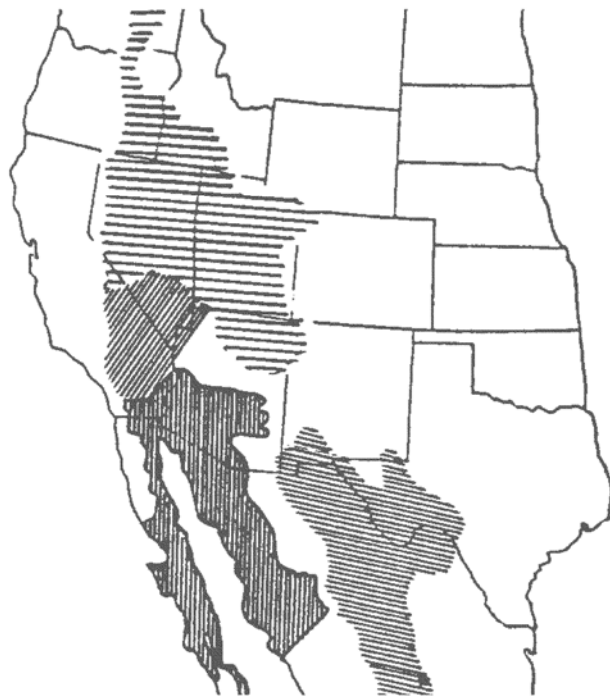






# ***A LOOK AT THE SONORAN DESERT***

## Background Information

The Arizona-Sonora Desert Museum is located in the Sonoran Desert. This desert is one of four that occur in North America. The other three are the Great Basin, Mojave and Chihuahuan deserts. Arizona is the only state in which all four deserts can be found.



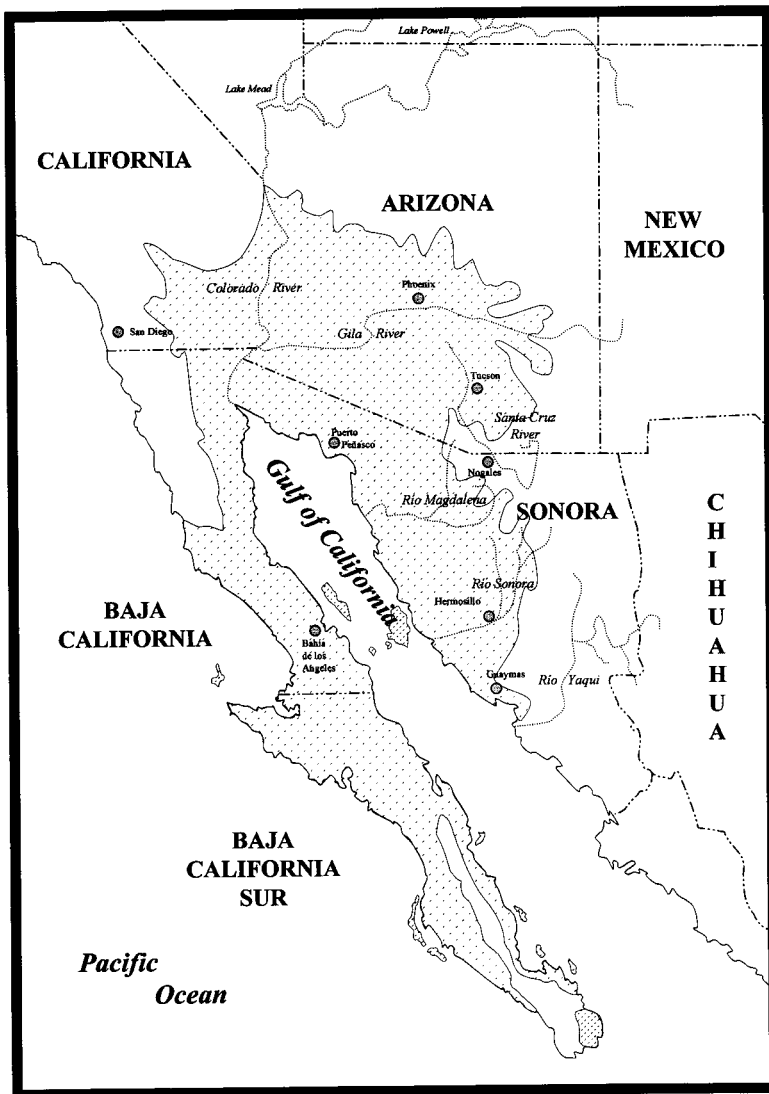
## Major North American Deserts

-  Great Basin Desert
-  Mojave Desert
-  Sonoran Desert
-  Chihuahuan Desert

### **What Is A Desert?**

All deserts share a common factor – they are dry! Little rain falls in the desert, often less than 10 inches per year. The rain that does fall may come in sudden large bursts from a violent desert thunderstorm. Much of this water runs off the soil into washes or evaporates before it has a chance to soak into the ground. This leaves little water for plants and animals.

Other characteristics of deserts include windy conditions, intense sunlight, unpredictable and changing amounts of annual rainfall, and great differences between day and night temperatures (days may be hot, but nights may be much cooler).



## The Sonoran Desert

The Sonoran Desert, for the most part, is a low, hot desert. Parts of this desert get less than 3 inches of rain a year! Winters are mild and summers are hot. Summertime temperatures may reach 120°F. Tucson and the area surrounding the Arizona-Sonora Desert Museum get an average of 11.4 inches of precipitation per year. Rainy seasons vary throughout the desert, but in our area, the rainy seasons usually come twice a year, in the late summer and winter.

The Sonoran Desert is quite lush when compared to other deserts of the world. It contains over 2,000 different species of flowering plants alone. *Columnar* cacti (such as saguaro and organ pipe) and *legume* trees (such as mesquite, palo verde, acacia) visually dominate the landscape.

*The Arizona-Sonora Desert Museum displays only the plants and animals of the Sonoran Desert Region. This region includes the desert itself and the non-desert communities found next to – or within -- the desert. These other communities include riparian corridors (lush areas along streams), pine-topped mountain islands, and desert grasslands.*

## **ADAPTATIONS: THE NAME OF THE GAME!**

There are many different kinds of plants and animals in the Sonoran Desert. Did you ever wonder how this could be so, considering this is a desert? Life thrives here because organisms are **adapted** to this environment. They have ways of surviving the lack of

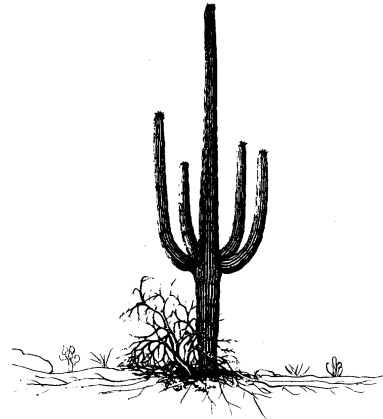
water and hot summer days. Many are so well adapted to the desert that they could not survive anywhere else!

## DESERT PLANTS

Imagine yourself stuck in one place in the middle of the desert, unable to move. You have to make your own food, drink water, protect yourself from the heat of the summer and cold of the winter, deal with **drought**, and avoid becoming someone's lunch; all without moving an inch! If you can imagine all that, you can begin to understand what it's like to be a desert plant. It seems rough, because we are not well adapted to desert life. However, desert plants have evolved many adaptations that help them thrive here.

### Special Roots

Desert plants have special root systems. Most cacti have huge masses of shallow, wide-spreading roots that can soak up large amounts of water very quickly. In contrast, mesquite, blue palo verde and ironwood trees have very deep roots that may tap into water deep under the ground.



### Special Leaves and Stems

All plants lose water from their leaf and stem surfaces to the air. This process is called **transpiration**. Transpiration occurs mainly through a plant's stomates. Stomates are tiny openings in the "skin" of a plant similar to the pores on your skin. The stomates of desert plants have the following special adaptations to cut down on water loss:

- The stomates of desert plants are smaller, and there are less of them than in non-desert plants;
- in many cacti the stomates lie deep in the plant's tissue; and
- many desert plants open their stomates only at night, since there is less water loss when it is cooler.

**Smaller Leaves:** Less water evaporates from smaller leaves than from larger leaves due to the reduced surface area. Therefore, many desert plants have evolved smaller leaves. Some plants, such as the ocotillo and palo verde, drop their leaves during times of drought to further reduce water loss.

**Succulence:** Plants, such as cacti and agaves, soak up water when it is available and store it in the juicy tissues of their leaves or stems. These plants are called *succulents*. They survive periods of drought by using this stored water. Some plants like the saguaro and barrel cactus have pleats or folds that enable them to expand as they take up water and to contract as the stored water is used up.

### Special Seeds That "Sleep"

Most desert wildflowers have developed another strategy -- they avoid the drought altogether. During dry periods they exist as seeds in the soil. These periods may last for years! When the right amount of rain soaks into the soil and the temperatures are just right, these seeds sprout. The young plants grow very fast, bloom, make seeds, then die. This cycle repeats itself over and over in the desert.

*When you visit the Museum, be sure to take a close look at all the fascinating desert plants and identify their adaptations. Pay special attention to the signs in the Cactus Garden. A wildflower exhibit is housed in the Reptile and Invertebrates building. The Pollination Gardens highlight plant/animal interactions and interpret ways plants have evolved to attract pollinators.*

## **ANIMALS**

Like plants, desert animals have plenty of adaptations that help them deal with scarce water supplies and high temperatures.

### **Surviving the Heat**

**Nocturnal** living is the most common heat avoidance method used by desert animals during the hot summers. The desert comes to life at night! Kangaroo rats are out looking for seeds, great-horned owls are actively looking for rats and other rodents, banded geckos (lizards) are hunting for insects, kit foxes are searching for prey, and many more animals are moving about. During the hot days, these desert animals are asleep in cool hidden places such as underground burrows, rock crevices, or cactus holes.

Some animals remain active during parts of the hot day. They have other adaptations to deal with the heat. Have you ever noticed the long ears of a jackrabbit? These ears are thin and full of blood vessels. Extra body heat passes from the rabbit's blood, through its thin ears into the surrounding air, helping to cool it. Have you ever seen a lizard stand with its body raised high above the soil? Since soil temperatures can be 40°F warmer than the surrounding air, this behavioral adaptation helps keep the lizard cooler.

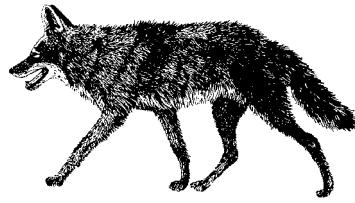
### **Surviving the Drought**

Some desert animals are able to get all the water they need from the food they eat. Pack rats eat cactus and other "juicy" plants that contain a lot of water. Kangaroo rats are the kings of water conservation! They don't have to drink water or eat juicy plants. Instead the kangaroo rat's special digestive system is able to get enough water from the seeds they eat for them to survive.



*kangaroo rat*

Large desert mammals such as coyotes, bobcats and foxes need to drink water. Although they do get moisture from the bodies of the mice and other small animals they eat, this is not enough. They are usually within a day's traveling distance from a water source.



coyote



One of the most dramatic examples of desert adaptation is found in the Couch's spadefoot. For most of the year this small amphibian lies hidden beneath the surface of the desert. When the summer rains begin, the vibrations of the falling raindrops wake the spadefoot. It digs to the surface and begins to search for a rainpool and a mate. Time is short. Eggs must develop into tadpoles and the tadpoles must develop into toadlets before the rainpool dries up. The entire process can take place in as few as 10 days! The young toadlets leave the pool to dig

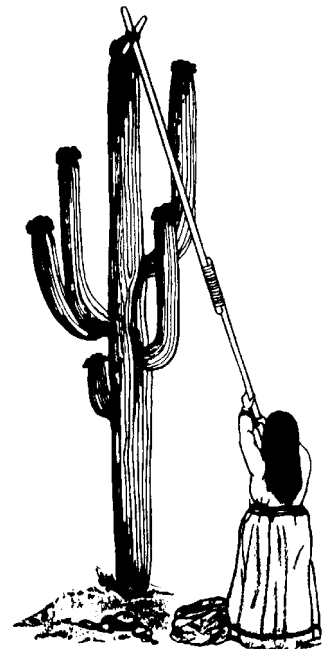
their own burrows and wait through the fall, winter, *Couch's spadefoot* and spring until the next season of summer rains.

*When you visit the Museum you may see more than 300 Sonoran Desert animal species! You'll get a close up view of mountain lions, Gila monsters, tarantulas, bighorn sheep, western diamondback rattlesnakes, Harris' Hawks, and more. Have you ever wanted to peek at a kit fox inside its burrow? You can do this at the Life Underground exhibit. Test your observation skills by searching for camouflaged lizards in the Reptiles and Invertebrates building and Reptile enclosures. As you tour the Desert Loop Trail, you will observe javelina and coyote behind nearly invisible fencing; try to answer the questions on the pop-up signs. And don't forget to find the animals that live in Arizona's riparian areas at the Fish and Amphibian and Riparian Corridor exhibits.*

## PEOPLE

Different groups of people have lived in the desert for thousands of years. The Hohokam culture is thought to have emerged from the desert sometime before 300 B.C. The Hohokam built villages along rivers where they raised corn, squash, beans and cotton. They gathered much food from the desert including cactus fruit and mesquite pods, and hunted many desert animals.

The Tohono O'odham (Papago), Hia ced O'odham (Sand Papago), and Akimel O'odham (Pima) have lived in the Sonoran Desert for hundreds of years. In the past, they gathered all their food, medicine and water from the desert. Today, many tribal elders still know which plants are good to eat and good for



medicine. Some O'odham still use traditional methods to grow desert-adapted crops, including squash, tepary beans, dipper gourds, corn, watermelon, and devil's claw. Basket weavers still gather beargrass, yucca and other plants to weave baskets.

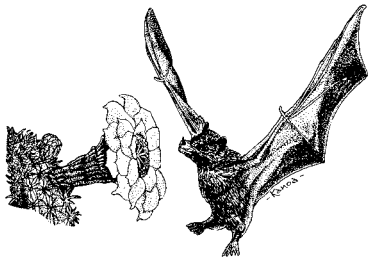
The Seri Indians currently live in two villages by the Gulf of California in Sonora, Mexico. They are a fisher-gatherer people, traveling between seasonal camps during different times of the year. Tribal fishermen have an extensive knowledge of the animals and plants of the sea. Women still gather some food from the desert. Like O'odham baskets, Seri baskets made from local plants are valued world-wide.

For thousands of years, many other tribal groups have lived and traveled through the Sonoran Desert, and many still live here today. Many tribal members still visit sacred Sonoran Desert sites and important resource gathering areas as their ancestors had done for hundreds, perhaps thousands, of years.

*Throughout the Museum, you can rest under traditional shade ramadas, built from desert plants. You can find more information on Desert People in the [Earth Sciences Cave](#), [Hohokam Agave Field](#), [Mammoth Kill-site](#), and from various docent interpretations.*

## ***PROTECTING THE SONORAN DESERT***

The Sonoran Desert region is home to many native plant and animal species. Some, like the desert pupfish and giant saguaro are not found anywhere else on earth! Most species of Sonoran Desert plants and animals are protected or regulated by law.



*Lesser long-nosed bat (Endangered)*

The federal Endangered Species Act was written to protect America's wildlife. When the population of a species begins to drop a lot, the species may be listed as a **Threatened Species**. If its numbers become so low that it is in danger of becoming extinct, it will be listed as an **Endangered Species**. Threatened and Endangered species are protected by this law.

Sonoran Desert plants are also protected by the Native Plants Act. In most cases, it is against the law to remove native plants, including their flowers, fruits and seeds, from the desert. It is even illegal to take dead cactus skeletons from the desert.

One of the major reasons why animals and plants become Threatened, Endangered and extinct is because the areas in which they live are destroyed or changed. This is called

**habitat** destruction. Habitat destruction occurs as more wilderness is turned into cities, housing developments, ranches, or mines, and as people drive off-road vehicles through the undeveloped desert. As groundwater is pumped out of the ground for drinking water, streams and water holes become dry. Fish, amphibians, and other animals that depend on these wet areas lose their habitat and may disappear.

*Desert pupfish  
(Endangered)*

Pima County planners are trying to come up with better development plans for new houses and shopping areas. Part of this Sonoran Desert Conservation Plan includes leaving open spaces for wildlife. Water conservation is an important step we can all take to conserve ground and surface water. When we hike and picnic in the Sonoran Desert Region, we can help plants and animals by not disturbing them or destroying their habitat. Can you think of other ways you can help protect our beautiful desert?

*The Desert Museum has some Threatened and Endangered species on display. When you visit, look for signs identifying these animals. The Museum also has established successful captive breeding programs for some of these species.*

**For more information on the Sonoran Desert and Desert Museum, visit our web site: [www.desertmuseum.org](http://www.desertmuseum.org).**

## REVIEW QUESTIONS

1. In which countries can the Sonoran Desert be found? In which states?
2. Describe the characteristics of a desert climate.
3. Would you expect to see giraffes at the Desert Museum? Why?
4. What non-desert communities can be found within or near the Sonoran Desert?
5. True or False. The desert is a harsh place for plants and animals to live. Explain your answer.
6. How do some desert plants conserve moisture?
7. How does a barrel cactus survive periods of drought?
8. After a dry winter rainy season, would you expect to see many wildflowers? Why?
9. How does a shallow root system benefit some cacti?
10. Why are kangaroo rats the “kings of water conservation”?
11. Describe 2 adaptations that animals use to deal with heat. Give an example of an animal that demonstrates each adaptation.
12. Describe 2 adaptations that animals use to deal with drought. Give an example of an animal that demonstrates each adaptation.
13. Explain some reasons why some species of native plants and animals are Threatened or Endangered in the Sonoran Desert Region.
14. What is being done to protect native plants and animals? What can you do to help?

### Extension Activities

1. Invent a well-adapted desert animal. Diagram your animal and describe its adaptations to life in the Sonoran Desert.
2. Invent a well-adapted desert plant. Diagram your plant and describe its adaptations to life in the Sonoran Desert. Be sure to consider roots, stems, leaves, flowers and seeds.
3. Today we can go to the grocery store, mall, hardware store and doctor's office to meet our needs for food, clothing, shelter, and medicine. How did Native Desert People meet their needs 250 years ago?
4. Pretend you are a city planner in the Sonoran Desert. Design a new city taking into consideration the needs of native plants and animals as well as people.

### GLOSSARY

**Adaptation:** A body part or behavior of an animal or plant that helps it live in its environment. *Example:* An eagle has sharp claws that help it grab prey.

**Amphibian:** An animal that needs to keep its skin wet and lay its eggs in water. Frogs, toads, and salamanders are amphibians.

**Arthropod:** The largest group of animals who all have an exoskeleton (hard outer covering), jointed legs and many body sections. Examples include insects, spiders, scorpions, and centipedes.

**Camouflage:** An animal's color patterns that help it blend in with the plants or rocks around it.

**Carnivore:** An animal that eats only meat.

**Decomposer:** Living things that break down dead plants or animals returning the nutrients to the soil. *Examples:* termites, bacteria, millipedes, and fungus.

**Diurnal:** Active during the day.

**Drought:** A long period of time without rain or snow.

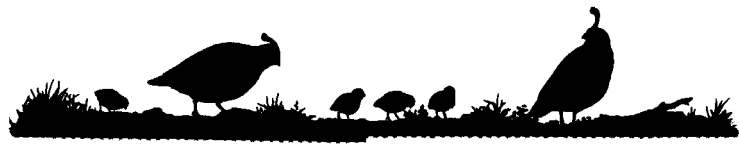
**Endangered:** An animal or plant that is so rare it may become extinct.

**Food Chain:** A group of animals and plants in a community through which energy flows in the form of food.

**Habitat:** An area in which a plant or animal naturally lives that provides food, water, shelter and space.

**Herbivore:** An animal that eats only plants.

**Hibernate:** To live through the winter in a sleep-like state.



**Metamorphosis:** The change of an animal from young to full-grown adult in which the young is very different from the adult. *Example:* A butterfly hatches into a caterpillar (young,) then changes into a butterfly (adult.)

**Niche:** The "role" or "job" of an animal or plant within its habitat.

**Nocturnal:** Active at night.

**Omnivore:** An animal that eats both plants and animals.



**Pollination:** The movement of pollen from the male to the female part of a flower of the same species. This is often done by a pollinator including bees, moths, and some birds and bats.

**Population:** A number of a group of animals or plants of the same kind.

**Predator:** An animal that kills other animals for food. (*Try not to think of a predator as the enemy of the prey. A predator is simply getting its food in the way in which it is best adapted.*)

**Prey:** An animal that is hunted for food by a predator. *Example:* a kangaroo rat may become prey for a coyote.

**Scavenger:** An animal that eats the parts of dead animals.

**Species:** A group of plants or animals that are very nearly alike and are able to breed with each other. (For example, a fox and a coyote are similar, but they cannot breed with each other. A fox is one species and a coyote is another.)

**Succulence:** Having thick leaves or stems to store water.

**Threatened:** A species of plants or animals whose population is dropping quite a bit.