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Land Tenure and Preservation

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ABSTRACT

Political boundaries between countries, such as the border between the United States and Mexico, affect the way natural resources and ecological systems are allocated, protected, and preserved. Not only does the fragmentation of geographic space impede the optimal use of a resource, but the differences in political, legal, and planning systems between both countries make it difficult to create a coordinated approach to preserving natural resources.

Groundwater management practices differ according to land ownership. On the U.S. side, groundwater is mostly used by private landowners. On the Mexican side, the federal government owns the aquifers, as well as all natural resources, and the Comisión Nacional del Agua (National Water Commission, in Spanish CNA) manages them. The binational International Boundary and Water Commission (IBWC) could conceivably deal with aquifers, however, at present, it mainly manages only surface waters in the U.S.-Mexican border region, including the Rio Grande/Río Bravo and the Colorado River.

In the absence of a coordinated, transborder effort for preservation, many of these resources will be irrevocably depleted and destroyed. If that is the case, a balanced and sustainable natural and

man-made environment will not be possible and the future quality of life and the survival of the natural environment will be endangered.

Conservación y Tenencia del Suelo

Carlos Graizbord y Emilio de la Fuente

RESUMEN

Los límites políticos entre los países, tal como la frontera entre los Estados Unidos y México, afectan la manera de asignar, proteger y conservar los recursos naturales y los sistemas ecológicos. La fragmentación de un espacio geográfico no sólo impide el uso óptimo de los recursos sino que, además, las diferencias entre los sistemas políticos, jurídicos y de planeación entre los dos países generan dificultades en el establecimiento de un enfoque coordinado para conservar los recursos naturales.

Las prácticas relacionadas con el manejo del agua subterránea varían conforme a la tenencia de la tierra. En los Estados Unidos, los propietarios privados utilizan el agua subterránea en su mayoría. En cambio, en México, los acuíferos, así como todos los recursos naturales, son propiedad del gobierno federal, y la Comisión Nacional del Agua (CNA) se encarga del manejo del agua. La Comisión Internacional de Límites y Aguas (CILA), en teoría, se podría encargar de los acuíferos; sin embargo, en la actualidad, se concentra principalmente en el manejo de las aguas superficiales a lo largo de la frontera entre los Estados Unidos y México, inclusive del Río Grande/Río Bravo y del Río Colorado.

Ante la ausencia de un esfuerzo coordinado transfronterizo de conservación, se agotarán y se destruirán irrevocablemente muchos de estos recursos. Si así fuese, no será posible lograr un entorno

equilibrado y sostenible natural y artificial; a futuro, se pondrá en peligro la calidad de la vida y la supervivencia del medio ambiente natural.

THE IMPORTANCE OF PRESERVING NATURAL RESOURCES AND ENVIRONMENTALLY SENSITIVE AREAS IN THE BORDER REGION

Natural resources are not used optimally in border regions because political boundaries fragment their geographic locations; therefore, management and preservation cannot be adequately performed. This is especially true of groundwater aquifers, forests, agricultural areas, and habitats.

The aquifer of a watershed (and/or sub-basin) provides a good example of the types of problems that exist with natural resources that are located in a border region—they are resources that are fragmented by an international boundary. The Tijuana River Watershed and the sub-basin of the Alamar-Tecate-Cottonwood Rivers are specific examples in California and Baja California. The aquifer within these basins and sub-basins crosses the border and is exploited on both sides without a joined, coordinated water management system. As a result, further pollution and the eventual depletion of the aquifer appear imminent.

Groundwater management practices differ according to land ownership. On the U.S. side, groundwater is mostly used by private landowners. On the Mexican side, the federal government owns the aquifers, as well as all natural resources, and the Comisión Nacional del Agua (National Water Commission, in Spanish CNA) manages them. The binational International Boundary and Water Commission (IBWC) could conceivably deal with aquifers, however, at present, it mainly manages only surface waters in the U.S.-Mexican border region, including the Rio Grande/Río Bravo and the Colorado River.

Another issue also confounds entities when they are attempting to effectively manage natural resources—flooding. To control flooding on the Mexican side, the Tijuana River channel was lined with concrete. However, on the U.S. side of the Tijuana river channel, the

river's estuary has been designated a natural preserve. These two different approaches to natural resource management exemplify the challenge of transborder resource management when allocating and protecting a resource. The two different approaches have led to two different policies. In Tijuana, the channeling of the river was intended to both provide protection from flooding and to reclaim land for future development, while in San Diego the main criterion was preservation of the riparian habitat.

Water quality must be considered when discussing water quantity. On the Mexican side, discharges from poorly operated sewage treatment plants and industrial facilities pollute rivers and aquifers. Raw sewage and latrines from squatter areas, industrial discharges, illegal trash dumping sites, and other adjacent land uses also pollute rivers. Furthermore, riverbeds are disturbed by sand and gravel mining operations.

Water pollution and the depletion of aquifers harm both nature and the population living in the border area, and thus create international conflicts that are likely to worsen over time. Similar problems also affect other natural resources, such as forests; agricultural land; ecological habitats; and historical, archeological, and paleontological resources.

In the absence of a coordinated, transborder effort for preservation, many of these resources will be irrevocably depleted and destroyed. If that is the case, a balanced and sustainable natural and man-made environment will not be possible and the future quality of life and the survival of the natural environment will be endangered.

ANALYSIS OF NATURAL RESOURCES

This section details various ecological subsystems and their importance for transborder collaborative planning and management efforts. Although presented separately, they form an integrated system and should be seen as such. As mentioned in the previous section, lack of transborder collaboration presents a risk for natural resources and for the transborder population. The differences in the

legal and planning systems between both countries exacerbate the difficulties of developing a better collaborative process. The differences in land ownership are explored later in this chapter.

Hydrology

Rivers and creeks serve many public purposes. They affect the quantity of a community's water resources because increased runoff and sedimentation will choke a stream's connection with the underlying groundwater, which leads to decreased and irregular groundwater recharge. Streams also affect the quality of water for a community, as they are sources for groundwater recharge, reservoir storage, and surface water supply. Streams are riparian habitats and environmental corridors, which are pathways for many animal species, as well as a means of transporting nutrients and sediments. Streams bind ecological communities such as hillsides, woodlands, and wetlands with shared water resources and are thus part of the hydrological and nutrient cycles.

Water has become a scarce resource in the border region. Water is supplied to a rapidly growing urban population that competes for this resource with agricultural uses. Most of the rivers and natural streams within the border region face urbanization pressures. As mentioned earlier, municipal and industrial waste discharges, sewage from illegal settlements, illegal trash dumping, and gravel and sand mining pollute these streams.

Land development also causes river and stream pollution. Uncontrolled development on hillsides, woodlands, wetlands, and even along river banks has removed hillside soil and vegetation and graded and leveled hilltops. Soil has been removed and used to fill parts of riverbanks and marshes. Urban development and runoff have eliminated the protective vegetative cover and, as a result, flooding has increased. Rivers have become a health hazard because of pollution and because the natural filtering system of the marshes has been destroyed by fill and sedimentation.

To protect and conserve streams and rivers, one must look beyond the watercourses and consider the watersheds (basins and sub-basins), which include wetlands, lakes, reservoirs, groundwater resources, and the rivers and creeks within a system. Streams and

rivers should be cleaned, and their riparian ecosystems and flora and fauna should be restored or rehabilitated. Streams and rivers should be developed for extensive recreation, tourism, preservation, education, and research. These undertakings will protect streams and rivers as water recharge areas and as ecological corridors that connect open space with urban areas.

If the discharge of wastewaters into rivers is permitted, strict control measures must be effectively implemented. These measures should prohibit any discharge that causes environmental and aesthetic damage, pollutes beaches, or deteriorates groundwater quality. Effluent standards should be set for chemical, physical, and microbial elements of suspended solids, organic and nitrogen concentrations, and pathogenic microorganisms. An appropriate balance must be sought between environmental requirements and economic costs.

Coastal Areas

Coastal areas are unique ecological, geological, and biological habitats for an array of terrestrial and aquatic life forms including, increasingly, humans. Coastal areas are important because they:

- Have commercial value as productive areas with fish and other seafood that are extracted for the dietary needs of millions of people; as well, fisheries and aquaculture are commercial activities that are important to many people
- Are a barrier to natural hazards: beaches, dunes, cliffs, and islands act as buffers against strong winds and waves from ocean storms
- Are unique recreational areas: swimming, boating, fishing, sunbathing, and walking are some of the various tourist and recreational activities in coastal areas
- Have an aesthetic and scenic value and are one of the most dramatic natural environments
- Have a unique ecological value – many interconnected subsystems, including estuaries and coastal wetlands, cannot be duplicated elsewhere

Marine and coastal environments are integrated systems. Degradation of one system can damage the ecosystem as a whole. However, pressures on the coastal environment come from various sources, some of which are natural, such as hurricanes and coastal storms. These events change the coastal topography and are hazards to structures. Coastal areas usually recuperate from such pressures, but uncontrolled development stresses these areas and could overload their carrying capacities. Public policies affect the coastal environment when development in the coast is encouraged by, for example, new roads and bridges and the provision of public water supplies.

Development requires infrastructure, which exerts pressure on the coastal zones by increasing runoff into coastal waters. Groundwater extracted close to the coast leads to changes in the water table, which results in saltwater intrusion. Human settlements can also pollute groundwater. Oceans have become dumping grounds for garbage, sewage, and medical waste. Over-harvesting of fisheries threatens the sustainability of these areas. Human activities and global climate change affect coral reefs and coastal wetlands. The expansion of energy production can adversely affect the recreational and aesthetic qualities of the coast.

Beaches and estuaries on both sides of the international border are being polluted with direct discharges of sewage and partially treated effluents from failing treatment plants, among other sources. Land use pressures are destroying riparian systems and specific valuable plants, such as the coastal sage scrub. Fisheries are being over-exploited, such as the lobster fishery along Puerto Nuevo in Rosarito, B.C. Inadequate information about saltwater intrusion into aquifers, which comes from over-pumping, threatens water supplies and jeopardizes efforts to manage coastal areas. The lack of uniform standards hinders planning and management activities.

Hillsides

Building structures on slopes disturbs the surface of the land by making cuts and fills. The steeper the natural slope, the greater the area that must be disturbed. Soil is then destabilized and becomes more susceptible to erosion, primarily rain erosion. Disturbed sur-

faces create loose materials, which tend to move downhill. Structures experience a component of gravitational force that will tend to move them downhill. Grading a level pad or roadways, even for pedestrian paths, disturbs more than just the resultant leveled area. Cuts and fills extend some distance up and down slope before meeting their natural grade. A good solution is to minimize disturbances by building roads and structures on piers. As yet, regulations do not specify the rules for building in this manner.

Hillsides are inherently unstable. Changes in these areas can result in erosion or landslides, which can result from rains, flowing rivers and creeks, excessive landscape watering, or the concentration of storm runoff by human-built channels or storm drain outlets. Earthquakes and faults also affect erosion.

Landslides damage roadways, residences, and other structures. They are a common natural means of adjusting slopes to more stable configurations over surfaces that have been steepened by uplift or weakened by weathering. These areas need to be identified. When the forces that bring about movements exceed the forces that resist movement, the “factor of safety” is overwhelmed. Resisting forces decrease with:

- The introduction of water (through rainfall or human intervention)
- Long-term weathering
- The removal of deep-rooted vegetation, thus reducing roots’ resistance to movement

Destabilizing forces can increase as a result of:

- The removal of support by excavation or undercutting by flowing water
- Loading by structures, fills, or sediment accumulation
- Movements caused by earthquakes and heavy traffic
- Rapid build-up of underground water pressure from heavy rains

Human alterations contribute to slope destabilization by:

- Placing fills on top of marginally stable slopes
- Cutting slopes at steep angles or undermining the bottom of a slope

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- Redirecting storm runoff to concentrate flows in portions of the landscape not prepared to receive them
- Removing woody vegetation
- Adding water with hillside septic systems at rates that exceed average annual rainfall
- Excessive landscape irrigation at rates that exceed average annual rainfall

The main interrelated reasons to regulate hillside development include the protection of:

- Lives and property from landslides and fires
- Natural resources, such as water supply
- Environmental features and systems, such as river corridors, wildlife habitat, and natural vegetation
- Aesthetic or scenic quality
- Access for residents, visitors, and public service providers

In the United States, development is prohibited on hillsides with grades of 25% or more; in Baja California, development is prohibited on hillsides with grades of 35% or more. Because of the variety of geological settings and the different possible planning purposes and contexts, hillside regulations must adapt to each possible scenario. In the border scenario, a single slope category and all regulatory measures related to hillsides, such as densities for different slopes, should be established. Hillside overlay zones can be an instrument to control building within permissible high slopes (from 10% on up to 35%), and all projects should undergo a review process.

Woodlands

The general forest types in the U.S.-Mexican border region are the coastal forest, desert, and scrub. Forests differ according to elevation, latitude, topography, and other environmental factors. They also differ according to their stage of succession. Environmental conditions influence the stability of their flora and fauna. If environmental factors remain constant, the forest communities will remain intact, keep their identity, and continue reproducing.

However, disturbances by fire, humans, or other alterations in climate and environment, can create conditions more favorable to invading species.

Irresponsible development and woodland destruction affect the environment in a variety of ways – they increase erosion, cause siltation, lower water quality, diminish landscape diversity, increase flooding risks, reduce land values, and produce other detrimental effects. The elimination of forests fundamentally changes the surrounding ecology of wildlife and related herbs and shrubs.

Woodlands are beneficial in many ways. Forests produce timber, house wildlife and habitats, provide recreation, are aesthetic, and they produce other, non-monetary values. Woodlands are environments rich with animals and plants. Treetops, branches, trunks, shrubs, and plants provide breeding, feeding, and refuge for mammals, birds, and insects. Woodlands protect watersheds and soils. Forest vegetation moderates the effects of winds and storms, stabilizes and enriches the soils, and slows runoff from precipitation allowing it to be filtered by the forest floor as it replenishes the groundwater reserves. Decreased runoff and increased groundwater infiltration protect communities from flooding.

Woodlands moderate climatic extremes. The microclimate of a forest is partly produced by the shade of trees and the evapotranspiration rate of water from the leaves, which moderates the surrounding air temperature. Forest temperatures are cooler in the day and warmer at night than temperatures in un-forested areas. Thus, forests act as natural air conditioners for urban areas.

Forests located close to urban areas are usually unsuitable for economic use, such as tree forestry, but their value remains for environmental health, watersheds and soils, they improve air and water quality, and they act as noise buffers and climate modifiers. Woodlands also buffer noise from freeways and factories, absorb some air pollutants, and screen ugly views.

Wooded areas promote high real estate values, but they do not necessarily play a role in development decisions. Usually, if a wooded area is near an urban area, real estate values are high. Yet, development normally destroys wooded areas. The elimination of wooded areas lowers land development costs because streets and

sewer lines are less expensive to build in flat, treeless terrain. Clusters of housing developments within forested areas are a better type of development for the environment.

The different patterns and rates of succession in forests depend on natural disturbance and aid the diversity of woodland flora and fauna. Adjoining forests and meadow communities create ecologically crucial edges where animals feed and intermingle with open-field species. Some species feed in the meadows and seek shelter in the forest. This variety of natural environments is crucial to a healthy environment. The more variety within the area, the more likely it is to absorb the effects of any disturbance. Woodland diversity should be protected because it is more capable of absorbing stress.

This goal to protect forests is especially important for suburban forests where humans disturb the natural ecosystem. The forest should be able to adapt to human influence, but man's impact on forests has been extensive. Land dedicated for settlements, timber, and agriculture has destroyed forests. Competition among urban growth, agricultural, grazing, and forest land uses are continuous and increasing. Although replacing lost forests is difficult, regulation and mitigation will protect the diverse character of ecological subsystems.

The coastal sage scrub is on the brink of extinction. Additionally, less valued species of desert vegetation are being smuggled from Baja California to be sold in the United States. Some of these species are unique to the eastern parts of California and Baja California.

Poorly regulated use diminishes the benefits of woodlands. To create policies that protect and conserve rural woodlands, the following points should be considered:

1. It can take decades to replace lost woodlands. Usually, woodlands are replaced by plants that are unsuitable for recreation, habitats, and provision of other benefits.
2. Decisions have to be made that balance the short-run productive use of woodlands with their long-run use. The long-term use of woodlands should depend on development compatible with woodland ecology, but that is rarely the case.

3. If a wooded area or forest is to be replaced, the public benefits of the proposed land use must be weighed with the costs. Proper land use policies can allow woodlands to be used for many purposes while still conserving the original lands. Effective land use is not usually the reality, though, because woodlands are constantly being pressured by several other proposed land uses.

Woodland regulation has been ignored despite the benefits of woodlands as buffers and mitigators of flooding, erosion, noise, and air pollution, which are important for the public good. Trees in urban areas within the public domain, such as those growing on city streets, parks, and forest preserves, should be protected. Woodlands found on private lands should also be protected. Several types of ordinances would be appropriate, for example, to:

- Preserve yard and street trees of residential or commercial land uses
- Regulate commercial forestry within urbanizing areas
- Identify sensitive wooded areas
- Preserve not just trees, but the entire woodland ecology

Other implementation mechanisms include *declaratorias*, or special zoning provisions, which can help preserve woodlands. *Declaratorias* have proven ineffective in Baja California because of the public sector's poor enforcement capability. However, other "inductive" mechanisms could be used, such as fines and taxation that provide "rights" for the use of a natural resource. Woodland protection ordinances seek to protect the entire woodland; that is, not only the trees but the associated flora and fauna as well. In the usual case of woodland protection ordinances, some land uses are permitted and others require permits. Permitted uses include:

- Conservation of soils, vegetation, water, fish, and wildlife
- Extensive outdoor recreation, such as play and sporting areas, field trails for nature study, hiking, horseback riding, boating, trapping, hunting, and fishing where otherwise licensed and regulated

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- Grazing, farming, gardening, harvesting of crops, forestry, and nursery practices, where otherwise legally permitted and regulated
- Operation and maintenance of existing dams and other water-control devices, if in compliance with state or federal statutes
- Driveways and roads where alternative means to access prove impractical

These uses are not necessarily compatible with woodland ecology. For example, grazing and agriculture could disturb these areas and/or prevent woodland reproduction, as well as destroy under-story vegetation. All uses should be processed for permits and analyses for each case should be required and performed by specialists. Woodland regulations should be tied to a grading plan and a plan for the control of erosion and sedimentation.

For any development in a wooded area, review requirements should include lot coverage, open or natural areas, a grading plan with cut and fills limitations, and an erosion and sedimentation plan. New regulations might be needed. A promotional or educational approach with the public may be necessary for the preservation of natural resources, including woodlands.

Habitats

Urban growth fragments and/or destroys natural wildlife habitats. Agricultural areas also contribute to the loss of wildlife habitat because they drain wetlands, disturb grasslands, and reduce the diversity of wildlife. Buildings, roads, fences, and other obstructions also restrict wildlife migration. Some species do not seek alternative routes around fences and instead remain within them until they starve. Impermeable surfaces create heavy runoff that erodes riparian areas. Air and water pollution affect the quality and quantity of wildlife habitat in developed areas.

The monetary value or general value of habitats is difficult to assess even though it has been studied extensively. For example, the recreational value of fishing, bird watching, hiking, and hunting depend on the availability of wildlife. Likewise, the protection of wildlife promotes tourism and thus contributes to economic devel-

opment. It has been estimated that in some U.S. states, the opportunity to view wildlife contributes approximately 20% to revenues from tourism.

Border habitats are fragmented, especially those located within or near urban areas. Conceptually, an ecological subsystem should be viewed as an integrated system that encompasses climate, land uses, and human activities. For the purpose of transborder governance, a comprehensive pro-active approach that includes land use and the environment should be taken.

TRANSBORDER DIFFERENCES IN LAND OWNERSHIP AS THEY RELATE TO PRESERVATION

This section explores the relationship between preservation and land tenure in both Mexico and in the United States. Land tenure makes a significant difference in both successful and unsuccessful preservation practices. There are also other factors important to consider, namely:

- The location of the preservation area in relation to urbanization pressures
- The size of the area in question
- The differences in regulatory environment on both sides of the border

It is believed that wider and more systematic research needs to be conducted on this subject. In general, successful preservation on both sides is possible when the area considered is large enough and located far enough away from urban areas or urbanization pressures.

Land Ownership and Preservation in Mexico

The following table represents possible cases of land ownership types and the probability that they will successfully preserve land in Baja California. In Table 1, two variables are considered: land ownership type and location relative to urbanization pressures (when urbanization occurs close to the area to be preserved and when no significant urbanization pressures exist near the preservation area).

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Usually, areas that have high urbanization pressures are close to a present or potential urban area. Conversely, areas that have insignificant urbanization pressures are usually large tracts of land that are located far away from urban areas. The table identifies the probability that the area will be preserved as high where examples of successful preservation exist and few factors affect these efforts negatively, medium where some favorable factors exist that could allow for successful preservation, or poor where few or no examples of successful preservation were found and the public sector could not intervene effectively.

The following explains the specific cells of the above matrix. They were made as a result of observations of various cases in Baja California.

Ejidors (or collective properties) located far away from urban centers and related development pressures, could use *declaratorias*, or special zoning, to protect ecological resources. This assumes there is a plan or context for identifying and designating such areas. For example, Terra Peninsular, a non-governmental organization (NGO) in Baja California, signs land conservation agreements, which are legal procedures in Mexico, with *ejidatarios*, or tenants of the collective properties. Even with urbanization pressure, *ejidos* have an organization and representatives to support preservation through a *declaratoria* or through other legal resources. However, there are no plans to identify which areas to preserve and which to urbanize. The

Table 1. Land Ownership Types and Probability of Success in Land Preservation in Mexico

Land Ownership Type	Without Urbanization Pressures	With Urbanization Pressures
Collective (<i>ejidos</i>)	High	Medium
Private (with various land owners)	Medium	Poor
Private (with few land owners)	High	Medium
Government (federal)	High	Poor
Government (state)	High	Medium
Government (local)	High	Medium

Source: Authors

preparation of a *plan parcial* or community plan can correct this situation. This is a requirement for large areas, under any type of ownership, that are located adjacent to urban centers that are under urbanization pressures. If there are squatters on these properties, the *ejidatarios* or landowners of the parcels, can file a legal complaint (*denuncia de despojo*, or denunciation of dispossession) with the state attorney to remove squatters. In the case of creeks and rivers, CNA is responsible for the protection of the natural resource and for taking any required legal action.

Private landowners within a potential preservation area might have plans for their parcels that do not include preservation efforts, so it might be difficult to create a consensus among them to abide by special zoning or any other legal mechanism for preservation. With urbanization pressure, landowners with large properties have to be mobilized and organized to protect their land. In the Valle de Guadalupe, the most important wine-producing valley in Mexico, landowners have organized and are, at least for now, protecting their valley from development pressures.

The owner of a large parcel would have a better chance of preserving land than the owner of a small parcel would, but there should also be an appropriate plan for the preservation of smaller, non-contiguous tracts. A large private parcel could develop an informal plan or a *plan parcial* (depending on its size) and thus could protect the designated land uses. The owner can use various legal recourses, such as a *denuncia de despojo*, a *declaratoria*, or a moratorium (*directriz*). Moratoria only last for one year, but they can be extended. In many cases, CNA makes an agreement with developers to protect rivers and creeks. CNA might make use of gabions to protect against flooding and to provide more land to developers under a *derecho de usufructo*, or “usufruct right.” In some cases, developers develop parcels on creeks in an effort to encourage the owners to protect them.

In all government cases and without urbanization pressure, there is a moderate probability that large areas will be preserved. The Mexican federal government has few human and financial resources to manage natural resources in a country as large as theirs. For example, many remote archaeological sites that are difficult to access are vandalized because of lack of protection. The state has properties

close to urban areas and is usually successful in controlling them. Examples of these areas include land reserves by the state *inmobiliarias*. Municipal authorities control their properties through the *oficialías*.

The governments' ability to control urbanization pressures is less clear. Federal properties are difficult to protect because few resources are available and government enforcement is weak. There are too many rivers, aquifers, forests, habitats, wetlands, and archaeological sites in the country for the few inspectors, who have limited financial resources, to administer adequately. State and local management of natural resources may be more successful than federal management, despite the lack of funds and weak law enforcement capabilities. Many land reserves are allocated for urbanization purposes—including low income housing and public services, such as schools. The municipalities have land banks or municipal real estate agencies, such as Inmobiliaria Estatal de Tijuana y Tecate (INETT), Fideicomiso de Desarrollo Urbano de Mexicali (FIDUM), and Fideicomiso de Desarrollo Urbano de Ensenada (FIDUE). The municipalities also own land used for special purposes or that could be sold. The agencies in charge of that are the state Oficialía Mayor (or public administration office) in Mexicali and the municipal *oficialías*.

Three more variables must be taken into account if successful preservation areas are to be implemented: the Mexican government's weak enforcement capabilities in land use issues, the lack of appropriate regulations and laws, and the lack of appropriate specific land use analyses and preservation plans. The third variable includes ensuring that there are accurate "capability or suitability analyses" within the plans and that there are appropriate geographic data to perform these analyses. At present, the geographic information from the Instituto Nacional de Estadística e Informática (INEGI) in Mexico and from the U.S. Geographical Survey (USGS) in the United States is essentially unusable because the data are too general and the map's scale is too large, specifically for open spaces located close to cities. It is necessary to consider that, except in a few cases, transborder geographic data have not been coordinated or harmonized. Therefore, such information is not yet available as a basic planning resource.

Land Ownership and Preservation in the United States

Table 2 represents four possible cases of land ownership types and the probability that they will successfully preserve land in the United States. Similar to Table 1, two variables are considered: land ownership type and presence of urban pressures. Again, as is the case in Mexico, the areas with high urbanization pressures are either close to an urban area or plans for development exist for an area. The areas that have few or no urbanization pressures are usually large tracts of land that are located far away from urban areas. The table identifies land ownership types and urbanization pressures and indicates the probability that the area will be preserved as high, medium, or poor. This table assumes that appropriate plans and geographic data exist for large tracts of land.

Only a conflict between the local and the federal authorities over the use of a particular land would jeopardize preservation. One such example could occur if the federal government has one objective for a preservation area and local authorities (or other groups) have other objectives. Such a controversy has arisen over the preservation of the white owl habitat versus forest exploitation.

It is assumed that the U.S. has stronger enforcement capabilities than Mexico does. The issue in the United States is mainly the appropriate level of authority for preservation vested on the responsible agencies and the dilemma is whether to assign regulatory powers for preservation to local, state, or federal authorities.

Table 2. Land Ownership Types and Probability of Success in Land Preservation in the United States

Land Ownership Type	Without Urbanization Pressures	With Urbanization Pressures
Public Property	Medium	High
Private Property	High	Medium

Source: Authors

The Border Area

It is important to differentiate between formal transborder efforts for preservation and informal efforts. Formal efforts include projects or plans with the coordinated participation of both the United States and the Mexican governments. Informal plans or projects are those where other, mainly non- and inter-governmental organizations, are involved.

Land ownership differences within the border area add difficulty to any effort to coordinate land use decisions, especially when these decisions relate to preservation. The main obstacles to successful formal transborder coordination on land use planning in general, and to preservation efforts in particular, are:

- A lack of formal comprehensive binational planning organizations dealing with land use, ecological, and infrastructure issues
- A lack of basic transborder planning resources to identify and map natural resources and environmentally sensitive areas
- Transborder differences in enforcement capabilities, regulatory powers, and regulations
- Transborder differences in organizational structures and roles of the public sector
- Differences in implementation capabilities concerning ordinances, financing mechanisms, public works, and administrative mechanisms

It is possible that the informal coordination of preservation plans, especially of large areas without urbanization pressures, has had, or may have, some successful results. Table 3 represents four possible preservation cases and the probability that they will result in the successful preservation of land in transborder areas. Two variables are considered in the table: size of projects or size of open space area affected, and urbanization pressures. Two types of urbanization pressures are also considered—urbanization pressures close to the area to be preserved and the absence of urbanization pressures in such areas.

Table 3. Land Ownership Types and Probability of Success in Land Preservation in the Transborder Area

Size of Project of Area to be Preserved	Without Urbanization Pressures	With Urbanization Pressures
Large	Medium	Poor
Small	Medium	Poor

Source: Authors

The table shows the differences that can occur in a border area considering the degree of influence that urbanization pressures can have on the preservation of either large or small parcels. For specific cases, it is recommended to consider Tables 1 and 2 in combination with Table 3 to estimate the preservation potential of a specific site. In this case, areas with no urbanization pressures could be successfully preserved with the support of federal, state, and local governments. Therefore, coordinated plans need to be developed. For areas close to cities, the close cooperation between both governments and among other institutions involved could lead to the successful preservation of land. In the long run, a transborder commission, similar to IBWC, would need to be the official body in charge of protecting preservation areas.

STRATEGIES: LARGE PROJECTS AND SMALL DEMONSTRATION PROJECTS

There are many aspects that have to be dealt with before the mid-term and long-term implementation of coordinated or joint transborder preservation plans can be implemented successfully, including the following:

- Land ownership
- Size of preservation area
- Location in relation to urbanization pressures
- Formal transborder organizations
- Planning and regulatory (or enforcement) capacity
- Implementation mechanisms

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In the short term, land ownership or the continuation of ongoing (informal) planning efforts should be considered so that areas with better chances of being preserved are selected for preservation efforts. The Tijuana River Watershed, including the Alamar-Tecate-Cottonwood sub-basin, and the coastal area from Santa Barbara and San Quintín are examples of the informal planning efforts in the Baja California-California region. Both propose the creation of a preservation plan for an area large enough to provide a comprehensive vision for the larger region. Without such a vision, many fragmented projects could be implemented that may encroach on each other.

Large-scale preservation and conservation plans are necessary for areas with strong urbanization pressures as well as for those without them. At present, organizations such as Terra Peninsular are involved in the preservation and conservation of some large areas located in Baja California and in the border area with no significant urbanization pressures.

Besides the need to develop large-scale preservation and conservation plans in areas with significant urbanization pressures, there are urgent problems, such as pollution of the aquifer and surface water, that need to be addressed. Because there are few or no financial resources to solve them, it is proposed to develop small demonstration or pilot projects that are related to the larger, visionary plan. Since many private foundations can finance small projects, it is recommended that pilot or demonstration projects be coordinated as part of a general vision to avoid duplication of efforts or even contradictory objectives. Pilot projects, once implemented, act as catalysts for rehabilitation or revitalization in specific larger areas, create credibility among the community and the public sectors, and help develop a dynamic, cohesive force among all interest groups.

Difficulties in preserving land uses and natural resources exist in each country, including the lack of resources for implementing and/or enforcing the law in large areas. Additional difficulties exist within a transborder context. To respond to this situation, it is recommended that a new transborder committee, or similar group within an existing binational organization, be established. This new institutional framework should be able to use regulatory, adminis-

trative and financial resources, as well as a comprehensive, proactive approach, to collaborate with local authorities that are faced with transborder challenges in land preservation.

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