

Part Three

Ecosystems



Blooming flowers

Photo: Claudio Contreras Koob

This section presents a discussion of the possible impacts the construction and operation of the border fence might have on flora, based on the analysis by the experts who attended the workshop. In addition, it includes three chapters on the effects of the border fence on ecosystems and biodiversity at a regional and bioregional level.

POSSIBLE IMPACTS OF BORDER FENCE CONSTRUCTION AND OPERATION ON FLORA

SPECIALIST DISCUSSION

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INTRODUCTION

In the United States-Mexico border region there are important shared ecosystems, such as the Sonoran and Chihuahuan deserts, as well as temperate regions with important mountain ranges and sky islands. Scientific knowledge has widely documented that ecological processes are affected by isolation; that is why considerable is considered that construction of a physical barrier, such as the fence, will affect the flora and its interactions with the fauna, as well as the water flow on both sides of the border. In this discussion group, the potential impacts of the construction of the border fence on flora, as well as possible solutions or alternatives, were analyzed.

MAIN IMPACTS ON FLORA

- I. *Removal, fragmentation and edge effect on plant communities.*
The removal of plant species leads to habitat fragmentation; this, in turn increases the edge effect which has negative impacts on species composition and on the distribution and abundance of plant life.
- II. *Introduction and establishment of invasive and exotic species.*
Areas subjected to anthropogenic disturbances favor the establishment

of invasive species that may directly or indirectly impact wildlife populations.

III. Loss of substrate (soil erosion and compaction).

The removal of vegetation cover, the use of equipment, vehicular and human traffic, the formation of pathways and roads, and soil removal are all highly erosive factors that produce irreversible ecological damage which affects species of flora and the environmental services they provide.

IV. Interruption or alteration of seed dispersal patterns, colonization and pollination.

The establishment of the fence may constitute a physical barrier for the free passage of dispersers or of the seeds themselves. In addition, the lighting, the radars and other measures may affect the behavior and the distribution of nocturnal pollinators, such as bats, seed dispersers and insects, affecting genetic exchange between populations.

V. Alteration of plant communities due to disruptions in water flow and soil removal.

Water plays an important role in the dispersal of seeds and plant propagules. Changes or disruptions in its flow affect the existing dispersal patterns. Soil removal generates a change in its structure, which can, in turn, impact the composition and abundance of the vegetation community at the affected site.

VI. Microclimate alterations.

The removal of native vegetation impacts heat ratios in the ground, as well as water absorption and evaporation, generating microclimate alterations (temperature, relative humidity, albedo, rainfall, air currents, etc.).

AVAILABLE INFORMATION

The group analyzed the available information for each of the impacts identified. They acknowledged that there is ample literature on the flora of the Chihuahuan, Sonoran and Baja California Deserts. The review of environmental impact studies for previous projects in the border region, technical reports of projects carried out by government and academic institutions, clearing and deforestation data banks and lists of flora and types of vegetation along

the border, was recommended as useful for addressing and documenting the problems. The group also pointed out the need to perform searches to identify scientific publications related to the region's flora and its possible impacts, as well as specific works, such as those taking place in the Tijuana River Basin, regarding vegetation cover loss.

RESEARCH OR INFORMATION GAPS

Significant gaps in information were underscored, among which the following stand out: the relationship between vegetative cover loss and aquifer recharge in arid and semi-arid zones; the relationship between vegetative cover loss and soil erosion and desertification; limited knowledge on potential invasive species and their effects on natural communities on both sides of the border; fragility characterization by types of soil and geographic areas.

SOLUTIONS TO RESEARCH OR INFORMATION GAPS

The group identified a series of actions that can reduce the knowledge gaps regarding the potential impacts of the construction and operation of the border fence on vegetation. Following are the most significant. Perform detailed impact research studies in areas where there is already a physical barrier at the border. Generate a data base from reliable scientific sources regarding the effects of plant cover loss. Direct research funds from sources such as SEMARNAT-CONACYT and CONAFOR-CONACYT to establish priority study areas and earmark funds to support research. Promote the study of potential invasive species and their effects on natural communities on both sides of the border as priority research themes. Finally, another topic identified as a priority is fragility characterization by types of soil and geographic areas.

POSSIBLE SOLUTIONS TO THE POTENTIAL IMPACTS

The study group explored and suggested useful measures for solving and addressing the fence's potential impacts on flora. First, the group expressed, as the first measure, the need to seek alternatives to building the fence and to promote the creation of cross-border flora corridors. If this is not possible, in order to reduce the impact on flora it will be necessary to: a) propose a less aggressive design that allows the passage of seeds and propagules, b) have the strip of land taken up by fence construction be as limited as possible, and c) use

security systems that do not interfere with pollinators and animal dispersers.. Also, to minimize the damage, a strategy for mitigation and compensation is recommended.

More specifically, recommendations were made, such as minimizing the areas exposed to the edge effect; establishing quarantine and prophylactic measures; conducting permanent monitoring to prevent the introduction and establishment of invasive and exotic species; minimizing the use of heavy equipment; proposing a construction design that allows free action of pollinators, seed dispersers and colonization of native plants; establishing seed banks on both sides of the fence and promoting seed exchange among populations that are cut off from each other; preventing the modification of flow patterns in micro-basins and allowing drainage that respects these patterns; as well as avoiding the modification of the area's topography (geomorphology).

GROUPS THAT ARE CURRENTLY WORKING ON THE SUBJECT OR THAT COULD WORK ON IT

The discussion group identified the following academic and government institutions that are working on topics that can be useful for addressing the problems. Autonomous University of Nuevo León (Aquifer Recharge as a Function of Vegetation Cover in Semiarid Zones); Autonomous University of Baja California (Ecosystem Classification in the Area of the Californias, Tecate), National Forestry Commission, Cementos Mexicanos-SUL Ross University (Vegetation in the Rio Grande and Big Bend areas), SEMARNAT (Environmental Impact Studies), State Governments (Environmental Impact Studies) University of Arizona, COLEF, Autonomous University of Tamaulipas, Texas A&M, UNAM Institute of Ecology, National Institute of Ecology (INE, Colorado River Delta, Salt Cedar Control; Rio Grande).

CONCLUSIONS

There is sufficient technical and scientific evidence to identify potential damages to flora in both countries that would be brought about by the construction of the border fence. Among the main impacts are habitat destruction and degradation, isolation, loss of connectivity, and the introduction of exotic and invasive species. The most viable solution is to have the U.S. Government reconsider its proposal and protect its border by means of an alternative mechanism; or to have them consider an alternative fence design that mini-

mizes the impact on the flora, the physical environment and associated fauna. Also, if construction is carried out, mitigation and compensation measures are recommended. Finally, the groups that are currently working on related topics in the region are clearly identified.

DISCUSSION GROUP PARTICIPANTS

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Impact	I. Edge effect due to fragmentation
Description	In fragmented habitats the edge effect has negative impacts on the distribution and number of animals.
Available Information	<ul style="list-style-type: none"> • There is sufficient information published on the subject.
Research or Information Gaps	<ul style="list-style-type: none"> • The areas where the fence will be built and their characteristics are unknown. • Mexico does not have an Environmental Impact Assessment for the border fence • There is no inventory or list of species that would be affected.
Solutions to Research or Information Gaps	<ul style="list-style-type: none"> • Identify critical connectivity sites for fauna and propose strategies to conserve them. • Disseminate at all levels the information on the risks of building the border fence. • Identify potential partners for carrying out joint efforts (on both sides of the border) to generate the necessary knowledge for proper decision-making.
Possible solutions to the potential impacts	<ul style="list-style-type: none"> • Establish critical connectivity sites for fauna and propose strategies to conserve them. • Consolidate and implement the “wilderness” concept in protected areas (large green corridors that connect both countries). • Replicate successful habitat management strategies in the border region. • Avoid habitat fragmentation by finding alternatives to the border fence.

II. Contraction of the individuals' area of activity

Building a barrier would fragment territories, reducing the area of activity and modifying the living environments of many animal species.

- The habits of large mammal species are known, with regards to the impediments they would have for crossing the fence.
- The areas where the fence will be built and their characteristics are unknown. • Mexico does not have and Environmental Impact Assessment for the
- There is no inventory or list of species that would be affected.
- Generate precise information on the distribution and movements of fauna affected on both sides of the border.
- Research the characteristics of the establishment of territories and living environments for animal species.
- Disseminate at all levels the information on the risks of building the border fence.
- Identify potential partners for carrying out joint efforts (on both sides of the border) to generate the necessary knowledge for proper decision-making.
- Establish critical connectivity sites for fauna and propose strategies to conserve them.
- Consolidate and implement the “wilderness” concept in protected areas (large green corridors that connect both countries).

III. A barrier for dispersion and migratory movement

The fence would represent a barrier that would obstruct the free transit of fauna between the two countries. Natural dispersion and migration processes would be affected.

- There is sufficient theoretical information published on the subject.
- There are visual records and evidence of large mammals crossing the border zone.
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- Consolidate and implement the “wilderness” concept in protected areas (large green corridors that connect both countries).
- Replicate successful habitat management strategies in the border region.

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