

ENVIRONMENTAL IMPACTS IN CUATRO CIENEGAS, COAHUILA, MEXICO:
A COMMENTARY

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ABSTRACT

The Valley of Cuatro Ciénegas, Coahuila, México, and its endemic biota are suffering anthropogenic damages in Poza la Becerra (loss of water, temperature imbalance, species loss), unnamed Poza (loss of water and *Terrapene coahuila* habitat), White Dunes (extraction and destruction), and Ejido Tierra Blanca (irrational development). Increasing needs of the human population threaten to increase losses of endemic species and damages to local ecosystems.

RESUMEN

El valle de Cuatro Ciénegas, Coahuila, México, y su biota endémica están sufriendo daños antropogénicos en Poza la Becerra (pérdida de agua, desequilibrio de temperatura, pérdida de especies), Poza sin nombre (pérdidas de agua y de hábitat de *Terrapene coahuila*), Dunas Blancas (extracción y destrucción), y Ejido Tierra Blanca (desarrollo irracional). El incremento de las necesidades de la población humana amenaza con aumentar las pérdidas de especies endémicas y daños a los ecosistemas locales.

INTRODUCTION.—Numerous papers have been written about environments and biotas of the Valley of Cuatro Ciénegas, Coahuila, México, but no anthropogenic environmental impact studies have been done there, in spite of the fact that numerous detrimental changes in local ecosystems have occurred and been documented between 1959 and 1983.

On my first visit in 1959, the Valley was little developed. There were a few dirt roads to ranches and pozas (springs), sometimes consisting of no more than shallow impressions of wheel tracks. About 1964, local and out-of-state tourism began to develop, with activities such as fishing, swimming, water exploration, and opening of agricultural and cattle settlements. Resultant damages here commented on are only a sample of those recorded.

EXEMPLARY LOCALITIES.—**Poza la Becerra.** A water measuring channel, the first stages of a swimming resort, and a definitive drainage canal to deliver irrigation and industrial water outside the basin (Fig. 1), were built in 1961-64 (Minckley 1969, Taylor 1966). Arroyo la Becerra and its extensive, associated marshes were dried, and has flowed only once (1982) since. Water level in the head-spring was lowered 0.7 m, and changes in flow regime and water level resulted in changes in angle of repose of soft bottom sediments, and slumping occurred from sides toward the center; the bottom rose from its original depth of >8 m to its present depth of <3 m. Water formerly

remained at a temperature of 32-33°C throughout the head-spring; southern parts of the system now frequently drop to 25-26°C, possibly because of changes in flow patterns and surface-to-volume relationships. Diminishing populations of the following species are noticeable: The snails *Mexipyr-gus churinceanus*, *Mexithauma quadripaludium*, and *Nymphophilus minckleyi*, the shrimp *Palaemonetes suttkusi*, the fishes *Astyanax mexicanus*, *Notropis xanthicara*, and *Cichlasoma minckleyi*, and the endemic turtles *Terrapene coahuila*, *Pseudemys scripta taylori*, and *Trionyx ater*.

Unnamed Poza. This small spring and associated marshlands, located just northwest of the extreme northern tip of Sierra de San Marcos, dried during a drought in 1982. The marshy outlet was a refuge for a substantial population of box turtle, *Terrapene coahuila* (Brown 1968, 1974), now locally extirpated.

The White Dunes. Gypsum dunes of the Cuatro Ciénegas basin, with a $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ content >95% (Minckley and Cole 1968), are unique in Mexico, and one of only three such places in North America. Because of their high quality, they have been under exploitation since 1968. At first, extraction was at a low level, but since 1979 is at an industrial scale. Five hectares have been affected, to a depth of 6 m. Figures 3, 5, and 7, are views of consolidated dune heads, wind ripples, and vegetation of dunes prior to being modified, while figures 4, 6, and 8, are at approxi-



Figure 1. Water measuring channel, opened at Poza la Becerra in 1964. Arroyo la Becerra flowed left at more than a meter deep. Cuatro Ciénegas Basin, Coahuila, México. From Ektachrome slide, S. Contreras 10/IX/82.



Figure 2. Water extraction channel south of Poza la Becerra, Cuatro Ciénegas Basin, Coahuila, México, shortly after its construction in 1964. From Ektachrome slide, S. Contreras 15/IX/66.

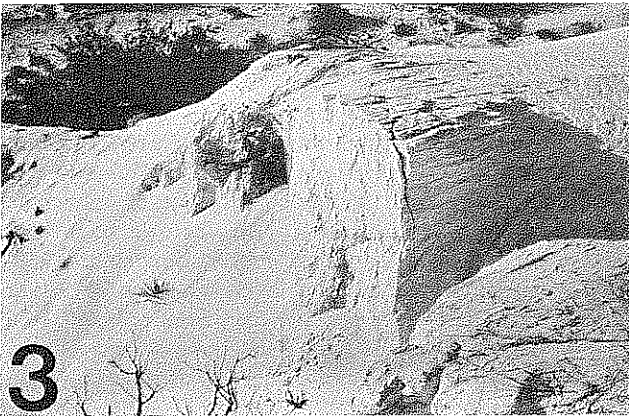


Figure 3. Consolidated gypsum dunes in the Cuatro Ciénegas Basin, Coahuila, México. From Ektachrome slide, S. Contreras 5/IV/71.



Figure 4. Gypsum mounds remaining after extraction of material surrounding consolidated areas in the Cuatro Ciénegas Basin, Coahuila, México. From Ektachrome slide, S. Contreras 30/IX/82.



Figure 5. Gypsum sands rippled by wind over dunes in the Cuatro Ciénegas Basin, Coahuila, México. From Ektachrome slide, S. Contreras 3/IV/77.



Figure 6. Scars left by machinery extracting gypsum sands in the Cuatro Ciénegas Basin, Coahuila, México. From Ektachrome slide, S. Contreras 30/IX/82.

being modified, while figures 4, 6 and 8, are at approximately the same sites after modification. These dunes, and other gypsum deposits of the basin support numerous endemic taxa of plants (Pinkava, this symposium) and an unique scorpion (Williams 1968).

Ejido Tierra Blanca. The Valley floor at a site a few kilometers northwest of the northern tip of Sierra de San Marcos was converted in 1974 to an *ejido* (communal farm), called Tierra Blanca (= white soil) because of the whitish, gypsum-loaded surface layers of soil. The purpose was agricultural development (Fig. 9), but production was essentially nil, and the *ejido* was abandoned totally or partially due to lack of investment returns. Several places around the *ejido* still abound with garbage deposits (Fig. 10).

CONCLUSIONS.—Exploitation of waters of Cuatro Ciénegas for expanding industry in northern Coahuila is on-going. In addition, with increases in population of the Cuatro Ciénegas region, needs for space, water, soil, and land also have increased. The Valley has been the only available area because of roughness and aridity of surrounding terrain, and in spite of high soil and water salinities that result in low crop and cattle growing potentials. If the trend of attempted exploitation of the valley floor continues with a lack of protective steps, strong risk exists that species will be lost through irreversible damage to local ecosystems.

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Figure 7. Unusual scenery: yuccas growing on top of an undamaged gypsum dune in the Cuatro Ciénegas Basin, Coahuila, México.



Figure 8. Scars on mounds crowned by a mezquite, accidentally left after gypsum extraction on dunes in the Cuatro Ciénegas Basin, Coahuila, México. From Ektachrome slide, S. Contreras 30/IX/82.

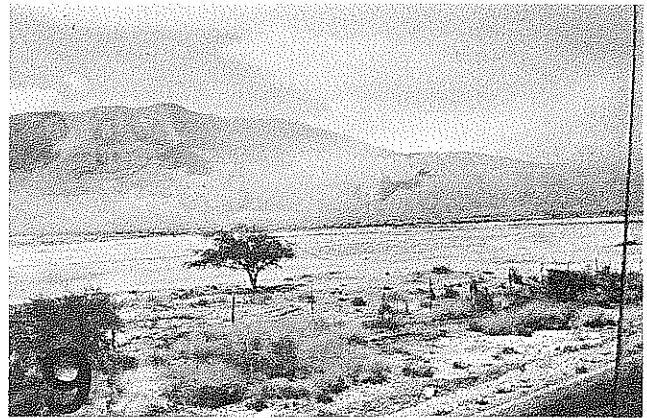


Figure 9. View of the central part of Ejido Tierra Blanca in 1975; its production was nil. Cuatro Ciénegas Basin, Coahuila, México. From Ektachrome slide, S. Contreras 23/VIII/75.

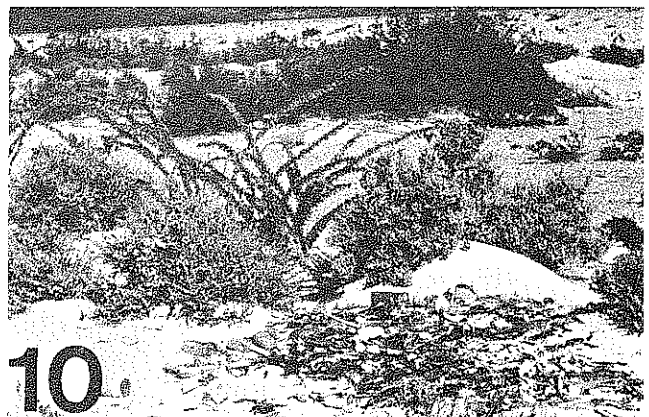


Figure 10. Trash site on gypsum dunes in the Cuatro Ciénegas Basin, Coahuila, México. From Ektachrome slide, S. Contreras 30/IX/82.

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