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Adjacent U.S.-Mexican Border Natural Protected Areas: Protection, Management, and Cooperation

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ABSTRACT

A number of adjacent parks and adjacent natural protected areas exist along the U.S.-Mexican border. They serve as models that other sections of the U.S.-Mexican border can use and they serve as testing grounds for binational, collaborative management. The vehicle for a discussion of their binational management is the two cooperation pilot programs for binational natural protected areas. A 1997 Letter of Intent between the U.S. Department of the Interior and Secretaría de Medio Ambiente y Recursos Naturales established these pilot programs. This chapter briefly describes the set of natural protected areas in these pilot programs and it describes the U.S. federal policies for natural protected areas management. It then delineates the extant binational cooperation on adjacent natural protected areas. The chapter closes with a focus on the barriers and opportunities for further cooperative efforts regarding those parks. The result of the analysis indicates there is a remarkable amount of

local cooperation at the present time, as well as significant opportunities for more cooperation, including cooperation at higher levels. However, many, and in some cases large, obstacles still remain.

Zonas Naturales Protegidas Adyacentes a la Frontera Estados Unidos -México: Protección, Manejo y Cooperación

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RESUMEN

Existen varios parques y otras zonas naturales protegidas adyacentes a lo largo de la frontera entre Estados Unidos y México. Se utilizan como modelos que pueden aprovechar otras secciones de la frontera entre Estados Unidos y México y estas zonas también se aprovechan para poner a prueba el manejo a nivel de cooperación binacional. El medio para la deliberación sobre su manejo binacional se integra de dos programas piloto de cooperación de zonas naturales protegidas binacionales establecidos en la Carta de Intención de 1997 entre el Departamento del Interior y la Secretaría del Medio Ambiente y Recursos Naturales. Este documento presente una breve descripción el establecimiento de zonas naturales protegidas en estos programas piloto, así como las políticas federales de los Estados Unidos relacionadas con el manejo de zonas naturales protegidas. Luego, se describe la cooperación binacional existente en las zonas naturales protegidas adyacentes. El documento culmina con un enfoque sobre las barreras y oportunidades de los esfuerzos cooperativos futuros con respecto a esos parques. El resultado del análisis indica que, en la actualidad, hay una gran cantidad de cooperación, además de oportunidades significativas para establecer más cooperación; sin embargo, aún existen muchos obstáculos.

INTRODUCTION

Mexico and the United States have well-developed policies regarding protected natural areas, particularly in their national parks and other officially designated natural sites. The policymaking in this sphere of government has not always been coordinated at the binational, national, or state levels. Often, different government agencies have developed components of such policies; however, because of limited mandates or internally conflicted mandates, they could not always define a comprehensive vision of protection for natural areas. That said, there have been some government inter-agency coordination initiatives within and between the national governments of the U.S. and Mexico. For example, as a manifestation of a binational shared concern, information and expertise on protected natural areas have been shared for mutual benefit.

The United States, and to a lesser extent Mexico, has also been developing policies and programs for cooperative management with local and aboriginal communities. Such tribal issues are of critical importance in the United States because tribal governments are the primary managers of tribal trust land and tribal natural and cultural resources that are located both on and off current reservations. Also, all federal agencies and departments, including the National Park Service (NPS), The U.S. Department of Agriculture Forest Service, the Bureau of Land Management (BLM), and the Fish and Wildlife Service (FWS), must consult with tribes on a government-to-government basis before they can take any action that affects tribal members, lands, or other resources. To further complicate matters, there has been a strong conflict between some states and the federal government in the United States over the regulation of federal natural areas that fall within these states' boundaries.

Needless to say, there is a tremendous opportunity for more binational cooperation related to adjacent protected natural areas. Because Mexico and the United States have many ecosystems that cross their shared border, there is a need for a broader perspective on protected natural areas, or at least binational principles and goals. Once such principles are established, there is a need for coor-

dination and implementation at the national level, because protected-area management cuts across departments. From an ecosystem point of view, such national-level coordination is needed.

At present, there has been significant environmental degradation in protected natural areas, particularly in the most popular parks. This coincides with the under-funding of protected areas management, a trend toward less government spending, and pressure to generate funds from tourism. Thus, the time is ripe for a new direction that balances economic, social, cultural, and environmental interests without sacrificing the human need for connectedness with nature or the productive and compatible use of land.

Although cooperative relationships have developed locally among border communities, non-governmental organizations (NGOs), and state and federal agencies, efforts have generally been area- or issue-specific and uncoordinated along the east-west border spectrum. Stakeholders along the border have rallied around specific issues and formed coalitions that address border environmental problems, and as such, these coalitions have generally been north-south focused. In the same vein, there have been cases where local management staff from U.S. federal and state authorities have sought cooperation from their southern counterparts, local research organizations, and communities to successfully carry out natural resource protection in designated areas along the border. While traditionally these efforts have been fragmented and specific, in the last decade, agencies within the U.S. and Mexican federal governments have made great strides in coordinating their efforts both along and across the border. These efforts have been supported through a number of agreements, memoranda of understanding (MOU), and letters of intent (LOI) that were signed to address such binational, environmental issues.

In particular, this chapter will highlight the spirit, intent, and effect of the Letter of Intent on Adjacent Protected Areas that the U.S. Department of the Interior (DOI) in the United States and the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) in Mexico¹ signed in 1997. Two pilot areas were named in the LOI—the Western Sonoran Desert region and the Big Bend region of the Chihuahua Desert. Within each region, the LOI also designated adjacent protected areas on either side of the border that share

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similar ecosystems, habitat, and wildlife. The purpose of the LOI was to “expand existing cooperative activities in the conservation of contiguous natural protected areas in the border zone and to consider new opportunities of cooperation in the protection of natural protected areas on the U.S.-Mexico border (DOI 1997).” The LOI was signed during a time of increased interest in the U.S.-Mexican border environment, which resulted from the passage of the North American Free Trade Agreement (NAFTA) and its related side agreements, and which occurred before September 11, 2001. Inevitably, September 11th shifted the type and degree of attention given to U.S. international borders. However, while the political and economic environment has changed considerably in the last seven years, the natural protected areas that lie in the border region are still home to shared ecosystems that are both treasured and threatened. Consequently, a great deal of crossborder activity still exists that can help address natural resource issues along the entire 2,000 mile *frontera*, especially at the local level, as this chapter will reveal.

DESCRIPTION OF PROPERTIES

The border region—the southwest United States and northern Mexico—combines the ecoregions of eastern dry temperate forests, North American deserts, Mediterranean California, temperate sierras, the southernmost part of the Great Plains, and some southern semi-arid highlands. The landscape varies from mountains and grasslands to canyons and deserts. It hosts many impressive United Nations Biosphere Reserves, National Parks, National Monuments, National Wildlife Refuges (NWR), Natural Protected Areas, National Forests, military reservations, state lands, and other public lands, much of it with wilderness status.

As part of the 1997 LOI, two pilot project areas were established. These are made up of eight different protected areas that lie on both sides of the U.S.-Mexican border (Table 1). These areas will be examined throughout this chapter to demonstrate successful cooperative efforts, to point out obstacles that still exist, and to explore opportunities for collaboration in binational protected areas’ management.

Big Bend National Park

The Big Bend National Park is situated on the U.S. side of the border and lies along the Rio Grande as it flows to the northeast and separates the states of Texas on one side and Chihuahua and Coahuila on the other. First authorized in 1935 and established June 12, 1944, the park was designated a biosphere reserve in 1976 under the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Man and the Biosphere Program (MAB). More than 1,200 species of plants, 75 species of mammals, 450 species of birds, 40 species of fish, 56 species of reptiles, and 11 species of amphibians live within the park's 801,000 acres.

Since its founding in 1944, the area included in Big Bend National Park has greatly increased. In 1988, the Texas Parks and Wildlife Department purchased the Big Bend Ranch State Natural Area, which lies adjacent to the national park. This purchase substantially added to the total existing acreage of the protected area. In addition, the Rio Grande Wild and Scenic River lies next to and within the park. This is a more than 300-kilometer (km) long portion of the Rio Grande that extends from the Chihuahua-Coahuila state line in Mexico to the Terrell-Val Verde county line in Texas. In 1978, Congress designated this portion as part of the National Wild and Scenic Rivers System, and although only 110 km of it actually lie within the boundaries of Big Bend, the entire section is administered by the park.

Big Bend National Park also makes up a large portion of the Chihuahuan Desert Biosphere Reserve. The reserve, in addition to Big Bend, contains the Agricultural Research Service's La Jornada Experimental Range in New Mexico and Bolson de Mapimi, located in the Mexican states of Chihuahua, Coahuila, and Durango. Together, these three sites form a regional reserve where natural resource protection, research, and implementation coincide. Under the structure of the Biosphere Reserve System, Big Bend serves as the "core" protected area where national and cultural resources are fully protected. This provides baseline information that results from inventory and monitoring activities. La Jornada serves as the "buffer zone" where research and field application takes place, and Mapimi serves as the "transition area," although it also contains its own core

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and buffer zones. Scientists, policymakers, landowners, and ejidatarios cooperatively manage Mapimi and they involve local residents in the implementation of sustainable practices researched and designed in the core and buffer areas of the reserve.

Cañón de Santa Elena/Maderas del Carmen

The “sister area” that lies adjacent to Big Bend on the Mexican side is actually made up of two areas that, after more than 60 years’ effort, finally attained protected status in the Mexican system in 1994. These areas are the Cañón de Santa Elena and the Maderas del Carmen, which lie within the Chihuahua desert along the northeast border of the state of Chihuahua and within the northwest border of the state of Coahuila, respectively. Both areas were named Flora and Fauna Protected Areas (Área de Protección de Flora y Fauna) on November 7, 1994, and together they constitute nearly 600,000 hectares. Within their desert ecosystem, which harbors many endemic plants and a variety of wildlife, mountainous islands rise 2,400 meters (m) into the sky. Called the Chisos Mountains, these peaks south of the Rio Grande contain an even greater diversity of flora and fauna than those mountains that lie north of the border in Big Bend National Park. Animal life, plant life, and topography are similar on both sides of the border, but because Mexico has a larger amount of higher-elevation acreage, many mammals and birds are found in greater numbers there. These areas also grow large oak, juniper, and pine forests, as well as chaparral vegetation, all of which support a distinct fauna and serve as refuges for animals, such as black bears, mountain lions, and Sierra de Carmen white-tailed deer.

Organ Pipe Cactus National Monument

Organ Pipe Cactus National Monument, named after the large cactus that is characteristic of the Sonoran Desert, is a nearly 150,000-hectare (ha) (330,689-acre) natural preserve in southern Arizona. It lies directly on the U.S.-Mexican border to the northeast of its sister area, El Pinacate y el Gran Desierto de Altar Biosphere Reserve in Mexico. In addition to sharing a 56 km-long border with the state

Table 1. Case Study Areas

Name	Date Established	State	Acres
Pilot Sister Area #1			
Organ Pipe Cactus National Monument	In 1937 named a national monument, then designated a biosphere reserve in 1976	Arizona	330,689
Cabeza Prieta National Wildlife Refuge	Established in 1939 as a wildlife refuge, then added to the wilderness system in 1990	Arizona	860,000
Reserva de la Biosfera El Pinacate y Gran Desierto de Altar	In 1979 set aside as a forest protected zone and wildlife refuge, in 1982 named an ecological reserve, and then designated as a biosphere reserve in 1993	Sonora	1,764,953
Reserva de la Biosfera Alto Golfo de California y Delta del Río Colorado	First recognized in 1955 as a refuge zone, then established as a biosphere reserve on June 15, 1993	Baja California	2,308,847
Imperial National Wildlife Refuge	Designated in 1941	California	25,125
Pilot Sister Area #2			
Big Bend National Park	In 1944 established as a national park, then designated a biosphere reserve in 1976	Texas	801,000
Área de Protección de Flora y Fauna Maderas del Carmen	November 7, 1994	Coahuila	514,701
Área de Protección de Flora y Fauna Cañón de Santa Elena	November 7, 1994	Chihuahua	684,709

Source: Authors

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of Sonora, the monument also shares an approximately 53 km eastern boundary with the Tohono O'odham Nation. This nation encompasses more than 1 million ha (2.8 million acres) of land to the east of Organ Pipe and includes approximately 16,500 tribal members that live throughout its territory (Pearson 1998). Fifty-five species of mammals, 43 species of reptiles, four species of amphibians, and one species of fish exist within the monument. The desert pupfish is endemic to the area, although a related species is believed to live in the Río Sonyata in Mexico—this has given further impetus for cooperative crossborder protection efforts.

Organ Pipe Cactus National Monument is part of the Sonoran Desert, which includes the area from the tip of Baja California north to southeastern California and the southernmost third of Arizona. It is also part of the “Greater Sonoran Desert Protected Ecosystem,” a nearly 3 million ha (6 million acre) area that includes the following regional lands in addition to Organ Pipe: the Tohono O'odham Nation, the Cabeza Prieta National Wildlife Refuge, the Barry M. Goldwater Air Force Range, the Pinacate and Alto Golfo Biosphere Reserves in Mexico, and the Bureau of Land Management Areas of Critical Environmental Concern in the United States (Pearson 1998). Although NPS primarily controls Organ Pipe, the entire area's characterization as one protected ecosystem has benefited cooperative management practices beyond respective area boundaries.

Cabeza Prieta National Wildlife Refuge

Cabeza Prieta National Wildlife Refuge lies in the Sonoran Desert of southwestern Arizona, nestled between the Barry M. Goldwater Air Force Range to the west, the Organ Pipe Cactus National Monument to the east, and Mexico to the south. It is the largest wilderness refuge in the lower 48 states, with 860,000 acres off-limits to development. It was set aside in 1939 largely to protect the desert bighorn sheep and the endangered Sonoran pronghorn, although more than 200 bird species, 40 mammal species, an array of reptiles and amphibians, and more than 420 species of plants populate the area.

Pinacate y el Gran Desierto de Altar Reserva de la Biosfera

The Pinacate is also found in the Sonoran Desert, and it encompasses the area just south of the Cabeza Prieta National Wildlife Refuge in Arizona and just north of the Alto Golfo Biosphere Reserve in the state of Sonora. Long revered as a sacred area by the Tohono O'odham, El Pinacate is made up of two very distinct characteristics. One is the Pinacate lava field that was created by volcanic activity related to Earth's cooling. This portion of the protected area is characterized by hundreds of black cinder cones that haphazardly jut out of the surface, and by two peaks that reach more than 1,000 m (Zakin 1995). The largest sand dune in North America, the Gran Desierto, sits on the other side of the peaks.

By presidential decree, El Pinacate was first recognized as a forest protected zone and wildlife refuge on March 1, 1979. At that time, the protected area consisted of nearly 35,000 ha (70,790 acres). However, by 1993, the Sonoran state government, with the help of local academic institutions, put together a proposal that suggested the possibility that both the Alto Golfo and the Pinacate be made U.N. Biosphere Reserves. This, in conjunction with the efforts of Luis Donaldo Colosio, the head of SEMARNAT, led to the June 10, 1993 declaration of El Pinacate y el Gran Desierto de Altar as a Biosphere Reserve, by presidential decree (Ezcurra 1998). The new designation greatly expanded the coverage of the protected area to its current size of nearly 800,000 ha (1,764,953 acres), which is made up of 36% federal property, 63% ejido land, and 1% private land.

The ecological and cultural values of the Pinacate include more than 200,000 ha of volcanic shield with approximately 700 cinder cones, more than 1 million acres of active sand dunes of various types, prehistoric and cultural sites from the Tohono O'odham culture, 500 species of vascular plants, 41 species of amphibians, and two types of freshwater fish (Pearson 1998). Threats to the area include ecological degradation from illegal roads, drug smuggling activities, the increasing numbers of off-road vehicles, the poaching of plants and animals such as the ironwood tree and the antelope, and thievery of cactus and historical artifacts (Zakin 1995).

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When named as a biosphere reserve, the government of the state of Sonora charged the Ecological Center of Sonora with creating an integrated management program for the area (Rojas-Caldelas 1999). However, the Pinacate is still a federal protected area and the Instituto Nacional de Ecología (INE) manages it within SEMAR-NAT. The resulting management program is a joint work program for an integrated team made up of government agencies, academic institutions, and local nonprofit organizations.

Reserva de la Biosfera Alto Golfo de California y Delta del Río Colorado

The allotment of water rights along the Colorado River has altered the ecosystems of the upper Gulf, which has spurred efforts over the past 45 years to protect this expansive area. The need to design and implement a conservation program in the area was first highlighted in 1955 when the Mexican Office of Fish and Related Industries decreed the Upper Gulf area a Refuge Zone (Alto Golfo 2004). Various decrees were made throughout the following 37 years, often propelled by concerns over the threatened Totoaba and the related harmful fishing practices. By 1992, the Technical Committee for the Preservation of the Vaquita and the Totoaba in the Upper Gulf of California Reserve was established (the Vaquita and the Totoaba are the two most notable threatened species in the area). These events and actions culminated on June 15, 1993, when the expansive delta of the Colorado River and the many surrounding wetlands, estuaries, and desert ecosystems were formally protected as a U.N. Biosphere Reserve.

The reserve covers more than 1 million ha (2,308,847 acres) and is largely made up of sand dunes, halophilic scrub, intertidal mudflats, and estuary ecosystems. The varied ecosystems that fall within the reserve make it distinct. These ecosystems include: desert sand dunes, salt marshes, estuaries, and near shore marine life. This is the third marine reserve in Mexico but the first that contains a large marine area and the participation of two states (Baja California and Sonora) and the federal government. The reserve is significant for its specific geological, biological, and marine qualities. Many endemic species exist there, including the aforementioned Gulf of California

harbor porpoise, or the Vaquita, and the Totoaba, both of which are threatened species. It also serves as a nursery for many marine species, as well as a resting-place for a variety of migratory birds that migrate in large numbers.

Given the reserve's status as a biosphere, it has designated core and buffer areas. The core area occupies more than 200,000 ha (407,005 acres) and the remaining nearly 1 million hectares (1,901,841 acres) are designated as its buffer zone. Thirty-three percent of the area is federal land, 62% is categorized as ejido land, 2% is state owned, and 3% is unaccounted for. Management of the reserve includes a partnership of state agencies, local communities, and academic institutions under the supervision of federal authorities.

Imperial National Wildlife Refuge

The Imperial National Wildlife Refuge, which contains a mere 12,000 ha (25,125 acres) of land, is miniscule when compared to its more than 1 million ha (2,308,847-acre) "sister area" on the gulf to the south. Despite its small size, it is a key connection to the Alto Golfo Biosphere Reserve because it is the southern-most wildlife refuge in a chain of national wildlife refuges along the Colorado River. These refuges—through management at Havasu, Bill Williams, and Cebola—also participate in partnership projects with Imperial NWR and the Alto Golfo Biosphere Reserve. Imperial lies along the Colorado River, approximately 56 km north of Yuma. It is the only protected area named in the pilot project that does not actually lie directly on the U.S.-Mexican border. However, it was included in the LOI to provide a northern connection to the Alto Golfo area, and a large part of its migratory bird population finds temporary residence in both areas. This refuge represents the last non-channelized section of the Lower Colorado River and is characterized by an array of wildlife, primarily: waterfowl, marsh and waterbirds, shorebirds, songbirds, mule deer, and desert bighorn sheep. The U.S. Fish and Wildlife Service manages and maintains the refuge.

U.S.-MEXICAN BORDER ENVIRONMENTAL COOPERATION ON THE NATIONAL LEVEL

Crossborder cooperation between the United States and Mexico has been relatively successful over the last 150 years. Despite significant differences in cultural and economic attributes, the two nations have been able to solve border-related issues and problems fairly amicably. This is due in part to the geographic location of the border region, which lies hundreds of miles away from both respective central governments, which enables a degree of local autonomy. Until the last decade, this distance between the U.S.-Mexican border and both countries' capitals has allowed central policymakers to maintain a sort of peripheral attitude regarding the border region, one that has attached less importance to the region than other regions of each country. However, as industrialization, development, and population have increased along la frontera, so have a plethora of social, political, economic, and environmental issues.

As a result, policymakers in Mexico City and Washington, D.C. have had to take a more active role in governing the binational affairs that pertain to the distant border. Ironically, in creating national policy that is designed to manage the border regions' problems, opportunities have arisen for more local and regional collaboration and cooperation. In fact, the inability of the central governments to adequately manage or even address border issues from afar has led to the formation of a complex network of cooperative efforts among local, state, tribal, and federal officials; various government agencies; NGOs; and communities on both sides of the border.

Most attempts to coordinate natural protected areas along the border before 1983 were unsuccessful (Table 2). In 1983, the federal governments signed what is commonly referred to as the La Paz Agreement, making such issues a concern of both central governments. Since the La Paz Agreement, the pace has quickened in the establishment of binational accords to address border environmental issues, and more specifically, protected areas' management along the U.S.-Mexican border. The signing of NAFTA elevated environmental concern for the border among U.S.-Mexican relations, culminating in the Integrated Border Environment Program, the subsequent

Border XXI Program in 1996, and finally, in the current Border 2012 Program. Border XXI was presented as a comprehensive plan for protecting public health and the environment along the U.S.-Mexican border. Border XXI was a five-year program that ended in 2000 and the current border environmental program, Border 2012, has replaced it.

It was within the Border XXI context that the Letter of Intent to Cooperate on Border Region Protected Areas was signed in May 1997. This LOI, signed by then-Interior Secretary Bruce Babbitt and then-SEMARNAT Secretary Julia Carabias, stated an intent to expand upon the existing activities on the conservation of contiguous protected areas. Moreover, at the time, the LOI named the Border XXI Natural Resource Workgroup the monitoring body for such activities.

The information in Table 2 is by no means an exhaustive list of agreements signed by the United States and Mexico for addressing border issues. In fact, there have been many other accords, memoranda, and agreements that have dealt with specific border-related problems, such as hazardous waste, endangered species trade, solid and residual waste management, and drug enforcement. The agreements shown do, however, provide the framework within which the various states, agencies, communities, and other stakeholders along the border negotiate their strategies and actions. It is also this broad understanding of cooperation between both countries' central governments that has allowed such an extensive network of local binational cooperative relationships to flourish both within and around the various protected areas. Without such a framework, local initiatives would be hindered because legal restrictions would require central government approval for each and every action.

U.S. NATURAL PROTECTED AREAS MANAGEMENT

Because the United States does not have one overriding policy for natural protected areas, no one systematic approach to protected area conservation exists. Responsibility for protected areas' management falls under a number of agencies within DOI, each of which attempts to manage each area or responsibility with respect for the

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area's unique qualities and attributes. Through its agencies, DOI manages nearly 5 million ha (10 million acres) of land within 100 km of the border. NPS, FWS, and BLM are the agencies that are primarily responsible for protected areas. However, other bureaus within DOI also provide services and have other responsibilities within the border region. Thus, responsible agencies include NPS, BLM, FWS, Bureau of Reclamation, Minerals Management Service, U.S. Geological Survey, and Bureau of Indian Affairs (BIA).

These agencies manage 37% of the total land that borders Mexico (Table 3 outlines responsibilities). However, while each of these seven agencies falls under the umbrella of DOI, these agencies' responsibilities, administration and management styles, land use priorities, and cultures differ quite dramatically. Additionally, other federal agencies not under the DOI umbrella, including the Department of State, International Boundary and Water Commission (IBWC), U.S. Department of Agriculture (USDA) through the Forest Service, and the Department of Defense (including its Army Corps of Engineers and its individual services' bases), either control land or are involved in initiatives along the border.

The lack of a national comprehensive ecosystem management plan or umbrella agency has created some problems in promoting cooperative stewardship across respective administrative boundaries within the United States. Subsequently, this has created some obstacles in the coordination of land use planning with Mexico and with the indigenous nations in the area, such as the Tohono O'odham and Cocopah Nations in the Sonoran Desert. On the other hand, if all protected areas were managed the same way—for example, as a park, wildlife refuge, or national forest—the unique qualities of any specific area might not be adequately addressed. For example, the protected areas on the U.S. side that are part of the pilot project established by the 1997 LOI fall under various protected areas status and have varying management agencies. However, coordination among and within the agencies mentioned above, coordination among these agencies and their counterparts in Mexico, and coordination within Mexico's agencies, is critical in adjacent natural protected areas management. Government-level coordination occurs through a number of mechanisms.

Table 2. Federal Binational Agreements Between the United States and Mexico Relevant to Protected Areas' Management

Year	Agreement
1944	Treaty Relating to the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande signed
1966	La Comisión para el Desarrollo Fronterizo y la Amistad (CODEF) established (it dissolved less than one year later)
1983	Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area (the La Paz Agreement) signed
1984	FWS and SEDESOL sign an accord for cooperation in wildlife conservation
1988	Memorandum of Understanding on Cooperation in Management and Protection of National Parks and Other Protected Natural and Cultural Heritage Sites (between FWS and SEDUE)
1992	Release of the Integrated Border Environment Program (IBEP) 1992–1994
1993	U.S. and Mexico agree to conduct a joint field study of Big Bend National Park
1994	“NAFTA environmental side agreement (the North American Agreement on Environmental Cooperation, NAAEC) signed”
1994	Memorandum of Understanding between the U.S. National Park Service and the Instituto Nacional de Ecología (INE) signed
1995	Letter of Intent signed by DOI and SEMARNAT counterpart to work together in protected areas management

Sources: Authors

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Table 2. continued

Year	Agreement
1995	Memorandum of Understanding Concerning Scientific and Technical Cooperation on Biological Data and Information signed
1996	USGS and INEGI sign agreement to cooperatively acquire compatible aerial photography for the entire border region
1996	Border XXI Program (building on IBEP) begins
1996	“Memorandum of Understanding to Establish the Canada/Mexico/United States Committee for Wildlife, Plants and Ecosystem Conservation and Management signed”
1997	Letter of Intent to Cooperate on Border Region Protected Areas signed
May 1997	Memorandum of Understanding between SEMARNAT and U.S. Department of Agriculture (USDA) on forest cooperation signed
June 1999	Wildfire Protection Agreement between SEMARNAT and USDA for the common border signed
June 1999	Joint Declaration made between SEMARNAT and DOI to work jointly in the Upper San Pedro River Basin
May 2000	Memorandum of Understanding between SEMARNAT and DOI to work jointly in environmental protection and conservation signed
May 2000	Agreement made between SEMARNAT and National Park Service on cooperation in management and protection of national parks and other protected natural areas

Sources: Authors

Table 3. Major U.S. Agencies Involved in Management of Natural Protected Areas

Agency	Department	Internet information	Mission	Land	Year Established
Forest Service	Department of Agriculture	http://www.fs.fed.us/	“Recreation, timber harvesting, livestock grazing, fish and wildlife habitat, and wilderness”	100 million hectares (about one-half forested areas)	1905
Bureau of Land Management	Department of the Interior	http://www.blm.gov/	“Recreation, timber harvesting, livestock grazing, fish and wildlife habitat, and wilderness”	130 million hectares (mostly range lands)	1946 (from the combination of the General Land Office [1812] and the Grazing Service [1934])
Fish and Wildlife Service	Department of the Interior	http://www.fws.gov/	“Conservation and protection of fish and wildlife”	40 million hectares	1939
National Park Service	Department of the Interior	http://www.nps.gov	“Preserving, protecting, and interpreting the natural, cultural, and historic lands and resources of the nation”	35 million hectares	1916

Source: Cody 1995

MECHANISMS FOR COOPERATION

In order to promote a more systematic approach to border-related activities, on August 11, 1994, the seven agencies listed above signed an Environmental Charter. This charter recognized the need for a “comprehensive, integrated inter-bureau approach to working cooperatively with Mexican counterparts in the shared responsibility for monitoring, preserving and managing the U.S.-Mexican shared border ecosystems,” according to the DOI website. Before this charter, many of the agencies had been working with Mexico on specific projects for decades. This charter marks the first time, however, that the DOI formed a cohesive unit for the monitoring and coordination of each of the activities of the nine agencies, in order to better use resources among them and to generally work more efficiently to address border environmental problems with Mexico. The first article of the charter formally established the DOI U.S.-Mexico Border Environmental Issues Field Coordinating Committee, which oversees 10 inter-bureau “issue teams” (GNEB 1998). These issue teams have representation from the various agencies that have a relevant interest in each specific issue area. Each team is defined to address a specific problem area or topic, which can range from environmental education to the research and management of shared water resources.

One of the issue teams has as its defined priority U.S.-Mexican “Sister Areas,” and is specifically charged with collaborating with Mexican counterparts in the design and management of protected areas along the border. The DOI bureau agencies that participate in this team are BLM, FWS, BIA, and NPS. These agencies collectively control nearly 5 million ha (10 million acres) of land within 100 km of the border. This issue team is involved in various activities within the three contiguous protected areas examined in this chapter. However, while a number of successful collaborative efforts have occurred in the past, recently the agencies appear to be less focused on multi-partnering (Ness 2004).

The U.S. agencies most involved in land management along the border are NPS, FWS, BLM, and the Forest Service. NPS is the most visible, as it manages five units directly on the border. NPS employees and their Mexican counterparts had been informally working

Transboundary Ecosystem Management

together for many years on protected areas management along the border. However, in 1988, such efforts were formalized with the signing of the MOU. Spurred by the MOU, in 1991, NPS established the United States-Mexico Affairs Office (MEAF) to promote information exchange among all NPS units along the border, as well as to strengthen cooperation with Mexico. MEAF serves as the lead office for the coordination of international conservation projects among NPS, the National Institute of Anthropology and History of the United Mexican States, SEMARNAT, and among other organizations in Mexico and the United States (National Park Service 2004). NPS is the most visible and active agency that engages in collaborative planning with Mexico and it is the only agency of DOI that maintains an office that is dedicated to this purpose. NPS has signed a number of MOUs with Mexico, the most recent of which was an NPS-CONANP (Comisión Nacional de Áreas Naturales Protegidas) Joint Work Plan, which was signed at the Binational Commission meeting in 2002. NPS also signed an MOU in 2000 to extend a crossborder program of technical exchange and cooperation for five years. This program dates back to 1997 (National Park Service 2004).

Nonetheless, while the various U.S. agencies do attempt to coordinate programming that relates to natural protected areas along the border, a confusing mosaic of activities exists among, between, and within various agencies, which makes it difficult to clearly define one overall cooperative strategy. The Good Neighbor Environmental Board (GNEB) was created to present an overall view and to advise the U.S. President and Congress on environmental needs of the border (GNEB 1998). The board is comprised of representatives from appropriate government agencies, from the four border states, and from private and nonprofit organizations. The board meets annually with its Mexican counterpart, Region I of the Mexican National Advisory Council for Sustainable Development, and it submits annual reports to the U.S. government.

The Federal Relationship

While DOI maintains contacts with SEMARNAT, it is DOI's agencies that appear to move the crossborder work forward. The agreements DOI has signed with SEMARNAT provide a framework within which its agencies are free to move about and to conduct their work, but the larger DOI does not micromanage their work. The strongest crossborder institutional bonds appear to exist at the lower agency level among the managers working in the border region. DOI gives a great deal of autonomy to its field offices (Ness 2004) and, in a sense, relies on each of its agencies working on border projects to manage their relationships with Mexico on an agency-to-agency level.

Since signing the LOI in 1997, DOI and SEMARNAT have gone on to sign a number of other border environment-related agreements to further work in adjacent protected areas management. These agreements include declarations to work cooperatively in the Colorado River Delta, the Upper San Pedro River Basin, and in the Rio Grande/Río Bravo. The agreements also include a successful initiative for managing wildfires in the borderlands. All of these declarations of cooperation were signed from 1999 to 2000, highlighting the positive working relationship held by Babbit and Carabias. The strong bond that had been developed between these two leaders should not be underestimated in its ability to foster new cooperative agreements between the two countries (Harris, et al. 2001). Relationship-building plays an integral role in the development of successful crossborder initiatives.

Since 2000, DOI has undoubtedly been working under a new set of constraints than it was when it signed the LOI in 1997. These constraints, along with the change in administrative relationships since 2000, have led to a relative decline in such agreements. The passage of NAFTA was still fairly recent and a great deal of attention was being devoted to the potential affects of increased trade on the binational border environment. This attention translated to funds for the agencies responsible for managing natural resources on the border and to support of and encouragement for further developing crossborder relationships and programs to address environmental woes in the borderlands.

Currently, DOI is operating within a very different context—one overshadowed by national security concerns and terrorist threats. Nationally, this has translated to a shifting of funds away from protected areas management (and many other resource issues) toward initiatives and programs to further secure the borders. This does not necessarily mean that those working along the border have been directed against seeking crossborder solutions to border resource issues, but it does mean that attention is no longer focused on these endeavors. Nonetheless, those land managers working in protected areas management adjacent to the border are continuing their work toward binational collaborative initiatives, albeit without the level of fanfare or resources once received (Ness 2004).

The Trilateral Committee and the U.S.-Mexico Binational Commission

The Canada-Mexico-U.S. Trilateral Committee for Wildlife and Ecosystem Conservation and Management is another federal-level mechanism for communication and cooperation in this arena. This committee was established in 1996 through an MOU, and it works towards the coordination, cooperation, and development of partnerships among the three countries' wildlife agencies. FWS is the United States' main participatory agency in this committee, which functions through a number of working tables. One of those tables is the Wildlife Without Borders-Mexico program, which was developed through FWS and SEMARNAT. This program supports a number of projects related to training, ecosystem management, and information and technology exchange both in the border region and in nature reserves in other areas of Mexico.

The U.S.-Mexico Binational Commission is specific to the U.S.-Mexican relationship. This commission is a mechanism that is maintained through the U.S. Department of State for the high-level discussion of any number of topics that relate to cooperation between the United States and Mexico. The commission meets annually, alternating between Washington, D.C., and Mexico City, and topics discussed vary from year to year. Cabinet officials and agency chiefs from both nations also meet in working groups to deal with

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specific topics (U.S. Department of State 2003). The working group for natural resources typically deals with questions relating to adjacent natural protected areas.

While topics related to national security, immigration, and economic development have dominated discussions at the most recent Binational Commission meetings, the natural resources working group has maintained an ongoing dialogue on resource issues along the border. Some recent actions include a Joint Action Plan, which was signed at the annual meeting in 2002 to encourage exchanges and cooperation among national parks throughout the two countries. Additionally, in 2003, a Wildfire Protection Agreement was signed (U.S. Newswire 2003) and a continued vow of support for the Wildlife Without Borders program was declared. Most recently, at the last meeting of the natural resources working group, participants discussed the potential to give sister parks status to a number of protected areas in the border region (Clark 2004). This was based in part on Interior Secretary Gale Norton's request to name at least one new set of border sister-parks in 2004. Potential sister-park areas include the many areas that are already conducting some level of collaborative work, such as the Saguaro National Park in the United States with the San Pedro Martir Protected Area in Mexico, and the Coronado National Memorial in the United States with El Chico Protected Area in Mexico (Ness 2004).²

Border XXI to Border 2012

From 1996 to 2000, Border XXI provided a framework for the U.S. and Mexican federal entities that were responsible for the border environment to work cooperatively in addressing environmental protection and natural resource management along the U.S.-Mexican border. It did so through the establishment of nine workgroups, the Natural Resources Workgroup being the most relevant for this discussion. At the closing of this five-year program, evaluations and recommendations were made regarding the success of each workgroup and the design and foci of the new program. Overall, those involved agreed that Border XXI was successful in deepening cooperation on border environmental issues as a whole, and that many achievements were made in natural resource management in

the border region.³ The Natural Resource Workgroup served as a positive forum for the many U.S. agencies working on the border to communicate with each other and with their counterparts in Mexico. However, while the workgroup did provide a forum for improved federal agency communication on border environmental issues, it did a less effective job of integrating state, local, and tribal officials into its structure—something that agencies on both sides of the border are still working to improve.

Border 2012 looks significantly different than Border XXI, the most striking difference for this discussion being the absence of any group related to natural resources or natural protected areas. This is primarily because DOI, which is the federal umbrella agency for most U.S. resource management agencies, opted out of mandating the participation of its various agencies in the Border 2012 program. Since DOI agencies are responsible for most of the protected areas on the border, it made it much less likely that Border 2012 could address resource protection issues without those agencies at the table. It should be noted that DOI has encouraged its agencies to participate on a voluntary level, if they have the resources available (Clark 2004). However, DOI maintains its own mechanisms (primarily DOI's U.S. Mexico Border Field Coordinating Committee [FCC] and MEAF) for managing and promoting cross-border initiatives in these areas and in some cases, Border 2012 would be a redundant use of its limited resources (Fege 2004).

CURRENT STATE OF CROSSBORDER COOPERATION

The original purpose of the 1997 LOI was “to empower local land managers from both countries to exchange information and work together (DOI 1997).” This LOI, in concert with the many other such federal agreements, has had a positive effect on protected areas management in the border region, and as a whole, there are more collaborative efforts visible in the pilot areas than in other areas of the border (Clark 2004). However, it is impossible to give credit to any one agreement or agency for the many projects, programs, initiatives, studies, management plans, and collaborative training programs that have been undertaken. Likewise, it is unclear whether the

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success in binational cooperation in the pilot areas is due to the support received through the LOI, or if the LOI named the two pilot areas because of the existing successful crossborder relationships already established.

The agreements in place seem to have encouraged efforts toward:

- Technical data exchange
- Human resource development programs
- Environmental education
- Research regarding invasive plant removal
- Reintroduction of disappearing animal species
- Field trip-type exchanges
- International forums for land managers from the United States and Mexico

Such efforts continue to thrive in the border region, even in the current atmosphere of tighter border control. The U.S. agencies working in this arena appear to access each other as needed, when they must work together to achieve common goals. Each specific program or project will not be listed for the purposes of this chapter, as there are too many to describe here. Overall, crossborder efforts tend to be issue-specific, and they encompass stakeholders from both north and south of the border and usually do not span an east-west spectrum. Instead, they are targeted at a particular location or area along the border.

Chihuahua Desert Pilot Area

This area includes the following five natural protected areas:

- Big Bend National Park in Texas
- Big Bend Ranch State Park in Texas
- Black Gap Wildlife Management Area in Texas
- Maderas del Carmen Flora and Fauna Protected Area in Coahuila
- Cañón Santa Elena Flora and Fauna Protected Area in Chihuahua

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Attempts to collaborate on natural resource protection in these areas date back to 1935, long before the establishment of the protected areas on either side of the border. At the time, the two governments discussed the possible establishment of an International Peace Park. These discussions have resurfaced a number of times over the years. Most recently, the National Parks Conservation Association supported the idea of creating an International Park in a report that highlighted the need for more funding in Big Bend National Park. Establishing such a park goes beyond naming the areas as sister-parks, a status they already enjoy given the 1997 LOI and their willingness to work collaboratively in those areas.

The establishment of an international park would require a more formal agreement, authorized by the Congress of the United States and by Mexico, to jointly manage the adjacent protected areas as one park. This would imply that while recognized, international boundaries would not separate the park in the way they currently do. While efforts are being made by some to encourage Congress to enact legislation to create an international park for the Big Bend/Maderas del Carmen/Cañón Santa Elena adjacent protected areas (LoBello 2004), it appears unlikely that such a designation will occur in the near future. In fact, quite the opposite has occurred, as a number of border entry points within these park areas have been closed since September 11, 2001, further isolating the areas as opposed to integrating them (Davila 2004).

Specific binational activities that relate to species research, wild-fire management, air quality monitoring, invasive plant removal, and training and outreach continue to occur. The “Diablos Firefighting Program” has been particularly lauded as a successful cooperative venture and regular, binational patrols of the Rio Grande have been as recognized and lauded. However, no cohesive cooperation on overall ecosystem protection nor development of collaborative management plans currently exist.

Most recently in the Big Bend area, binational efforts to address issues in the Rio Grande/Río Bravo basin and its tributaries have emerged. A number of efforts are underway among both federal agencies and environmental groups interested in attaining a balance between the competing water demands on this system. In 2000, DOI and SEMARNAT signed a Joint Declaration to work collabora-

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tively to protect the ecology of the river (DOI 2000). This effort, led by IBWC and supported by its Mexican counterpart, Comisión Internacional de Límites y Aguas (CILA), as well as by other agencies, is addressing concerns over declining water quality and quantity, habitat degradation, and development pressures on the river (Spener 2004). However, IBWC has had difficulty responding to the implications of greater water demand on the river (Kelly and Szekely 2004) to balance environmental and human needs, and has been criticized for not truly engaging other stakeholders, such as environmental groups, research institutions, and local landowners, into its processes.

Western Sonoran Desert Pilot Area

This region was also named in the 1997 LOI and includes the following protected areas:

- Organ Pipe Cactus National Monument
- Cabeza Prieta National Wildlife Refuge
- Imperial National Wildlife Refuge
- Special management areas administered by BLM
- Alto Golfo de California y Delta del Río Colorado Biosphere Reserve in Baja California and Sonora
- El Pinacate y Gran Desierto de Altar Biosphere Reserve in Sonora

Binational collaboration in these areas has continued to progress and the positive working relationships that were established both before or as a result of the 1997 LOI have further solidified. The Tohono O'odham Nation continues to be an active partner in general planning activities as well as some specific initiatives, and NGOs, such as the Sonoran Institute, the International Sonoran Desert Alliance, the Arizona-Sonora Desert Museum, The Nature Conservancy, and Pronatura, among others, are active in these protected areas (EPA 2001). Successful collaborative efforts include:

- Flora and fauna surveys on both sides of the border that will help accurately assess populations and migratory routes
- Various species monitoring and vegetation inventory projects
- Geographic information system (GIS) data sharing

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- Land manager training programs and exchanges
- Training programs to enlist local landowners in protection and management of sensitive ecosystems
- Programs aimed at developing opportunities for ecotourism and sustainable income generation
- A great deal of hydrologic, flora, and fauna studies to support riparian habitat restoration of the lower reaches and the upper delta of the Colorado River

Again, the projects are too numerous to be listed here, and in most cases each project has a number of participatory stakeholders involved.

Colorado River Delta

The response to environmental issues in the Colorado River Delta exemplifies how the United States and Mexico have failed to assert common goals for a difficult binational environmental issue, and how other non-governmental stakeholders are working to fill the policy vacuum.

Work in the Colorado River Delta has particularly flourished since the signing of the LOI. Currently, more than 20 nonprofit and academic groups are actively working to restore the delta (Marcos and Cornelius 2004). In addition, Mexican public agencies are working closely with these groups. For example, CONANP continues to provide leadership for the reserve. Additionally, the Sonora Institute for the Environment and the Instituto del Medio Ambiente y el Desarrollo Sustentable (IMADES), which are also actively involved in its management and protection. IBWC-CILA also maintains a Colorado River Delta Workgroup, which has conducted hydrologic studies and restoration feasibility studies (Spener 2004). IBWC and CILA are the appropriate federal agencies to address this issue, but until now they have only attempted to address the environmental symptoms that are caused by the lack of water for the riparian ecosystem. They have not made strides in determining innovative ways to assure water delivery to the delta.

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To a great extent, the health of the delta ecosystem depends on the availability of water that flows down through the final reaches of the Colorado River. Unfortunately, the Upper Basin states' water demands are increasing during the same time the Colorado River Basin is facing a long-term drought, which makes it less likely that surplus flows will be delivered to Mexico and the delta. The Lower Colorado Multiple Species Conservation Program was established to address critical habitat issues along the Colorado River in the United States. The development of this plan has moved forward significantly since 1997 and was projected to be finalized by the end of 2004. This plan, however, does not address habitat south of the border and has been criticized for not integrating Mexican participation into the process. Although, many individuals involved in this process are also involved in restoration efforts in Mexico and all the data derived through this program will be available to Mexico (Harris 2004).

The current efforts of environmental groups and other stakeholders in the delta are remedying the environmental issues that resulted from a lack of proactive and innovative bilateral solutions. However, a consummate solution to the problems facing the delta would ensure a consistent flow of water to the region. Given the highly politicized nature of Colorado River water rights, the United States and Mexico have been unable or unwilling to develop any creative policy to fully remedy the problem. As stated by Cornelius, et al. (2004), "absent affirmative, cooperative political action by the governments of the United States and Mexico, it seems likely that both the quantity and quality of water available to support the Colorado River Delta will continue to decline."

Funding Protected Areas Management in the Border Region

Funding woes have long been an issue in natural resource management along the U.S.-Mexican border. Usually, discussions on this issue refer to the lack of resources on the Mexican side. While there is still a relative lack of human and capital resources for protected areas management in Mexico, some significant gains have been made. Since 1997, Mexico has dedicated larger amounts of federal

funding to Mexico's CONANP and has successfully sought outside funding through such organizations as the Global Environmental Facility and international nonprofit conservation groups (Gonzalez-Montagut 2003). Protected areas are still pressured to generate funds through tourism, to increase stakeholder involvement, and to promote local stewardship to alleviate some of the burden of managing natural protected areas throughout Mexico. However, in recent years, CONANP has made great strides in developing management plans and undertaking ecosystem restoration activities in many of its natural protected areas.

In the United States, agencies responsible for protected areas management have seen funds shift away from resource management areas toward programs and initiatives that are aimed at border defensive strategies. In general, DOI has a growing law enforcement focus, as some of the areas it manages along the border have become increasingly dangerous for its land managers. According to National Park Service staff, this has not negatively affected its partnerships with Mexico, just changed the realities of its daily activities on the U.S. side of the border (Ness 2004).

From a funding perspective as well as to achieve a more holistic approach to environmental management, stakeholders not affiliated with government agencies continue to play an important role in resource management in protected areas on both sides of the border. This includes local landowners, tribal nations, NGOs, and universities and research institutions from both sides of the border and internationally. The agencies responsible for protected areas are working to better include these groups because they bring valuable ideas and resources to the table, and in some cases, own land in or around the protected areas themselves.

CONCLUSIONS

Given their inconsistent, often incongruent legal systems, cultures, and resources, it is difficult to even imagine genuine cooperation between the United States and Mexico on natural protected areas. In the United States, there remains a plethora of agencies with different and sometimes conflicting responsibilities. These agencies are usually under-funded when their conservation mandates are consid-

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ered. Meanwhile, Mexico's natural protected areas policy is more centralized, which can create as many problems as the United States' relative chaos does. Environmental authorities on both sides of the border are short on human and capital resources that could be used for a true natural resources effort in protected natural areas. While both nations are adding land to their natural protected areas systems, there is a continuous loss of and threat to natural protected areas from encroachment—both by outsiders and through serious land tenure conflicts. In Mexico, the land in natural protected areas in the border region is primarily private property or ejido/communal lands over which the government has less control. In the United States, state and federal entities often compete for authority over conservation efforts. These lands are variously controlled by a diverse set of stakeholders, including indigenous communities, peasant farmers, fishermen, ranchers, and miners, among others. As a result, both federal governments are subject to constant pressure for land use change. They are faced with a lack of sustainable development options and are instead saddled with a situation that has resulted from many decades where little attention was paid to protection and financing of their natural protected areas. Successful protection of natural resource areas requires:

- Information collection, dissemination, and exchange
- Similar goals across administrative boundaries
- An approach that is broad and ecologically based
- Stakeholder input (from communities, NGOs, government, and private landowners) and a long-term vision
- The willingness of individuals (or governments, in this case) to cede some control, as well as social and cultural understanding of management tactics on the other side
- An ability to identify the nature of any conflicts
- Workable solutions that include local partnerships
- The support of the national governments to implement and monitor solutions

That being said, adjacent protected areas management along the U.S.-Mexican border is flourishing and progressing, thanks to the dedication and tenacity of local NGOs, landowners, border communities, and land managers. Despite a shift in national attention away

from fostering environmental cooperation and toward efforts to protect borders from potential threats to national security, those working on the ground continue to seek partnerships, exchange information, and work to develop new sister-park designations with counterparts in Mexico. Institutional relationships remain intact, largely due to personal relationships built over many years and supported by a number of government-to-government agreements, letters of intent, and declarations to work together to preserve, protect, and enhance this shared border environment. In this vein, while the 1997 LOI has not necessarily been a lightning-rod for the cooperative management of the pilot areas, it has certainly served as a tool that provides legitimacy, support, and encouragement for new collaborative efforts to flourish along the border. Ultimately, it is such high-level agreements that provide a framework and allow local initiatives to occur. Likewise, the work being undertaken by land managers; local, state, and federal agencies; NGOs; and others in protected areas along the border help meet the goals of these overarching federal agreements.

Consequently, there are many opportunities for more cooperation. The two countries can continue to build on joint commitments on environmental and conservation issues. There is certainly more room to engage the private sector and non-governmental and conservation organizations in these efforts. Mexico and the United States can also look to jointly manage and monitor the ecological impacts and benefits of tourism and other economic development in these natural protected areas. The two nations can jointly develop adequate and environmentally sound transportation, infrastructure, and financing for tourism. In doing so, they can share techniques that reconcile consumptive and non-consumptive multiple uses of natural resources (e.g. forest management). Finally, and perhaps most importantly, the logic behind crossboundary stewardship should be established in the collective government consciousness—natural ecosystems do not recognize administrative boundaries, and boundaries themselves often pose the greatest threat to the area they are serving to protect.

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ENDNOTES

¹ At the time of signing, the Mexican agency responsible for protected areas management was the Secretaría de Medio Ambiente, Recursos Naturales y Pesca (SEMARNAP). This agency has since changed its name and is now called the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). For simplicity, the authors will use the acronym SEMARNAT for references both past and present.

² The notion of establishing a sister-park relationship differs from that of establishing an International Park, which has also been discussed over the years and is still being sought in the Big Bend/Maderas del Carmen/Cañón Santa Elena area by a number of non-governmental groups.

³ For a list of accomplishments and programs cited by the Natural Resources Workgroup at the end of Border XXI implementation, see EPA 2001.

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