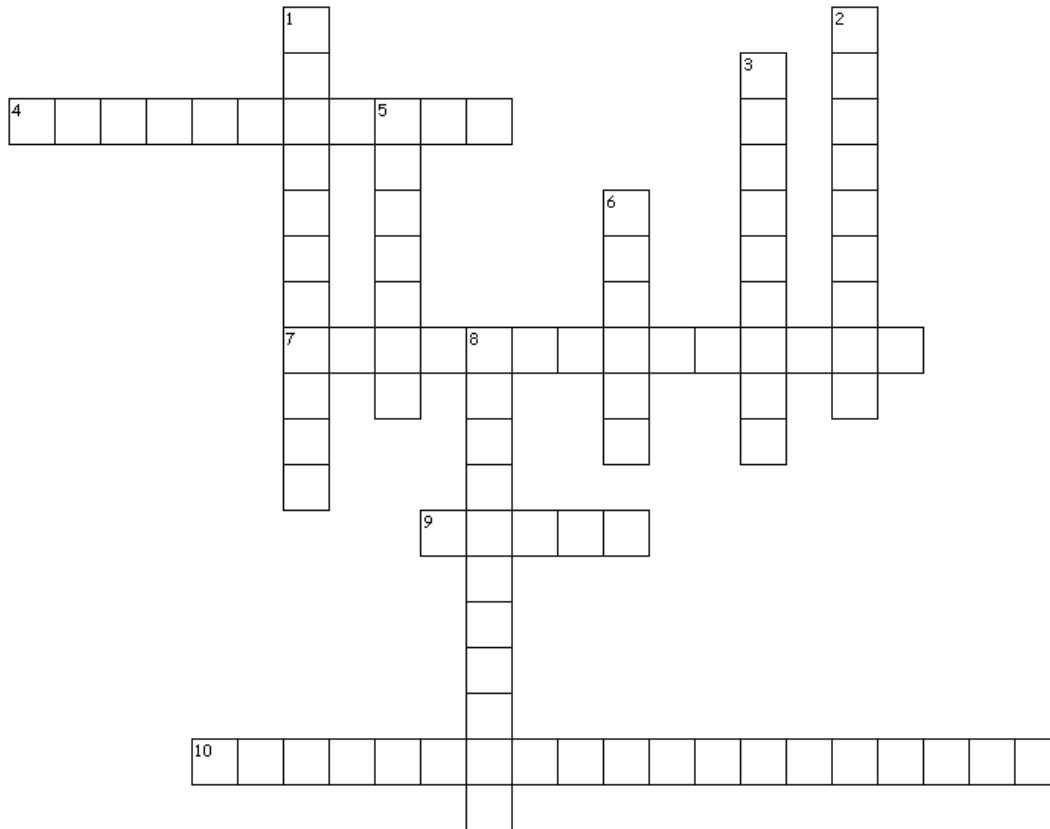
4) My thoughts about reducing my personal ecological footprint.

5) What I learned about my power to effect change.

6) What did I learn during this project about my environmental responsibilities?

7) What did I learn from this project that I can apply to other situations?

Ecological Footprint Crossword



Across

- 4. the area that a plant or creature lives
- 7. way of getting from one place to another
- 9. unwanted or excess material
- 10. a measurement of human impact on the environment

Down

- 1. amount used
- 2. to make less
- 3. an environment and all that lives in it
- 5. a plan that is made to help improve the environment
- 6. power that comes from electricity, gas, etc.
- 8. care and management

Word Bank

| | | | | |
|----------------|---------------------|-------------|-------------|-----------|
| consumption | ecologicalfootprint | ecosystem | environment | energy |
| transportation | ecoplan | stewardship | waste | reduction |

Ecological Footprint Wordfind

Q C M E C O P L A N F S N E T P E L T J
 V I K I T C T G J P U I S J V N N Q E E
 X G R B G O H G A F Z L P F I Y I I M W
 P O V R M N R F O O D P O T Z Y Z J A A
 Q L C E E S E Y M H U O R P M E J Q K C
 M O O P T U X N A V W P T I Z U E P T F
 X C S C S M W V V D Y J A Y I Y F G P E
 Y E S Z Y P T W Z I G G T V Z H O P S T
 B U E X S T W N K C R M I C O B O W U D
 U M E S O I V S T T R O O I Q N T H Z O
 B I R V C O N D V S W J N J V T P C X E
 V T F N E N T H H U O I R M U Q R R A N
 U I I F P D I W I Y Z G P R E G I Y J E
 O Q N B N U U Z R Z P J H W W N N K T R
 C V G Z N A V J P S F T N Y E Q T H C G
 T O D R V J J Y G R E N E C B Y G Y F Y

| | |
|-------------|----------------|
| consumption | food |
| ecological | footprint |
| ecoplan | reduction |
| ecosystem | transportation |
| energy | waste |
| environment | water usage |