Dust storms have long been associated with erosion of topsoil, poor air quality and other harmful effects. In March of this year, a dust storm from the Gobi Desert in northwest China cast much of southeast Asia in a pallid gloom as airports canceled flights and health officials warned people to carry umbrellas and wash thoroughly when they returned home. Residents of Utah faced similar storms in April. But dust isn’t all bad. Scientists working in Canyonlands have discovered that airborne dust can be extremely beneficial to the area in which it falls.

Any local gardener will agree that it’s a miracle anything grows in Canyonlands without the advantage of compost, manure and daily irrigation. Despite natural obstacles like extreme temperatures and lack of water, native plants endure, even surprising visitors with their abundance. Airborne dust may be one reason for this success.

As much as 30% of the soil in Canyonlands arrived as airborne dust. Dust can be distinguished from other sediments because it differs in mineral and chemical composition from nearby bedrock, the only other source of soil-building material in many areas. According to lab results, dust both introduces new elements and enriches many others consumed by plants. For example, dust doubles the amount of phosphorous and manganese, triples the amount of sodium, and more than quadruples the amount of magnesium in the soil. Imagine food falling from the sky, filling your fridge and three others just like it. It’s a virtual feast for the plant community.

Examining new elements helps identify potential dust sources, though naming exact origins remains impossible. Given the right conditions, dust can travel halfway around the world, and frequently does. A Gobi Desert storm last year crossed the Pacific and sprinkled tons of Asian dust from California to Florida. It was the largest storm ever recorded, and noticeably affected visibility in American Southwest. The Mojave, Great Basin and Sonoran deserts are all upwind of the park, and recent satellite images have recorded dust plumes traveling from the Mojave to the Canyonlands area. Soil profiles in Canyonlands indicate a change in sources during the past several decades, so it’s possible that human modifications like farming, grazing, military testing, urban development and water diversions have made the Mojave more prone to erosion. Not surprisingly, the Gobi has witnessed many of the same activities.

Most dust destined for Canyonlands probably originates in the American Southwest. The Mojave, Great Basin and Sonoran deserts are all upwind of the park, and recent satellite images have recorded dust plumes traveling from the Mojave to the Canyonlands area. Soil profiles in Canyonlands indicate a change in sources during the past several decades, so it’s possible that human modifications like farming, grazing, military testing, urban development and water diversions have made the Mojave more prone to erosion. Not surprisingly, the Gobi has witnessed many of the same activities.

Desert storms can be devastating to the ecosystem in which it occurs, and the newly airborne nutrients only benefit soils that can retain them. In Canyonlands, this job falls to cryptobiotic soil crust, a sticky, fibrous web. Holding the crust together are clearly visible. While it can withstand wind, the flattening impact of feet or wheels crushes crust back into dust, which may float away on the next breeze. More importantly, the formation of healthy soil crust requires up to half a century. Protecting park soils is a small but significant step every visitor can take. Stay on roads and trails, and crushes crust back into dust, which may float away on the next breeze. More importantly, the formation of healthy soil crust requires up to half a century. Protecting park soils is a small but significant step every visitor can take. Stay on roads and trails, and本科教育包含超过100个科学学科的课程和大纲。这些课程和大纲符合犹他州科学核心课程的标准，并与科学国家标准相一致。请访问我们的网站获取更多信息和下载获奖课程的获奖课程大纲：http://www.nps.gov/seug/coe.

Taking Inventory

Much like a physician monitors a patient’s heartbeat and blood pressure for diagnostic purposes, National Park Service officials need accurate information about the resources in their care. Specifically, they need to know how and why natural systems change over time, and what amount of change is normal, in order to make sound management decisions.

In 1998, Congress authorized and funded a new initiative designed to build a stronger scientific foundation for the management and protection of natural resources in parks and monuments across the country. As part of the National Resource Challenge, Canyonlands joins sixteen other parks on the Colorado Plateau where scientists are designing an integrated inventory and monitoring program. The first goal of the program is to verify records of what plants and animals exist in the parks. To accomplish this, teams of scientists and park biologists are conducting inventories of plants, mammals, reptiles, amphibians and birds.

The second phase of the program is the development of vital signs monitoring. Vital signs are measurable, early warning signals that indicate changes which could affect the long-term health of natural systems. Canyonlands, along with other network parks, is planning a program to monitor biological and physical resources like air quality, water quality, exotic species, soils and threatened and endangered species.

To guide inventory efforts, plant and animal species lists are available at all visitor centers. Many species suspected to occur in Canyonlands remain undocumented. Visitors are invited to make observations, take photographs and report sightings of these species to park staff. Sightings of rare or endangered species are also appreciated.
The view from Grand View Point at the Island in the Sky contains an incredible collection of canyons, spires, pinnacles and mesas. The view also contains many stories: stories of sedimentation and erosion; stories of mountains and rivers. A series of roads, one distinct but most nearly obscured by vegetation, reveal a human story: that of uranium miners exploring unfamiliar country with the hopes of becoming rich.

Uranium is a critical component of atomic weapons. In the 1950s, the United States government sought to stockpile it. South- east Utah’s canyon country was thought to contain a considerable amount of uranium. However, finding it was not simple. The uranium was in unknown locations scattered throughout accessible terrain. A wide-scale exploration of the canyon country would be necessary.

To accomplish this, the government, through the Atomic Energy Commission (AEC), recruited an army of prospectors to comb the area for uranium. Potential miners were offered the chance to make a fortune while fulfilling their duty to national security. In addition, the AEC offered a number of incentives, including bonuses and inflated prices for uranium finds, as well as information and instruction to beginners. These were strong drawing cards, enticing men from all over the country to leave their jobs and families behind to join one of America’s last great mining booms.

The search for uranium altered canyon country forever. To provide miners access to prospecting areas, the AEC built almost 1,000 miles of road in southeast Utah, many of them in what would become Canyonlands National Park. The roads were constructed by hard physical labor, often by lonely miners working with bulldozers, picks and shovels. One can imagine the difficulty of building and traveling these roads, which remain as a testament to the tremendous amount of work undertaken by the miners to prospect the area.

Though substantial amounts of uranium were found in the region, very little was found in what is now Canyonlands. However, the newly created roads led to other discoveries. Prior to the mining boom, canyon country was an inaccessible region. Only a handful of people, mostly cowboys, sheepherders and miners, knew it at all. Traffic slowly increased as more people began touring the area simply to see the sights. Soon Bates Wilson, Superintendent of what was then Arches National Monument, other National Park Service employees from the area, and members of the local community began working to establish a national park. Wilson led jeep tours for government officials which featured lengthy discussions over campfires and Dutch oven dinners amid the canyons. In 1964, Congress established Canyonlands National Park to preserve the scenery and recreational opportunities of the area.

So, when you enjoy the view from Grand View Point, or any of the overlooks at the Island in the Sky, remember the story of hard-working miners toiling with hopes of making a fortune. While many of them did not make the money they envisioned, their labor lead to an important treasure. By leaving roads, they blazed the trail for the establishment of Canyonlands National Park.

### What to do with your day
First, stop at the visitor center for current information on trails, roads, interpretive programs, weather, or to watch the park orientation video.

#### If you have 2 hours:
- **Drive to Grand View Point or Green River Overlook.** Hike to Mesa Arch.
- **If you have 4 hours:** Drive to Grand View Point, Green River Overlook and Upheaval Dome. Hike the Grand View Point, Mesa Arch, and Upheaval Dome Overlook trails.
- **If you have 8 hours:** Visit every overlook. Hike several mesa top trails or one of the more strenuous trails descending to the White Rim. Enjoy lunch on the trail or at White Rim Overlook or Upheaval Dome picnic areas.

#### If you are interested in geology:
- View the exhibits at the visitor center and pick up a geology handout. View the exhibits at the visitor center and pick up a natural history handout. View the exhibits at the visitor center and pick up a natural history handout.
- Visit Upheaval Dome and hike to the first overlook. There you can learn two theories about how the crater might have been formed.

#### If you are interested in natural history:
- View the visitor center exhibits and pick up a free natural history handout. As you pass through Gray’s Pasture, keep an eye out for mule deer or bighorn sheep. Walk the Mesa Arch or Neck Spring trails and learn about native plants.

#### If you are interested in human history:
- Visit the visitor center exhibits and pick up a free handout. Hike the Arctic Butte Trail to see ancestral Puebloan ruins. Visit Buck Canyon Overlook and see the exhibit about ranching. Old fences and corrals are visible along the scenic drive and Murphy Pond Road. Also, old mining roads are visible from most overlooks.

#### If you are interested in watching sunrise/sunset:
- Find out sunrise and sunset times at the visitor center. Visit Mesa Arch at dawn. Visit Green River Overlook at dusk for incomparable views of sunset over the canyons. Hike to the top of Aztec Butte for a spectacular view of the Island in the Sky and surrounding countryside.

---

**Exploring in the Sky**

### Basics
- **Visitor center** is open 8 a.m. - 6 p.m. from April to late October, 8 a.m. - 4:30 p.m. the rest of the year. Features exhibits, book and map sales, audio-visual programs, backcountry permits, general information, and park ranger on duty.
- **There are no free water sources at the Island. Water is sold in the visitor center at the front desk and at a vending machine outside.**
- **Orientation video:** Wildlife of Rock is shown on request at the visitor center (15 minutes).
- **Vista** is available at the visitor center, Grand View Point, White Rim Overlook, Upheaval Dome and Willow Flat Campground. The visitor center toilets are wheelchair accessible.
- **Campground** at Willow Flat has 12 sites available on a first-come, first-served basis. No water or hookups provided. Fee is $5 (cash/money).

### Scenic drive
- **A 34-mile (round-trip) scenic drive allows visitors to tour the entire mesa top. The Road Guide to Canyonlands - Island in the Sky District offers an insightful narrative for the trip and is sold at the visitor center. Wheelchair-accessible overlooks include Grand View Point and Buck Canyon Overlook. There are picnic areas at White Rim Overlook, Grand View Point and Upheaval Dome.**

### Interpretive activities
- **Interpretive trails (with printed guides) include Mesa Arch, Neck Spring and Upheaval Dome Overlook.**
- **Ranger programs:** Geology talks (20 minutes) are presented daily at 10:30 & 11:30 a.m. at Grand View Point (April to late October). Campfire programs are presented several nights a week at Willow Flat Campground (April - September). Check at the visitor center or campgrounds for times, topics and dates.

### For kids
- **Free Junior Ranger booklets are available at the visitor center. Kids age 6 to 12 can earn a Junior Ranger badge by completing five or more activities in the book. For hiking, kids enjoy peaking through Mesa Arch and climbing the back of the whale at White Rock. Use caution as there are unfenced overlooks on both of these trails.**
Have You Seen Our Galaxy?

FOR THOUSANDS OF YEARS, OBSERVING THE night sky has been fundamental to human life and survival. The sky was a major symbol in the natural world of order and cyclic repetition. Studying the skies brought a sense of normalcy to people’s lives. Movement of the planets and stars helped farmers determine when to plant and harvest crops and guided ritual and religious observances. Interpretations of the celestial bodies varied widely among cultures, but often the sky was considered the abode of gods, a place humans could never touch. How do we know that sky watching was important to people of the past? Folk stories, myths, elaborate rituals and festivals, dance and costumes, and complex and symbolic architecture survive today.

Astronomers today ask the same questions posed millennia ago by people sitting around a campfire at night. Those people wondered about the meaning of the flickering but eternal stars overhead and the fragile transient life around them. Today we can reenact that thousand-year-old campfire scene. Campers and backpackers settling in for the night watch the unfolding drama of our galaxy as stars unloack one by one. Soon the night sky is filled with thousands of dazzling jewels, too many to count. Occasionally, a meteor blazes across the sky. The final act is one that may only be viewed by ten percent of the world’s inhabitants and is the most majestic and breathtaking of scenes. Spanning the sky like a cloud of light is a region known as the Milky Way. Earthlings peering into this “band of mist” are looking at the center of our galaxy.

Yet light pollution from nearby towns has become evident even here in the last few miles. As these towns grow, so grows the amount of light that encroaches on the dark skies of Canyonlands National Park. Advertisers and display lighting, building illumination, upward flooding light and industrial security lights vanquish the dark into shadowy corners. How do we protect the beauty of our night skies? Should we turn off street lights and exterior building lights in favor of dark skies and forego private and public safety and security? Does this starry wilderness deserve the same protection afforded to other resources of this national park? To date there is no federal legislation mandating preservation of the night sky. What is the solution? Do we need another federal regulation?

Fortunately, with some modifications of lighting sources and forethought about the placement of lighting, the needs of safety and security and dark skies can all be accommodated. Light pollution is mostly the product of public lighting that goes to waste. In the United States alone, billions of dollars a year in energy costs could be saved by replacing high wattage, unshielded street lamps and exterior lights with well-directed, lower wattage, shielded lights. Shields would allow the same amount of light to be delivered to the ground where it is needed for safety and security. Additionally, less carbon dioxide and other pollutants would be introduced into the atmosphere because power plants would be

Exploring the Needles

Basics
- Visitor center is open 8:00 a.m. - 5:00 p.m. from April to late October, and 8:00 a.m. - 4:30 p.m. the rest of the year. Features exhibits, book and map sales, audio-visual programs, backcountry permits, general information, and park rangers on duty.
- Water is available year-round at the visitor center and at the Squaw Flat Campground.
- Orientation video: Wilderness of Rock is shown on request at the visitor center (15 minutes).
- Restrooms are available at the visitor center and Squaw Flat Campground (wheelchair accessible). There are also vault toilets at Elephant Hill.
- Squaw Flat Campground has 26 sites available first-come, first-served. No hookups. $10/night.

Scenic drive
The scenic drive continues 7 miles past the visitor center, ending at Big Spring Canyon Overlook. Along the way are several pullouts for short hiking trails, viewpoints and a picnic area. Graded dirt roads lead to Cave Spring, where there is an interpretive trail, and to the Elephant Hill trailhead, where there is a second picnic area. The Elephant Hill access road provides excellent views of the Needles from a car (about one mile from the pavement). Note: The scenic drive to Big Spring Overlook will be closed beyond the campground turnaround June through August 2002.

Interpretive activities
- Interpretive trails (with printed guides) include Cave Spring, Pothole Point, Roadside Ruin & Slickrock.
- Campfire programs are presented five nights a week at Squaw Flat Campground (April - October). Check at the visitor center or campground for topics and times.

For kids
Free Junior Ranger booklets are available at the visitor center. Kids age 6 to 12 can earn a Junior Ranger badge by completing five or more activities. The Cave Spring Trail, featuring a cowboy camp and prehistoric pictographs, is always a hit with kids. Pothole Point is another popular hike, especially if the potholes are full of water. Before you set out, borrow a kids’ discovery pack from the visitor center. Packs include a naturalist guide, binoculars, hand lens and more (small fee and deposit required).

What to do with your day
- First, stop at the visitor center for current information on trails, roads, interpretive programs, weather, or to watch the park orientation video.
- If you have 2 hours: Drive to Big Spring Canyon Overlook and hike the Pothole Point trail along the way. Drive to a view of the Needles on the Elephant Hill access road.
- If you have 4 hours: Explore the scenic drive and graded dirt roads. Hike the Cave Spring, Pothole Point and Roadside Ruin trails or the longer Slickrock trail.
- If you have 8 hours: After exploring the scenic drive, hike to Chesler Park or around the Big Spring-Squaw Canyon loop. Enjoy lunch on the trail or at a picnic area.

If you are interested in geology:
View the exhibits at the visitor center and pick up a free geology handout. Every Trail Guide provides unique views of rock formations, and marine fossils are visible in the canyon below Big Spring Canyon Overlook (follow the Confluence Trail).

If you are interested in natural history:
View the visitor center exhibits and pick up a free natural history handout. Bighorn sheep are seen most frequently from overlooks along the Slickrock Trail. Squaw, Lost and Salt Creek canyons are great for early morning birding.

If you are interested in human history:
View the visitor center exhibits and pick up the free human history handout. Hike the Roadside Ruin and Cave Spring trails. If time permits, visit the Piskabos rock art panel at Salt Creek Canyon.

If you are interested in watching sunrise/sunset:
Find out sunrise and sunset times at the visitor center. Sunrise is spectacular from the campground area, especially along the short trail over the butte between Loops A and B. Visit Pothole Point or Wooden Shoe Arch Overlook as the glow of sunset washes over the Needles.
Sustainable Living at the Maze

For many visitors to the Maze District of Canyonlands, isolation is both risk and reward. Few places are farther from the bright lights and big cities of urban America. For park employees living at Hans Flat, the Maze District headquarters, isolation is a fact of life. With the nearest grocery stores at least two hours away and a four-hour trip to town for a loaf of bread, a container of milk and a stick of butter.

This isolation also affects park management. The nearest power transformer is 45 miles away. There is no potable ground water. For years, diesel generators supplied power to the small community of eight residences, maintenance shop, ranger station and laundry. At considerable expense, tanker trucks delivered fuel and water. High operating costs meant that facilities were closed and the rangers furloughed every winter. The need to conserve resources has always been a priority.

The residents of Hans Flat have responded to this challenge with remarkable thrift and restraint. They began a recycling program to reduce waste in the 1980s, long before there were even "local" drop off points. In the early 1990s, employees began composting and established organic gardens which now produce mixed greens and vegetables year-round. Their measures to conserve power and water are extreme: turning off lights in unoccupied rooms, unplugging everything can be enough to save 20. Even compared to the other districts of Canyonlands, water conservation saves Hans Flat over $50,000 a year, almost enough to cover the salary of a seasonal ranger.

This discipline is encouraged because water still has to be trucked to the Maze, and each 5,800 gallon load costs the park around $700, or 12 cents per gallon. There is no car to bathe in potholes or intermittent streams. There is no car to bathe in potholes or intermittent streams. There is no car to bathe in potholes or intermittent streams.

Thanks to You
CANYONLANDS ENCHANTS VISITORS WITH ITS BEAUTY. HUNDREDS OF THOUSANDS OF OUTDOOR enthusiasts are drawn here each year. This popularity creates a challenge - to assist and protect visitors, while preserving the natural and cultural treasures they come to see. With your fees and continued support, we can meet this challenge together.

In 1996, Congress authorized the Recreational Fee Demonstration Program to improve the scope and quality of federal facilities and address natural and cultural resource issues. Prior to this program, fee money was returned to the general fund of the federal government and parks were only reimbursed for their collection costs. Now, the park keeps 80 percent of camping, entrance and permit fees. During the last five years, over 2.3 million dollars in retained fee revenue has been put to work at Canyonlands.

The park has a trail crew for the first time in nearly 20 years. Major trail reconstruction projects have been undertaken at Grand View Point, Mesa Arch and Roadsides Ruin. All of the paved roads at Canyonlands have received preventative maintenance that extends their life and makes travel safer. Visitor centers have received fresh paint and new carpets. A sprinkler system was added to the Island in the Sky Visitor Center. A Backcountry Information Office was constructed at Needles. An additional restroom was installed at Upheaval Dome. Campsites are being rehabilitated both in the frontcountry and along the White Rim Road. Finally, if you are headed into the backcountry, your fee dollars fund the permit system, including staffing the reservation office.

Many other projects are in progress. Throughout the park, informational signs are being replaced, power-generating systems are being upgraded, and critical research programs are being initiated. This summer, significant improvements will be made to the Green River Overlook at the Island, making the overlook handicap accessible and adding a restroom. Other less-visible projects, such as repairing park water and sewer systems, are crucial for guarding health and safety.

National Park Service employees strive to protect the natural and cultural resources of Canyonlands. Now you're a partner in this important work. Thanks to you, improvements are being made to park facilities and programs that will ensure future visitors are able to experience this national treasure.