Chaco

AIR QUALITY MONITORING AT CHACO CULTURE NATIONAL HISTORICAL PARK

Chaco Culture National Historical Park was established as a unit of the National Park Service in 1907 for its cultural resources (primarily 13 large ruins). The National Park Service must also protect and manage the significant natural resources including air quality and visibility. Chaco Canyon is part of a monitoring system called 'Visibility Investigative Experiment in the West', a program designed to determine existing conditions from which future trends can be projected. Chaco needs long term monitoring to detect problems at early stages, and at best, anticipate them before they occur. Certainly in order to make sound long term management decisions, the National Park Service must have an understanding of the interaction of the air with other resources.

Chaco Culture National Historical Park lies within the energy rich San Juan Basin. One quarter of the nation's known coal reserves and one-sixth of the worlds known uranium reserves are located within the geographic boundary of the Basin. Several coal-fired power plants affect the airshed of the Basin, and the area abounds in dirt roads which contribute a considerable amount of airborne dust. The ruins, rock-art, plants and animals, as well as the quality of experience while visiting the park are susceptible to air quality deterioration. Thus the monitoring system provides an early warning system concerning pollution problems by developing an historical record on the condition of the Park's air resources over time. This record provides the basis for National Park Service personnel to make informed and effective air resource management decisions. The National Park Service wants to assure that the quality of visual resources within the park are maintained for todays visitor and the generations to follow. This means the Park Service must be aware of the scenic resources and how they may be affected by changing levels of air pollution from in and near the park.

What are some of the visual resources that are important to the interpretation of Chaco Canyon? The Anasazi Indians of Chaco built and maintained over 500 miles of road (up to 30 feet wide) in order to move goods and people over a vast area. Along this road system, the Chacoans developed an extensive visual communications network tying in all of the outlying communities with those in the canyon. Many of these 'outliers' are situated so that they see at least two signaling 'shrines' located on the canyon rims.

In order to properly discuss the outliers, roads, and communication system with visitors, it is essential to maintain the clarity of Chaco's vistas.
These vistas include (but are not limited to):

1. The San Juan Mountains - 75 miles northeast
2. The Chuska Mountains - 35 miles west
3. Lobo Mesa and Hosta Butte - 31 miles south
4. Mt. Taylor - 65 miles southwest
5. Nacimiento Mountains - 75 miles
6. La Plata Mountains - 75 miles north

Every day at 9 a.m. and 3 p.m. (weather and staff permitting) there is a Ranger at Pueblo Alto monitoring air quality through the use of a Multi-Wavelength Contrast Teleradiometer. Light reflected from a target point on the horizon (usually a series of 5 mountains or buttes) forms an image which is degraded as it passes through the atmosphere in a way which is proportional to the amount of pollution in the air. The Teleradiometer measures the amount of light remaining at the target point as well as the amount of light in the sky above the target.

By comparing the image light to the brightness of the open sky, a measurement of the loss of visibility due to pollutants in the air is recorded. In addition, the Teleradiometer is multi-wavelength. It measures not only light in general, but also in separate wavelengths. Airborne particles of different size scatter different wavelengths or colors of light. The instrument detects these differences which may aid in identifying the type and source of the pollution. It is known that particles in the 0.1 to 1.0 micron size are the ones that interfere most with visibility. Larger particles such as windblown sand have a lesser effect on visibility.

Another instrument used at Chaco is the Fine Particulate Sampler or Stack Filter. This device draws particles out of the air through a vacuum system. The particles are collected on two different filters according to the size of the airborne particulate. The filters are then analyzed to determine what types of particulates are affecting visibility.

If you are interested in more information on air quality activities at Chaco, we encourage you to meet the Ranger at Pueblo Alto (one of our backcountry trails requiring a permit). Also available at the Visitor Center is an 8 minute slide program which will show you the air quality monitoring program in action. Request this program at the Visitor Center desk.