

THE SONORAN DESERT

Background Information

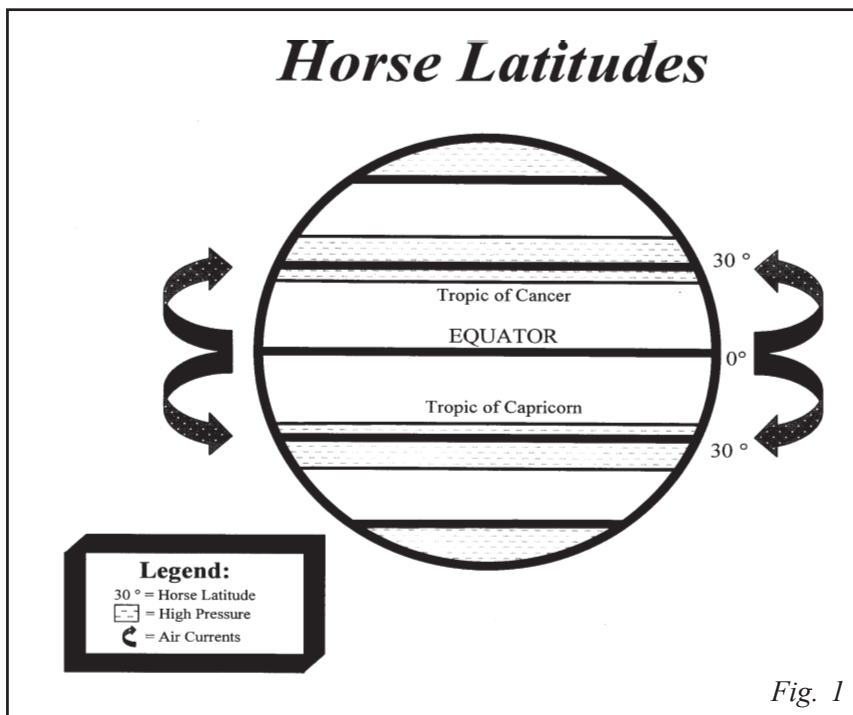
What Is A Desert?

We often hear of the desert as being a “harsh environment” where plant and animal life must “struggle to survive.” To humans, the desert heat and drought do appear to be harsh, and desert life does seem to be a struggle. However, desert species are adapted to desert conditions. Thousands of organisms thrive here. If the desert environment were hostile to life, life here would not exist.

The common denominator of all deserts is a lack of usable water. Availability of water is modified by seasonal and yearly fluctuations in length and intensity of rains, rate of evaporation, and the nature of the soil. What truly characterizes a desert is not how much annual rainfall is received, but the ratio of precipitation to evapotranspiration. Evapotranspiration is the process by which water is lost from the earth’s surface via evaporation of free-standing water and transpiration (the release of water vapor) through plants. In a desert, precipitation is much less than potential evapotranspiration. Other characteristics of deserts include intense sunlight, unpredictable and varying amounts of annual rainfall, windy conditions, and great variations between day and night temperatures.

What keeps precipitation away? The air currents passing over the land must be either dry or unable to release their moisture. Vertical motion of the air currents influences the amount of precipitation. As air moves downward it becomes warmer and drier, interfering with potential rain; as air rises it becomes cooler and the moisture it contains condenses, resulting in rain.

The world’s deserts are categorized into two main classifications based on the conditions that create them: horse latitude deserts and rain shadow deserts.



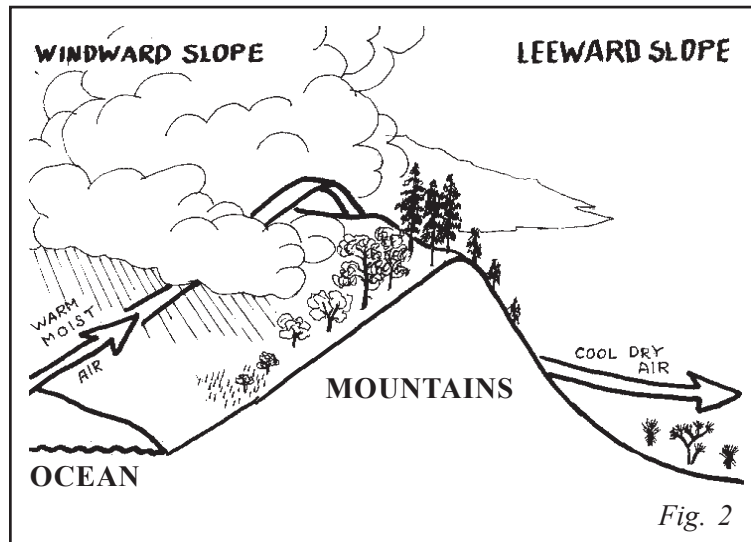
Horse Latitude or High Pressure Zone.

At 30 degrees latitude in both the northern and southern hemispheres, the west coasts of all continents have deserts. These are caused by high pressure zones which result from warm, dry descending air (fig. 1). This downward motion of dry air prevents precipitation.

Rain Shadow or Orographic Effect.

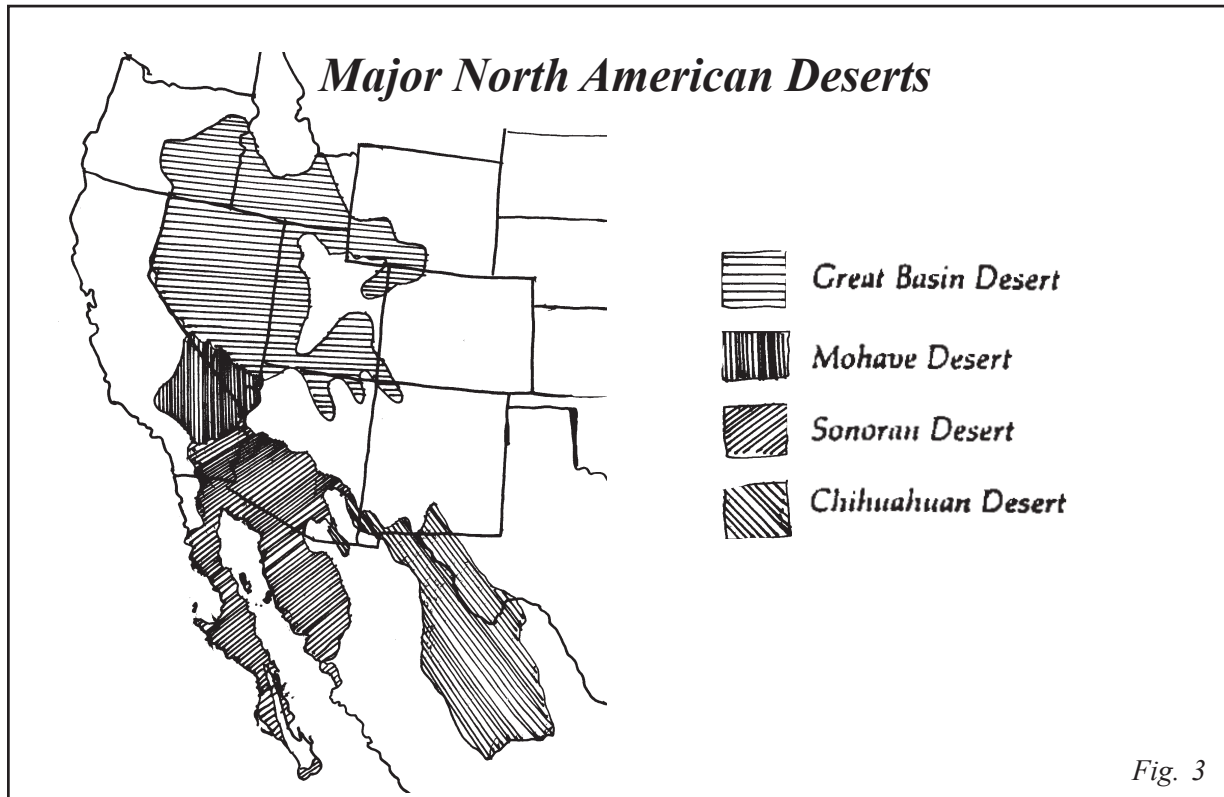
Moist air crossing a land mass loses its moisture while passing over mountains (fig. 2). As this air moves upward, it cools and the moisture it contains condenses dropping precipitation on the windward slope. The air is dry by the time it reaches the leeward side resulting in desert conditions.

The Sonoran Desert is a combination of a rain shadow desert in the northern limits and horse latitude desert at 30 degrees.



The North American Deserts

The North American Desert system consists of some 440,000 square miles in the western United States and northern Mexico. It is composed of four deserts that differ somewhat in climate and vegetation. Arizona is the only state in both countries in which all four can be found (fig. 3).





Sonoran Desert – The Sonoran Desert covers approximately 100,000 square miles and most of it is a low, hot desert with an elevation ranging from 3,500 feet to below sea level (fig. 4). Winters are mild and summers are hot. Precipitation varies in different regions, ranging from 1- 14 inches (2.5- 36 cm). Rainy seasons also vary; the eastern section receives summer rains, the northwestern portion receives winter rains, and the northeastern portion receives bi-seasonal rainfall (both in the late summer and winter).

The Sonoran Desert is quite lush when compared to most other deserts of the world. Its vegetation is visually dominated by columnar cacti (saguaro and organ pipe) and legume trees (mesquite, palo verde, acacia, etc.). The Sonoran Desert is diverse, containing more than 2,000 species of flowering plants alone.

The Sonoran Desert has been divided into six subdivisions, based primarily on vegetation differences. *Information on these subdivisions can be found in the Orientation area at the Desert Museum (see enclosed Desert Museum map.)*

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 adjacent to or within the desert. These other communities include riparian corridors (lush areas along streams), pine-topped mountain islands, and desert grasslands.

Life in the Desert

The Sonoran Desert contains a diversity of plant and animal life adapted to thrive in the desert. An adaptation is any physical, physiological or behavioral trait or characteristic that enables an organism to survive and reproduce in its environment. Desert creatures have evolved a variety of drought- and heat-reducing adaptations. These include heat avoidance, heat reduction, heat tolerance and drought tolerance. Examples of these adaptations exhibited by different groups of animals and plants are described in the activities and student readings that follow.

B. SUGGESTED RESOURCES

(Available at the ASDM Gift Shop)

Arizona-Sonora Desert Museum Press (publications for adults)

- *ASDM BOOK OF ANSWERS* (Answers 42 most commonly asked questions by visitors.) Paperback \$14.95
- *DESERT DOGS: COYOTES, FOXES & WOLVES* Paperback \$4.95
- *DESERT WATERS, FROM ANCIENT AQUIFERS TO MODERN DEMANDS* Paperback \$4.95
- *FIELD GUIDE TO DESERT HOLES* Paperback \$7.50
- *GARDENING FOR POLLINATORS* Brochure \$3.95, Poster \$9.95
- *STRANGERS IN OUR MIDST, THE STARTLING WORLD OF SONORAN DESERT ARTHROPODS* Paperback \$4.95
- *A NATURAL HISTORY OF THE SONORAN DESERT* Soft cover \$24.95, Cloth cover \$55
- *THE SECRET LIVES OF HUMMINGBIRDS* Paperback \$4.95
- *WILD FOODS OF THE SONORAN DESERT* Paperback \$4.95

Children's Books

- Bash, Barbara. *DESERT GIANT*. Paperback \$6.95
- Bash, Barbara. *SHADOWS OF NIGHT: THE HIDDEN WORLD OF THE LITTLE BROWN BAT*. Paperback \$6.95
- Cobb, Vicki. *THIS PLACE IS DRY: ARIZONA'S SONORAN DESERT*. Paperback \$7.95
- Baylor, Byrd. *THE DESERT IS THEIRS*. Paperback \$5.95
- Buchanan, Ken and Debby. *IT RAINED ON THE DESERT TODAY*. Hardcover \$14.95
- Guiberson, Brenda Z. *CACTUS HOTEL*. Paperback \$5.95
- Jablonsky, Alice. *101 QUESTIONS ABOUT DESERT LIFE*. Paperback \$6.95
- Lesser, Carolyn. *STORM ON THE DESERT*. Hardcover \$15.00
- Moreillon, Judi. *SING DOWN THE RAIN*. Hardcover \$14.95
- National Geographic Society. *CREATURES OF THE DESERT WORLD POP-UP*. Hardcover \$16.00
- Retana, Maria Luisa. *THE PIG THAT IS NOT A PIG/EL CERDO QUE NO ES CERDO* (a book about javelinas). Paperback \$6.95
- Retana, Maria Luisa. *BORN INTO THE PACK/NACER EN LA MANADA*. Paperback \$6.95
- Sabin, Louis. *WONDERS OF THE DESERT*. Paperback \$3.50.
- Skramstad. *WILDLIFE SOUTHWEST*. Hardcover \$10.95
- Spencer, Guy J. *A LIVING DESERT*. Paperback \$3.95
- Steiner, Barbara A. *DESERT TRIP*. Hardcover \$16.95
- Storad, Conrad. *SAGUARO CACTUS*. Hardcover \$18.95
- Storad, Conrad. *SCORPIONS*. Hardcover \$18.95
- Stephen, Richard. *DESERTS*. (The Our Planet series). Paperback \$4.95
- Zoehfeld, Kathleen Weidner. *CACTUS CAFE*. Paperback \$5.95

Videos (often available at public libraries or through your school)

- Alejandro's Gift. (*Reading Rainbow*)
- Saguaro, Sentinel of the Desert. (*The Best of Nature*)

C. VOCABULARY LIST

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

Archaeologist: A person who studies past human life by looking at remains like pottery, tools, and homes.

Arthropod: The largest group of animals who all have an exoskeleton, jointed legs and many body sections. A beetle is an arthropod.

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.

Ectothermic: An animal whose body temperature changes with the environment.

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

Evaporation: Water on the ground, on leaves, and other living things changing to gas (vapor) and going into the air.

Exoskeleton: A hard outer covering of beetles and other arthropods.

Extinct: Gone forever.

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

Fossil: Ancient signs or parts of a dead plant or animal left in rock or clay.

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.

Mammal: An animal that makes milk for its babies and has hair, a steady body temperature, and live-born young. A dog is a mammal.

Mano: A hand-held grinding stone.

Metate: A stone base which holds corn and mesquite pods for grinding with a mano.

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.

Paleontologist: A scientist who studies past forms of life by looking at fossils and other things found in rocks.

Petroglyph: Pictures of animals, hunters, and scenes of daily life chipped into rock by people who lived a long time ago.

Pictograph: Paintings on rock or cave walls made by people who lived a long time ago.

Pollination: The process by which pollen is moved from the male parts of one flower to the female parts of another flower of the same kind.

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.

Reptile: Animals that have dry, scaly skin, lay eggs, and are ectothermic. Snakes, lizards, and tortoises are reptiles.

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.)

Succulent: A plant that has thick leaves or stems to store water.

Threatened: A kind of plant or animal whose population is decreasing and may become endangered.

Venomous: An animal that has a poisonous bite or sting.