Guadalupe Mountains

THE AIR,
THE RAIN,
. . . THE CONCERN

INTRODUCTION

National Park. The words conjure up images of blue skies, clear water, green foliage, healthy wildlife and unique cultural resources. Indeed, national parks are national treasures. Visitors to the national parks should expect pristine, scenic vistas during their visit to these national treasures.

In recent years, however, the scenic vistas and natural and cultural resources in the national parks have been disturbed by air pollution and contaminated precipitation. The permanent residents of parks, plants and animals, are showing signs of stress directly resulting from air pollution and acid precipitation. Air pollution can accelerate aging and decay of historic building materials. These pollution problems are not limited to parks near urban centers. Parks in remote areas are showing effects due to air pollution and acid precipitation. Recent findings by the National Park Service (NPS) indicate that all of the parks in the lower 48 states suffer some degree of reduced visibility, due to man-made pollutants, at least 90% of the time. Just as pollution finds its way into the national parks, it crosses international boundaries sometimes straining relations. Pollution also enters our personal lives, affecting our individual health and well being.

THE AIR

Anyone who has played the game of holding their breath knows how important air is to our well being. Because the air we breathe comes to us through the earth's atmosphere, it naturally contains moisture and solid particulates. These enter the atmosphere as a result of natural processes such as evaporation from lakes and streams, volcanic eruptions, lightning strikes, forest fires, dust storms, sea spray and release of pollen. Although these natural pollutants affect the color, taste, and smell of our air, the effects of man-made pollution often overwhelm those of nature. Man-made pollutants are of great concern to many people and organizations, including the National Park Service. The NPS is concerned about the following air pollutants which are linked to effects on park resources. These pollutants, their sources, and their effects are described below.

1. **Sulfur Dioxide:** Sulfur dioxide is one of the most significant pollutants in the atmosphere. Released naturally into the environment by biological decay and volcanic activity, its man-made sources include coal-fired power generation, coal and oil furnaces and lead and copper smelting. Seventy million tons of sulfur are estimated to be released annually into the atmosphere from man-made sources, 60% from coal-fired power generation.

Sulfur dioxide is very corrosive to stone, paint, and metals. Sulfur dioxide also aggravates existing respiratory diseases and contributes to the development of these conditions in humans. Plant species sensitive to atmospheric SO_2 include Douglas fir, ponderosa pine, white pine, and forest shrubs. Various crops are also affected, including alfalfa, grains, squash, cotton, grapes, and apples.

Sulfur dioxide ultimately transforms in the atmosphere into sulfates which are very

In 1980, legislation known as the Acid Precipitation Act authorized a monitoring program throughout America known as the National Acid Deposition Program — NADP. As part of this program, acid deposition within the units of the national park system is monitored. Both air quality and acid deposition monitoring programs call for biomonitoring of sensitive plant and animal species in areas of significant pollution.

AIR QUALITY — GUADALUPE MOUNTAINS

In 1982 park rangers began monitoring the quality of the park's air resource. The monitoring station is located on land bordering the park and provides an unobstructed view in the direction of the El Paso, Texas - Ciudad Juarez, Chihuahua, Mexico urban complex and the copper smelters of Southern Arizona and New Mexico. At Guadalupe Mountains the NPS monitors visibility, particulate matter, ozone and sulfur dioxide.

VISIBILITY

To monitor the visibility at Guadalupe Mountains National Park, the station is equipped with a fixed camera which automatically takes pictures 3 times daily year round. The camera is focused on Sierra Prieta, a peak located 28 miles west of the station. Using the visual contrast of the pictures and allowing for daytime seasonal changes in lighting, the visual range is determined. On the average, the visibility at Guadalupe Mountains ranges from 118 miles (190km) in winter to 76 miles (122km) in summer.

PARTICULATE MATTER

Twenty-four hour particulate matter samples are taken every 3 days at the air quality station. Both fine and coarse particles are collected. The samples are sent to University of California at Davis for anaylsis of the chemical composition of the captured particulates.

The coarse particles (2.5 to 15 micrometers) are mostly soil related. Here at Guadalupe Mountains, the composition of these particles has generally been calcium, silica, potassium, aluminum, iron and sodium. The fine particles concentrations (less than 2.5 micrometers) are dominated by sulfate compounds which are the most detrimental to visibility.

OZONE AND SULFUR DIOXIDE

The air quality monitoring equipment measures the amounts of ozone and sulfur dioxide in the atmosphere. These measurements will enable the Park Service to determine any increase in these gases over future years. This monitoring began recently and there is no real baseline data at this time.

THE RAIN — GUADALUPE MOUNTAINS

Acid deposition has been monitored weekly at Guadalupe Mountains National Park since June 1984. Rainfall is collected and analyzed on site for pH, conductivity and weight. If there is a sufficient quantity of rainfall for further analysis, the liquid is shipped to a laboratory under the National Acid Deposition Program - National Trends Network. There, a repeat of the analysis is conducted plus an ion analysis. These ions include: Ca^{++}, Mg^{++}, Na^{+}, K^{+}, NH_4^{+}, NO_3^{-}, $SO_4^{=}$, $PO_4^{\equiv}$.

Since beginning the acid deposition monitoring, the rainfall in the park has ranged from ph 4.30 to ph 6.70.

WHAT ARE WE TO DO?

Just as Aldo Leopold so eloquently and graphically wrote, "Conservation is a state of harmony between men and land. By land is meant all of the things on, over, and in the earth. Harmony with land is like harmony with a friend; you cannot cherish his right hand and chop off his left . . . the land is one organism". We cannot cherish our national parks and continue to pollute our air and rain. Each of us who enjoys the natural and historical resources of America indeed, the world, should concern himself with the well-being and preservation of these resources. By using public transportation, carpooling, walking short distances - not driving, recycling energy intensive products like aluminum, glass and paper, each of us can lower the consumption of fossil fuels and its resultant pollution.

The air and the rain: two of life's basic necessities link us directly to all the ecosystems of the earth. Humans with their increasing industrialization must also increase their awareness and obligations concerning the environment around them and around earth . . . for land truly is one organism.