

# Human-Environment Interactions

## Big Idea

The impact of human systems on natural systems can be expressed as our Ecological Footprint. In systems terms, the size of our Ecological Footprint is a measure of resource *inputs* from natural systems into human systems and waste *outputs* from human systems into natural systems. For example, a natural system input could be the amount of land set aside as a landfill for our garbage, which is a human system output.

As human systems interact with natural systems, the results are sometimes difficult to predict. New properties are continually created as a result of the interactions between and among systems, such as:

- ▶ depletion or loss of non-renewable resources (e.g., fossil fuels);
- ▶ loss of renewable resources (e.g., trees, fresh water);
- ▶ ecozones where the vegetation, soil, landforms, wildlife and human activity are changed over time as greenhouse gases are released into the atmosphere;
- ▶ new economies (e.g., carbon trading) and policies (e.g., the Kyoto Protocol);
- ▶ extreme changes in climate systems.

The waste *output* of greenhouse gases produced by human activity (such as, for example, driving cars) becomes an *input* to the climate system, thus changing the way the system works. Modifying human behaviour by relying less on fossil fuels can slow climate change and reduce its impact. Reducing the size of our footprint by driving less reduces that input into the global climate system.

New solutions are needed to make the human use of nature more sustainable over the long term.

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<p><i>Understanding and Managing Change</i></p> <ul style="list-style-type: none"><li>• [OE] explain the relationship between sustainability, stewardship, and an “ecological footprint”</li><li>• [OE] identify current or anticipated physical, social, or economic changes and explain how they could affect the lives of Canadians</li><li>• [OE] apply the concepts of stewardship and sustainability to analyse a current national or international issue</li><li>• [SE] describe the calculations and criteria used to determine their “ecological footprint”</li><li>• [SE] explain the relationship between stewardship, sustainability, and change in Canada’s consumption of energy (e.g., use of conventional versus alternative sources) and other resource-use practices (e.g., “consume and discard” versus “reduce, reuse, recycle”)</li><li>• [SE] describe how regional disparities (e.g., in resource accessibility) affect the economic sustainability of communities</li><li>• [SE] assess Canada’s environmental stewardship and sustainability based on the average Canadian’s “ecological footprint”</li></ul>

<p><i>Human-Environment Interactions</i></p> <ul style="list-style-type: none"> <li>• [SE] use selected criteria (e.g., costs, capacity, availability, sustainability, application, local attitudes) to evaluate alternative energy sources (e.g., solar, wind, tidal, hydrogen fuel cell) and conservation strategies</li> </ul>	
<p>For tips on using Focus Questions, please see page 2.</p>	
<p><i>Human-Environment Interactions</i></p> <ul style="list-style-type: none"> <li>• [OE] relate current lifestyle choices of Canadians to the prospects for sustaining Canada's economic and environmental well-being</li> </ul> <p><i>Understanding and Managing Change</i></p> <ul style="list-style-type: none"> <li>• [OE] explain the relationship between sustainability, stewardship, and an “ecological footprint”</li> </ul>	
<p>For tips on using Focus Questions, please see page 2.</p>	
<p>1. <i>Ecological Footprint</i> (see <a href="#">Ecological Footprint</a>)</p> <p>1. <i>Ecological Footprint</i> (see <a href="#">Ecological Footprint</a>)</p> <p>1. <i>Ecological Footprint</i> (see <a href="#">Ecological Footprint</a>)</p>	<ul style="list-style-type: none"> <li>▶ <i>The Ecological Footprint is the amount of space (land and air) that is required to support a person's activities. It can be determined for individuals, countries, cities, or even the world.</i></li> <li>▶ <i>Components of the Ecological Footprint include housing, food, transportation, consumer goods (e.g., clothes, books, furniture, vehicles, recreation, etc.) and services (e.g. education, health care, entertainment, waste disposal, etc.).</i></li> </ul>
<ul style="list-style-type: none"> <li>• <i>Ecological Footprint</i> (see <a href="#">Ecological Footprint</a>)</li> <li>• <i>Ecological Footprint</i> (see <a href="#">Ecological Footprint</a>)</li> <li>• <i>Ecological Footprint</i> (see <a href="#">Ecological Footprint</a>)</li> </ul>	<ul style="list-style-type: none"> <li>▶ <i>The Ecological Footprint allows us to calculate how much human systems consume and converts that into an equivalent of how much of the Earth's land systems are required to sustain that consumption.</i></li> <li>▶ <i>However, the Ecological Footprint is based on the premise that all land is productive. It also assumes that all humans share equally in the Earth's resources (which is not the case). This concept is called “fair earthshare.” This is worth mentioning so that students realize that the Ecological Footprint assumes this ideal situation.</i></li> <li>▶ <i>The Earth's carrying capacity refers to the number of people that can be safely and sustainably supported by productive land. Calculations show that the Earth's sustainable carrying capacity has already been exceeded. The existence of climate change is an indicator of this fact.</i></li> </ul>

<p><b>. H</b> <i>Human-Environment Interactions</i></p> <p><i>Ecological Footprint</i></p> <p><i>Ecological Footprint is a measure of the demand placed on Earth's ecosystems. It is the amount of land and water required to produce the resources that we consume and to absorb the waste that we generate. It is expressed in global hectares (gha). The Ecological Footprint of a country is the sum of the ecological footprints of all the people living in that country. It is a measure of the sustainability of a country's consumption patterns. A country's Ecological Footprint is compared to the biocapacity of the planet to determine if the country is living within its means. If a country's Ecological Footprint is greater than the biocapacity of the planet, the country is over-consuming resources and is contributing to global environmental degradation.</i></p>	<ul style="list-style-type: none"> <li>▶ <i>In 2004, Canada's Ecological Footprint was calculated at 8.56 ha/person. (Vemetoulis, et. al, Ecological Footprint of Nations (2004), cited in <a href="http://www.progress.org">www.progress.org</a>).</i></li> <li>▶ <i>Since we require ever larger amounts of materials and energy to support the population's needs and wants, the size of our Ecological Footprint has increased greatly over time. Productive land is being developed and used at a rapid rate, changing the appearance of our landscape. For example, forests might become golf courses, clear cuts (which grow back after many years) and pavement. Or a hillside might become a ski run or a mining project.</i></li> </ul>
<p><b>. H</b> <i>Human-Environment Interactions</i></p> <p><i>Quality of Life</i></p> <p><i>Quality of life is a measure of the well-being of a person or a community. It is a subjective measure that takes into account a person's or a community's physical, mental, and social well-being. It is a measure of the sustainability of a person's or a community's consumption patterns. A person's or a community's Quality of Life is compared to the biocapacity of the planet to determine if the person or the community is living within its means. If a person's or a community's Quality of Life is greater than the biocapacity of the planet, the person or the community is over-consuming resources and is contributing to global environmental degradation.</i></p>	<ul style="list-style-type: none"> <li>▶ <i>We need to look carefully at the changes we can make to maintain or improve our quality of life while increasing our impact on the Earth as little as possible:</i> <ul style="list-style-type: none"> <li>▶ <i>Change the types of fuels that we use for transportation and industry or in our homes to renewable options wherever possible.</i></li> <li>▶ <i>Choose products that are made of recycled materials.</i></li> <li>▶ <i>Walk, bicycle or use public transit.</i></li> <li>▶ <i>Buy foods with less packaging.</i></li> <li>▶ <i>Create homes that are properly insulated and have energy efficient appliances.</i></li> </ul> </li> </ul>
<p><b>. H</b> <i>Human-Environment Interactions</i></p> <p><i>Alternative Energy</i></p> <p><i>Alternative energy is energy that is derived from renewable resources. It is a clean, sustainable source of energy that does not rely on fossil fuels. It is a measure of the sustainability of a person's or a community's consumption patterns. A person's or a community's Alternative Energy is compared to the biocapacity of the planet to determine if the person or the community is living within its means. If a person's or a community's Alternative Energy is greater than the biocapacity of the planet, the person or the community is over-consuming resources and is contributing to global environmental degradation.</i></p>	<ul style="list-style-type: none"> <li>▶ <i>Wind and solar power are two alternative energy sources that do not rely on fossil fuels. When fossil fuels are burned, carbon is released into the air as carbon dioxide, which contributes to climate change.</i></li> </ul>
<p><b>. H</b> <i>Human-Environment Interactions</i></p> <p><i>Responsible Consumer</i></p> <p><i>A responsible consumer is a person who pays attention to the environmental impact of their purchases. They make choices that result in less fossil fuel being burned. Less burning means less CO<sub>2</sub> production, which will help to slow climate change. (Brainstorm ideas with the class.)</i></p>	<ul style="list-style-type: none"> <li>▶ <i>Being a responsible consumer involves paying attention to personal consumption and making choices that result in less fossil fuel being burned. Less burning means less CO<sub>2</sub> production, which will help to slow climate change. (Brainstorm ideas with the class.)</i></li> <li>▶ <i>A consumer who pays no attention to reduction of fossil fuel use as a criterion for making choices is missing a chance to help slow climate change. (Brainstorm ideas with the class.)</i></li> </ul>