

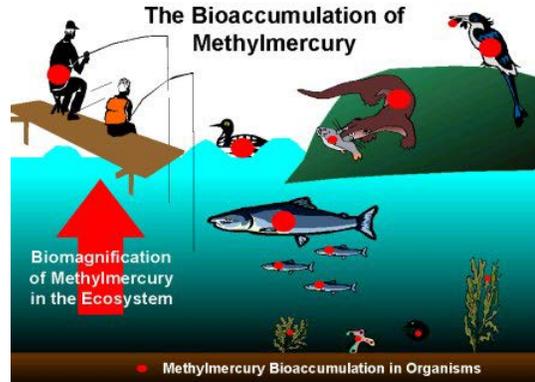
4.0 Maintaining sustainable environments requires knowledge, decisions and actions.

4.1 There are Intended and Unintended Consequences of Human Activities within Ecosystems

• *Human Impact On Ecosystems: Chemical Use*

Mosquito populations in Borneo were causing malaria among the Dyak people. The World Health Organization used the pesticide DDT to kill off the mosquito population. However the DDT also killed a species of parasitic wasp that ate a certain species of caterpillar. This species of caterpillar began eating the material roofs of houses were made of and the roofs began falling on people's heads. DDT also affected small bugs that were food for the geckos. The geckos began to move slowly and the cats, which normally ate rats, switched to the slower moving geckos. The cats eventually died of the DDT magnified in their food supply and the rat population increased. The rats were infested with fleas that carried a bacteria causing typhus malaria – a much worse form of the original malaria.

Bioaccumulation is the process in which a substance builds up in a living organism from the surrounding air or water, or through the consumption of organisms that already have the substance that is being accumulated. It will vary for different species and will depend on sources of contamination, as well as water quality and temperature. It provides increasing levels harmful to species higher up the food chain, because of "**biomagnification**", where substances like mercury will increase in concentration from microorganisms, to fish, to fish eating predators like otters and loons, and to humans.



The accumulated mercury is shown by the red dots. **Source: Communication Canada**

Human Impact On Ecosystems: Too Little Too Late?

Many species in North America and in Canada specifically are in danger of **extinction**. If a species becomes extinct, it can no longer be found anywhere in the world. Sometimes the organism is only lost in a large region. If this occurs, the species is **extirpated**. If a particular species is in danger of becoming extinct, or extirpated, it is placed on the **endangered species list**. The classification of species whose numbers are declining is **threatened**. There are special protection programs and laws made to protect endangered species.

Canada's Endangered Species

<http://raysweb.net/specialplaces/pages/canada-es.html>

Alberta's Endangered Species

<http://srd.alberta.ca/fishwildlife/speciesatrisk/>

• ***Famous Potatoes***

The small town of [Pemberton, British Columbia](#) is home to world-famous potatoes. These potatoes are virtually free of virus and disease because only locally cultured and laboratory-inspected seeds are used to grow them.

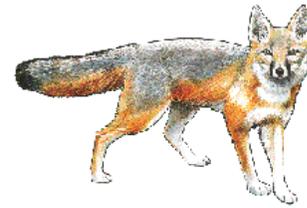
4.2 Information from Scientific Investigations Can Assist Environmental Decision-Making

• *The Saving of the Peregrine Falcon*



[*Find out more*] Peregrine Falcon

Knowing what affects you are having on the environment (or will likely have) will help you make decisions. The use of **DDT** (a chemical pesticide) was found to have a negative effect on **Peregrine Falcons**. It wasn't until the species was almost lost completely that something was done. DDT was banned and recovery programs were put in place to restore the numbers of peregrine falcons.



[Find out more] Swift Foxes

Swift foxes were accidentally poisoned because certain predators were seen as 'pests' or 'unnecessary' animals. When the Swift foxes used the poison instead, the species almost became extinct. Natural control is necessary in any ecosystem. If this natural control is upset, the impact can have ripple effects, which were never anticipated.

Captive breeding programs are used to help threatened species recover.

Sustainable Resources Development (Alberta Government)

You can also get additional information on other species that are threatened in ALBERTA..

Find out also about Canada's most Endangered Species – the Vancouver Island Marmot. – and what they are trying to do to save it.

4.3 There are Limitations to Scientific and Technological Knowledge

Science and technology cannot always solve the environmental problems we face. The mystery of the missing GOLDEN TOAD of Costa Rica is one such example. Scientists have theories, but no conclusive evidence has been found to support one as the primary cause of the problem. The top 4 theories include: climate change, pollution, disease and the thinning of the ozone layer.

• *The Walk That No Wolf Would Take*



Overpasses and Underpasses - to help wildlife cross the highways more safely have been built in Banff National Park. There are many reasons that determine the suitability of a crossing structure to a particular species. Grizzlies are influenced by the distance the structure is from Banff. Elk are influenced the structure's length. Wolves and cougars choose underpasses near drains. When humans used the underpasses or overpasses, the effectiveness of the structures was reduced.

Wildlife Crossing Structures – Monitoring by Parks Canada

4.4 Using Evidence from many Sources Can Help Analyze a Local Problem

• *Ecological Footprint*

The ecological footprint was developed to help people understand why they need to find a sustainable way of life. To calculate your **ecological footprint**, you need to determine **the total area of land that you use and water needed to supply all of the energy and materials that you use, as well as absorb all of the waste that you produce.** **Materials** that are included are: food, water, supplies to build shelter and raw materials needed to produce the manufactured products you use. **Energy** includes: electricity, natural gas, as well as all the energy needed to produce, and transport all of the manufactured products you use

• *Comparing Ecological Footprints*

We depend on the environment and we are part of the environment. **Sustainability** means that the resources from the environment can be replaced as quickly as they are used. Are we putting back what we take out, or, are we using up all the resources before they can be replaced? The amount of land available on Earth to support each person living is 1.7 ha. The average ecological footprint per person worldwide is 2.2 ha. The average Canadian ecological footprint is 7.7 ha. We are using more than we should!

Sustainability



Large Ecological Footprint



The ecological footprint of average Canadians is very large, because they are using many more resources and creating much more waste than is sustainable.

Factors That Can Reduce Your Ecological Footprint

Ways to reduce ecological footprint include:

1. Be aware of the products you consume in a typical day
2. Reduce the energy you use
3. Reduce the number of products you buy
4. Reduce the amount of garbage you produce

Reduce, Reuse, Recycle

