



# THE MOJAVE AND COLORADO DESERT BIOSPHERE RESERVE

by Bill Truesdell

*Editor's Note: This is the first in a series on the International Biosphere Reserves in the deserts of the United States. Bill Truesdell is the Chief Naturalist for Joshua Tree National Monument.*

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Death Valley! Joshua Tree! Anza-Borrego! Santa Rosa Mountains and Deep Canyon Research Center!

These are some of the reasons that the Mojave and Colorado Deserts Biosphere Reserve was dedicated in March of 1975 by the Director General of UNESCO and the United States' Secretary of State. It includes Death Valley and Joshua Tree National Monuments, Anza-Borrego Desert State Park, the Santa Rosa Mountains Wildlife Management Area and Deep Canyon Research Center. It is a unit of the International Biosphere Reserve System under the United Nations' Program on Man and the Biosphere.

These terms may be new to you, so we'll define them briefly and introduce you to a model Biosphere Reserve. Finally, we'll describe the Mojave and Colorado Desert Biosphere Reserve.

The biosphere is that veneer of the earth's crust, waters and atmosphere that supports life. You are in the biosphere now. The only way you can leave it is to fly into space or drill deep into the earth where no life exists.

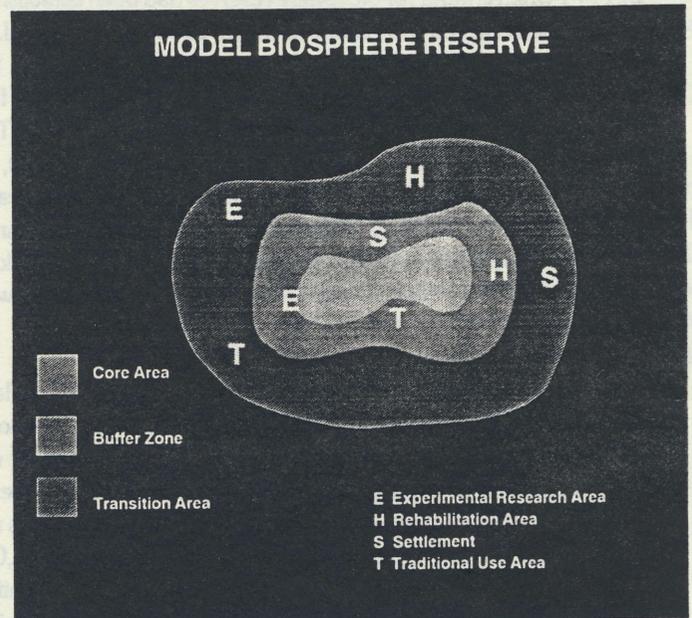
Each biosphere reserve is nominated because it contains a unique portion of the biosphere representing forests, deserts, tundra, grasslands, mountains or river/lake systems. Each "is recognized as part of the international network of biosphere reserves. This network of protected samples of the world's major ecosystem types is devoted to conservation of nature and scientific research in the service of man. It provides a standard against which the effect of man's impact on his environment can be measured."

## WHY WERE BIOSPHERE RESERVES ESTABLISHED?

In the late 1960s, serious world-wide environmental problems were recognized, such as acid rain, pollution of the earth's lakes, rivers and oceans, global warming, deforestations and desertification. It became increasingly evident that it was necessary to reverse these trends, to provide mitigation and rehabilitation and to combine protection of natural resources with continuing use,

production and cultural practices. The Biosphere Reserve program was conceived by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1971 to address the problems on an international basis. The program is organized in each country under the Man and the Biosphere Program (MAB). As of 1987, there were over two hundred reserves in 70 countries including 44 in the United States. Forty other countries involved in the program are considering designating new reserves.

## A MODEL BIOSPHERE RESERVE.



At the center of the reserve is the core zone established to preserve genetic materials and minimally disturbed areas characteristic of that particular terrestrial or coastal/marine region. It contains sufficient habitat for numerous species including predators, or centers of endemism (Galapagos Islands), or high biological diversity (Manu National Park in the Peruvian Andes), or wild progenitors of economic species or areas of interest for observing particu-

lar species, features or processes. A core area has secure legal protection and permits activities which do not adversely effect natural processes and wildlife.

Next is a buffer zone which is managed to protect the core zone and may include settlements, experimental research, rehabilitation areas and traditional land use areas. Buffer zones may coincide with parks, refuges and multiple use areas. Manipulative management practices may be permitted to enhance production and protection while conserving natural processes.

Transition areas typically surround the core and buffer zones and are usually dynamic zones of cooperation where, hopefully, conservation knowledge and management skills are applied and where uses are in harmony with the purpose of that reserve. Such uses include settlements, croplands, forests, recreation and economic uses characteristic of the region thus providing opportunities for interdisciplinary studies to support regional planning for conservation and rural development.

In summary, biosphere reserves are needed to:

- conserve biological resources, especially genetic materials,
- perpetuate and learn from traditional forms of land use,
- learn how natural systems work, and educate others,
- monitor natural and human-caused changes,
- improve management of natural resources,
- share knowledge, and,
- cooperate in solving natural resource problems.

## THE MOJAVE AND COLORADO DESERTS BIOSPHERE RESERVES

In 1971 when criteria for biosphere reserves had been established, UNESCO accepted nominations from all over the world. In California, the Mojave Desert (lying mainly above 3,000 feet elevation) and the Colorado Desert (lying mainly below 3,000 feet) had many worthy candidates. Death Valley and Joshua Tree National Monuments, the Eastern Mojave (now a scenic area), the Kelso Dunes, the Granite Mountains, the Desert Tortoise Research Natural Area, the Western Mojave Research Natural Area, Anza-Borrego Desert State Park, the Santa-Rosa Mountains Wildlife Management Area and Deep Canyon Research Center were nominated.

However, only four core units were chosen; they had the legal protection of Congressional and State legislation: the two monuments; the state park and the research center. They had rich representations of both of the two desert ecosystems, endemic plants and animals, numerous archeological and historic sites and encompassed topography ranging from below sea level to 11,000 feet. They offered boundless opportunities for research, education, interpretation and the protection of species and genetic materials.

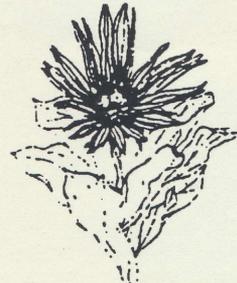
Surrounding these protected areas, buffer zones are available for additional research, education, recreation, interpretation as well as revegetation and rehabilitation projects.

Surrounding these core and buffer zones are thousands of acres of city, county, state and federal lands where often-conflicting and damaging uses occur. However, some sophisticated land use/

mitigation programs have been established to protect vital areas while sustaining the economic benefits of users (Coachella Valley Preserve) and where compatible uses are encouraged (Santa Rosa Mountains National Scenic Area.)

## THE CORE AREAS

DEATH VALLEY NATIONAL MONUMENT was chosen to represent the Mojave Desert ecosystem. The Monument, one and a half times the size of Delaware, is the hottest and driest place in North America, yet its highest peaks, around 11,000 feet, sport snow fields, panamint daisy, juniper, pinyon and other pines. The lowest place in the United States (-282 feet) is in the Valley. The steep escarpments reveal ancient rock formations pushed upward by inexorable pressures in ages past.



Panamint Daisy

Death Valley is anything but dead! It contains a living treasure house of flora and fauna. Some 970 species of plants have been identified within the Monument including some 15 species that are endemic to the Monument and another 21 in the Death Valley Region. Five taxa of fish are found within the Monument including the endangered Devil's Hole pupfish (*Cyprinodon Diaboli*), Reptiles, insects, birds and mammals (predator and prey) occupy distinctive niches and offer research and educational opportunities as well as management challenges. Mining activities have decreased, the 20 Mule Teams have given 'way to trucks, but historic mining sites abound. Hundreds of people descend annually on the Monument to celebrate 49-er days.

JOSHUA TREE NATIONAL MONUMENT was chosen as a core area because two great desert ecosystems come together in the 560,000 acre Monument. These two systems, primarily determined by elevation, illustrate the differences between high deserts and low deserts.



Joshua Tree

Below 3,000 feet, the Colorado Desert in the eastern half of the Monument is dominated by creosote bush. Ocotillo and jumping cholla cactus are also found more abundantly in this lower desert. The higher, slightly cooler Mojave Desert., lying generally above 3,000 feet, is the special habitat of the Joshua Tree. A third ecosystem, the oases, provide dramatic contrast to the arid surroundings. Five fan-palm oases dot the Monument indicating where water occurs naturally at or near the surface. Geological displays include contorted mountains, granite monoliths, arroyos, playas, bajadas, alluvial fans, pediments, desert varnish, granites, aplite and gneiss. Early inhabitants, known as Pinto Man, lived along the slow-moving river in dry Pinto Basin.. Later, Native Americans traveled in tune with the seasons harvesting pinyons, mesquite beans, acorns and cactus fruit. They left rock paintings, ollas and still-discernable trails.

The opportunity for research and education, for contemplation, for interpreting the desert systems and interdependency of their species and the protection of genetic materials is clearly available. The Monument provides Environmental Education programs in neighboring communities, programs which teach about our place in the natural environment.

ANZA-BORREGO DESERT STATE PARK is the third core area of the Mojave and Colorado Desert Biosphere Reserve. It preserves the Colorado, or low desert, with its creosote, ocotillo and various cacti. Over 600 species of plants are found within the Park of which 40 are considered rare or endangered. Birds include 150 species, some of which migrate through the Park or come to spend a season. Animals include the shy bighorn sheep of the Peninsular subspecies, found in the Park, south into Baja California and northeast into the Santa Rosa Mountains.



Fan Palm

Annual sheep counts indicate that the population is dwindling rapidly. Palm oases dot the Park. Evidence of early human occupation is widespread. Fossil records which include large mammoths, indicate a lush, tropical habitat and ancient seas in ages past.

Together with the Santa Rosa Wildlife Management Area, Anza-Borrego Desert State Park offers unparalleled opportunities for research, protection of genetic resources and education.

In the final recommendations to the Man and the Biosphere Directorate, the SANTA ROSA MOUNTAINS WILDLIFE MANAGEMENT AREA was recommended for inclusion in the Mojave and Colorado Desert Biosphere Reserve combined with Anza-Borrego. Operating within this area is the Deep Canyon Research Center.

THE DEEP CANYON RESEARCH CENTER of the University of California, Riverside, is a part of the University's state-wide system. In concert with scientists from Canada, Ohio State and other units



Ocotillo

of the University system, it over-sees dozens of short term projects and many long-term investigations (a minimum of nine years, some many more.) It provides opportunity for scientists to conduct research under strictly controlled conditions. Research at Deep Canyon embraces the concept of biosphere reserves by offering direction and networks for research and monitoring of resources within the core areas of the Mojave and Colorado Deserts biosphere reserve.

#### PRESERVATION OF EXISTING SPECIES

Of specific concern is the need to preserve existing species, especially those which are rare or endangered. The U.S. Fish and Wildlife Service and the California Department of Fish and Game

are mandated to protect these categories state-wide. Within the core areas, the task is easier, though legal protection does not always assure continuity of species.

For example, only a few score of the peninsular big-horn sheep (*Ovis canadensis cremnobates*) are found in the Anza-Borrego Park and adjacent mountains. The Baja California herd has been pretty well isolated from the south end of the Park because Interstate Highway 8 bisects the range between Baja California and the Park thus diminishing exchange of genetic materials. Additionally, the Anza-Borrego herd is subject to diseases transmitted by feral cattle which wander into the Park.

In Death Valley, five types of pupfish occupy widely separated habitats and exhibit different genetic materials though they are descendants of a single Pleistocene ancestor. However, the supersalty, temperature-varying ponds in which they live are jeopardized by water mining inside and outside of the Monument boundaries. This draw-down is especially dangerous for the Devil's Hole endangered pupfish.

Evidence that protection in the core area is effective is found in Joshua Tree where the cactus *Coryphantha Alversonii Vivipari* is thriving, but it is seldom seen outside the Monument. And, in Death Valley, the removal of feral burros is improving the habitat of the native bighorns.

Unfortunately, the threatened desert tortoise occupies large territories in the western Mojave Desert, outside of the Monuments. Though tortoise reserve and natural areas have been designated, they are located in the transitional zone, far beyond the legal protection of the core and buffer zones, and, therefore are subject to direct and indirect impacts. Their numbers are declining and it is possible that they may have to be listed as endangered in the near future.

#### PRESERVATION OF THE NATIVE WAY OF LIFE

Traditional forms of land use and living are practiced in many countries today and are incorporated into biosphere reserves. In the United States, however, such uses and customs are mostly ceremonial. Only a few Native Americans have retained traditional skills and knowledge, fewer still practice them. In the Mojave and Colorado Deserts Biosphere Reserve, native traditions and ways are preserved and studied by archaeologists.

#### RESEARCH PROJECTS

In DEATH VALLEY, research is being carried out on:

- Desert Bighorn Sheep, a five-year study
- Fault lines, tectonics, desert varnish
- Desert pupfish
- Reopening of springs and installation of guzzlers

At JOSHUA TREE, research is centering on:

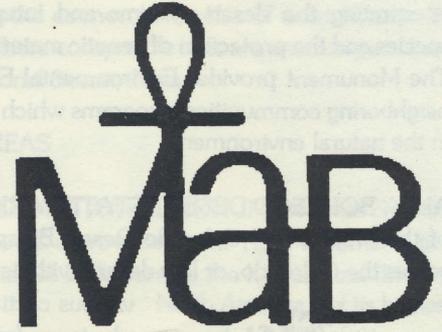
- Air quality monitoring
- Ozone injury to resources
- Biological monitoring plots
- Desert tortoise
- Early Human occupancy

At ANZA-BORREGO DESERT STATE PARK, research is focused on:

- Bighorn sheep
- Palm Oasis revegetation
- Removal of exotic (non-native) plants
- Paleontology and past ecosystems

At DEEP CANYON RESEARCH CENTER, long-term investigations include:

- The social behavior and activity patterns of Kangaroo rats
- The behavioral ecology and communications among grasshoppers
- Interaction between palo verde seed pod production and beetle infestation
- Water use and metabolism of agave and cactus



#### THE FUTURE OF THE MOJAVE AND COLORADO DESERTS BIOSPHERE RESERVE

Death Valley and Joshua Tree National Monuments, Anza-Borrego Desert State Park, the Santa Rosa Mountain Wildlife Management Area and Deep Canyon Research Center will continue as the core and buffer areas where training, education, monitoring and rehabilitation take place.

Here is where long-term, sustainable conservation of species and ecosystems has to take place in cooperation with the local people and agencies. Emphasis is on conservation of genetic material for practical and problem-orientated research, for general environmental education, for specialized training and, more generally, for land-use planning and sustainable resource development within the region.

For more information on biosphere reserves and MAB activities and programs, write:

U.S. MAB Secretariat  
Department of State (10/UCS)  
Washington, D.C. 20520  
or Phone (202) 632-2786

For a 20" x 32" International Biosphere Reserve Map, send \$1.00 to DPC Publications 3750 El Canto Drive Spring Valley, CA 91977. Make checks payable to: Biosphere Reserve Maps.



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