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# Asia's Wind-Borne Pollution a Hazardous Export to U.S.

**Air: Dust, chemicals travel a long way. 'We're a small world,' one scientist says.**

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April 26 2002

Wind-borne pollution from China and neighboring countries is spreading to California and other parts of the nation and Canada as a result of surging economic activity and destructive farming practices half a world away, according to new scientific studies.

The research shows that a mix of pollutants, from dust to ozone to toxic chemicals, travels farther than once realized.

Federal air quality officials fear that the foreign-born pollution will complicate efforts to cut smog and haze, and make it more difficult to meet federal air quality standards in California and other parts of the West. Although most of the pollutants are similar to ones already found in North America, they do add to health concerns by slightly increasing year-round concentrations of gases and tiny particles in the air, according to the U.S. Environmental Protection Agency.

During peak winds, however, dust and smoke levels can approach or exceed health-based standards. Federal scientists, too, are beginning to probe the dust for bacteria and viruses that may be attached.

The made-in-China label on haze over North America is partly due to increased productivity of consumer goods ranging from patio furniture to CDs to toys. But it also is a result of deforestation, over-grazing and intensive cultivation of fragile soils.

Researchers at universities on both sides of the Pacific have been tracking the haze for a number of years along its 6,000-mile journey, using satellites and aircraft, land-based sensors and computer models.

In one severe dust storm in spring 1998, particle pollution levels in Oregon, Washington and British Columbia soared. In Seattle, air quality officials could not identify a local source of the pollution, but measurements showed that 75% of it came from China, researchers at the University of Washington found.

"A larger fraction of the haze we see is Asian, far more than we ever dreamed," said Tom Cahill, professor of atmospheric science and physics at UC Davis. "We're a small world. We're all breathing each other's effluent."

The amount of pollution reaching North America from Asia does not equal that produced by the United States.

But the impact of foreign-born pollution is becoming more widely visible.

The imported haze has recently been spotted at ski resorts from Lake Tahoe to Aspen, Colo., and above Los Angeles and Vancouver, Canada. At its worst, it can cast a faint, yellow hue across a 1,200-mile front from Arizona to Calgary, Canada, and beyond before it peters out somewhere over Greenland, studies show.

"We may need to be more engaged in countries in Asia in helping them clean up their industries and reduce pollution to protect the health of Americans," said John Beale, deputy assistant administrator for air programs at the Environmental Protection Agency.

This week, scientists are launching a major new research project to better understand the problem. Based in Monterey, dozens of scientists plan to track pollutants reaching the West Coast. They have installed wind and pollution sensors at coastal outposts from Goleta and Trinidad in California to the Olympic Peninsula in Washington.

They will compare data with researchers in Japan, and study satellite images from space and data from lasers aboard an airplane flying between Seattle and Los Angeles.

Called the Intercontinental Transport and Chemical Transformation 2002 Project, the research effort will collect and analyze air pollution samples through late May.

What researchers don't fully understand yet is just how much pollution drifts across the Pacific, its exact chemical composition, how it changes once it reaches North America and how it affects the environment. They also want to know how much air pollution comes from thousands of cargo ships plying the Pacific to service the global economy.

What they do know is that deserts in China and Mongolia are a major source of pollution. Wind storms rake the Taklimakan and Gobi deserts, where soil erosion is increasing, whipping towering clouds of dust miles into the air. High-speed winds whisk them along at up to 1,500 miles per day.

"Once the pollution gets on that conveyor belt, it often doesn't run into clouds or weather systems and doesn't mix or fall out of the air, so you have largely undiluted pollution arriving in North America," said Rudolf Husar, director of the Center for Air Pollution Impact and Trend Analysis at Washington University in St. Louis.

A process called desertification has intensified in China, home to about 100 million peasant farms. As a result of drought, forest-clearing, overgrazing and intensive cultivation, huge tracts have been stripped of the vegetation that held the soil in place.

Desertification affects one of every four acres in China today, Cahill said.

Numerous studies have linked microscopic airborne particles with a host of health problems, including heart attacks, respiratory failure, asthma and premature death. The smallest particles are too tiny to be filtered by the body and penetrate deep into the lungs.

Mixed with all the dust is another menace: Toxic and industrial pollutants from farms, factories and power plants. China's coal-burning power plants and factories emit roughly 40 million tons per year of sulfur oxides, the most in the world and double the U.S. emissions of that pollutant. "We're not breathing just dust, but dust and whatever else has been deposited on it, like hundreds of compounds from man-made pollution," said David Parrish, atmospheric chemist for the National Oceanic and Atmospheric Administration.

About one-third of all the mercury--a toxic metal--released in the United States comes from fossil-fuel burning in Asia, said Daniel Jacob, professor of atmospheric chemistry at Harvard University. Mercury is found in some

coal deposits and is released into the air primarily by power plants.

Also, pesticides that have been banned in the United States are part of the fallout from dust blowing off farmland in China, said Dan Jaffe, atmospheric chemist at the University of Washington. Among the pesticides detected are DDT, toxaphene and dieldrin, he said.

"In the United States, many of these pollutants are decreasing, yet in these countries, the pollution is increasing," Jaffe said.

Spring is when most of the pollution blows across the Pacific. For example, after the 1998 dust storm, particle pollution levels across much of the interior West tripled. An additional 20 to 50 micrograms of particles were detected in valleys along the West Coast--equivalent to one-third to three-quarters of the allowable particulate matter under EPA pollution standards.

Ozone also has been tracked moving across the North Pacific. In one instance, concentrations at Cheeka Peak on the Olympic Peninsula in Washington reached 70 parts per billion, 60% of the U.S. one-hour ozone standard, Jaffe said.

Ozone, a gaseous pollutant formed chemically in the air as emissions from smokestacks, tailpipes and cleaning solvents react with sunlight, is the common ingredient in smog, and highly destructive to lung tissue.

Most of the year, however, pollution from Asia is less severe. Winds wane in summer and the smog-conveyor belt slows down. Still, a steady trickle of pollutants reaches North America throughout the year, adding 5 to 15 parts per billion of ozone, Jacob said.

Scientists are unsure how the pollution affects the marine environment. Dust can benefit marine ecosystems as minerals falling on water enhance plankton. But dust blowing over the North Pacific sometimes blocks about one-third of the sunlight reaching the ocean, reducing energy available for biological productivity. "We know it [haze] can affect the weather in the North Pacific by cooling the air, but we are trying to figure out what it means for climate and plankton," Cahill said.

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