



Hot Air from EEOP – *A Newsletter*

Environmental Education Outreach Program (EEOP)
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<http://www.nau.edu/eeop/newsletter>

The Newsletter

This newsletter is a service of the Institute for Tribal Environmental Professionals (ITEP) Environmental Education Outreach Program (EEOP). The EEOP staff created this newsletter for K-16 students, educators, and tribal professionals that are interested in learning more about environmental issues with an emphasis on air quality.

Yard-Waste – To Burn or Not To Burn

Burning leaves and other yard wastes pollutes the air and can lead to uncontrolled fires. Leaf smoke can make breathing difficult for people who suffer from asthma, emphysema, chronic bronchitis, or allergies. Moisture that is usually trapped within leaves, make the leaves tend to burn slowly and thus generate large amounts of airborne particulates—fine bits of dust, soot and other solid materials. These particulates can reach deep into lung tissue and cause coughing, wheezing, chest pain, shortness of breath and sometimes long-term respiratory problems.

Leaf smoke may also contain hazardous chemicals such as carbon monoxide, which can bind with hemoglobin in the bloodstream and reduce the amount of oxygen in the blood and lungs. Another noxious chemical commonly present in leaf smoke is benzo(a)pyrene, which has been shown to cause cancer in animals and is believed to be a major factor in lung cancer caused by cigarette smoke. And while breathing in leaf smoke can irritate the eyes, nose and throat of healthy adults, it can really wreak havoc on small children, the elderly and people with asthma or other lung or heart diseases.

Sporadic individual leaf fires usually don't cause any major pollution, but multiple fires in one geographic area can cause concentrations of air pollutants that exceed federal air quality standards. According to the U.S. Environmental Protection Agency (EPA), several leaf and yard waste fires burning simultaneously in a particular locale can cause air pollution rivaling that from factories, motor vehicles and lawn equipment.

Burning fallen leaves used to be standard practice across North America, but most municipalities now ban or discourage the incendiary practice due to the air pollution it causes. Most municipalities also do not collect yard waste and put it into landfills. It takes lots of room in the landfill and there are other options for the disposal of yard waste.

Purdue University consumer horticulture specialist Rosie Lerner says that composting leaves is the most eco-friendly alternative to burning. Dry leaves alone will take a long time to break down, she says, but mixing in green plant materials, such as grass trimmings, will speed up the process. Sources of nitrogen, such as livestock manure or commercial fertilizer, will also help.

“Mix the pile occasionally to keep a good supply of air in the compost,” she says, adding that a compost pile should be a minimum of three cubic feet and will generate soil conditioner within weeks or a few months, depending on conditions.

Another option is to shred leaves for use as mulch for your lawn or to help protect garden and landscape plants. Lerner suggests adding no more than a two-to-three-inch layer of leaves around actively growing plants, chopping or shredding the leaves first so they don't matt down and prevent air from reaching roots.

Is it Good Ozone or Bad Ozone?

Ozone is neither good nor bad, it is a chemical - trioxygen (O₃), a molecule consisting of three oxygen atoms. (Oxygen is a molecule consisting of two oxygen molecules.) Ozone is a powerful oxidizing agent, far stronger than dioxygen, which means it will react quickly with most metals. No chemical is inherently good or bad. Good or bad depends on its location and the dose or concentration of the chemical.

Ozone is a gas that occurs both in the Earth's upper atmosphere and at ground level. Ozone can be "good" or "bad" for people's health and for the environment, depending on its location in the atmosphere. Ozone occurs in two layers of the atmosphere. The layer closest to the Earth's surface is the troposphere. Here, ground-level or "bad" ozone is an air pollutant that is harmful to breathe and it damages crops, trees and other vegetation. It is a main ingredient of urban smog. The troposphere generally extends to a level about 6 miles up, where it meets the second layer, the stratosphere. The stratosphere or "good" ozone layer extends upward from about 6 to 30 miles and protects life on Earth from the sun's harmful ultraviolet (UV) rays.

Ozone is produced naturally in the stratosphere. But this "good" ozone is gradually being destroyed by man-made chemicals referred to as ozone-depleting substances (ODS), including chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), halons, methyl bromide, carbon tetrachloride, and methyl chloroform. These substances were formerly used and sometimes still are used in coolants, foaming agents, fire extinguishers, solvents, pesticides, and aerosol propellants. Once released into the air these ozone-depleting substances degrade very slowly. In fact, they can remain intact for years as they move through the troposphere until they reach the stratosphere. There they are broken down by the intensity of the sun's UV rays and release chlorine and bromine molecules, which destroy the "good" ozone. Scientists estimate that one chlorine atom can destroy 100,000 "good" ozone molecules.

Even though we have reduced or eliminated the use of many ODSs, their use in the past can still affect the protective ozone layer. Research indicates that depletion of the "good" ozone layer is being reduced worldwide. Thinning of the protective ozone layer can be observed using satellite measurements, particularly over the Polar Regions.

Ozone depletion can cause increased amounts of UV radiation to reach the Earth which can lead to more cases of skin cancer, cataracts, and impaired immune systems. Overexposure to UV is believed to be contributing to the increase in melanoma, the most fatal of all skin cancers. Since 1990, the risk of developing melanoma has more than doubled.

UV can also damage sensitive crops, such as soybeans, and reduce crop yields. Some scientists suggest that marine phytoplankton, which are the base of the ocean food chain, are already under

stress from UV radiation. This stress could have adverse consequences for human food supplies from the oceans.

The United States, along with over 180 other countries, recognized the threats posed by ozone depletion and in 1987 adopted a treaty called the Montreal Protocol to phase out the production and use of ozone-depleting substances.

EPA has established regulations to phase out ozone-depleting chemicals in the United States. Warning labels must be placed on all products containing CFCs or similar substances and nonessential uses of ozone-depleting products are prohibited. Releases into the air of refrigerants used in car and home air conditioning units and appliances are also prohibited. Some substitutes to ozone-depleting products have been produced and others are being developed. If the United States and other countries stop producing ozone-depleting substances, natural ozone production should return the ozone layer to normal levels by about 2050.

Ground-level or "bad" ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NO_x and VOC.

At ground level, ozone is a harmful pollutant. Ozone pollution is a concern during the summer months because strong sunlight and hot weather result in harmful ozone concentrations in the air we breathe. Many urban and suburban areas throughout the United States have high levels of "bad" ozone. But many rural areas of the country are also subject to high ozone levels as winds carry emissions hundreds of miles away from their original sources.

Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. "Bad" ozone also can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. Healthy people also experience difficulty breathing when exposed to ozone pollution. Because ozone forms in hot weather, anyone who spends time outdoors in the summer may be affected, particularly children, outdoor workers and people exercising.

Ground-level or "bad" ozone also damages vegetation and ecosystems. It leads to reduced agricultural crop and commercial forest yields, reduced growth and survivability of tree seedlings, and increased susceptibility to diseases, pests and other stresses such as harsh weather. In the United States alone, ground-level ozone is responsible for an estimated \$500 million in reduced crop production each year.

Under the Clean Air Act, EPA has set protective health-based standards for ozone in the air we breathe. EPA, state, and cities have instituted a variety of multi-faceted programs to meet these health-based standards. Throughout the country, additional programs are being put into place to cut NO_x and VOC emissions from vehicles, industrial facilities, and electric utilities. Programs are also aimed at reducing pollution by reformulating fuels and consumer/commercial products, such as paints and chemical solvents, that contain VOC. Voluntary programs also encourage communities to adopt practices, such as carpooling, to reduce harmful emissions.

We live with ozone every day. It can protect life on earth or harm it, but we have the power to influence ozone's impact by the way we live. If you are interested in monitoring ozone in your

area there is a GLOBE protocol (<http://www.globe.gov>) for measuring ozone. Contact the EEOP staff for more information.

Scholarships for Minority Students Going Unclaimed

A large amount of scholarship money that has been set aside by companies for deserving minority students are either collecting dust or being returned to businesses because of a lack of interest. For more information, please go to:

http://www.tapartnership.org/cc/docs/minority_scholarships.pdf

America's Children and the Environment Website

This EPA web site provides measures of environmental factors related to the health and well being of children in the United States. The website shows trends in environmental contaminant levels in air, water, food, and soil; concentrations of contaminants measured in the bodies of children and women; and childhood illnesses that may be influenced by exposure to environmental contaminants. Ultimately these measurements will help guide efforts to minimize environmental impacts on the nation's children and also will form discussions among policymakers and the public about how to improve. <http://www.epa.gov/envirohealth/children/>

Association for Environmental Studies and Sciences

Faculty, students, and education-minded environmental professionals are encouraged to join the newly formed Association for Environmental Studies and Sciences (AESS; <http://aess.info>). The annual membership fee is \$30; \$15 for students. A major aim of AESS will be to fill an important gap in our ability to facilitate understanding of environmental science, policy, management, ethics, and history, by providing a professional association that supports the identity, collective voice and continuing education of individuals involved in interdisciplinary environmental research, teaching, and problem-solving. A quarterly electronic newsletter has already been established, and a flagship journal will be launched in 2009. The next annual meeting will take place next year in Madison, Wisconsin (Oct 8- 11, 2009), and a call for proposals will be available on the web site this Spring.

Communications

The EEOP staff offers a variety of communications. The EEOP website provides information about programs. We also have a list-serve for sharing information on internships, programs, scholarships, as well as EEOP services and projects. If you would like to join the list-serve send an email to mansel.nelson@nau.edu.

Credits and Contacts

The US Environmental Protection Agency (USEPA) Office of Air and Radiation provides part of the funding to make this newsletter possible. The newsletter is disseminated on various list serves, however, if you would like to join the newsletter list serve, contact Mansel.

Our staff looks forward to providing new services and developing new programs, as well as continuing existing programs. We especially look forward to hearing from you. So please visit our website at <http://www.nau.edu/eeop> or contact us via telephone or email.

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