

## DDT is Forever

It is often thought that in the beautiful Arctic regions of Québec, where there is no heavy industry, Inuit enjoy clean air and water (Figure 1). Dr. Eric Dewailly, a public health official with Québec's Community Health department, began a study to compare the breast milk of women who lived in the unpolluted North to the breast milk of women who lived in the cities of southern Québec. 🌐

To learn more about becoming a public health official,



GO TO NELSON SCIENCE



Figure 1 Our polluted Canadian Arctic

### SKILLS MENU

- Defining the Issue
- Researching
- Identifying Alternatives
- Analyzing the Issue
- Defending a Decision
- Communicating
- Evaluating

He predicted that the pollution from car exhaust and factory fumes would cause higher levels of toxic chemicals in city dwellers than in Inuit. He was concerned that women in the south would pass these toxins to their breast-fed babies. He expected that Inuit women would be free of the harmful pollutants of the big cities and produce uncontaminated milk.

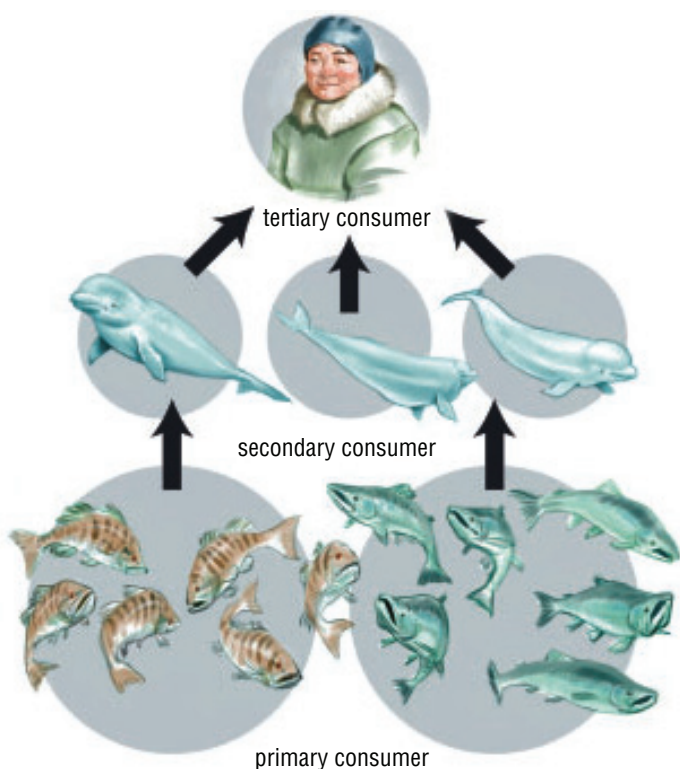
Much to everyone's surprise, the results of the study showed the exact opposite effect. The concentrations of toxins in Inuit women were five times greater than in women who lived in the polluted south. These chemicals included the extremely poisonous dichlorodiphenyltrichloroethane (DDT). DDT is a powerful insecticide that was widely used from the 1950s to the 1970s. Extensive spraying of DDT reduced malaria infections around the world by killing malaria-carrying mosquitoes. DDT was also used extensively in Canada as an agricultural pesticide.

DDT is a synthetic compound, composed of carbon, hydrogen, and chlorine. DDT does not mix well with water, but dissolves in oil and fats, so it is stored in body fat and breast milk. Studies show that high exposure to DDT is linked to human cancers of the liver, pancreas, and reproductive organs.

The levels of polychlorinated biphenyls (PCBs)—another compound made of carbon, hydrogen, and chlorine—were also much higher in Inuit women than in women in the south. PCBs are found in oils that lubricate electrical equipment, in fire-retardant fabrics, and in certain glues and paints. PCBs impair reproduction and are a probable cause of some cancers. Like DDT, PCBs are fat soluble, so they accumulate in fatty tissue.

Is there an explanation for these unexpected results? The toxins are not in the air or the water. They have been traced to the traditional foods that Inuit women eat—fish, beluga whales, walrus, and seals. These large animals consume countless

smaller fish and marine mammals, each of which has eaten smaller contaminated organisms down the food chain. Every molecule of PCB and DDT is stored in the fatty tissues of these sea creatures. The body has no way of breaking down these toxins, so they accumulate, much like discarded plastic water bottles in a landfill site. These stored toxins are passed along from each eaten organism to each eater of the meal. When the top consumer, an Inuit woman, eats whale meat or seal blubber, she is also eating all of the toxins collected in it from polluted waters far from the pristine North. The process that results in a build-up of toxins as you go up the food chain is called bioamplification (Figure 2).



**Figure 2** Bioamplification occurs when toxins that are stored in fatty tissue become increasingly concentrated as they move up the food chain.

## The Issue

Since Dr. Dewailly's study, Inuit have reduced the amount of high-fat fish and animals in their diet. There is concern that their traditional way of life has been threatened. Most, but not all, developed countries in the world have banned the use of these harmful compounds. The Canadian government banned the use of DDT in the 1980s.

Some countries continue to sell DDT to developing nations that have asked for help to prevent the spread of malaria. Is the continued use of DDT worthwhile despite its effects on health and on the lifestyle of Inuit?

## Goal

To decide whether the risks of using DDT worldwide ultimately outweigh the benefits.

## Gather Information



Choose a stakeholder from the list below, or another stakeholder of your choice. Possible roles include

- a representative of a company that manufactures DDT
- the president of a poor Latin American country with a major malaria problem
- a Canadian health official representing the concerns of Inuit

Research the pros and cons of using DDT from the perspective of your stakeholder. **7/1**



GO TO NELSON SCIENCE

## Identify Solutions

Consider the following questions to help you identify solutions:

- What are the risks of using DDT?
- What are the benefits?
- What are the alternatives to using DDT?

## Make a Decision

Make a decision on the issue based on the information you have gathered from the perspective of your stakeholder.

## Communicate



Prepare a presentation to the United Nations outlining your arguments for or against the continued use of DDT from the perspective of the stakeholder you have chosen. **A C**

### UNIT TASK Bookmark

You can apply what you learned about the effects of chemical products to the Unit Task described on page 286.