Amphibians in Danger

Laboratory results do provide evidence of a link between UV radiation and deformities or reduced hatching rates in various amphibian species.

One study, performed by Joseph Kiesecker of Yale University and Andrew Blaustein of Oregon State University, found that deformities were over 91% more likely in long-toed salamanders exposed to UV radiation than in long-toed salamanders shielded by a UV filter. Hatching rates were 14.5% for unshielded salamanders, compared to 95% hatching rates for those shielded by the filter.

However, these results alone do not provide a clear explanation for the decline of amphibians in their natural environment. Only combined studies of amphibians, UV radiation, and other environmental variables can provide necessary information to answer these questions and perhaps help save these endangered species.

Long-toed salamander (Ambystoma macrodactylum). Photo from the Northern Prairie Wildlife Research Center, U.S. Geological Survey.

The National Park Service and U.S. Environmental Protection Agency: Partners in Monitoring UV

In 1996, the National Park Service and the U.S. Enviromental Protection Agency established the Park Research and Intensive Monitoring of Ecosystems Network (PRIMENet). PRIMENet provides long-term monitoring of visibility, ground-level ozone, atmospheric particulates, UV radiation, and meteorological conditions. These measurements help scientists better understand how changes in these quantities affect human health and various ecosystem processes.

PRIMENet stations have been set up at 14 national parks, including Acadia, Big Bend, Canyonlands, Everglades, Denali, Glacier, Great Smoky Mountains, Hawaii Volcanoes, Olympic, Rocky Mountain, Sequoia-Kings Canyon, Shenandoah, Theodore Roosevelt, and Virgin Islands. These parks are home to many major ecosystems and have also been designated as Class-1 air quality parks. The U. S. Congress established this air quality classification to aid in maintaining and improving air quality in these areas.

PRIMENet measurements are shared with the U.S. Geological Survey, the U.S. Department of Agriculture, and several universities for use in tying atmospheric changes to ecosystem responses. Changes in human health, plants, aquatic ecosystems, and other species have already been documented and may be directly related to changes in UV. Monitoring these amounts, in coordination with studies of the affected ecosystems, can help scientists better understand the ecosystems' response to changing UV levels.

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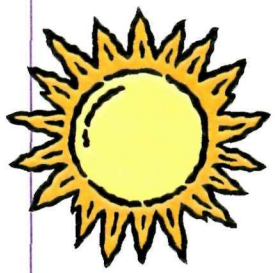

UV and Amphibians

Produced by the University of Colorado and NOAA's Air Resources Laboratory in collaboration with the National Park Service and PRIMENet.

UV and Amphibians

In many locations of the world, frogs and other amphibians are dying. Some species are already entirely extinct, while others show alarming rates of deformities such as malformed tails.

The causes of these amphibian deaths and deformities are uncertain. Pollutants, habitat destruction, and changing predator populations can all contribute to the problem, and scientists have discovered that ultraviolet (UV) radiation from the sun may play a role as well, either on its own or in combination with these other factors.

Because of this potential link, understanding changes in the amount of UV radiation reaching the earth's surface may be especially important for preserving and protecting frogs and other amphibian species.

In 1999, U.S. national parks rated amphibian monitoring as one of their top ten research needs.

To achieve this goal, National Park Service and U.S. Environmental Protection Agency scientists have proposed combined UV measurement/ amphibian population surveys at Sequoia-Kings Canyon, Olympic, and Glacier national parks.

Water samples and UV measurements will also be collected in Rocky Mountain, Acadia, and Great Smoky Mountains national parks. These measurements will provide information about UV doses in amphibian habitats across North America.

Alpine salamander.

In recent years, surface UV levels have been increasing due to a thinning of the ozone layer. The ozone layer is a protective shield high in the atmosphere that helps prevent human, amphibians, and all plants and animals on earth from receiving harmful doses of UV.

Damage to this layer has occurred in recent years as a result of the accumulation of human-made substances called chlorofluorocarbons (CFCs) in the earth's atmosphere.

These CFCs react with sunlight and other chemicals to quickly break apart the ozone molecules. Just one CFC molecule can destroy many ozone molecules.