

REBE FERALDI

How does your city compare to the wildland next door?

[Socorro, New Mexico, United States:](#)

Chihuahuan Desert Ecoregion, Deserts & Xeric Shrubland

The Chihuahuan desert is the largest desert ecoregion in North America (i.e., covering over 170,000 square miles or more area than the state of California) and extends nearly 500 miles into Mexico. This area is geographically isolated as it is rain shadow desert bound by two mountain chains—the Sierra Madre Oriental and the Sierra Madre Occidental to the east and west, respectively. Elevations generally vary from ~1500 to 5500 feet above sea level and reach over 12,000 feet at some of its highest peaks. Only 150 years ago, the valley portions formed by the Rio Grande and Pecos rivers were a rich floodplain with tall grasslands on the northern portion. The influx of cattle grazing from the western migration and decades of drought has transformed much of the area to xeric shrubland dominated by creosote and mesquite. However, because the area contains the deposits of ancient seabeds, there are also playas and gypsiferous white sand dunes. Further, volcanoes and uplift over geological time also created the Chihuahuan Montane, which contains woodland forest, the hilly areas of the low mountains and bajadas, and lava malpais. This assortment of habitat types creates rich biological diversity with many endemic species. Because of the abrupt changes in the mountain areas relative to the low desert surroundings, the isolated pockets of moist forest are often referred to as “sky islands” and usually the only areas that receive snowfall. In most of the desert, the annual precipitation average is less than 10 inches, which often arrives all at once during summer (a.k.a. monsoon) thunderstorms. Thus, the main abiotic pressure is long periods of very low water availability. Other abiotic pressures include high summer daytime temperatures (e.g., ~ 95 -104°F), high winds, and colder winters (i.e., relative to the Sonoran and Mojave deserts) with temperatures falling below freezing most winter nights. There are also natural fire disturbances from lightning, usually before the summer monsoons. The short grass steppe consists mainly of creosote, mesquite, agave, and ocotillo, which are indicator species throughout the ecoregion. The Montane regions produce Juniper savannah, pinyon-juniper woodlands, and coniferous forest, while the riparian regions of the Rio-Grand Corridor enjoy more grasslands and large cottonwoods. Endemic species number up to 1,000 (29%) and include succulents (e.g., barrel and prickly pear cactus), insects (e.g., butterflies, harvester ants), scorpions, reptiles (e.g., long-nosed leopard and greater earless lizards, Western diamondback rattlesnake, gopher snake), amphibians (e.g., spade-foot toad), rodents (e.g., prairie dogs), birds (e.g., red-tailed hawks, roadrunners, turkey vultures), and mammals (e.g., kit fox, bobcat, coyote, mule deer, pronghorn sheep, Mexican grey wolf).



Geographic Isolation of the Chihuahuan Desert via Mountain Ranges
Image from Creative Commons via https://en.wikipedia.org/wiki/Sierra_Madre_Occidental

Manage cyclical ecological disturbance:



Socorro, New Mexico lies adjacent to the Rio Grande and is part of the Middle Rio Grande River Basin (MRGRB) and nearby extinct volcanoes. There are several wildlife refuge areas along the river that contain remnants of the Bosque (Spanish: “forest”) cottonwood forests—desert riparian woodlands, shrublands, grasslands, and emergent wetland systems. These systems provide several types of habitats that primarily offer the following ecosystem services around cyclical disturbances:

- Natural periodic flooding, which promotes foliage decomposition and decreased accumulations of fire fuels
- Riparian cottonwood and Goodding’s willow forests and native shrub (e.g., coyote willow, seep willow) and exotic salt cedar, which prevent erosion, mitigate flooding, purify the air and water, and provide habitat to diverse organisms contributing to ecosystem feedbacks
 - Rodents (29 populations threatened)
 - Birds (~28.8 breeding pairs/km²) concentrate in shrub and arroyos and provide dissemination of seeds and production of safe germination sites by nest construction, which concentrates viable grass seeds and forbs (e.g., bush muhly and Lehmann’s lovegrass); then, the materials are re-dispersed when the nest is abandoned
 - Lizard species (~30-50/ha) concentrate in shrubs and consume ants and termites
 - Anurans (i.e., Frogs) concentrate in riparian and low-lands that form temporary wetlands during summer monsoons; they move nutrients from areas of concentration to the surrounding landscape
 - Ants concentrate in shrubs and have granivory effects on plant reproduction, concentrate nutrients and provide soil patchiness
 - Arthropods (e.g., subterranean termites keystone species at 3.6 kg biomass/ha), which have a role in:
 - seed dispersal and fate of seeds
 - decomposition and nutrient cycling and processes (e.g., roots, litter, and dung)
 - formation of patch heterogeneity (i.e., increasing macroporosity of water infiltration) of the landscapes (e.g., water infiltration, organic matter by reducing soil carbon and nitrogen mineralization rates)
 - Microflora and microfauna, which consume and decompose detritus to assist in nutrient cycling

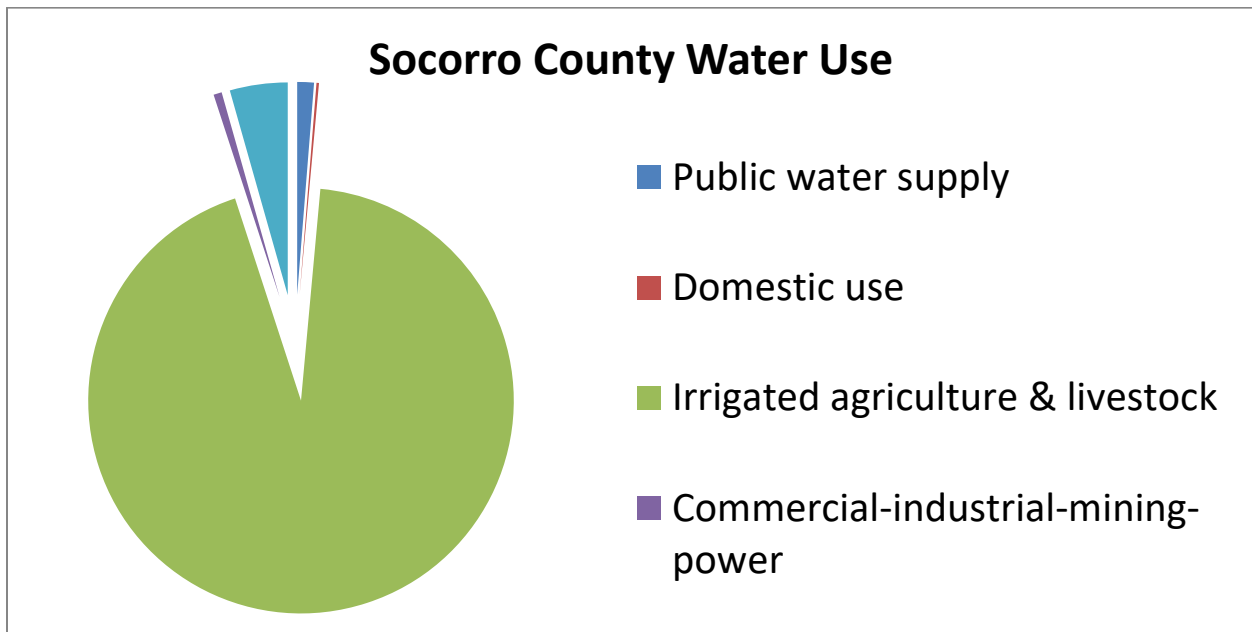
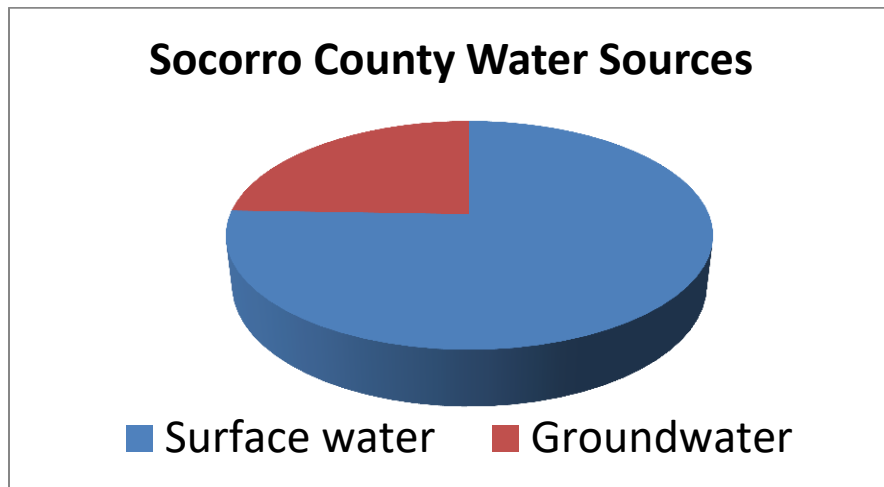
SOCORRO TOWN



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Most significantly, the increase in municipal development and alteration of the natural riparian flow regime has:

- Significantly increased water surface withdrawals and aquifer pumping for agriculture, which has severely decreased the periodic riparian flooding cycle
- Increased riparian fuel loads, and therefore, periodic Bosque fire disturbances, which can destroy above-ground tissue but also releases seeds and breaks down nutrients enriching soil
- Increased impervious surfaces and therefore, precipitation runoff decreasing aquifer recharge



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