

## **CASE STUDY #2: ACID RAIN IN CANADA**

From <http://www.pavilion.co.uk/dwakefield/curriculum/ks4/letts/acidrain.htm> &  
<http://www.ec.gc.ca/acidrain/acidfact.html>

### **What damage is acid rain doing in Canada?**

- Fourteen thousand lakes are now so acidic that plants, animals, fish and birds are all dying.
- Trees such as spruce, fir and pine in eastern Canada are dying. The tops of trees turn yellow, their growth slows down, sometimes the bark splits, and finally the tree dies.
- 84% of agricultural land in eastern Canada is polluted by acid rain.
- 80% of Canadians live in areas where acid rain levels are too high. Acid rain has also been linked to respiratory diseases in children.
- Buildings are being affected, especially those made of marble, granite and limestone. Some estimates suggest that buildings in Canada are losing 4% of their weight every year.

### **Why is acid rain doing such a lot of damage in eastern Canada?**

- Large amounts of the acid rain which falls on Canada actually come from the USA. The prevailing north easterly winds blow the acid rain away from the industrial areas of the northeast USA to eastern Canada.
- Acid rain is a problem in eastern Canada because many of the water and soil systems in this region lack natural alkalinity - such as a lime base - and therefore cannot neutralize acid naturally. Provinces that are part of the Canadian Precambrian Shield, like Ontario, Quebec, New Brunswick and Nova Scotia, are hardest hit because their water and soil systems cannot fight the damaging consequences of acid rain. In fact, more than half of Canada consists of susceptible hard rock (i.e., granite) areas that do not have the capacity to effectively neutralize acid rain. If the water and soil systems were more alkaline - as in parts of western Canada and southeastern Ontario - they could neutralize or "buffer" against acid rain naturally.

### **What is the situation in western Canada?**

- Historically, lower levels of industrialization than in eastern Canada, combined with natural factors such as eastwardly moving weather patterns and resistant soils (i.e., soils better able to neutralize acidity), have preserved much of western Canada from the ravages of acid rain.
- However, not all areas in western Canada are naturally protected. Lakes and soils resting on granite bedrock, for instance, cannot neutralize precipitation. These are the conditions found in areas of the Canadian Shield in northeastern Alberta, northern Saskatchewan and Manitoba, parts of western British Columbia, Nunavut and the Northwest Territories. Lakes in these areas are as defenseless to acid rain as those in northern Ontario. If sulfur dioxide and nitrogen oxide emissions continue to increase in western Canada, the same sort of harmful impacts that have happened in eastern Canada could occur.

### **What is being done by the governments of the U.S. and Canada to solve the problem?**

- Spraying trees with water to wash off the acid rain. Unfortunately this is not very effective.
- Canada is now replacing coal fired power stations with gas fired ones.
- Lime is added to lakes, rivers and soil in an attempt to neutralize the acid. This costs a lot of money and is very time consuming.
- Some power stations have fitted equipment to remove SO<sub>2</sub> and NO<sub>x</sub> emissions. This is very effective but also very expensive.