



Atmospheric Deposition at Organ Pipe Cactus NM

Importance

Both the Clean Air Act and the National Park Service (NPS) Organic Act protect air resources in national parks. Understanding changes in air quality can aid in interpreting changes in other monitored vital signs and support evaluation of compliance with legislative and reporting requirements. At Organ Pipe Cactus NM, the Sonoran Desert Network has identified atmospheric deposition and visibility as high-priority vital signs for monitoring.

Long-term Monitoring

For Organ Pipe Cactus National Monument, the Sonoran Desert Network (SODN) acquires, analyzes, and reports on air quality data from the web-based program archives of the National Atmospheric Deposition Program/National Trends Network and the Interagency Monitoring of Protected Visual Environments program.

SODN air quality monitoring objectives at Organ Pipe Cactus NM are to:

1. Determine the seasonal and annual status and trends in concentrations of N- and S-containing ions; and
2. Determine the seasonal and annual status and trends in concentrations of visibility-reducing pollutants.

Management Applications

Information gathered from this protocol will:

- Support evaluation of compliance with legislative requirements of the Clean Air Act, regional haze guidelines, National Environmental Policy Act, and the Government Performance and Results Act (GPRA); and
- Facilitate interpretation of other SODN vital signs, such as vegetation and water-quality measurements.

Park Overview

Both local and distant air pollution sources affect air quality in Organ Pipe Cactus NM. The park's air quality related values (AQRVs) are those resources that are potentially sensitive to air pollution, and include vegetation, surface waters, soils, fish and wildlife, and visibility. At present, visibility has been identified as the most sensitive AQRV in the park; other AQRVs may also be sensitive, but have not been sufficiently studied. Although visibility in the park is still superior to that in many



Airshed, Organ Pipe Cactus National Monument.

parts of the country, it is often impaired by light-scattering pollutants (haze).

Atmospheric Deposition

Overview

Wet deposition occurs when air-pollutant emissions, such as sulfur dioxide (SO₂), nitrogen oxides (NO_x), and ammonia (NH₃) from power plants, automobiles, agriculture, and other sources are transported and transformed in the atmosphere and deposited to ecosystems as sulfate (SO₄), nitrate (NO₃), and ammonium (NH₄) compounds via rain or snow. Dry deposition of particles and gases occurs through complex processes, such as settling, impaction, and adsorption.

Atmospheric deposition can have a variety of effects on ecosystems, including acidification, fertilization, or eutrophication, and accumulation of toxins. In freshwater lakes, streams, and watersheds, deposition from nitrogen (N) and sulfur (S) compounds can cause changes in water chemistry that affect algae, fish, submerged vegetation, and amphibian and aquatic invertebrate communities.

Monitoring results

No trends were seen in nitrate, sulfate, or ammonium concentrations in rain and snow from 1999 to 2008. Sulfur conditions are good, but nitrogen conditions are rated as being of significant concern. This park is meeting its 2009 GPRA goal for deposition.