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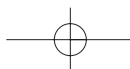
## Economy and Environment: Overview and Recommendations

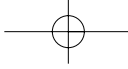
*Paul Ganster*

### INTRODUCTION

This volume is the product of the second Border Institute, held in Rio Rico, Arizona, in April 2000. Convened by the Southwest Center for Environmental Research and Policy, the United States Environmental Protection Agency, and the Border Trade Alliance, this annual series brings border stakeholders together to address significant issues that are critical to the sustainability and environmental quality of the U.S.–Mexican border region.<sup>1</sup> The first Border Institute, held in late 1998, examined the demographic, environmental, and economic features of this binational region and analyzed the challenges the region faces to achieve a sustainable environment by the year 2020.<sup>2</sup> The second Border Institute built on the vision developed for the border region in the first Institute by exploring the challenge of reinventing the economy to provide a solid base for achieving development, providing necessary environmental infrastructure, and enhancing quality of life in border communities.

Titled “Economy and Environment for a Sustainable Border Region: Now and in 2020,” the meetings followed the format established at the first Institute. A number of briefing papers were commissioned from leading researchers and practitioners and distributed to participants along with abstracts several weeks prior to the actual meetings. At the Institute, authors presented short summaries of their papers that were





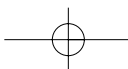
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then commented on by panelists from local government, federal agencies, the private sector, and stakeholder groups. Participants were encouraged to take part in the lively discussions that accompanied each paper and panel. One afternoon of the conference was devoted to a field trip to Nogales, Sonora, and Nogales, Arizona, to observe environmental infrastructure and related issues and to participate in briefings by local subject experts. The final morning of the Institute was dedicated to a series of roundtable discussions by working groups, which digested the material presented during the previous days and produced a series of recommendations and conclusions. The Institute recommendations are included in this introduction and appear after the summaries of the conference briefing papers.

### SUSTAINABLE DEVELOPMENT IN THE U.S.–MEXICAN BORDER REGION

The essay on “Sustainable Development on the U.S.–Mexican Border: Past Lessons, Present Efforts, Future Possibilities,” by Alan D. Hecht, Patrick Whelan, and Sarah Sowell, summarizes environmental conditions and sustainable development issues in the border region. They begin with a useful review and analysis of environmental cooperation between Mexico and the United States on border environmental issues. They next raise interrelated questions of whether environmental sustainability can be achieved in the border region by 2020 and, if so, what are the principal challenges for sustainable development? The final section pulls together conclusions from the paper. Some of the most important conclusions include the following:

- The combined effects of increased population growth, unplanned economic development, and limited water resources are stressing border communities now.
- Continued and increased high-level attention to the border’s needs is necessary; the United States must recognize the problems of the border as an issue of nationwide concern. Without international cooperation in support of the border, there is the possibility of international friction and conflict. Even with sustained effort on the part of governments and the public sector, serious challenges remain.
- The lack of local capacity to design and finance major projects underscores the need for greater attention on the part of gov-



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- ernments to build the stock of human capital in communities and regional authorities.
- Continued decentralization of authority from federal to state governments is essential for fostering this capacity and empowering local level officials.
  - Greater public and private sector attention is needed to manage current and future growth in a way that is commensurate with available resources.
  - The border's present economic mix is unlikely to promote sustainability or stability without diversification and new investment.
  - Both countries depend heavily on federal subsidies for water infrastructure projects. This dependence is likely to continue in coming decades. The lack of such subsidies for non-water-related projects (such as solid waste) currently constrains the development of other needed infrastructure.
  - Health threats present particular risks to the border population and threaten community well-being in addition to economic prosperity.
  - The production, management, and disposal of hazardous waste remain major problems in the border area.
  - The various water-use sectors, along with the private and public sectors, need to develop a strategy for water use that includes a binational component.

### U.S.–MEXICAN BORDER ECONOMY IN THE NAFTA ERA

“The U.S.–Mexican Border Economy in the NAFTA Era: Implications for the Environment,” by Norris Clement, Sergio J. Rey, Noé Arón Fuentes, and Alejandro Bruges, reports the outcome of research conducted by a group of Mexican and U.S. economists that belong to the Network of Border Economics/Red de la Economía Fronteriza (NOBE/REF). The basic purpose of the study was to test assumptions regarding the effects of NAFTA on the border economy by analyzing available data and conducting interviews with local Mexican and U.S. community leaders and experts.

The study, while not determining what the specific effects of NAFTA were in the border region, nonetheless clearly lays out pre-NAFTA and NAFTA-era economic and social trends. For U.S.

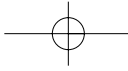
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border counties, per capita income grew at a lower rate than the nation as a whole, although employment grew faster than the nation as a whole. This took place despite a much higher population growth rate in the border region. While NAFTA brought declining unemployment to the U.S. border counties, unemployment fell less rapidly than in the rest of the United States. Thus, although the NAFTA era brought increased bilateral trade and higher population growth rates to the U.S. border region, the border lagged behind the nation as a whole in economic terms. The elusive NAFTA promise of economic prosperity was not realized in U.S. border communities.

For Mexican border municipalities, however, the NAFTA era brought population growth rates and employment growth that were significantly higher than the nation as a whole. Of particular importance was that job creation increased by a factor of five since the implementation of NAFTA in 1994, from an annual rate of 3% to 15%. Nevertheless, the Gross Regional Product in the Mexican border region grew only slightly faster than the country as a whole.

U.S. border economies have increasingly been concentrated in sectors that are declining at a national level, such as manufacturing, or are growing slower than total U.S. employment, such as wholesale trade. Retail trade and services sectors have accounted for over half of the new jobs in the U.S. border region since 1994, underlying the basic problem of the failure to create high-value-added jobs in border communities. In contrast, the growth of manufacturing in the Mexican border economy has been significant.

In general, this study shows that NAFTA has not accounted for a significant economic improvement for the U.S. border communities. In contrast, Mexico's northern border has done quite well under NAFTA, relative to the rest of the country. Yet, perceptions of border residents reveal that U.S. border community leaders tended to be more optimistic than the economic data might merit. Ninety-one percent of U.S. respondents and 83% of Mexican respondents felt that their community's economy had improved, partly due to NAFTA and partly due to other factors such as the expanding U.S. economy. With regard to infrastructure, 47% of U.S. community leaders felt that infrastructure had improved while 18% saw it worsening. Mexican respondents were much more positive, with 77% indicating improvement in infrastructure and 9% indicating a worsening situation. With respect to the environment, 48% of U.S. respondents felt that their county's envi-



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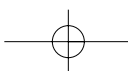
ronment had remained the same while 18% felt it had worsened. Mexican responses were 23% and 40%.

In addition to these findings, this study reached a number of general conclusions. First, the study noted considerable variation among the different economic subregions along the border. Second, although the U.S. border economies improved in some ways, the U.S. border counties continued a long-term decline relative to the rest of the United States. This, along with rapid demographic growth, raises serious concerns about the ability of the region to address infrastructure and environmental needs without significant state or federal assistance. On the Mexican side, the growth of industry, along with even more rapid demographic expansion, also raises serious questions about the long-term sustainability of these communities.

## NATURAL CAPITALISM AND THE BORDER REGION

While Clement and others—in their essay in this volume—characterize the border economy and discuss the perceptions about the economy and the environment by border leaders, Michael Kinsley, Hunter Lovins, and Mark J. Spalding lay out options for reinventing the border economy. They apply the concept of natural capitalism to the U.S.–Mexican border region. Natural capitalism suggests ways to reinvent local economies and to develop competitive businesses and economic activities while protecting natural resources for future generations. The goal is to develop ways of using natural capital—natural resources such as vegetation, ecosystems, water, and air—in a sustainable way while building prosperous communities. Central to natural capitalism are four shifts in the way business and economic development are conducted:

- *Dramatically increase the efficiency with which resources are used.* By changing technology and production design, farsighted companies are finding ways to drastically reduce inputs of energy, water, materials, and other resources.
- *Reduce or totally eliminate waste.* In the closed-loop production systems of industrial ecology, every output either is returned to the ecosystem as a nutrient or becomes an input into manufacturing another product.
- *Adopt a solutions-based business model where the sale of goods is*





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*replaced by the sale of services.* One example is the case where a company leases its carpeting instead of buying it. The leasing company manufactures the carpet in square sections from old carpet and recycled plastic products and regularly replaces worn or unsightly sections of the carpet. Thus, the company paying for carpet always has high quality floor coverings and the flow of old carpet and plastics into landfills is dramatically reduced. In this case, business wins and the environment benefits.

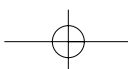
- *Reinvest in restoring and sustaining critical ecosystems.* Both businesses and communities as a whole would provide the support needed to maintain the natural resources that, in turn, support community prosperity.

Although the concepts of natural capitalism may appear to be idealistic and theoretical, the authors of this essay offer specific cases from the United States and other areas of the world, as well as the border region. For example, in Ojinaga, a small Mexican community in the Big Bend region of the Rio Grande, SCERP researchers developed a project to reclaim salinated land by planting trees that are irrigated with partly treated wastewater that also supplies nutrients. The trees are harvested by the local community for sale to a paper mill, replacing biomass from natural forests. At the same time, a new habitat is created for native animals and human use. And the cost of infrastructure for wastewater treatment is reduced. The community, economy, and environment all win.

## ENVIRONMENTAL ACCOUNTING

“Environmental Accounting along the U.S.–Mexican Border,” by Michael Jerrett, Sergio J. Rey, Christian Dufournaud, and Deborah Jones, also looks at the border economy in a very different way. The paper examines the prospects for establishing an environmental accounting system for use by border communities. Environmental accounting is a new methodology that attempts to place monetary values on environmental and resource losses and gains that are produced by economic growth. In other words, environmental accounting enables local officials to determine the true long-term impacts of development decisions.

This article presents a number of case studies in the San Diego–Tijuana area. The first estimates the total proportion of gov-



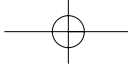
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ernment expenditures made to defend the environment against human-induced changes in San Diego. This study reveals that those expenditures accounted for approximately 1.23% of total economic output and more than 21% of local expenditures for the San Diego region. A second study focuses on the area along the border where the Tijuana River National Estuarine Research Reserve in the United States is connected to Mexico by the heavily populated Cañón Los Laureles subwatershed in Tijuana. In this case, dense human settlements in Mexico, often constructed without adequate infrastructure or planning, produce direct impacts on the downstream critical ecosystems of the Tijuana Estuary. These effects are mostly related to sedimentation and nonpoint source pollution as the result of storm events. In this subregion, expenditures in Mexico are mainly made to protect against threats to human health and safety and totaled approximately \$2.6 million in capital expenditures and \$0.4 million in operating costs (in U.S. dollars). The expenditures in the United States address issues of recreational resources and ecosystem health, particularly with preservation of the Tijuana Estuary. On the U.S. side of the subwatershed, expenditures were \$1.5 million for capital costs and \$0.9 million for operating costs. Relative to the size of each country's regional economy and government expenditures, Mexico actually spends more proportionately, although some 90% of the watershed in question lies in Mexico.

Although there are significant issues regarding availability of adequate data for both Mexico and the United States and the methodology still needs to be refined, environmental accounting promises to be a very useful tool for local planners, development officials, elected officials, and other regional stakeholders. It provides a mechanism for evaluating the potential true costs of economic development projects to the environment, which will help guide decision makers in determining the long-term sustainability of large and small projects.

### ENVIRONMENTAL INFRASTRUCTURE NEEDS ASSESSMENTS

The next section of the volume turns to questions of border environmental infrastructure in "A Verification and Meta-Analysis of Past Border Environmental Infrastructure Needs Assessments," by D. Rick Van Schoik. Border population growth has outstripped the ability of



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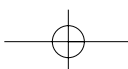
existing drinking water, wastewater, and hazardous waste disposal infrastructure to meet the demand for these services. The infrastructure deficit affects most border communities, but particularly those in Mexico and the smaller and poorer communities in the United States.

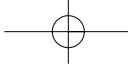
Van Schoik reviews past estimates of infrastructure needs to establish a credible estimate of current environmental infrastructure requirements and costs for the U.S. side only. He concludes that current investment needs range between \$6 billion to over \$10 billion to provide adequate services for today's population. Moreover, investments of \$12 billion to \$20 billion will be needed over the next 20 years to accommodate future growth. However, these estimates are for traditional technologies and Van Schoik suggests that low-tech, alternative technologies should be seriously considered for cost savings and enhanced sustainability.

### SUSTAINABLE WATER AND WASTEWATER INFRASTRUCTURE FOR THE BORDER

Barbara R. Bradley elaborates on this theme and related topics in her essay "Sustainable Water and Wastewater Infrastructure for the U.S.–Mexican Border Region." Since aridity, growing populations, and expanding economic activities characterize the border region, new sources of water must be found to meet the needs of these active communities in the near future. The most obvious, and often the only, alternative is reclamation of wastewater. However, the cost of existing conventional water reuse treatment is high, from \$450 to \$850 per acre-foot, not including piping and distribution system costs. Thus, the costs of infrastructure and operation for reclamation systems would severely tax the ability of economically stressed local border communities to pay. These costs could also cause a reduction of expenditures in other areas of infrastructure, such as roads and schools, and negatively impact the quality of life of border residents. It is thus imperative that border communities begin now to develop alternatives to conventional infrastructure.

Bradley evaluates costs of centralized systems to treat wastewater and produce reclaimed water. She concludes that "in general centralized systems may simply be too expensive for full-scale treatment and distribution of reclaimed or repurified water. Thus, for both existing and new communities, decentralized treatment and reuse offer an





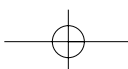
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important approach to maximize the number of times water is used.” It is clear that onsite and decentralized systems offer benefits to border communities, including lower costs, reduced energy consumption, promotion of reuse, and lowered demand on scarce fresh water resources. However, two significant hurdles must be overcome before substantial investment in these systems can take place. First, good cost data are lacking for conventional centralized systems. Typically, information is available regarding the cost of operating a wastewater treatment plant, but not available for the costs of the collector system. Second, there are a number of institutional barriers that must be overcome among water, wastewater, and public health agencies and their jurisdictions need to be reorganized to enhance cooperation and to enable these decentralized systems.

## FINANCES FOR BORDER ENVIRONMENTAL INFRASTRUCTURE

The final essay, “Border Finances: Paying for Environmental Infrastructure,” by Christopher A. Erickson and David W. Eaton, addresses the very basic financial challenge that most border communities face. The authors note that the most severe infrastructure problem is that of providing a safe and secure water supply for the region. While there are a number of significant impediments to meeting border environmental infrastructure needs, a key problem along with the lack of adequate financing mechanisms is the lack of human capital to plan, implement, and maintain environmental infrastructure. The human capital issue is critical for smaller U.S. border communities. It is also ubiquitous in all Mexican border communities due to historic issues such as predominance of centralized authorities, three-year municipal administration cycles and lack of large permanent staffs, and lack of municipal financial resources. A complicating factor is that by national standards Mexican northern border municipalities are well off, with higher per capita incomes and more positive economic characteristics than most other areas of Mexico. Thus, the northern border is not a high priority for allocation of the scarce infrastructure resources by the Mexican federal government.

There are a number of alternatives for financing environmental infrastructure. These include tax financing, general obligation bonds, revenue bonds, contracting with the private sector, and philanthropy.



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Federal and state grants also play a role, but these are declining in the United States and are even less a possibility in Mexican border areas. There are also the two NAFTA institutions engaged in environmental infrastructure efforts. The Border Environment Cooperation Commission (BECC) helps develop and provides certification for appropriate projects. The North American Development Bank (NADB) arranges financing packages with a combination of its own funds and grant funds. However, to date, these two institutions have been only able to meet part of the needs, so other alternatives will have to be developed. In the case of Mexican border municipalities, the most likely scenarios are increasing reliance on private contracting and development of municipal bond markets. The authors recommend that serious efforts be made to develop a Mexican municipal bond market at this time. They cite a number of factors that justify this. First, municipal bond markets have been established in similar developing countries over the past few years. Second, the overall credit position of Mexico has improved dramatically since the 1994 peso crisis. Third, the northern border municipalities are prosperous, with the highest economic growth rates in the nation over the last two decades. This economic growth has created the economic depth conducive to the establishment of financial markets.

## BORDER INSTITUTE II RECOMMENDATIONS AND CONCLUSIONS

Stimulated by the analytical briefing papers and considerable discussion, conference participants developed a number of specific recommendations that were articulated during the final roundtables and plenary conclusion session. These recommendations are grouped in broad categories and are listed below.<sup>3</sup>

### BORDER ECONOMIC DEVELOPMENT STRATEGIES

In identifying strategies for border economic development, participants considered the current border economic situation, in which border communities continue to fall farther behind the rest of the United States in per capita income terms despite the economic growth of NAFTA. They also took into account the need to reinvent the border economy in a way that creates more high-value-added jobs (economic

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development) and embraces the principles of natural capitalism. Recognizing the need for better analytical tools to support sustainable development, participants produced three recommendations:

- Economic and environmental indicators and monitoring systems need to be developed to inform and motivate new investments and improvements. Border communities, decision makers, and economic development planners lack adequate data and analysis to support the immediate-term decisions and long-term planning needed to foster sustainable communities in the border region.
- Future economic development must address long-ignored needs such as raising real incomes of all sectors and valuing ecological services, the community, and individual health, all of which lie at the base of any economic potential. Depletion of resources and pollution have costs that have not been integrated into the overall economic engine. In addition, Institute participants recommended that a source book of successful examples of natural capitalism actions be compiled for use by private and public sector officials in the border region.
- Environmental accounting, which considers both the positive and negative contributions of economic activities to environmental health and ecological services, should be used by jurisdictions to help evaluate the long-term environmental costs of new industry, infrastructure, and other investments. Environmental accounting techniques and methods need to be developed for border communities as a decision-support tool.

## BORDER ENVIRONMENTAL INFRASTRUCTURE NEEDS

A key theme in the papers and in the discussions was that the current shortfall in U.S. border communities of \$5.8 to \$10.8 billion in environmental infrastructure (water, wastewater, and solid waste) will increase to \$12 to \$20 billion by 2020 due to expanding population and economy. These projections are based on traditional technologies with heavy capital costs and maintenance costs. In order to reduce these costs, Institute participants recommended that alternative and sustainable technologies become priorities of the U.S. and Mexican local, state, and federal agencies involved in developing environmental

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infrastructure. These approaches provide cost-effective options for many border communities and have significantly lower capital costs and operating costs, including energy efficiencies.

In many border communities, an inadequate water supply is a critical problem and existing water distribution and sewage collection and treatment systems are often managed independently of each other, resulting in a lack of coordination and the resultant synergies. In order to address these problems, reorganization of environmental management administrative structures in border communities needs to move forward. In addition, demand-side management, conservation, and reuse of water supplies must be priorities and these options should be exhausted prior to contemplating expanding supply within a region or transferring water from other regions. The BECC and NADB are well positioned to help build technical expertise and human capital required for these new administrative approaches.

### THE BORDER ENVIRONMENT COOPERATION COMMISSION AND THE NORTH AMERICAN DEVELOPMENT BANK

A number of the papers and significant discussions at Border Institute II centered on the functions of the BECC and the NADB, both of which are critical to the efforts of border communities in meeting their environmental infrastructure needs and improving the quality of the environment. The Institute participants developed three recommendations regarding these agencies:

- The funding level and scope of activities of the BECC and the NADB must be expanded to include other needs and environmental media.
- The BECC and the NADB need to provide more assistance to professional management of utility operations to increase synergies and cost effectiveness.
- The BECC and the NADB need to expand emphasis on sustainable technologies and methods.

### INFRASTRUCTURE FINANCE

Clearly, the planned and anticipated transfers from the U.S. and Mexican governments to the border communities for environmental infra-

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structure investment will not be adequate to meet the current and projected demands. New sources and mechanisms of financing such projects need to be developed to supplement the NADB. These discussions produced two specific recommendations:

- User fees for environmental services need to be implemented more widely in border communities. Not only do these provide incentives for more efficient use of the services, but the cash flow can provide the foundation necessary to attract more capital through bonds and other mechanisms.
- Structural bottlenecks for financing environmental infrastructure need to be addressed, particularly for Mexican border communities. Specifically, Mexican border communities need better structures for long-term planning, the ability to increase tax revenues, and the ability to borrow through bond mechanisms.

## ADDITIONAL RECOMMENDATIONS

The discussions at Border Institute II also produced a number of additional recommendations on topics beyond those specifically targeted by the briefing papers and panels. The range of these recommendations is indicative of the complexities of the border region and the significant needs of this dynamic binational zone. Additional recommendations include the following:

- All stakeholder groups need to improve and intensify transborder cooperation to resolve border environmental and related issues.
- The new national administrations must continue the bilateral cooperation on the environment of the U.S.–Mexican border region that characterized Border XXI, the BECC, and the NADB.
- Because government personnel turnover is exceptionally high in Mexican border communities, civil service reform and higher salaries for public employees are urged in order to increase tenure and continuity of planning and policy implementation. Improved human resources are critical to addressing the region's environment and development issues.
- Shortfalls in the border region of technical training and licensing, environmental education, local monitoring and enforcement, and accountability management need to be addressed.

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- Deteriorating air quality needs to be addressed through funds to pave roads, build natural gas infrastructure, insulate homes, and tap alternative energy sources such as solar and wind power.
- The maquiladora industry is mature enough to implement recycling programs for waste materials, wastewater effluents, and waste energy.

These recommendations take into account the unique context of the U.S.–Mexican border region and the challenge of reconciling urgent infrastructure needs with limited resources. By bringing a diverse group of border stakeholders together to begin a dialogue and contemplate these difficult issues, Border Institute II is an important step on the path to sustainable development. The next step is for stakeholders to work together in finding innovative ways to implement these recommendations and develop solutions that lead to a sustainable environment and a higher quality of life in 2020.

## NOTES

1. A number of individuals provided helpful suggestions for the preparation of this summary chapter: Paul Rasmussen, Rick Van Schoik, K. David Pijawka, Jane Clough-Riquelme, and Elena Lelea.
2. The background papers and outcomes of Border Institute I were published as Paul Ganster, ed., *The U.S.–Mexican Border Environment: A Road Map to a Sustainable 2020*. SCERP Monograph Series no. 1. San Diego: San Diego State University Press, 2000.
3. These recommendations also appear in the “Executive Summary of Recommendations,” compiled by Rick Van Schoik and others and issued by SCERP shortly after Border Institute II. This document is available on the SCERP Web site at <<http://www.scerp.org>>.