Canyonlands

National Park Service
U.S. Department of the Interior

Canyonlands National Park

Natural History

The word ‘desert’ usually conjures images of barren, desolate lands. In fact, many plants and animals have adapted to this environment. The collared lizard (shown above) is one of Canyonlands' more colorful inhabitants.

Desert Ecology

Deserts form where lack of water limits life. At the middle latitudes (30 degrees) in each hemisphere, deserts occur where warm, dry air masses descend toward the earth’s surface. Deserts also form where localized high pressure zones result from warm, dry air flowing off mountains. The interior of continents tend to be drier than coastal areas, so deserts are common in these regions as well.

Canyonlands lies in the interior of the North American continent, in the rain shadow of mountains to the west. The park sits near the center of a region known as the “Colorado Plateau.” As the name suggests, the Colorado River drains this region, much of which is over a mile above sea level. Elevations inside the park range from 3,700 to 7,200 feet.

The park averages 9 inches of rain annually, more than most deserts. However, much of this moisture falls as snow which cannot be used by plants. Some rain falls during summer monsoons which drop so much water so quickly that much of it washes away.

Extreme temperatures further complicate life in Canyonlands. Summer highs frequently exceed 100 degrees, while winter lows can dip below zero. In a single day, air temperatures may fluctuate as much as 40 degrees. Additionally, clear skies, sparse vegetation, strong winds and low humidity all encourage evaporation. Water can disappear before it hits the ground. The animals and plants in Canyonlands have many adaptations that enable them to survive these conditions.

Animals

The natural quiet of Canyonlands often creates the impression of lifelessness. Yet many animals live here. Birds, desert cottontails, kangaroo rats and lizards are common and may be seen by a majority of visitors. Many desert animals are either inactive during daylight hours or wary of humans, so sightings can be special events.

Canyonlands’ hot climate and lack of water seems to favor small mammals. Because of their size, these animals have an easier time finding shelter and require less food and water to live. Rodents are numerous, with nine species of mice and rats alone. Beavers, the largest North American rodent, are found along the Colorado and Green rivers.

One animal uniquely adapted to life in the desert is the kangaroo rat. This rat lives its entire life consuming nothing but plant matter. Its body produces water by metabolizing the food it eats. However, even the kangaroo rat is prone to spending the hottest daylight hours sleeping in a cool underground burrow and may even plug the opening with dirt or debris for insulation.

Desert bighorn sheep

The desert climate also favors reptiles like lizards and snakes. Reptiles are cold-blooded, regulating their body temperature with sunshine and shade rather than internally. Since keeping warm in the desert requires little work during summer, reptiles can use their energy to find food and reproduce. During cold months, reptiles hibernate.

Large mammals like mule deer and mountain lions must roam vast territories in order to find food and water, and sometimes migrate to nearby mountains during summer.

Desert bighorn sheep live year-round in Canyonlands. These animals make their home on the talus slopes and side canyons of the rivers, foraging on plants and negotiating the steep, rocky terrain with ease. Once in danger of becoming extinct, desert bighorns are making a tentative comeback thanks to the healthy herds in Canyonlands.

Plants

Many visitors are surprised at the amount of vegetation in Canyonlands. Plants are critical components to all ecosystems, and Canyonlands is no exception. Plants capture particulate dust in the air, filter gaseous pollutants, convert carbon dioxide to oxygen, provide animal habitat and possess raw materials useful to humans. A variety of adaptations in leaves and roots enable plants to survive the moisture and heat stresses here. Plant survival strategies are grouped into three basic categories: drought escapers, drought resistors and drought evaders.

Drought escapers are plants that make use of favorable growing conditions when they exist. These plants are usually annuals that grow only when enough water is available. Seeds may lie dormant for years if conditions are not favorable. Spring annual wildflowers are escapers. They sprout following winter and early spring rains, and sometimes again after late summer rains.

Prickly pear cactus

Drought resistors are typically perennials. Many have small, spiny leaves that reduce the impact of solar radiation, and some may drop their leaves if water is unavailable. Spines and hairy leaves act to reduce exposure to air currents and solar radiation, limiting the amount of water lost to evaporation. Cacti, yuccas and mosses are examples of drought resistors. Yuccas have extensive taproots that are able to find water beyond the reach of other plants. Moss, a plant not commonly associated with deserts, thrives because it can tolerate complete dehydration: when rains finally return, mosses green up immediately.

Another fascinating adaptation to resisting drought can be found in the Utah juniper, one of the most common trees in the southwest. During drought conditions, junipers can self-prune, diverting fluids from one or more their branches in order to conserve enough water for the tree to survive.

Drought evaders, the final group, survive in riparian areas where water is plentiful. Monkey flower, columbine and maidenhair fern are found in well-shaded alcoves near seeps or dripping springs. Cottonwoods and willows require a lot of water, and only grow along river corridors and intermittent streams where their roots can reach the water table easily.

Cryptobiotic Soil Crust

Cryptobiotic soil crusts are a living groundcover that forms the foundation of plant life in Canyonlands and the surrounding area. This knobby, black crust is dominated by cyanobacteria, but also includes lichens, mosses, green algae, fungi and bacteria.

Cyanobacteria, previously called blue-green algae, are one of the oldest known life forms. Scientific evidence indicates that these organisms were among the first colonizers of the earth's early land masses, and played an integral role in the formation and stabilization of the earth's early soils.

In addition to other functions, soil crusts provide a haven for seeds.

When wet, cyanobacteria move through the soil and bind rock or soil particles, forming an intricate web of fibers. In this way, loose soil particles are joined together, and an otherwise unstable surface becomes very resistant to both wind and water erosion.

Nitrogen fixation is another significant capability of cyanobacteria, as they are able to convert atmospheric nitrogen to a form plants can use. Soil crusts also store water, nutrients and organic matter that might otherwise be unavailable to plants.

Unfortunately, many human activities damage soil crusts. Footprints and tire tracks are very harmful, especially when the crusts are dry and brittle. Impacted areas may never fully recover.

Avoiding these fragile crusts is simple. Always drive or ride on designated roads. Respect road closures and search for places wide enough to pass other vehicles rather than driving over roadside vegetation. When hiking, always walk on marked trails, or on other durable surfaces such as rock or in sandy washes.

Potholes

Throughout Canyonlands, naturally occurring sandstone basins called "potholes" form tiny ecosystems inhabited by a surprising collection of animals. Potholes collect rain water and wind-blown sediment, and range in depth from less than an inch to several yards. Even the smallest potholes may harbor microscopic creatures.

Potholes in the Needles District.

Pothole dwellers include clam, fairy and tadpole shrimp, snails, mites and rotifers. Potholes are also important breeding grounds for many winged insects, and for amphibians such as the spadefoot toad.

Tadpole shrimp

To survive in a pothole, organisms must endure extreme fluctuations in several environmental factors. Surface temperatures vary from 140 degrees Fahrenheit in summer to below freezing in winter. As water evaporates, organisms must disperse to larger pools or tolerate dehydration and the drastic physical and chemical changes that accompany it. Most organisms living in potholes have very short life cycles, as brief as ten days, reducing the time water is required and allowing them to live in the shallow pools.

A pothole is a unique habitat that is easily disturbed. Pothole organisms are sensitive to sudden changes in water chemistry, temperature, sediment input, being stepped on, and being splashed out onto dry land. Human use of pothole water (swimming, bathing or drinking) may change the salinity or pH of a pool drastically. Hikers should therefore avoid using water in potholes as well as walking through dry ones.

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