Poughkeepsie Journal.com
Since 1785 | New York's Oldest Newspaper

Originally published: Sunday, October 14, 2007

Ecofocus: Lessons from the ozone hole

By William H. Schlesinger

When surrounded by fall foliage and crisp autumn weather, it's easy to forget that it's spring in the southern hemisphere. In Antarctica, sea ice is melting, penguins are returning to their nesting grounds, and there is a curious thinning in the layer of ozone in the stratosphere—10 miles or so above the Earth's surface.

Ozone in the stratosphere plays a crucial role in filtering out the sun's harmful ultraviolet radiation. When the ozone layer shrinks, humans and other organisms are at an increased risk for skin cancer, cataracts, and other forms of cellular damage.

Scientific evidence indicates that the hole in the ozone layer is a recent phenomenon. Human-created compounds called chlorofluorocarbons (CFCs) have been identified as the primary culprit. Marketed after World War II, CFCs were widely used as refrigerants and cleaning solvents.

Once released into the atmosphere, CFCs can persist for decades. They eventually break down when they are mixed into the upper atmosphere and exposed to ultraviolet radiation. When this happens, CFCs release active chlorine, the ozone layer's main offender. One atom of chlorine can destroy over 10,000 ozone molecules. This depletes ozone faster than it can be created, causing a hole to form.

The South Pole provides optimal conditions for breaking down CFCs. During Antarctic winters, the sun does not shine for three months. Extremely low temperatures cause stratospheric polar clouds to form. When the sun emerges in October, the ultraviolet light causes the CFCs accumulated in polar clouds to breakdown. This causes a loss of about 2/3 of the ozone in the stratosphere until late December.

The first few years after its discovery, the ozone hole grew larger each year, eventually encompassing cities in Chile and New Zealand. Concern over the health effects of ozone depletion lead to the formation of the Montreal Protocol, one of the first successful international environmental agreements. Initiated in 1987, the treaty was established to phase out the use and production of CFCs.

Thanks to the decisive measures taken by the Montreal Protocol, the ozone hole has stopped expanding in size. It will take 50 to 100 years before CFCs are completely removed from the atmosphere and the ozone hole is relegated to environmental history. But at least it does not seem to be getting worse. Without efforts to stem its cause, it was likely to affect a significant portion of humanity.

The Montreal Protocol is a superb example of how the international community can work together to limit environmental damage when the causation science is solid, the danger is real, and alternative approaches are available. To date, 191 countries have signed on to the treaty. By restricting CFCs, society dodged a serious bullet. Although the ozone hole still appears each spring, the situation seems to have stabilized.

Scientists continue to refine our understanding of ozone destruction by monitoring the amount of ultraviolet radiation that reaches the Earth's surface. The Institute of Ecosystem Studies is among the organizations that make routine measurements. Other scientists are trying to understand the role of another ozone-depleting compound, methyl bromide, which is widely used as an agricultural fumigant.

Efforts to combat the ozone layer should be used as a model for how we can address other global environmental problems, such as climate change. There is no need for humanity to sit quietly while the environment deteriorates around us.

When science informs policy and the public understands, we can make great strides with huge—indeed global—problems that will otherwise impact all humanity long into the future.

To monitor the ozone hole, visit:
NASA's Ozone Resource Page

To see the data for ultraviolet light in New York State, visit:
THE USDA UV-B Monitoring and Research Program

William H. Schlesinger *is the President of the Institute of Ecosystem Studies in Millbrook, NY.*