LESSONS FROM A FREE TRADE ERA IN MEXICO: ENVIRONMENTAL AND SOCIAL IMPACTS IN SONORA, AGUASCALIENTES, TABASCO AND OAXACA

FRONTERAS COMUNES

LA NETA

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Periodismo para Elevar la Conciencia Ecológica

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I. Introduction and Acknowledgements

Over the last five years, policymakers, citizens and media throughout the world have begun to question the benefits of free trade and global economic integration.[1] These concerns have been expressed in a variety of forums and in a variety of actions. From massive street protests in Seattle in 2000 and other cities focussed on the World Trade Organization to local protest outbreaks over economic policy in Argentina or Indonesia to an increasing number of academic and policy discussions, civil society organizations are bringing a myriad of social, economic, cultural and environmental concerns to degate over trade and development stratgeis. The breadth and depth of these issues was fully on display at the recent 2002 World Conference on Sustainable Development in Johannesburg, South Africa.[2]

Still, even as movements opposing "globalization" increase in size and sophistication, most political leaders in both the "developed" and "developing" world continue to pursue economic development strategies based upon free trade and open investment climate. In August 2002, the U.S. Congress approved "Trade Promotion Authority" – previously known as "Fast Track" – giving the U.S. administration authority to pursue free trade agreements, with Congress having the ability to either accept or reject, but not change, any new trade agreement. The adminstration has announced it will be pressing hard, along with administrations from Ontario to Buenos Aires, to establish a "Free Trade Area of the Americas," or F.T.A.A. by 2005, although it appears to be beginning with agreements with Chile as well as a Central American Free Trade Agreement (CAFTA).[3] Similarly, in Mexico and Central America, the seven presidents continue to tweak and fine-tune the "Plan Puebla Panamá," an Interamerican Development Bank-led development plan to better integrate southeastern Mexico and Central America into the world economy.

What often gets lost in these heated debates is an understanding of how our on-going experiments with freer trade and economic integration are affecting specific communities or issues or the use of natural resources. Does our experience to date provide insight relevant to the negotiation and structure of future trade agreements? There may be no better place to look for such lessons than Mexico. Once an economy and political system that looked inward for development, today Mexico is one of the most "open" economies, both in terms of its tariff structure and opportunities for foreign investments.

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[1] For some good web sites summarizing some of these concerns, see the International Institute for Sustainable Development (http://www.iisd.org), the Institute for Agriculture and Trade Policy (http://www.iatp.org); see also Tina Rosenberg, "The Free Trade Fix,"*The New York Times Magazine*, August 18, 2002. Recent books by economists on the subject have included Joseph Stiglitz, *Globalization and Its Discontents*, (New York: W.W. Norton & Company, 2002). Dani Rodrik and Francisco Rodríguez, "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence," *Macroeconomics Annual 2000*, Eds. Ben Benanke and Kenneth S. Rogoff, MIT Press, 2001; and Dani Rodrik, *Has Globalization Gone Too Far?* (Washington, D.C.:Institute for International Economics, 1997)

[2] http://www.johannesburgsummit.org/ is the official site of the United Nations-sponsored event. The International Institute for Sustainable Development also provides a good analysis of the outcomes of the event (http://www.iisd.org/).

[3] Robert Zoellick, United States Trade Representative "Administration to Proceed on Central America Trade Agreement," Letter to Congress, August 22, 2002 Available at http://usinfo.state.gov/regional/ar/trade/02082302.htm.

In fact, recognizing its importance as a "success" story for free trade, Mexico has been designated as the site for the next ministerial meeting of the World Trade Organization in 2003.

The lynchpin of Mexico's change has been the North American Free Trade Agreement (NAFTA), a voluminous series of measures implemented in 1994 which – over a period of 15 years – will integrate the economies of the U.S., Canada and Mexico. Widely cited as one of the most successful integration experiments in the world – at least at the macro level – in terms of both trade and foreign direct investment between the three countries,[4] there has been less attention to the positive and negative social and environmental impacts at the community level either caused or influenced by NAFTA. What lessons can be learned from the NAFTA experiment? Have the environmental and labor provisions – and the labor and environmental side agreements – been successful in mitigating or protecting local populations and environments from the "vagaries" of the free market?

Fortunately, a growing number of organizations and institutions have become interested in carrying out just this type of analysis in recent years. The North American Commission on Environmental Cooperation (NACEC), [5] a trinational institution that resulted from the NAFTA Environmental Side Agreement, spent considerable effort in developing a peer-reviewed framework for such analyses.[6] Using this framework, in 1999, the CEC released three independent studies on the economic, social and environmental impacts of NAFTA on different sectors of the economy: corn production in Mexico, electricity markets in the three countries and agricultural feedlot production in Canada and the U.S.[7] Then, building on this initial work, the CEC called for and funded a total of 14 studies from academic, private and non-profit organizations throughout the three countries to assess the impacts of NAFTA on a variety of sectors and natural resource issues throughout North America. These studies were initially presented in October of 2000 in Washington at the North American Symposium on Assessing the Linkages between Trade and the Environment, and later published by the CEC in 2002.[8] Recently,

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[4] United States Trade Representative, NAFTA at Eight: A Foundation for Growth, 2002. The summary report states that trade increased by 109 percent among the three NAFTA countries between 1993 and 2001, while foreign direct investment in Mexico between 1994 and 2001 was three times larger than FDI between 1987 and 1994.

[5] The Commission for Environmental Cooperation (CEC) is an international organization created by Canada, Mexico and the United States under the North American Agreement on Environmental Cooperation (NAAEC), a side agreement to the North American Free Trade Agreement (NAFTA).

[6] See CEC, **Assessing Environmental Effects of the North American Free Trade Agreement (NAFTA)** *An Analytic Framework (Phase II) and Issue Studies, 1999. Available at http://www.cec.org/files/pdf/ECONOMY/engframe_EN.pdf.*

[7] The three studies published by the CEC in 1999 included *Electricity in Canada, Mexico and the United States: Some Environmental Implications of the North American Free Trade Agreement; Maize in Mexico: Some Environmental Implications of the North American Free Trade Agreement*: and *Feedlot Production of Cattle in the United States and Canada: Some Environmental Implications of the North American Free Trade Agreement*. The reports are available on CEC's website (www.cec.org).

[8] Commission for Environmental Cooperation of North America, *The Environmental Effects of Free Trade: Paper Presented at the North American Symposium on Assessing the Linkages*

CEC announced it will fund a second round of such studies – focused more narrowly on the agricultural and electricity sectors – with the results being presented in March of 2003.

In the meantime, other organizations and institutions have begun publishing their own assessments of the impacts of NAFTA and economic integration on communities. Notable have been the the efforts of RMALC (Red Mexicana de Acción Frente al Libre Comercio or the Mexican Network on Free Trade), an NGO network in Mexico with serious reservations about Mexico's experience of free trade. In 2001, RMALC published a bilingual book on community response to free trade integration.[9] More recently, RMALC has teamed up with the Global Development and Environment Institute at Tufts University to develop 10 Mexican case studies on the social and environmental impacts of free trade in Mexico.[10]

The research conducted and commissioned by the CEC, Tufts University, RMALC, and others provides ample evidence that free trade does have a real impact on the lives and environment of communities throughout Mexico, as well as in the U.S. and Canada. While the science is not exact – charting the effects of increased trade, economic integration and investment on social and natural resources is complex and of course does not occur in a carefully controled laboratory setting – this developing body of work does point the way to a more cautious, less ideologically-driven approach to economic development, one that considers and embraces both the potential benefits and the drawbacks of free trade.

It is in this context that in January of 2001, TCPS and two Mexican organizations, La Neta and Fronteras Comunes, issued a call for proposals from Mexican civic and other non-governmental organizations for case studies examining the public health, community and environmental impacts related to the North American Free Trade Agreement and economic integration between the U.S. and Mexico. After receiving approximately 10 proposals over the next few months, in April of 2001, the three organizations selected four case studies for further investigation with local organizations in April of 2001. Over the next year, the Texas Center for Policy Studies, La Neta and Fronteras Comunes worked closely with one or more of the local organizations to produce four Spanish-language stand-alone reports, examining the impacts of free trade on these communities. A list of the reports and their authors is shown in Table 1 and Figure 1 shows the approximate location of the communities included in the studies.

This document provides an English summary of the four longer reports, available only in Spanish.

Between Trade and Environment (October 2000) (Montreal, Canada: CEC, 2002). TCPS teamed up with organizations in Mexico and Canada to produce two of the papers presented at the conference. See www.cec.org/files/pdf/ECONOMY/Symposium-e.pdf for the full texts of the presentations and www.texascenter.org/bordertrade for more information on the two TCPS reports.

[9] Salazar, Hilda and Laura Calrsen, eds. April 2001. *The social and environmental impacts of NAFTA: Grassroots responses to economic integration* (RMALC: Mexico City, D.F.).

[10] The book , tentatively entitled *Community Control in a Global Economy: Mexican responses to economic integration,* will be published by Tufts University in late 2002 or early 2003.

Table 1. Case Studies of Social and Environmental Impacts of Free Trade in Mexico

English and Spanish Title	Main Authors and Organization	Final Editorial Support
Hazardous Waste Combustion and Incineraton: A Tabasco Case Study *Tratadoras Térmicas de Residuos Peligrosos: Caso Tabasco*	José Manuel Arias Rodríguez and Elías Sánchez, Asociación Ecológica Santo Tomás	Marisa Jacott, Fronteras Comunes Cyrus Reed, Texas Center for Policy Studies
Interests and Objections in the Puebla-Panama Plan and the Oaxaca-Istmo-Huatulco Highway Project *Intereses y Resistencia: El Plan Puebla-Panamá y la Supercarreterra Oaxaca-Istmo-Huatulco*	Javier Balderas Castillo and Liz Ivett Sanchéz Reyna, Centro de Derechos Humanos Tepeyac del Istmo de Tehuantepec	Olinca Marino, La Neta: Proyecto Emisiones Cyrus Reed, Texas Center for Policy Studies
Aquifers and Free Trade: The Case of Hermosillo, Sonora *Acuíferos y Libre Comercio: El Caso de la Costa de Hermosillo*	José María Martínez Rodríguez, Red Fronteriza de la Costa de Hermosillo	Cyrus Reed, Texas Center for Policy Studies
The Effects of Industrialization and the Maquiladora Export Industry on the Economy, Health and Environment of Aguascalientes *Los efectos de la industrialización y del sector maquiladora de exportación en la economía, la salud y el ambiente en Aguascalientes*	Miguel Angel Torres Guerrero, Periodismo para Elevar la Conciencia Ecológica	Cyrus Reed, Texas Center for Policy Studies

Map. Location of Free Trade Case Studies

In Tabasco, the Asociación Ecológica Santo Tomás took the lead – with help from Fronteras Comunes and TCPS – on investigating a series of facilities engaged in the practice of combusting hazardous wastes. These wastes are mainly from the oil and gas industry. The combustion facilities have opened up in or near the capital city of Villahermosa over the last several years. From thermal desorption units, to incinerators to cement kiln burners, federal and state regulators suggest this is an appropriate way to deal with Tabasco's growing stockpile of hazardous wastes. This analysis however shows that there are serious issues which have not been adequately addressed.

One of Oaxaca's leading human rights institutions – the Centro de Derechos Humanos Tepeyac del Istmo de Tehuantepec, A. C. – worked closely with La Neta: Proyecto Emisiones and TCPS to document opposition to and problems with a locally planned highway – as well as the much larger Plan Puebla Panamá being promoted by the Interamerican Development Bank. While many of the stated goals of both the larger plan and the highway are laudable, the process has not included any active participation by the indigenous, rural populations of Oaxaca who would be impacted by these projects. The report documents these concerns and potential impacts.

The Texas Center for Policy Studies also worked with the Red Fronteriza de Salud y Ambiente, A.C. (The Border Health and Environment Network) in Hermosillo, Sonora to document the changes in the agriculture community within the "Coast of Hermosillo, " an agricultural district west of the capital city of Sonora. There, "traditional" agricultural production (wheat and corn) has slowly been scaled back, while new crops (grapes, citrus and pecans) are being irrigated with water from a dwindling aquifer. Most of this new fruit and vegetable production is exported and dominated by larger growers. Unfortunately, the impact on the aquifer and the larger discussion about sustainable water use within the state have been put on the backburner under pressure to expand export production.

In Aguascalientes, Periodismo para Elevar la Conciencia Ecológica (PECE), with assistance from TCPS, is to take a hard look at industrialization in the small central state of Aguascalientes. This state represents the kind of economic trends said to reflect the success of free trade – foreign investment and specialization in both auto parts and textiles. But, the municipal and state governments and the communities around them have not been able to keep pace with the growth, and serious gaps in regulation, infrastructure and access to information remain.

These case studies, at first view, could not be more different: water use in Sonora; maquilas in Aguascalientes; waste burning in Tabasco; and a planned road – and a *Plan Puebla Panama* – in Oaxaca. Yet, below the surface there are some common threads. First, all four case studies revealed the difficulties faced by local communities in gaining access to basic information necessary to make sound development decisions. In Aguascalientes, for example, relatively little public information is available about the kinds of chemicals, emissions, pollution control devices, environmental compliance, water use and hazardous waste management of the large multinational automobile parts and textile industries which have continued to migrate to the capital city and outlying industrial parks. In Sonora, while overall water use data is accessible – though its accuracy has been questioned -- there is much less information on water use on individual farms, nor a detailed study of the main aquifer itself, and there is simply no

publicly available data on a key aspect of the conversion from traditional to export crops: the use of fertilizers and pesticides.

In Tehuantepec, Oaxaca, only after protests, a mass letter writing campaign and continued pressure are local leaders and indigenous representatives finally getting more information on a tentative route for a highway that has been celebrated by local and state representatives for years and will likely cut through the heart of indigenous communites. In Tabasco, facilities for the most part won't let citizens review or tour their waste management facilities, even though they claim it is perfectly safe and state-of-the-art technology. Government officials have downplayed the possible existence of dioxin and furans in the waste stream. Meanwhile, there is little disclosure of what wastes are actually being burned and the resulting levels of emissions or the amount of hazardous waste contained in the left-over ashes and dust.

A second common theme is that changing economic and legal frameworks imposed by NAFTA makes it increasingly difficult for local organizations and even local governments to control or guide their own development. Whether growing thirsty crops for an export market in Sonora, or responding to investment decisions by international industry in Aguascalientes, local governments and actors are continually trying to play catch up with the increased need for infrastructure, regulation and resources. These increased demands are largely caused by decisions made outside of the local community. Thus, in Tabasco, even federal environmental protection agents lack basic knowledge about the "new technologies" they are asked to inspect. In fact, in general, the Mexican government has accepted the argument, increasingly discounted in the U.S. due to public health problems and opposition, that waste burning is an acceptable form of waste management. In the meantime, such investments and facilities have popped up in Tabasco and throughout Mexico through arbitrary approval, without even the existence of basic emission standards. Similarly, in Oaxaca, decisions on investment, education, electricity, agricultural subsidies and even housing are now being discussed among seven presidents, their cabinets, and representatives of the InterAmerican Development Bank, with only token participation from the public and local governance structures. Development decisions are decidedly top-down, often treating local people and natural resoruces as economic "inputs" to over-riding economic goals.

A specific NAFTA-related concern for all the organizations is the impact of a single provisions buried deep within NAFTA's pages. This provision, contained in Chapter 11 allows private investors to sue governments and collect monetary judgements if they can convince a three-member panel that a government has taken an action "which is tantamount to expropriation." On one level, this investor protection provision makes sense. Just as indigenous communities would wish to be paid for land condemned for the construction of a highway, investors should be compensated if their investment is taken from them. Nevertheless, the way the provision is written has allowed investors to sue local and state governments for regulating investments for legitimate health and environmental reasons through a secretive, undemocratic process.[11] If the "arbitration" panels set up under the process continue to interpret Chapter 11 in such a broad manner, governments will be deterred from enacting necessary regulations or even enforcing the ones they already have on the books.

[11] For a review of how the provision in Chapter 11 has been used, see Public Citizen. September 2001. *NAFTA Chapter 11 Investor-to-State Cases: Bankrupting Democracy; Lessons for Fast Track and the Free Trade Area of the Americas*.

If there is a silver lining in these case studies, however, it is the ability of people to study and understand the changes taking place, and to take action. Thus, recent moves by the Mexican Congress and the Aguascalientes state legislature to require publicly-accessible emission and hazardous waste inventories are important steps toward greater transparency and accountability in environmental programs. Whether it will ultimately help local and state leaders determine what type of industrial development is appropriate is of course another question, but it should help local communities know in the future what kinds of toxics might be affecting their homes and communities.

Similarly, the actions taken by Centro de Derechos Humanos Tepeyac del Istmo de Tehuantepec and others in Oaxaca to obtain information about the proposed highway cutting right through the middle of indigenous lands, as well as the larger movement in opposition to a top-down Plan Puebla-Panamá could lead to a more inclusive strategy of development and the consideration of alternative modes of development.

Investigations like that conducted by the Asociación Ecológica Santo Tomás in Tabasco – revealing a basic lack of information, limited enforcement and regulatory gaps – have led to a proposed new federal hazardous waste law, which would ban some kinds of incineration, being considered in Mexico's congress. That local communities, environmental organizations, and labor unions – with some cross-border help from organizations in the U.S. and Canada – could help spur such legislative action when other forces are calling for open borders and less regulation is a testament to the possibilities for local – and international -- response.

Even in a free trade era, people are able to take actions that will shape their own destiny. What these studies reveal, however, is how much more complex it can be to formulate and carry out effective response. Our hope is that these studies of the impacts of free trade and economic integration on communities will help advance the movement for public participation, access to information, appropriate labor and environmental standards and enforcement to be considered along with the rights of investors and tariff reductions in future trade liberalization agreements.

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Austin, Texas
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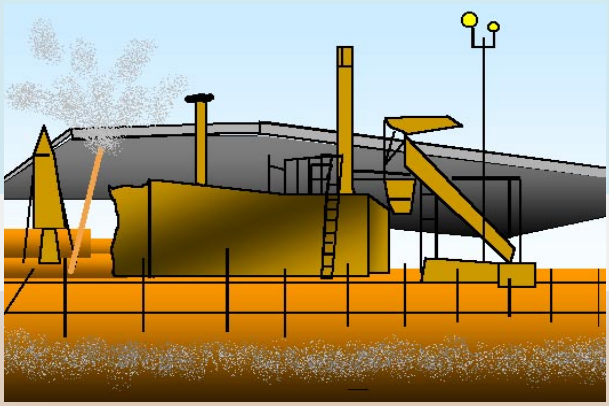
In addition, TCPS would like to specifically recognize the talents and energy of the two individuals who worked on this project from our two partner organizations: Marissa Jacott from Fronteras Comunes and Olinca Marino from La Neta: Proyectos Emisiones. Both deserve thanks for helping select the case studies and overseeing their development, including significant writing and editing.

Oliver Bernstein, spent his TCPS summer internship, summarizing the Spanish-language versions of these reports into English, as well as conducting additional research and writing in support of the case studies. We are very grateful for his timely assistance and also want to recognize the Nelson A. Rockefeller Center at Dartmouth College, which supported his Rockefeller Center Public Affairs Internship.

Finally, TCPS would like to thank the Mexican authors of the four reports as well as their organizations, which helped support their work. These authors represent the best of the non-profit world: quality writers and investigators who have not forgotten how to advocate for social and political change in an increasingly complex world.

HAZARDOUS WASTE INCINERATION AND COMBUSTION: A TABASCO CASE STUDY

English Summary Document



English Summary: Cyrus Reed, Oliver Bernstein, Texas Center for Policy Studies

Spanish Document: José Manuel Arias Rodríguez and Elías Sánchez Pérez
Asociación Ecológica Santo Tomás, A.C.

Editing: Marisa Jacott, Fronteras Comunes

Asociación Ecológica Santo Tomás A. C.

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INTRODUCTION

Between 1994 and 2000, the number of facilities with authorization to store, transport, treat, burn, recycle, reuse or dispose of hazardous wastes in Mexico increased from approximately 140 to nearly 520. Of particular note has been the exponential growth of various types of incineration facilities, including cement plants that burn hazardous wastes, medical waste incinerators, hazardous waste incinerators and the thermal "treatment" of contaminated soils. In fact, in the same time period the number of facilities engaged in these practices increased from less than 10 to more than 50.

This trend raises two questions. First is whether the increased incineration has the potential to result in a net increase in the quantity of pollutants released into the environment through the burning of hazardous materials. What are the consequences of this burning of hazardous wastes in terms of air, water and soil contamination, particularly from persistent, organic pollutants such as dioxins and furans?

The second question relates to the proliferation of these disposal facilities *in Mexico.* What has spurred this impressive growth since 1994? After signing the North American Free Trade Agreement (NAFTA) with the United States and Canada in 1994, Mexico's industrial growth certainly began yielding greater quantities of hazardous wastes that needed to be managed. This industrial growth alone cannot explain all of these new facilities, however. Could it be that certain aspects of Mexico's environmental regulation or enforcement programs help explain the apparently thriving incineration industry throughout the country? It is often difficult to answer these questions in Mexico due to the lack of accurate, public information concerning hazardous waste generation and treatment.

This brief summary highlights a new report published recently in Spanish on the growth of incineration facilities in one Mexican state – Tabasco. The report examines trends in Tabasco, potential links to NAFTA and the Mexican regulatory context, all with a view toward the impacts of hazardous waste incineration on human health and the environment.

HAZARDOUS WASTE INCINERATION AND COMBUSTION

The United States Environmental Protection Agency defines hazardous wastes as "by-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed."[12] Hazardous wastes usually possess at least one of four characteristics – ignitability, corrosivity, reactivity, or toxicity – and they can originate from a number of sources (domestic, industrial, agricultural or medical). As this report demonstrates, industrial hazardous waste generation in Mexico has increased dramatically since 1994. As Mexico's economy continues to industrialize, the country will have to manage its hazardous waste by using available technologies to miminize the amount of waste generated as well as minimize any negative effects on public health and the environment for those wastes which can not be eliminated.

Current incineration technologies used for hazardous waste treatment and management in Mexico include incineration, thermal desorption and combustion in cement kilns. Increased incineration of hazardous wastes, however, especially if inadequately regulated, does have impacts on public health and the environment. While wastes may be dangerous to workers or immediate neighbors when confined in a barrel or dumped on an isolated desert ranch, incineration can spread air pollutants throughout the community on a daily basis.

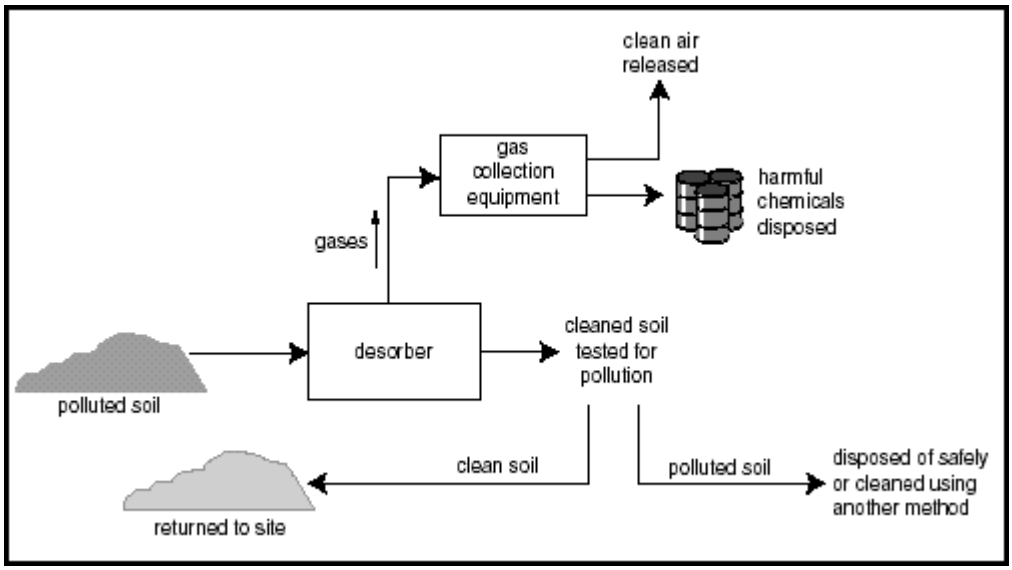
Many of the pollutants associated with incineration processes, including heavy metals and dioxins and furans, can cause serious health problems. The exposure of a pregnant woman to lead, for instance, can jeopardize the development of the fetus and the neurological development of the child. Human exposure to cadmium can negatively affect the kidneys, the liver and the lungs, and certain forms of cadmium may cause cancer. Exposure to mercury can cause permanent brain damage in humans as well as disorders of the nervous system. Beryllium and chromium, two heavy metals often present in the incineration process, are also suspected carcinogens.

In addition to the standard incineration of hazardous materials, thermal desorption is a technique used to treat contaminated soil by superheating it (see Figure 1) and capturing the released gases.[13] In theory, the toxic chemicals are removed, and the clean soil is returned to the site. Firms in both the United States and Mexico currently practice thermal desorption of contaminated soils.

[12] US EPA Terms of the Environment, http://www.epa.gov/OCEPAterms/hterms.html

[13] Information from US EPA, "A Citizen's Guide to Thermal Desorption," http://www.epa.gov/swertio1/download/citizens/citthermal.pdf

Figure 1. Thermal Desorption



Source: US EPA, " A Citizen's Guide to Thermal Desorption."

Experiences in the United States have shown that thermal desorption can have potentially dangerous consequences for both human and ecological well-being. This is not to say it is not a viable technology. It can be used safely and has been used successfully to treat contaminated soils at a number of Superfund sites. However, unlike incineration, which attempts to destroy pollutants, thermal desorption simply converts soil pollutants into gases for collection and treatment. While promoters claim that there are no toxic air emissions and that the soil and dust generated are rendered harmless, the technique has been found to produce low levels of dioxins and furans.[14] In many cases, soil treated by thermal desorption had to be retreated through traditional incineration. Treated soil is completely transformed and stripped of all organic material and microorganisms, thereby preventing the soil from hosting any vegetation.

The combustion of hazardous materials in cement kilns is another growing practice in both the United States and now in Mexico. By burning hazardous materials in the cement-making process instead of using more expensive fuels like natural gas, coal or fuel oil, the cement producers save large sums of money while also potentially earning money from hazardous waste generators for accepting their wastes. The downside of these savings is the elevated quantity of pollutants released into the environment through the burning of hazardous materials. In Mexico, authorities have been encouraging this type of combustion as a form of energy recycling.

Despite such encouragement, the incineration of hazardous wastes is a process that can seriously contaminate the environment and have permanent harmful effects on public health, especially in the presence of compound organic substances. Studies show that the incineration of hazardous wastes can generate toxic chemical substances that are even more dangerous than the ones that are incinerated:

[14] US EPA. "Cost and Performance Report: Thermal Desorption at Superfund Sites." http://www.epa.gov/superfund.

Burning hazardous waste….releases heavy metals, unburned wastes, and products of incomplete combustion (PICs), i.e., new chemicals formed during the incineration process. [In addition,] metals are not destroyed during incineration and are often released in forms that are more dangerous than the original wastes.[15]

HAZARDOUS WASTE INCINERATION AND COMBUSTION IN MEXICO

There is no complete and public inventory of the types or volume of hazardous wastes generated in Mexico. Although the National Institute of Ecology requires firms that generate and manage hazardous wastes to submit biannual accounts of their operations, only 30% of companies actually report to the government. The information that is available is often misleading, as evidenced by Table 1.

Table 1. Annual Hazardous Waste Generation in Mexico (tons)

Year	Tons
1991	5.292 million
1994	8 million
2000	3 million

Source: Ministry of the Environment and Natural Resources, Mexico (SEMARNAT). National Institute of Ecology (INE). *Segundo Informe Nacional de Emisiones y Transferencia de Contaminantes 1998-1999. Mexico. 2000*

While this data suggests that hazardous waste generation has decreased in Mexico, it is important to note that 1991 and 1994 numbers are based on estimates, while 2000 numbers are based upon what manufacturing industries were required to report. Based upon increased industrial activity between 1994 and 2000 in terms of the number of facilities and the amount of production, it is a near surety that in fact hazardous waste generation would have increased significantly in that period. Another indication of the likely growth in hazardous waste generation is the significant growth in the number of firms treating and storing hazardous wastes between 1994 and 2000. For example, the number of temporary storage firms rose from 60 to 342 during the six year period. In addition, the number of industrial plants that incinerate hazardous wastes as an "alternative fuel" grew from 4 to 26 in the same period.[16] Regardless of the scarce and inaccurate data that is publicly available, it is clear that the generation of hazardous wastes in Mexico is increasing, not decreasing.

[15] Costner, Pat and Joe Thornton. *Playing with Fire: Hazardous Waste Incineration.* Second edition. 1993 Greenpeace.

[16] *Informe de la Situación General en Materia de Equilibrio Ecológico y Protección Al Ambiente 1993-1994.* SEDESOL, INE. Mexico 1994 (p.252-255); 2001. http://www.semarnat.gob.mx/dgmic/rpaar/rp/infraestructura/infraestructura.html

Table 2. Facilities Authorized to Treat Hazardous Wastes in Mexico, 1994-2000

Type of Facility	No. of Facilities 1994	No. of Facilities 2000
Used Solvent Recyclers	17	29
Used Oil and Lubricant Recyclers	9	15
Temporary Storage, Transport	60	342
Metal Recycling	5	18
On-site Mobile Treatment	26	35
Petroleum Treatment Facilities	10	16
On-site Private Incinerators	2	9
Cement Kilns and other Industrial Furnaces Authorized to Burn Hazardous Wastes	4	26
PCB Treatment Facilities	1	6
Medical Waste Treatment Facilities, including incinerators	16	37
Hazardous Waste Landfills	4	2

Source *Informe de la Situación General en materia de Equilibrio Ecológico y Protección Al Ambiente 1993-1994.* SEDESOL, INE. México 1994 (p.252-255); and http://www.semarnat.gob.mx/dgmic/rpaar/rp/infraestructur/infraestructura.html; 2001.

Hazardous waste management in Mexico is governed by a series of laws, regulations and standards – called NOMs or Official Standards – that indicate how to operate hazardous waste facilities and manage hazardous wastes. Unfortunately, there are large gaps in the regulatory structure, and at present there are no NOMs for incineration, thermal desorption or cement kiln burning of hazardous wastes. Instead, federal regulators have instituted a cooperative agreement with the cement industry to allow burning through temporary authorizations and have authorized other incineration facilities on a case-by-case basis through limited trial burns. In the process, the public has been left out of these agreements.

Presently, several NOMs are being considered for adoption, including one which would – for the first time – set emission limits for hazardous waste incinerators, including limits on dioxin and furans. Unfortunately, these proposed limits would be roughly twice the proposed levels in the United States and five times the proposed levels in Europe. In addition, the proposal specifically excludes cement kilns and other industrial furnaces from having these limits apply to them, and would give incinerators presently operating up to three years to comply with even these requirements. Not surprisingly, this proposal has been criticized by major environmental organizations in Mexico for legitimizing incineration without sufficient controls of both air emissions and incinerator ash management. A new proposed law, on the other hand, supported by environmental organizations in Mexico would limit incineration by barring certain kinds of highly toxic wastes from being burned in incinerators or cement kilns. Thus, incineration of hazardous materials such as PVC plastics and other wastes which contain chlorine would be banned since these wastes can generate toxic air pollutants like dioxins and furans, pollutants that are more dangerous than the original hazardous materials themselves.

Table 3. Comparison of Proposed Maximum Emission Limits for Incinerators, Mexico, U.S. and European Union

Chemical	Unit of Measurement	Proposed Emission Limit, Mexico	Proposed Emission Limit, US	Proposed Emission Limit, European Union
Dioxin and Furans	Ng TEQ/cubic meters	0.5	0.2	0.1
Mercury	mg/m³	0.07	0.04	0.05
Cadmium	mg/m³	0.07	0.1 (includes lead)	0.05 (includes thalium)
All other metals	mg/m³	1.4	0.055 (only includes Arsenic, Antiminium, Chromium and Berilium)	0.5
Particulate Matter	mg/m³	50	35	10
Hydrogen Chloride	mg/m³	15	75	10
Sulfur Dioxide	mg/m³	80	NA	50
Carbon Monoxide	mg/m³	63	115	50

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- Sources: SEMARNAT, PROY-NOM-098-ECOL-2000, Tabla 1; U.S. EPA, Proposed MACT Limits for Incinerators, U.S. Federal Registry, May 2, 1997; Michelle Allsopp, Pat Costner and Paul Johnston, *Incineration and Human Health – State of Knowledge of the Impacts of the Incinerators on Human Health*, Greenpeace Research Laboratories, University of Exeter, UK. March 2001, Table 5.1

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Table 4. Official Mexican Standards (NOM's), Agreements and Laws Related to Hazardous Waste Incineration

Standard Number	Name	Status	Date	To Whom Does it Apply?
NOM-087-ECOL-1995	Requirements for separation, storage, labeling, transport, treatment and disposal of medical hazardous wastes.	Current	1995	Both auto-clave facilities and incinerators that treat medical waste considered hazardous, although does contain specific emission limits.
NOM-040-ECOL-1993	Maximum emission limits for particulate matter, as well as control requirements for fugitive emissions from cement manufacturing facilities.	Current	1993	Cement industry, including those that incinerate hazardous wastes, but only applies to particulate matter, not to other types of air emissions.
	Agreement between SEMARNAT, National Chamber of Cement and Cruz Azul Cooperative to Establish an Alernative Combustion Energy Recycling Program	Current	March 1996; Renewed in September of 2001	Authorizes the burning of hazardous wastes in cement kilns for periods of one year, following test burns, although it does not establish specific emission limits, which are instead set on case-by-case basis.
PROY-NOM-098-ECOL-2000	Environmental Protection, Incineration of Wastes, Operating Specifics and Emission limits for Contaminants.	Proposal in Federal Registry	2001, published for comments	Would apply to facilities incinerating hazardous wastes, but specifically excludes industrial furnaces including cement kilns
PROY-NOM-040-ECOL-2001	Hydraulic Cement Manufacturing – Maximum Emission Limits for Air Contaminants.	Proposal in Federal Registry	February, 2002, published for comment	Would apply new Emission Limits to Cement Industry, including those burning hazardous wastes
	General Law for Integrated Mangement and Prevention of Wastes	Being Considered in the Mexican Congress	Proposed in November 2001	Would among other measures prohibit the incineration of certain wastes, such as lubricants, electric batteries, PCBs, heavy metals and PVC plastics

While Mexican authorities have at least temporarily legitimized incineration and combustion as safer forms of hazardous material "recycling," several studies have shown that incineration is a process that can seriously pollute the environment and cause permanent harm to people's health. While Mexican law permits the importation of hazardous wastes for "recycling" purposes only, this provision causes significant quantities of hazardous waste – some 255,000 tons of it in 1999 according to Mexican officials – to enter Mexico from the United States. Presently, however, none of this waste is "recycled" in incineration facilities; instead, used batteries or electric arc dust containing zinc, lead and other metals are recycled in metal smelter and recycling facilities. There is concern, however, that in the future, Mexican authorities could permit the importation of solvents, thinners and used oils for "energy recycling" in cement kilns and other industrial furnaces.

HAZARDOUS WASTE INCINERATION AND COMBUSTION IN TABASCO

Located in Southeastern Mexico, the State of Tabasco has a population of 1,891,829, or 1.9 percent of the national total (2000). The manufacturing industry is the largest single contributor to Tabasco's economy, accounting for more than 20% of the regional GDP.[17] Much of this manufacturing industry is related to the exploration and production of gas and oil, which produces significant amounts of hazardous waste as a by-product. In the last few years, Tabasco has begun to examine and deal with this important environmental and public health issue.

Map 1. State of Tabasco, Mexico

Source: http://travelamap.com/mexico/tabasco.htm

According to the National Institute of Ecology, 314 facilities in Tabasco reported producing a total of 134,096 tons of hazardous wastes in 2000, or 3.61 percent of the national total. In 1994, Mexican officials estimated that facilities in Tabasco produced 44,841 tons of hazardous waste, or 0.63 percent of the national total (see Table 5). It is important to note that the 2000 number is what firms actually reported generating, while the 1994 total is only an estimate. Still, given increased oil exploration and production in

[17] INEGI, http://tab.inegi.gob.mx/economia/espanol/agregada/agr_03.html

Tabasco – much of which was eventually exported to the U.S. -- it is not surprising to assume that hazardous waste generation has increased significantly since 1994.

Table 5. Hazardous Wastes Generated in Tabasco*

1994	44,841 tons
2000	134,096 tons

*1994 value is an estimate from Banco de Información Económica, http://dgchesyp.inegi.gob.mx/pubcoy/estamb/acthum/CIII35.html; 2000 value is the amount reported by companies to the National Institute of Ecology, http://www.semarnat.gob.mx/dgmic/rpaar/rp/volumen/volumen.shtml

The petroleum industry accounts for the largest share of hazardous waste generation in Tabasco. PEMEX Oil Company, for example, generated 112,412 tons of hazardous wastes in 1999 and treated only 51.6% of this. Health care and other manufacturing industries, in contrast, treat an average of 60.3% and 99.4% of their wastes, respectively. The accumulation of hazardous wastes in the petroleum activity started to decline after 1998 when PEMEX – under a new policy -- began contracting firms to treat hazardous wastes.

Table 6. Hazardous Waste Generation by PEMEX Oil Company and Percentage Treated

Year	Volume in Tons	% Treated
1997	63,555	Not Reported
1998	77,234	44%
1999	112,412	51.6%

Source: Secretary of Environment, Natural Resources and Fishing (SEMARNAP), Federal Delegation, Tabasco. 2000; and *Five-Year Evaluation of Environmental Management*, 1995-1999. p. 27

In response to the increase in hazardous waste generation and the change in PEMEX policy, waste management firms opened new treatment facilities in Tabasco. Among the facilities opening in recent years include both incineration and thermal desorption – as well as the combustion of hazardous wastes in cement kilns. While there is very little public information available concerning hazardous waste *generation or treatment* in Tabasco, the growth in hazardous waste treatment facilities seems to indicate increased waste generation and treatment (Table 7).

Table 7. Number of Facilities Authorized to Treat Hazardous Wastes in Tabasco

Type and Year	Number of Facilities
Hazardous Waste Treatment Facilities, 1995	5
Hazardous Waste Treatment Facilities, 1998	26
Hazardous Waste Treatment Facilities, 1999	27
Collection and Transport of Hazardous Wastes; Bioremediation Treatment; Thermal Treatment (incineration or combustion) Hazardous Waste Landfill	10 7 4 1

Source: Federal Delegate to SEMARNAP in Tabasco, as cited in Reforma Newspaper, November of 2000.

FIELD WORK

The report investigated five facilities in the state of Tabasco that incinerate and combust hazardous materials (see Map 2).[18] Two plants – Residuos Industriales Multiquim (RIMSA) and Promotora Ambiental del Sureste (PASA) – practice thermal desorption. A third thermal desorption plant operated by CYGSA Servicios is awaiting construction. One firm (SIDESOLH) performs incineration of biohazardous hospital waste. The final facility (Cementos Apasco – Planta Macuspana) incinerates hazardous waste in its cement kilns as an "alternative fuel."

RIMSA replied to initial requests to visit the site but failed to respond to subsequent correspondence. PASA did not reply at all. The CYGSA site is in very preliminary stages of construction, and the APASCO plant was only willing to offer a guided tour of their facility. Most of the firms' owners were uncooperative, and very little information was available from government environmental agencies about their practices. SIDESOLH was the only exception, opening its doors and its incinerator to inspection.

Despite claims by regulators that no thermal desorption process could produce dioxin and furans as a byproduct, a single sample of dust from the RIMSA thermal desorption site was sent for this analysis to the University of Niigata, in Japan. Dr. Kaori Takise analyzed the sample and found traces of dioxins that – by their very presence – point to larger questions of environmental quality and public health.[iv] In Tabasco, environmental authorities indicate that some of the ashes from incinerated material have been

[18] The full report provides more detail on the operation and compliance of the five facilities mentioned in this section.

[iv] The one kg soil sample was taken in late 2000 from a truck carrying soil treated by thermal desorption at a RIMSA facility to a nearby municipal dump. The dioxin level was 0.0111162 ng toxicity equivalent (ng-TEQ/g).

authorized for use as fill in new construction, depending on the composition of the ashes. Much of the ash is sent to municipal landfills, which lack double liners and other standards required of industrial waste landfills. This ash is potentially contaminated with substances that can cause harm to the environment or to public health.

Map 2. Location of Selected Hazardous Waste Incineration and Combustion Facilities in Tabasco

Name of Firm	Facility Location	Year Started	Type
SIDESOLH	Anacleto Canabal	2001	Hospital Waste
RIMSA	Anacleto Canabal, Municipio de Centro	1999	Thermal Desorption
PASA (1)	Anacleto Canabal	1998	Thermal Desorption
APASCO (2)	Macuspana	1999	Cement Kiln Burning of Hazardous Materials
CYGSA	Comalcalco	Awaiting Construction	Thermal Desorption

(1) PASA began operations as OSCA S.A. de CV. in 1998;
(2) The APASCO facility began operations in 1982 and started burning hazardous materials in 1999

LINKS BETWEEN NAFTA, INCINERATION, THE ENVIRONMENT AND PUBLIC HEALTH

The North American Free Trade Agreement (NAFTA) is neither the first nor the last step in the integration of the Mexican and United States economies, but it does represent the most important step in the process. Mexico began opening its borders in 1985 under the General Agreement on Tariffs and Trade (GATT), and the subsequent administrations have since worked to facilitate foreign investment, liberalize trade and reduce state regulatory intervention.

Environmental issues did not play a major role in early NAFTA negotiations. Presidents George Bush and Carlos Salinas de Gortari shared the vision that a North American trade bloc had little or nothing to do with environmental protection. It was only through pressure from environmental, labor and other civic organizations that the North American Agreement on Environmental Cooperation (NAAEC) and the Labor Side Accords became NAFTA side agreement.

The North American Commission on Environmental Cooperation, a result of the environmental side agreement, has been an important resource for both studying the links of trade and environment, helping governments work to identify issues and to bring to light complaints by citizens about the failure of governments to effectively enforce environmental laws.

While the CEC has been a new and important institution in the struggle to link trade with the environment, NAFTA is not an environmental agreement, but a free trade, or more accurately, a managed trade agreement designed to lower and eliminate tariffs, provide investor protection and eliminate "non-tariff" barriers, which in some cases could include environmental regulations. In fact, protection mechanisms for investors -- through NAFTA's Chapter 11 – are considerably stronger than our mechanisms to ensure environmental protection and enforcement (see box in text).

During the NAFTA debate, however, supporters argued that the increased trade and investment likely to stem from the agreement, would translate into improvements in environmental regulations, investment and enforcement for three reasons:

- Economic integration would lead to an upward harmonization of environmental laws and regulations in Mexico;
- International competition and investment would help transfer clean technologies to improve quality, productivity and the environment;
- The growth in the economy would lead to more public and private monies invested in infrastructure, including environmental infrastructure;
-

Each of these claims is considered below.

NAFTA'S Chapter 11 and Hazardous Waste in Mexico

NAFTA sought to attract foreign investors to Mexico by giving them the same rights that Mexican investors have. The prioritization of free trade policies above other interests has made it more difficult to enforce environmental laws, due mostly to NAFTA's controversial Chapter 11. In this chapter, (Article 1102) it states that all investors from member nations must receive equal treatment from the country in which they are investing. Article 1110 of the Treaty declares, "no Party may directly or indirectly nationalize or expropriate an investment of an investor of another Party in its territory or take a measure tantamount to nationalization or expropriation of such an investment," with few exceptions. Under Article 1115, private investors can initiate an arbitration process against a national government if they claim that the government regulatory actions have unduly interfered with their business investment. If a country or state, through its actions, does expropriate an investment, then an arbitration panel may require the country at fault to compensate the investor for the lost investment. The hazardous waste management firm Metalclad has already used this arbitration process to its advantage. In 2000, a tribunal ordered Mexico to pay Metalclad $16.7 million in compensatory damages for the local and state government's role in preventing the firm from operating its hazardous waste landfill in San Luis Potosí. The state government had issued an ecological decree protecting an area that included the landfill site and the local government had refused to grant a land site permit. Without NAFTA, Metalclad would have had to protest the local regulations in a Mexican court. While NAFTA Chapter 11 "law" is still developing, early decisions such as Metalclad indicate the potential for Chapter 11 to be used to block or discourage government regulation, particularly of foreign investors.

Hazardous Waste Regulations and Enforcement since NAFTA in Mexico

The United States and some European countries have had to confront the direct relation between hazardous waste incineration, environmental contamination and public health. In recent years, the combination of strengthening environmental legislation and intense public opposition to incinerators has forced the closure or cancellation of many incinerators in developed countries. New environmental laws in the United States contributed to a reduction in the number of cement kilns burning hazardous waste though the practice continues.[19] There were 27 cement kilns in the United States burning hazardous waste in 1994 and only 18 in 2000, although the volume of waste treated nationwide has remained constant. Overall hazardous waste regulation has increased in the United States since NAFTA, while Mexico has approved only one standard relating to hazardous wastes since 1993, although a number of others have been proposed (see Table 4).[20]

More lenient environmental regulations in developing countries have encouraged incinerator producers to focus their efforts on developing nations. Companies that manufacture incinerators are currently concentrating their efforts in Asia, Africa and Latin America. Many residents of these regions are either unaware of the harmful health and environmental effects of incineration or have not yet organized against the facilities,

[19] Marisa Jacott, Cyrus Reed and Mark Winfield. April 2001. *The Generation and Management of Hazardous Wastes and Transboundary Hazardous Waste Shipments between Mexico, Canada and the United States, 1990-2000* (Austin, Texas: TCPS), pp. 18 and 70.
[20] See Mexican norm, NOM-087-ECOL-1995, concerning biological-infectious waste.

while the governments have yet to develop a regulatory and inspection framework for such facilities. As detailed earlier in this report, such is the case in Mexico.

In addition to the regulations themselves being weaker in Mexico, the enforcement of the regulations that do exist appear to be inadequate. Although Mexico's environmental enforcement agency (PROFEPA) increased the number of inspectors and inspections of hazardous waste generation and treatment facilities between 1993 and 1996, these numbers have since declined.

Table 8. Industrial Inspections and Compliance with Environmental Regulations, 1994-2001

Year	1994	1995	1996	1997	1998	1999	2000*(partial)	2001
Inspections	12,902	12,881	13,224	11,761	9,590	8,671	4,239	7,912
Without Violations (%)	20.6	27.6	25.1	20.6	21.7	20.2	20.9	22.6
Minor Violations (%)	75.7	70.3	72.9	77.4	76.7	78.1	77.0	75.4
Serious Violations (%)	4.1	2.1	1.9	2.0	1.6	1.7	2.1	2.0

Note: For 2000, data was only available for January-June.

Source: PROFEPA. *Índices de Cumplimiento de la Normatividad en* México, January 1999 and http://www.profepa.gob.mx

According to PROFEPA officials, there is less need for inspection now that many of the larger problems at manufacturing facilities have been resolved. In fact, however, environmental compliance at hazardous waste generation and management continues to be problematic. For example, a recent survey found that between 1999 and September of 2001, some 259 companies which manage hazardous wastes received an average compliance score of 43.9 percent, while some 1,165 manufacturing facilities and hospitals that generate hazardous wastes had an average complaince rating of 58.1 percent.[21] Government officials point out, however, that these low levels of compliance do not include companies and facilities that are taking advantage of a *self-auditing* program, whereby firms conduct internal investigations of their behaviors and work with the government to correct them. The self-audits began in 1992, but they have become increasingly popular recently through the participation of large firms, such as CEMEX, General Motors and PEMEX. In Tabasco, 107 firms began or finished environmental self-audits between 1992 and February 2002, including 96 PEMEX-related firms.[22] Although the program apparently shows signs of improving environmental practices in Mexico, critics protest the fact that results of the audits are not made public and that companies are not penalized for breaking the law among other issues.

[21] PROFEPA, Information from Website (www.profepa.gob.mx). Indices de Cumplimiento de la Normatividad Ambiental en México.

[22] PROFEPA, Registro de Instalaciones al Programa Nacional de Auditoria Ambiental, http://www.profepa.gob.mx/saa/audita35.htm

One promising development is the recent passage of amendments to the main environmental law in Mexico, the LGEEPA, or "General Law on Ecological Equilibrium and Environmental Protection." These amendments include for the first time the requirement of an obligatory Pollutant Release and Transfer Registry (PRTR or RETC in Spanish), similar to the Toxic Release Inventory in the U.S.. The change will require manufacturing facilities and hazardous waste management facilities in Mexico to report toxic releases, air emissions, hazardous waste generation and wastewater discharges to a publicly accessible database. In the past, this reporting has been voluntary and few companies have participated. While the rules and regulations governing the new law are still being implemented, having publicly available data on pollution in Mexico is a positive step since NAFTA and a direct result of both pressure by civic organizations and by the Commission on Environmental Cooperation, created as a result of a NAFTA side agreement.

International Competition and Investment in Hazardous Waste Management Technology

The 1986 La Paz Agreement regulates the shipment of hazardous wastes between the United States and Mexico. According to the treaty, the United States will accept wastes generated by the maquiladora export industry in Mexico, as required by Mexican law, as long as the waste results from inputs imported from the U.S.. These hazardous wastes are mostly the result of inputs that the United States sends to Mexico for assembly. Most experts and governmental officials agree that only 10 to 20 percent of the waste generated in the maquiladora industry is actually exported to the U.S. despite these requirements. While Mexican maquiladoras and other manufacturing plants have increased exports of hazardous waste to the U.S over time, the amount is a tiny portion of the total waste managed in the U.S. In 1999, the Mexican government reported that its industry exported some 84,000 tons of hazardous waste, more than 50,000 of which came from maquiladora industries.[23]

Mexico, on the other hand, imports significantly more amounts of hazardous waste from the U.S. Under Mexican law, however, Mexico only allows the import of hazardous wastes from the United States *for "recycling", which thus far has conisted mainly of recycling lead batteries and extracting metals from electric arc furnace dust.* Between 1995 and 1999, hazardous waste imports from U.S. companies grew from 160,000 to 255,000 tons[24].

Where have these imports been going? Apparently to recycling facilities. Since 1994, there has been a tremendous growth in hazardous waste facilities authorized in Mexico, particularly in terms of recycling facilities, which includes metal recycling, solvent recycling and "energy" recycling such as that practiced in cement kilns (see Graph 1). So far, Mexican officials have not authorized imports for fuel blending or energy recovery.

It appears that at least part of this increase in management facilities can be explained by investments and technology transfer from the U.S. to Mexico. Over the last decade, the Mexican Ministry of the Environment and Natural Resources (SEMARNAT) has authorized 19 plants to prepare "alternative fuels," 26 plants in various industries

[23] US EPA, Binational Solid and Hazardous Waste Working Group, Border XXI, 2001.
[24] Ibid.

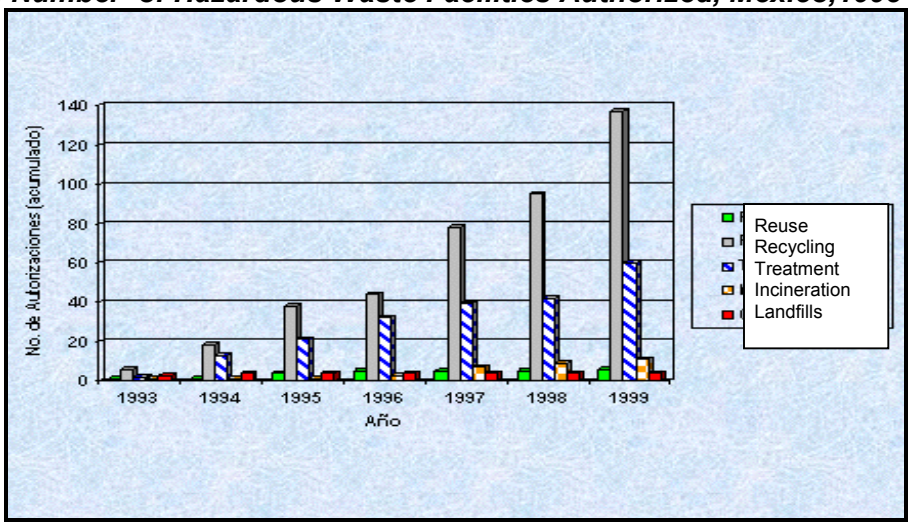
including the cement industry to burn the fuel, as well as 14 hazardous waste incinerators. The 26 hazardous waste burning industrial plants are Mexico-based, and they operate under a 1996 Mexican cement industry agreement – without specific standards -- to burn hazardous wastes in their cement kilns which was recently renewed in 2001. Nonetheless, the investment and technology to blend the fuels before they are burned are mostly foreign-based. A number of U.S. hazardous waste managemetn companies, including Mobley Environmental Management, BFI, and Safety Kleen, have been involved in hazardous waste projects in Mexico, to varying degrees, and more specifically in promoting the blending of hazardous wastes for burnign in cement kilns.[25] In Tabasco, RIMSA, which runs both a thermal desorption unit, and also is engaged in fuel blending and landfilling in Northern Mexico, has received substantial technical input from Waste Management, Inc. of the United States. Similarly, PASA/ONYX received its technology for its thermal desorption from a firm in Houston.

Thus, since NAFTA, it appears that foreign investment, increased hazardous waste imports and the transfer of technology have all helped spur an increase in the number of waste management facilities in Mexico. On the one hand, this could be seen as a positive trend, since Mexico certainly needs to manage its hazardous wastes and lacks the capacity to do so. Nonetheless, because of the lack of regulations and enforcements, these types of technologies seem to have been pushed on the Mexican government with little foresight or questioning. Thermal desorption, hazardous and medical waste incineration and hazardous waste combustion in cement kilns have been accepted in Mexico and – in the present study -- Tabasco, even though specific standards have not yet been established.

The hazardous waste treatment plants opening in Tabasco are supported by the government as examples of successful investment projects, but environmental and health consequences of these plants have not been adequately considered.The combination of weaker environmental regulations and enforcement and increased opportunities for firms to treat and “recycle” hazardous waste in Tabasco could be threatening environmental quality and public health across the state.

[25] Reed, Cyrus H., Mary Kelly, Fernando Bejarano González y María Teresa Guerrero *LA INCINERACION DE RESIDUOS PELIGROSOS EN HORNOS CEMENTEROS EN MÉXICO: LA CONTROVERSIA Y LOS HECHOS. 1998*. Comisión de Solidaridad y Defensa de los Derechos Humanos, A.C. y Texas Center for Policy Studies.

Figure 2. Number of Hazardous Waste Facilities Authorized, Mexico,1993-99



Source: National Institute of Ecology, 2000;
www.ine.gob.mx/dgmrar/rip/infraestructura/infraestructura.html.

Financing the Environmental Deficit

A third claim – that NAFTA would generate additional wealth which would be invested in environmental protection both by the government and private industry – also appears suspect. On the one hand, there has been a substantial increase in public and private funds flowing to the construction of water treatment wastewater treatment plants since NAFTA. This is particularly true along the northern border, in large part because of the efforts of the North American Development Bank and Border Environment Cooperation Commission, created in legislation parallel to NAFTA.[26]

Nonetheless, investment in both solid waste and hazardous waste management from the public sector has remained stagnant. While there has been increased monies spent on environmental clean-up by PEMEX in Tabasco and other states, most sites contaminated by environmental contaminants have not been dealt with, and private industry has not volunteered to spend money on clean-up. Unlike the U.S., there is no "superfund" program to clean up such sites and little enforcement to force clean-up.
If there has been private investment in the establishment of a network of hazardous waste management facilities – such as the energy "recycling" cement kilns and thermal desorption units which have proliferated in Tabasco – it has occurred in response to making profits, not to cleaning up the environment. Companies have chosen to shift their wastes – and their problems – off-site and out-of-site to third parties, who themselves treat the wastes with little regulation, inspection or enforcement.

[26] See Texas Center for Policy Studies, *The BECC and NADBANK: Achieving Their Environmental Mandate*, April 2001;

CONCLUSIONS

Since NAFTA, the opportunity for firms like PEMEX to export its products, and for U.S. companies to invest in Mexico have increased, and investment and trade numbers have skyrocketed. At the same, it does appear that this increase in production has led to increases in hazardous waste generation and opportunities for investment in hazardous waste management facilities and technology. Nonetheless, more management does not equal good management, and the promised environmental benefits to Mexico and to Tabasco have not materialized.

Incineration of hazardous wastes has been expanding in Tabasco, even though the Mexican government has yet to adopt strict regulations governing the practice. This trend poses potential adverse risks to the public health and the environment, and there has been a distinct lack of public participation in the authorization process. Tabasco's citizens are faced with difficult questions about the safety and performance of these new medical waste incineration, cement plants burning hazardous wastes and thermal desorption units which are combusting waste at their doorstep. With little information publicly available, the consequences of breathing these fumes or lining landfills and streets with ashes is unknown.

Fortunately, there are alternatives. Pollution prevention, waste reduction and other, more advanced technologies provide safer waste management alternatives. The first step toward protecting human health and the natural environment is to simply reduce the use of toxic substances and the generation of hazardous wastes. By limiting the production of these materials, logically, there will be less of them to eliminate. This is the idea behind "Clean Production and Zero Waste," a concept that seeks to remove hazardous materials from every stage of the production process. To deal with the hazardous waste already in existence, alternatives to incineration include chemical neutralization, supercritical water oxidation and biological treatment. Common alternatives to incinerating medical waste include classification and reduction, autoclave, microwaving, chemical disinfection and deep burial. These technologies do not involve burning hazardous materials and polluting the air, soil and water. In cement manufacturing, natural gas is a sound alternative to burning hazardous waste in cement kilns. Given incentives and a different regulatory structure, NAFTA rules could even help investment and technology transfer in these other types of more appropriate hazardous waste management to Mexico.

For more information:

You can request the complete report, ***Tratadoras Térmicas de Residuos Peligrosos: Caso Tabasco***, which is available only in Spanish and contains full citations, from any of the following organizations:

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http://www.laneta.org

INTERESTS AND OBJECTIONS:

The Puebla-Panama Plan and the Oaxaca-Istmo-Huatulco Highway Project

English Summary: Cyrus Reed and Oliver Bernstein, Texas Center for Policy Studies

Spanish Report: Lic. Liz Ivett Sanchez Reyna and Lic. Javier Balderas Castillo, Centro de Derechos Humanos Tepeyac del Istmo de Tehuantepec, A.C.

Editing: Olinca Marino, La Neta: Proyecto Emisiones

Centro de Derechos Humanos Tepeyac del Istmo de Tehuantepec, A. C.

FRONTERAS COMUNES

TEXAS CENTER FOR POLICY STUDIES

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Interests and Objections in the Puebla-Panama Plan and the Oaxaca-Istmo-Huatulco Highway Project

Due to its strategic location between the Atlantic and Pacific Oceans, the region of Central America and southeastern Mexico has been the setting for a multitude of projects aimed at increasing and facilitating commerce. Over time, a barrage of commercial agreements between the nations of Central America further promoted economic integration. Mexico led these efforts by signing at least 11 commercial agreements with various nations and by implementing the North American Free Trade Agreement (NAFTA) in 1994. Nearly a decade later, the spotlight returns to the region with the Puebla-Panama Plan (PPP), a multifaceted strategy to take advantage of the region's resources.

Many leaders agree that significant infrastructure improvements are needed in southeastern Mexico. The poor quality of the region's roads and its unpredictable energy network may be inhibiting economic growth. Proponents of the PPP believe that investing in infrastructure will attract a greater number of investments and will facilitate exports from the region, but some local residents oppose aspects of the proposal, claiming that they have been excluded from the planning process, or that aspects of the proposal will have negative cultural, environmental and/or economic impacts.

More than simply the next proposal to blur national borders in the name of commerce, the PPP is a comprehensive plan that requires further study. After reading the PPP proposals and studying the Mexican government's plans, the **Centro de Derechos Humanos Tepeyac del Istmo de Tehuantepec, A.C.,** the **Texas Center for Policy Studies**, **LaNeta: Proyecto Emisiones** and **Fronteras Comunes** have published a report, *Intereses y resistencias: Corredor Carretero Oaxaca-Istmo-Huatulco*. The report investigates claims that elements of the Puebla-Panama Plan lack social and environmental perspective. In addition, it highlights examples of communities being excluded from the planning process for a project that will eventually affect them either directly or indirectly. The Oaxaca-Istmo-Huatulco highway project may be one example of this exclusion, as the communities involved have not been adequately informed or consulted about the highway, and have not been able to determine the link between this local highway and other highways contained in the initial PPP documents. The report also examines the link between the PPP, NAFTA, and the proposed Free Trade Area of the Americas (FTAA). This summary begins with a brief description of the region and its economy.

I. Introduction to the Region

A. Southeastern Mexico: Background

Southeastern Mexico is composed of the states of Campeche, Chiapas, Guerrero, Oaxaca, Puebla, Quintana Roo, Tabasco, Veracruz and Yucatan, with a combined surface area of 502,738 square kilometers, or 25.7% of the national territory. Approximately 27.5 million people, or 28.3% of Mexico's population, live in this region. In addition, nearly 75% of all Mexican residents over five years old that speak an indigenous language live in this region.

Map 1. Southeast Region of Mexico

Table 1. Indigenous And Total Populations Of Southeast Mexico

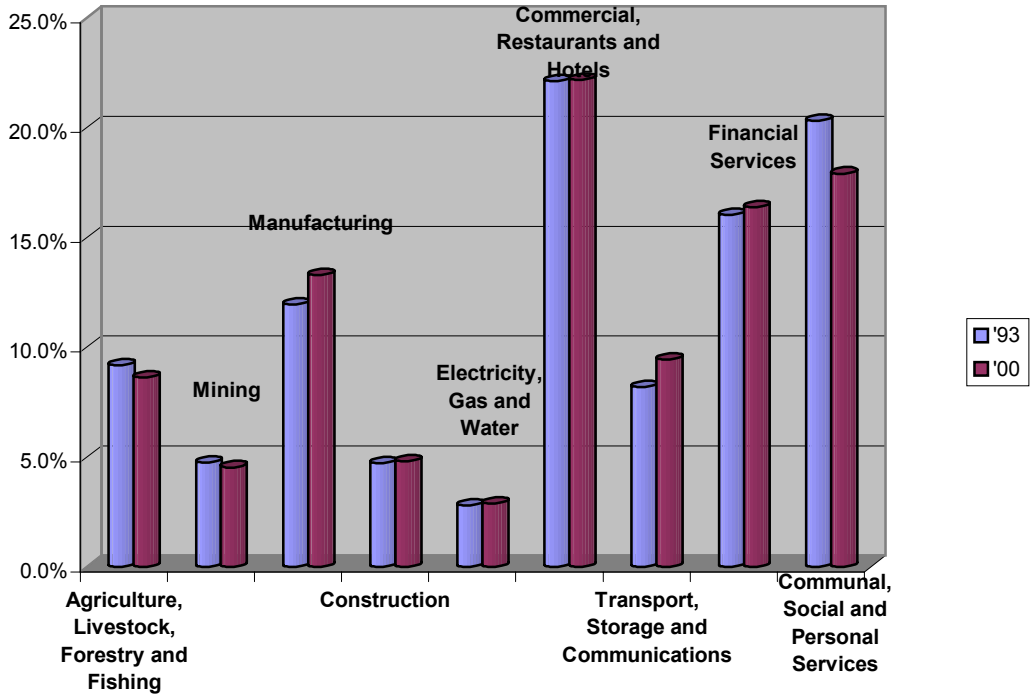
State	Total Population, 2000	Population over 5 Years Old that Speaks An Indigenous Language, 2000
Campeche	690,689	93,765
Chiapas	3,920,892	809,592
Guerrero	3,079,649	367,110
Oaxaca	3,438,765	1,120,312
Puebla	5,076,686	565,509
Quintana Roo	874,963	173,592
Tabasco	1,891,829	62,027
Veracruz	6,908,975	633,372
Yucatan	1,658,210	549,532
Regional Total	27,540,658	4,374,811
National Total	97,483,412	6,044,547

Source: INEGI, XII General Census of Population and Housing, 2000

The economies of the southeastern states depend heavily on agriculture, industry, services, commerce and transportation. In 1993, transportation and services generated 45% of the Gross Domestic Product (GDP), the commercial and tourism sectors generated 22%, the industrial sector generated 12% and agriculture generated 9% of the GDP.

The implementation of NAFTA, beginning in 1994, has apparently not had a significant effect on the macro-economic structure of this region. By 2000, transportation and services declined slightly (to 44%) and industry grew slightly (from 12 to 13%), but the overall economic distribution remained largely the same (see Chart 1). Agriculture declined from 9 to 8% of regional GDP. Although the structure did not change significantly, the overall GDP still rose approximately 20% during the seven-year period, due mostly to growth in the commercial, tourism and financial service sectors.

Chart 1. Percent of Gross Domestic Product, 1993 vs. 2000 by Major Economic Sector, Nine Southeastern States



Note: Total GDP for the nine states was $212 billion pesos in 1993 and $255 billion pesos in 2000, in 1993 prices.
Source: INEGI, Sistemas de Cuentas Nacionales de México, 2002.

Although it represents less than 10 percent of the regional GDP, the Southeast contains approximately one third of Mexico's agricultural land, and accounts for about 30% of the total national agricultural production value.[27] The region is the country's principal source of several crops, including cocoa, figs, pineapples, coffee, cherries, papayas, radishes, peanuts, sugar cane, mangos and oranges. These crops thrive due to the abundance of water and the hot, humid climate. The region's jungles and forests also occupy an important place in society, although they are increasingly being harvested. Despite providing jobs and potential economic gains, aggressive forestry in the region has had serious social and ecological consequences, especially in Chiapas and Oaxaca.[28]

[27] *Secretary of Agriculture, Livestock and Rural Development, Annual Agricultural Production Statistics, 1999*

[28] For a good discussion of problems with forestry management in the Lacondon jungle of Chiapas, see Environmental Law Institute, "Chapter 4: The Montes Azules Biosphere Reserve," in *Legal Aspects of Forest Management in Mexico* (Washington, D.C.: ELI, April 1998)

Table 2. Importance of Agriculture in Southeast Mexico, 1999

State	Planted Area (hectares)	Production Value (billion pesos)
Campeche	216,414	$0.9
Chiapas	1,533,913	$8.5
Guerrero	828,460	$5.4
Oaxaca	1,183,781	$7.7
Puebla	1,001,771	$7.3
Quintana Roo	122,006	$0.4
Tabasco	303,069	$2.1
Veracruz	1,664,157	$14.7
Yucatan	787,514	$1.6
Regional Total	7,641,085	$48.6
National Total	21,983,180	$164.0

Source: Secretary of Agriculture, Livestock and Rural Development, Annual Agricultural Production Statistics, 1999

Since NAFTA took effect, there has been a noticeable change in Mexico's corn imports from the United States. From 1994 to 2000, annual imports rose from 3.1 metric tons to 5.2 metric tons, due in part to the elimination and reduction of tariffs.[29] The more dramatic changes in corn production since NAFTA have taken place in northern Mexico, where low prices, droughts and competition with imports have led to a shift away from corn and toward fruit and vegetable production for the export market. In southeast Mexico – especially in the state of Oaxaca – the planted area and production levels of "traditional" products like corn, beans, sorghum and wheat have matched – and even surpassed – pre-NAFTA levels. In 1994, growers cultivated 510,000 hectares of corn in Oaxaca, while in 2000, that number reached 565,000. One reason why producers could maintain this level is that the imports – or competition – has not reached the South in the same way as it has reached the North. The more traditional diets and lifestyles of the southeastern populations have led to a greater reliance on local sources of production than on imported agricultural products. Southern populations are also more likely to make their own corn tortillas than they are to buy commercial corn or wheat tortillas, which also affects demand.[30]

Still, there is considerable concern that over time, low-cost imports of corn and other crops could supplant Mexican farmers. In addition, recent reports show that much of the imported corn is genetically engineered, which leaves Mexican corn susceptible to

[29] As reported in Nadal, Alejandro. "Issue Study 1. Maize in Mexico: Some Enviromental Implications of the North American Free Trade Agreement (NAFTA). *Assessing Environmental Effects of the North American Free Trade Agreement (NAFTA).* Montreal: Commission for Environmental Cooperation, 1999.

[30] For more discussion of the issue of corn production in the southern states versus the northern states, see Ackerman, Frank, Luke Ney, Kevin Gallagher and Regina Flores, Global Development and Environment Institute, Environmental *Impacts of the Changes in U.S. – Mexico Corn Trade under NAFTA*, Draft, (Montreal, Canada: Commission on Environmental Cooperation, January 2002).
Available at http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=637.

genetic pollution.[31] Mexico is the source of corn's greatest genetic diversity, but increased imports of modified strains of corn threaten this diversity.

The Maquiladora Industry

The industrial sector has also increased its presence in the Southeast in recent years, although not as dramatically as in the North or center of the country. Overall, the region's participation in the national GDP for manufacturing has actually fallen since NAFTA's enactment, contrary to most expectations.

The industrial growth in the Southeast has been concentrated in the number of maquiladora factories and jobs in the maquiladora export sector (see Table 3). Maquiladoras are manufacturing and assembly plants owned mainly by non-Mexican companies. Raw materials are delivered to the maquiladoras for assembly, and then the final product is exported with minimal taxation. In 1990 the southeastern states had only 2,950 people working in maquiladoras. This figure reached more than 13,500 in 1995, or two percent of the national total. In 2000, the southeastern states had almost 80,000 people working in maquiladoras, the majority of them – some 71,000 – in Puebla and Yucatan, where there were more than 235 factories. In contrast, in 1998 there was only one registered maquiladora in the state of Oaxaca.

Table 3. Number of People Working in Maquiladoras, Selected States, 1993-2002

Year	Puebla	Yucatan	Two-State Total	% of National Total
1993	4,547	5,342	9,889	2.52%
1994	5,582	5,819	11,401	2.23%
1995	7,579	6,280	13,859	2.42%
1996	12,120	8,029	20,149	2.90%
1997	14,907	10,897	25,804	3.09%
1998	22,818	15,881	38,699	4.03%
1999	29,694	24,984	54,678	4.99%
2000	38,008	32,833	70,841	5.51%
2001	36,988	31,795	68,783	5.72%
2002	29,669	28,401	58,070	5.45%

Source: INEGI, System of National Accounts of Mexico

When the maquiladora program began in 1965, the emphasis was on creating Northern border facilities that could easily export to the United States. Later, Mexico began to promote the establishment of maquiladoras in the Mexican interior. Both nationally and in the Southeast, the highest growth in the maquiladora industry took place following NAFTA's enactment through 2000. The recession in the U.S. has led to recent declines in the industry, however.

In terms of jobs, investment and exports, the recent growth in the maquiladora industry does not directly relate to NAFTA, but instead has more to do with the devaluation of the peso in 1994. In less than a month, the cost of labor fell by half, encouraging investment in Mexico through the maquiladora program. The increased demand for products by the United States market has also contributed to the industry's expansion.

[31] Michael Pollan, "Genetic Pollution." *The New York Times*, Dec. 9, 2001 – Sec. 6, p. 74

Still, certain NAFTA provisions affect aspects of the maquiladora program and provide an incentive for the establishment of new maquiladoras in the Mexican interior. For example, NAFTA eliminated the tariffs on exported products from Mexico to the United States, making this commerce more affordable. At the same time, NAFTA eliminated the quotas that set percentages of goods that maquiladoras had to export, meaning that the facilities could now choose to sell 100% of their products in Mexico. This, too, led to more maquiladoras in central and southeastern Mexico.

The growth in the maquiladora sector accounts for most of the manufacturing growth in certain southeastern states. Other states like Oaxaca, Chiapas and Campeche, experienced relatively little growth in the number of employees in the industrial sector. The economic growth in these states has been concentrated primarily in the mining, financial services and tourism sectors.

Table 4. Manufacturing Sector Employment in Southeast Mexico, 1988-98

State	Manufacturing Sector Employment, 1988	Manufacturing Sector Employment, 1993	Manufacturing Sector Employment, 1998	Percent Annual Change, 1988-98
Campeche	7,264	11,658	8,547	1.77%
Chiapas	20,754	27,451	30,342	4.62%
Guerrero	17,330	39,266	36,636	11.14%
Oaxaca	32,653	43,413	52,176	5.98%
Puebla	115,622	167,056	225,188	9.48%
Quintana Roo	5,700	8,575	9,364	6.43%
Tabasco	15,488	19,839	20,939	3.52%
Veracruz	121,327	122,355	132,809	0.95%
Yucatan	33,630	18,346	69,936	10.8%
Regional Total	369,768	457,959	585,937	5.84%
National Total	2,671,349	3,340,973	4,232,322	5.84%

Source: INEGI, Industrial Census XIII, XIV y XV.

Although not a significant factor in the regional GDP, mining – which includes the petroleum exploration sector and the gold and sulfur mining operations – is locally important in some areas. For example, in 2000, the nine southeastern states produced 2.9 percent of the country's gold and 2.4 percent of the silver; 3.1 percent of the lead and 4.4 percent of the zinc; and 54 percent of the sulfur, principally in Tabasco, Oaxaca and Veracruz.[32]

[32] INEGI. National Institute of Statistics. Institutue of Economic Statistics. *Estadísticas de la Industria Minerometalúrgica*

Four southeastern states – Campeche, Tabasco, Veracruz and Puebla – are petroleum and natural gas production centers. These four states – with Campeche and Tabasco leading the country in hydrocarbon production – produced 98% of Mexico's crude oil and 66% of the country's natural gas in 2001. [33]

Currently, less than 6% of Mexico's exports come from the Southeast. Many of the Puebla-Panama Plan supporters feel that this is due to poorly developed infrastructure. Mexico's current transportation system was designed in an east/west radial fashion, meaning that many highways and trains pass through the center of the country regardless of their destination. This system is not conducive to the export of products from Central America to the United States or vice versa. Proposals under the PPP would include corridors that permit the rapid transit of people and goods from one end of the country to the other (north/south).

B. The Isthmus of Tehuantepec: Local Background

The Isthmus of Tehuantepec is the narrowest point of Mexico, stretching 220 kilometers between the Gulf of Mexico to the north in Veracruz and the Pacific Ocean to the South in Oaxaca (See Map). It is composed of two large plains amidst the Sierra Madre mountain range of Oaxaca, as well as the Sierra Atravesada, with little change in elevation between the two oceans. The area of southeastern Mexico that surrounds the Tehuantepec Isthmus has the country's highest rates of extreme poverty as well as the lowest literacy rates and worst access to basic services, as compared to the national average. This profound poverty contrasts sharply with the region's rich culture and biodiversity. Overall, Mexico is home to 10 percent of the world's animal species and is included on the list of the planet's 12 megadiverse countries.

The Tehuantepec Isthmus has high annual rainfall, fertile soil, rich biodiversity and, more importantly, is one of the shortest distances between the Atlantic and Pacific Oceans. The quantity and quality of natural resources in the area have peaked the interest of those wishing to take advantage of both the resources and the potentially abundant labor of the local, largely indigenous, communities.

[33] Preliminary Data from PEMEX, Gerencia de Evaluación e Información, Mexico, 2002.

Map 2. Tehuantepec Isthmus

Former Mexico President Ernesto Zedillo brought attention to the region in the early 1990s with the "Megaproject of the Isthmus of Tehuantepec." The Megaproject called for creating an infrastructure network of canals, railroads and highways that would rival the Panama Canal. Although the Megaproject failed to develop in its first incarnation, many view the current plans for the Isthmus, in part through the PPP process, as simply the next "megaproject" to develop the region.

One of the proposed infrastructure improvements is a superhighway, stretching from Huatulco on the southern Oaxaca cost through the Tehuantepec Isthmus to the Capital City of Oaxaca. Along this proposed route in the Isthmus are communities composed chiefly of Zapoteca and Chontales indigenous peoples. These communities are rich in customs and traditions, make their living principally through agriculture, and often own land communally. In addition to its rich biodiversity, there are vast mineral deposits as well as water resources, with several major rivers, in the Tehuantepec region.[34]

[34] According to the 2000 Mexican Census, there are about 4,000 miners in Oaxaca; about 700 of those live in municipalities making up the Tehuantepec District.

II. A Vision and a Plan

In March 2001, Mexican President Vicente Fox officially released the Mexican segment of the Puebla-Panama Plan. The Plan includes projects in Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica and Panama, as well as in the southeastern region of Mexico. The PPP areas in the states of Chiapas and Oaxaca are home to the greatest concentration of biodiversity in Mexico. This conflict between rich biodiversity and impoverished constituency is critical to the debate over the Puebla-Panama Plan, the stated goal of which is to encourage development that will improve the quality of life for the population.

Map 3. Puebla-Panama Region

Source: National. Institute of Statistics, Geography and Informatics, http://www.inegi.gob.mx

Mexico's *2001-2006 National Development Plan* provides a framework for governmental projects and programs that closely reflects the themes of the Plan Puebla-Panama. The Development Plan's goal for 2025 is to help make Mexico a nation *that will have achieved a reduction of its extreme social inequalities and that will offer its citizens opportunities for integral development and a life based on the respect of the law and on the real exercise of their human rights.*[35] Much of the same language appears in the Plan Puebla-Panama's initiatives, which include references to human rights, sustainable development and environmental protection. The announcement of the PPP was also accompanied by the Interamerican Development Bank's announcement of its eight "Mesoamerican initiatives": Sustainable development, human development, disaster prevention and mitigation; tourism; facilitation of commercial exchange, transit

[35] Mexican Government, National Development Plan; http://pnd.presidencia.gob.mx/pnd/cfm/index.cfm

integration, energy interconnection and telecommunications. All of these initiatives receive consideration under the PPP.

III. Relationship between NAFTA and the PPP

On the surface, there is no direct relationship between the North American Free Trade Agreement (NAFTA) and the Puebla-Panama Plan. On the one hand, NAFTA is an international trade agreement between Mexico, the United States and Canada signed in 1993 and implemented in 1994. Over a period of 15 years, NAFTA will gradually reduce and eliminate tariffs and customs duties on products moving between the three countries and will prevent the implementation of non-tariff trade barriers. The Agreement also states that all investors from member nations must receive equal treatment from the country in which they are investing. NAFTA seeks to increase trade, investment and economic growth and establishes rules for international commerce and investment.

The Puebla-Panama Plan, on the other hand, is a series of programs authorized by the Mexican government, the seven Central American countries and the Inter-American Development Bank, among others. The programs will attempt to modernize several sectors including agriculture and industry, while improving transportation infrastructure and investment in social development programs like education and health. For the most part, the PPP is not an agreement that considers tariff changes or new investment rules, although it does call for harmonization of some highway construction regulations and energy systems among different governments.

There is an indirect relationship between NAFTA and the PPP, however, because the goal of the PPP is to permit southeastern Mexico and Central America to better take advantage of NAFTA's "benefits" by fully integrating these regions into the economies of the United States and Canada. The proponents of the Plan argue that poverty in southeastern Mexico and Central America is partially due to the lack of commercial opportunities in the region. The Plan also addresses the lack of education and practical training in the area, and highlights the importance of assisting indigenous residents to speak Spanish.

In essence, the idea behind the PPP is that if governments invest in infrastructure and social development, then the private investment will follow, creating jobs and facilitating the export of goods to the United States and Canada.

The PPP is also a preparatory step toward a potential Free Trade Agreement for Central America (sometimes called CAFTA) being pushed by the Bush Administration, as well as a Free Trade Agreement of the Americas (FTAA), which would essentially be a NAFTA for the entire American continent, except for Cuba.[36] Government leaders are still debating the FTAA, which probably would not take effect before 2005. If approved, then the lack of tariffs anywhere in hemispheric trade might mean that Central America and southeastern Mexico would see a substantial increase in the circulation of goods, trucks, ships and planes. The patrons of the PPP are eager to prepare the region for this possibility.

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[36] Robert Zoellick, United States Trade Representative "Administration to Proceed on Central America Trade Agreement," Letter to Congress, August 22, 2002 Available at http://usinfo.state.gov/regional/ar/trade/02082302.htm.

NAFTA creates the rules for southeastern Mexico's incorporation into the North American, and even the global market, facilitating investments, lowering tariffs and preventing the creation of non-tariff trade barriers. Although NAFTA has led to some economic changes in the Southeast, the impacts have not been as visible as in other parts of Mexico. The region's agriculture has not yet modernized and is not oriented toward export, nor has the "traditional" agriculture disappeared. So far the expected investments have not been seen, but supporters of the Puebla-Panama Plan consider the PPP the next step toward assuring "successful" economic integration throughout Mexico.

IV. PPP Breakdown

> *"The goal of the Puebla-Panama Plan is to take advantage of the human and ecological riches of the Mesoamerican region within a framework of sustainable development and respect for its ethnic and cultural diversity. In order to achieve this goal, the Plan proposes a strategy for the region that includes a series of Mesoamerican initiatives and projects."*
>
> -Interamerican Development Bank; http://www.iadb.org/ppp

The mission statement of the Mexican chapter of the PPP is *to promote and consolidate sustained and sustainable development through the coordinated and accelerated adoption of political policies and programs as well as public and private investment projects.*[37] In order to achieve these goals, the PPP proposes significant reforms to some of the region's major sectors:

- **Agriculture and Livestock**

In order to increase agricultural productivity in southeastern Mexico, the PPP endorses *technological investment, an increased number of animals per hectare and finding a productive use for lowlands with high residual humidity.* The PPP also cites the need to expand irrigation and livestock infrastructure to create large plantations for palm oil, coconut oil, oilcloth and cocoa. The Plan calls for modifying any laws that inhibit this expansion from taking place.

Many see such agricultural reforms as simply a way to attract investors, and various NGO's have actively warned of the dangers of massive plantations such as eucalyptus trees for paper. Trying to develop plantations of non-native species or practicing large-scale monocultivation could potentially mean increased poverty due to rapid farmland deterioration, as well as the loss of biodiversity. These practices can also affect traditional consumption patterns and the diversity of locally-produced crops, potentially threatening the region's cultural heritage and the natural environment.

[37] Conectividad de la Propuesta Regional de Transformación y Modernización de Centroamérica y del Plan Puebla-Panamá; April 30, 2001; Inter-american Development Bank; http://www.iadb.org/ppp/files/documents/ot/ot_ppp_100_db_es.doc

- **Industry and Energy**

One of the stated goals of the Puebla-Panama Plan is to increase industrial productivity for greater exporting potential. A large part of the industrial plan involves the installation of an energy network to facilitate production in the region. As part of the larger Electric Interconnection System for Central American Nations (SIEPAC), the energy upgrades are also meant to increase the quality of life for residents in rural areas.

Many economic advisors and government leaders want to see growth in economic activities in which southeastern Mexico possesses a comparative advantage. The climatological conditions, agricultural and biological diversity, abundance of water, hydrocarbon reserves, historic and ecological sites and abundant human resources should give production in the Southeast an edge. Through Mexico's commercial treaties with other countries, leaders hope to see more exports from this region to achieve greater reciprocity with trade partners. Many leaders also feel that the potential for a Free Trade Agreement of the Americas necessitates increased industrial production in this area.

Legal reform is another essential component to the PPP industrialization strategy. Leaders hope to see changes in regulations and norms to increase productivity and attract investment. While legal cooperation between levels of government may help assure that laws and regulations do not become barriers to trade, many fear that such reforms might weaken existing social and environmental protections.

- **Development of "urban nodes"**

Infrastructure systems can be difficult to design in sparsely populated areas like southeastern Mexico. To deal with the area's low population density, the government proposes to encourage citizens to resettle in denser, more concentrated "nodes" of population. The Plan calls for promoting jobs in urban centers and improving the quality of life for rural citizens, who in theory would receive greater access to health services, education and transportation in the urbanized "nodes." Bilingual education will be an integral part of the Plan, in that monolingual indigenous populations will be taught Spanish to "permit them to acquire the skills and knowledge to integrate to their advantage with the labor markets."

The creation of the planned city "nodes" contrasts sharply with many traditional and indigenous lifestyles. Cultures that do not assign ownership to lands but instead live communally might be profoundly affected by relocation programs. If a majority of traditional communities decide to reject the offers to relocate, then many fear the *forced* relocation of rural farmers to planned city "nodes."

According to officials, health care improvements may include programs "specifically oriented toward the attention of the most vulnerable indigenous groups, and in particular toward the problems associated with maternity, reproduction and premature birth." Some community members fear that the government or certain NGOs might begin birth control or even sterilization programs in the region to control population growth. Experience with the existing maquiladoras in Mexico have also caused fears over working conditions in the new labor centers, particularly with regard to women.

- **Transportation**

Population growth has strained the now inadequate transportation systems in southeastern Mexico, and the shoddy construction of many of the region's roads makes the situation even more serious. The PPP therefore calls for major improvements and developments in transportation, especially near the major centers of manufacturing, agriculture, livestock, forestry, fishing, and tourism. Under the heading of the International Mesoamerican Road Network (RICAM), three highway investment programs are proposed for Mexico: the Puebla-Panama Corridor, the Atlantic Corridor and the Mexican Interior Corridor. In essence, these corridors correspond to a Pacific route, an Atlantic route, and a North-South highway system, respectively.

In addition to the three new corridors, improvements to existing highways are also a major part of the PPP transportation plan. The International Mesoamerican Road Network attempts to use transportation infrastructure to take advantage of the region's strategic location between the three, large commercial blocks (Europe, Asia and the United States). In theory, the transportation projects would permit the efficient movement of goods between the Pacific and the Gulf of Mexico, and would connect the region to the principal markets of the world.

V. The Oaxaca-Istmo-Huatulco Highway Project: Presentation and Reaction

Alongside the much larger Puebla-Panama Plan, Mexico is planning some of its own, internal infrastructure projects. One such project being considered is the Oaxaca-Istmo-Huatulco highway project, which has numerous critics along its proposed path. It has been difficult to obtain many specifics about the highway's trajectory, but the plan seems reminiscent of the original proposal for the Megaproject of the Isthmus of Tehuantepec.

The local populations' uncertainty over the highway's path, as well as other projects encapsulated in the PPP, have created great concern in the region, and citizens fear potential violations of human and cultural rights. The communities presumably affected began organizing to get the information about the highways that could potentially affect them. Eventually brigades of engineers and topographers arrived in the region, sometimes without authorization, to survey lands and to take aerial photographs for viability studies of the proposed highway. When leaders began studying what the stretch of the Oaxaca-Istmo-Huatulco highway might look like, no one had publicly explained which communities would be affected by the highways. Despite repeated requests by the Centro de Derechos Humanos Tepeyac del Istmo de Tehuantepec, A.C. and by the Chontal and Zapoteca communities of the Sierra Sur, government officials did not provide this information.

In 1999, then-President Ernesto Zedillo and the governor of the state of Oaxaca, José Murta, inaugurated the Oaxaca-Istmo-Huatulco Project and announced it to the press, indicating that communities in opposition would have their land expropriated. It was not until January 2002 that the Office of Federal Highway Projects under the Secretary of Communication and Transportation provided any information about the path of the highway, allowing the Centro de Derechos Humanos to publicize this information. Some of the surveying marks made in these communities reportedly crossed farms, water sources and human settlements.

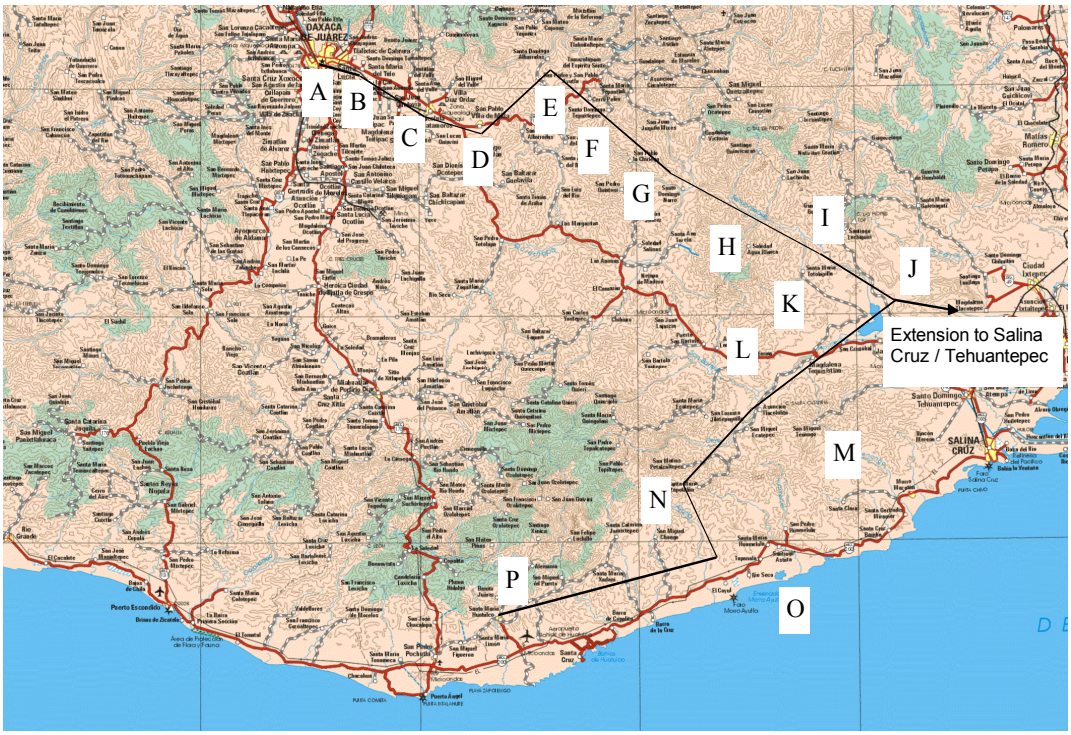
Representatives from many of the potentially affected communities traveled to the benefit to the local communities. In fact, some residents allegedly had to pay for the use of the highway and had to walk farther to reach their lands or to take their animals to pasture.District of Nochixtlán to speak with villagers who had been affected by the construction of the Mexico City-Oaxaca Highway. They learned that – in the case of the Mexico City-Oaxaca Highway – the authorities had not kept all of their promises to the local communities, like building bridges to allow pedestrian crossing of highways, paying for expropriated lands and constructing neighborhood walkways. The construction of the highway, it seemed, had provided no real benefit to the local communities. In fact, some residents allegedly had to pay for the use of the highway and had to walk farther to reach their lands or to take their animals to pasture.

Engineers did more surveying of the Isthmic region through 2000. Requests by local residents to participate in the project's planning continued to be ignored despite citizen declarations and assemblies. The latest available description of the highway's path would disrupt several communities. In Guadalupe Victoria, for example, the path might affect the only water source available to the mangrove and nance trees. In San Juan Alotepec, the stretch of highway might affect a cavern containing tribal relics, pottery shards and human remains. In Asunción Tlacolulita, the local river and planting beds may be crossed.

Particularly troubling are the highway project's potential effects on traditional communities and social structures. Many local residents fear that the projects might rupture communal forms of living. In cases where the highway might cross fruit orchards, like in Agencia Municipal Guadalupe Victoria, the economic livelihood of the community is at stake. Until now, policymakers have not clearly outlined the terms for indemnization payments for appropriated land, but residents hope that these rules take into account the possible harm caused by such invasive development.

Path of the Oaxaca-Istmo Highway Project, with Extension to Huatulco*

Source: Oficio 105.1.086, January 16, 2002, signed by Horacio Zambrano Ramos, Director General of the Proyecto de Carreteras Federales, SCT, and directed to Abgdo. Javier Balderas Castillo, Director of the Centro de Derechos Humanos Tepeyac.



Map Symbol	Reference	Distance
A	Entronque Guelatao en Oaxaca, Oax.	Endpoint
B	Santa María del Tule	2 km to the south
C	Tlacolula de Matamoros	passes through
D	San Pablo Villa de Mitla	2 km to the south
E	Santa Domingo Albarradas	1 km to the south
F	Santo Domingo Tepuxtepec	2 km to the west
G	Santo Domingo Narro	1 km to the north
H	Río Tehuantepec	Lefthand margin
I	Santa María Totolapilla	7 km to the north
J	Santa María Jalapa del Marqués	8 km to the north
K	Magdalena Tequisistlán	3 km to the north
L	Asunción Tlacolulita	2 km to the north
M	San Miguel Ecatepec	2 km to the west
N	Santa María Zapotitlán	2 km to the west
O	El Coyul	5 km to the north
P	Santa María Huatulco	Endpoint

*Note: This information in an estimate of the highway's path, based on the limited information that has been published regarding its route.

VI. Public Input and Response to the Puebla-Panama Plan

One of the objectives of the PPP, according to its proponents, is to increase the participation of the general public in development. This participation, it was announced, would help to define and implement shared objectives. The PPP suggests that large projects would be submitted to a careful analysis by society, paying particular attention to respecting and preserving the rights and cultures of indigenous peoples and helping to accommodate their opinions in the projects' design. Although more and more public forums have been taking place, many residents are concerned because the process remains essentially a top-down, dictated plan. Instead of holding forums to discuss what community members want to see in the plan, leaders solicit public comment on what has already been proposed. It seems unlikely that the public will be able to present its own projects or alternatives to development.

Among the more recent examples of resistance to development without consultation is the Forum for the Right to Information and Consultation, which took place in August 2001 in response to the Transisthmic Megaproject in Tehuantepec in Oaxaca. Various social organizations and indigenous community representatives attended, and the delegates developed regional strategies for resistance. Local communities, especially indigenous communities, are concerned that under the guises of environmental protection, more damage will be done to the region's biodiversity, and they will lose access to their lands.

The current conflict between proponents of the PPP and local indigenous communities is just the latest in a series of disagreements that were supposed to be resolved by the San Andrés Accords of 1996. The Accords theoretically assured "*that legislation should recognize the indigenous peoples as the subjects of the rights to free determination and autonomy*" as well as "*the right of indigenous peoples to the use...of the natural resources of the territories that they occupy or utilize*."[38]

These initiatives stem from the Commission of Concordance and Peace (COCOPA), which itself developed out of the Law for the Dialogue, Reconciliation and Dignified Peace in Chiapas, enacted on March 9, 1995. COCOPA continues to propose legislation that would protect indigenous rights and provide citizens increased access to regional planning information.

The PPP claims that it will seek to protect the environment and use natural resources sustainably, but the proposed highways cross important ecological niches and may have serious environmental consequences. Due in part to pressure by the Chontal and Zapoteca populations, some highway paths have been altered. Local residents continue to urge government leaders to include them more in the planning process in order to avoid further disputes and damage to communities or the environment.

Infrastructure upgrades are certainly important for the health and safety improvements they can bring. Improved highways and trains can facilitate regional travel and evacuation due to natural disasters. The concern in the case of the Puebla-Panama Plan is that the local communities are not being included in the planning of the

[38] International Service for Peace, Summary of the Comments of CONAI (National Mediation Commission) on President Zedillo's Legislative Proposal on Indigenous Rights and Culture; March, 1998; http://www.sipaz.org/info/indrghte.htm

"improvements" that may directly affect them. In addition, many of the reforms seem to be proposed in the name of *growth*, not sustainability or goodwill. For example, the Plan indicates that education infrastructure should be improved in order to produce better skilled workers, and transportation improvements should be made in order to facilitate commerce.

The opposition to the Puebla-Panama Plan continues to organize itself to achieve a more sustainable type of development.[39] In March 2001, the First Mesoamerican Forum in Tapachula, Chiapas was held, with the theme, "The People Before Globalization." During the forum, leaders called for the construction of an alternate plan called the Panama-Mexico Plan, which would better represent community interests. November 2001 brought the Second Mesoamerican Forum, in Xelajú, Guatemala. This time the 800 delegates confirmed their renunciation of the official Puebla-Panama Plan. Most recently in July 2002, the Third Mesoamerican Forum in Managua, Nicaragua highlighted opponents' objections to the Plan.

> *Despite being presented as an alternative for our people, the PPP is a geopolitical project that seeks to construct in Mesoamerica an area of services and infrastructure designed from the perspective of transnational corporations, oligarchic national groups and international finance organizations. All of these are done with the objective of exploiting our natural resources and the manual labor of our people.*
>
> – *Third Mesoamerican Forum, Managua,*
> – *July 2002*

As the Puebla-Panama Plan takes shape, issues of indigenous rights and public participation will play a central role in determining the viability of the Plan. In the specific case of the Oaxaca-Istmo-Huatulco Highway Project, it appears that information is not being adequately distributed to local populations, nor are alternatives being considered. Human and cultural rights groups will continue to campaign for access to information about plans that affect them and attempt to either prevent these plans or influence them until they are satisfied that not only is development being done in their best interest, but that they are active participants in the development process.

[39] Information from Third Mesoamerican Forum, Managua, preliminary version, July 2002, Red Mexicana de Acción frente al Libre Comercio; http://www.rmalc.org.mx/

For more information

You can request the complete report, entitled *Intereses y Resistencias: Corredor Carretero Oaxaca-Istmo-Huatulco*, available only in Spanish, from:

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AQUIFERS AND FREE TRADE:
AN HERMOSILLO COAST CASE STUDY

English Summary Document

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AQUIFERS AND FREE TRADE:
AN HERMOSILLO COAST CASE STUDY

I. INTRODUCTION

The enactment of the North American Free Trade Agreement (NAFTA) has substantially altered the relationship between Mexico and the United States. While discussions related to the Agreement have primarily focussed on trade between the two countries, in recent years, discussions have addressed how the opening of new markets and investment opportunities have impacted current and future sustainability of natural resources. Strategic natural resources – like water reserves – have been part and parcel of this discussion through the years, as evidenced by the recent disputes between the U.S. and Mexico over water quantity in rivers like the Rio Conchos, and over the poor water quality supplied by the Colorado River to Mexico.

The agricultural sectors of both countries have been especially sensitive to changes related to NAFTA. In general, the Agreement has meant a gradual opening of Mexican grain markets to North American exports and an opening of United States markets to Mexican fruit and vegetable exports. While the ultimate impacts of NAFTA might not be felt until the gradual tariff elimination process ends in 2009, initial evidence – as detailed in this report -- points to a growing disparity between Mexican and U.S. farmers in the production of traditional grains like sorgum and corn, and a growing dependency on U.S. markets for new export crops grown in Mexico.

The Mexican state of Sonora is a prime example of how the Mexican economy has transformed since NAFTA. While agricultural and livestock activities had slowed during the late 1980s and early 1990s, with the advent of NAFTA there has been renewed investment in agriculture in the state, principally in export fruit and vegetable crops. This has had both social and environmental consequences. One such consequence is the threat to natural resources, which has increased heavily over the last half century as economic growth and crop selection strain the arid ecosystem.

The Red Fronteriza de Salud y Ambiente, A.C., and the Texas Center for Policy Studies have jointly published a report, ***Acuíferos y Libre Comercio: El Caso de la Costa de Hermosillo***. The report analyzes the influence that economic integration policies such as NAFTA have had on the Sonoran socioeconomic structure. In addition, the report investigates the condition of the underground aquifer along the Hermosillo Coast, one of the principle agricultural regions in Mexico. The region has traditionally based its economic growth on the exploitation of underground reserves that are diminishing and facing increased saltwater intrusion.

The future of Sonora seems to include a profound transformation in the agricultural-commercial power structure. The report investigates to what degree NAFTA has promoted and facilitated this transformation through its emphasis on foreign trade. Finally, the report discusses the environmental consequences for a region that bases its development on the exploitation of an imperiled state aquifer. Given the strategic value of water rights in the border states of north Mexico, the analysis is presented in terms of water use by sector and potential consequences to the sustainability of the region.

II. NAFTA EFFECTS ON AGRICULTURAL SECTOR IN MEXICO AND SONORA

A. NAFTA Impacts on Mexican Agriculture

Since the enactment of NAFTA in 1994 – and more accurately since Mexico's 1986 entry into the General Agreement on Tariffs and Trade (GATT) – Mexican agriculture has had to adjust to increasing economic integration. Although it is difficult to determine the exact impacts of this integration on Mexican growers, it seems clear that agriculture in Mexico has changed, with more crops destined for export and more imports of basic grains from the United States.

Much of this change is due to tariff and quota reforms. In the case of corn, for example, NAFTA gradually reduced tariffs and quotas on corn imports to Mexico, allowing more corn from the United States to enter Mexico without duties. In 2000 the first 2.98 million tons of corn entered without a duty, while all imports beyond that had a tariff of 145.2% above the price. By the year 2008, the corn quotas and tariffs will be eliminated.

Table 1. Import Quotas from the United States without Tariffs and with Gradual Tariff Reduction, 1994 – 2008

Year	Tons from USA	Tariff Ad-Valorem Base=215%	Imports in tons from USA
1994	2,500,000	206.4	3,054,111
1995	2,575,000	197.8	2,858,829
1996	2,652,250	189.2	6,314,387
1997	2,731,817	180.6	2,566,142
1998	2,813,772	172.2	5.245.670
1999	2,898,185	163.4	5.051.767
2000	2,985,131	145.2	5.194.328
2001	3,074,685	127.1	
2002	3,166,925	108.9	
2003	3,261,933	90.8	
2004	3,359,791	72.6	
2005	3,460,584	54.5	
2006	3,564,402	36.3	
2007	3,671,334	18.2	
2008	Free	0.0	

Source: FIRA, Development Opportunities for Mexican Corn; Informative Bulletin Number 309; Mexico, October 1998; and FATUS, Foreign Agricultural Trade of the United States. Foreign Agricultural Trade of the United States Database. Available at http://www.ers.usda.gov/db/fatus.

An analysis of Mexican corn production between 1994 and 2000 shows a drop in volume and in cultivated area, suggesting that some growers could not survive the new open market. For those that did, however, productivity actually increased. Domestic corn

production levels remained stable while demand *increased*. Imports have risen to react to the growing demand – mostly to feed livestock – growing from 3.1 million metric tons in 1994 to 5.3 million metric tons in 2000. Other basic grains such as wheat have shown similar tendencies in their imports from the United States. Unground wheat imports rose from 625,000 to more than 1.7 million metric tons, while sorghum rose from 3.4 million to 4.7 million metric tons in the same six-year period.[40]

Beyond tariff and quota reductions under NAFTA, the rise in imports is also due to the elimination of the state organization CONASUPO (National Company of Popular Subsistence) in the 1990s. CONASUPO had bought large quantities of basic grains at guaranteed prices, and its elimination forced basic grain producers to compete at lower prices in a time when the price of grain and corn was falling.

Table 2. Changes in Mexican Corn Production since 1994

	Percentage Difference – 2000 vs 1994
Total Consumption (Human and Livestock)	+8%
Production (Tons)	-3%
Area Cultivated	-8%
Area Planted	-13%
Productivity (Tons/Hectare)	+6%
Imports from USA as percentage of total consumption	+10%

Source: Center for Agricultural Statistics, SAGAR y FATUS, Foreign Agricultural Trade of the United States. Foreign Agricultural Trade of the United States Database. Available at http://www.ers.usda.gov/db/fatus.

Analysis shows that economic liberalization has had the greatest impact on corn production in northern Mexican states.[41] While the traditional grain production states like Oaxaca and Chiapas have continued and even increased corn production, Sonora and Sinaloa have seen a strong shift away from corn and sorghum and toward the production of new crops, such as grapes, oranges and legumes. In Sonora, after corn production increased at the start of the 1990's, the planted areas fell rapidly, reaching half of their 1990 levels by 2000.[42]

[40] FATUS, Foreign Agricultural Trade of the United States. Foreign Agricultural Trade of the United States Database. Available at http://www.ers.usda.gov/db/fatus.

[41] For more discussion of the issue of corn production in the southern states versus the northern states, see Ackerman, Frank, Luke Ney, Kevin Gallagher and Regina Flores, Global Development and Environment Institute, Environmental Impacts of the Changes in U.S. – Mexico Corn Trade under NAFTA, Draft, (Montreal, Canada: Commission on Environmental Cooperation, January 2002). Available at http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=637.

[42] In Sonora as a whole, total irrigated and non-irrigated planted corn covered 38,323 hectares 1990, and then hovered between 85,000 and 173,000 (in 1996) over the next eight years. In 1999 and 2000, the growing area plummeted to 62,008 and then in 2000 to 19,000 hectares.

Given the low prices paid for basic grains, the high cost of irrigation to grow corn and other grains in the arid North and the increased competition with subsidized United States producers, this shift not surprising.

NAFTA offers exporters in such crops as grape, citrus and legumes new access to the United States market. For example, exports of these crops from Mexico to the United States grew from 41,305 metric tons in 1993 to 80,492 metric tons in 1995. It should be noted that some fruits and vegetables exported to the U.S. are actually imported back into Mexico as conserved and canned products, imports of which have increased significantly since NAFTA.

B. NAFTA Impacts on the Hermosillo Coast

Throughout its history, the Hermosillo Coast agricultural region has been characterized by transformations that have converted the rural environment into a privileged space for policy makers to promote agricultural modernization. The forces of economic liberalization in the years since NAFTA have facilitated the economic reorganization of the Coast but have also had serious environmental impacts due to the exhaustive exploitation of the regional hydrologic resources.

In the search for profits from the comparative advantages with North American trade partners, traditional agricultural systems that had thrived for decades on the Coast are being replaced. The new orientation toward fruits and legumes is completely transforming the regional productive system, which means not only new agreements between social actors, but also new “opportunities” for natural resource exploitation.

What follows is a brief overview of the principal factors that have helped establish new integration patters in the agricultural region of the Hermosillo Coast:

1. Strategic Partnerships

Families whose capital has come from the service sector, industry, political activity or other sources have formed alliances to invest in agricultural projects that offer high returns. In addition, new commercial associates in California, Chile or the rest of Mexico are benefiting from the “rescuing” of bankrupt growers by other agricultural companies that then liquidate the debts by acquiring property. The consolidation of growers has led to agricultural companies increasingly oriented toward the production of fruits and vegetables for export.

2. Financial Diversification

The National Bank for Foreign Trade (Bancomext) and the Trust Fund for Agriculture of the Bank of Mexico (FIRA) have increased their credit lines for growers. However, agricultural activity on the Coast depends more and more on financing from distribution companies located in the United States who, through their brokers, grant money, inputs and technical assistance in the production, logistical support and export of the crops.

3. Commercial Integration

The organization of trade networks is now largely determined by demand in United States markets. A well-integrated system exists for storage and transport, which starts in the agricultural fields, passes through a series of refrigerators owned by growers and the government, and moves through the principal highways of the state.

4. Technological Innovation

The export crops from the Coast compete in quality and output with the best in the world. This is possible due to the physical infrastructure and continuous improvements that the growers oversee.

5. Quality Standards

The requirements imposed by the United States on its imports have forced growers to observe restrictions on herbicides and to pay more attention to aspects of health and safety.

6. Labor Systems

Flexible contracts and the need for specialized labor has given rise to various labor networks that attract agricultural workers from across the country and even from United States border states, depending on productive cycles.

7. Labor Solidarity

The power of private agricultural interests has allowed them to present a unified front when influencing public policies over labor issues and to place representatives into key government posts to push their political and economic interests.

8. Public Resource Management

Basic service infrastructure and governmental agriculture stimulation programs have been oriented toward supporting the agricultural export sector. At the same time, bank "rescue" measures have made it possible for many growers to recover from previous administrative failures, and the public subsidy system has softened the effects of unscrupulous resource management.

9. Control of Hydrologic Resources

Economic activity on the Coast has been made possible by water reserves that were filled over thousands of years. For half a century, water had been under the control of the federal government, but the National Water Commission (CNA) delegated control of irrigation use to the *Irrigation District 051 Users' Association of the Hermosillo Coast* in October 1993, following changes in the National Water Law in 1992.

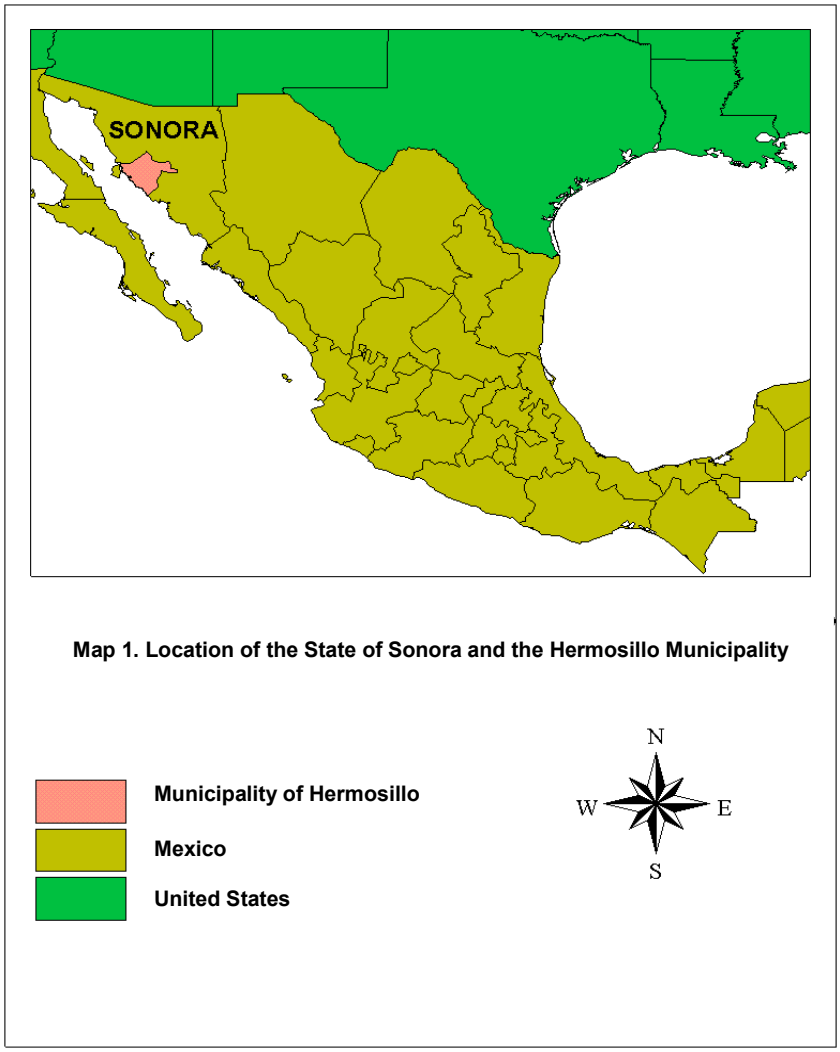
This Users' Association was created by District growers and is dominated by the largest agricultural families on the Hermosillo Coast. The Users' Association received a 20-year

concession to manage the annual extraction of 409 million cubic meters of water. By controlling this most strategic of natural resources, the Association has gained unprecedented power in the agricultural and water markets.

III. AGRICULTURE IN SONORA AND THE COASTAL DISTRICT

A. Location of the State and Importance of Agriculture

Located along the United States border in northwestern Mexico, the state of Sonora is the second largest in the country, behind Chihuahua. Its population is relatively small, with approximately 2.2 million people (2000 Census). Approximately 610,000 of the residents live in the capital municipality of Hermosillo.



Map 1. Location of the State of Sonora and the Hermosillo Municipality

Although Sonora is characterized by a semiarid climate with large deserts and few inhabitants, agriculture has always been important in its history. In 1960, for example,

agriculture, forestry and fishing accounted for nearly 35% of the state economic revenues. With the expansion of the service sectors in industrial centers like Nogales and Hermosillo, agriculture, forestry and fishing fell to 11.85% of the state economy in 1999. These sectors remain an important source of revenues, exports and jobs, however, accounting for 17.1% of employment in 2000.

Table 3. Distribution of the Gross Domestic Product of Sonora by Sector, 1960-2000

Year	Total	Agriculture, Livestock, Fishing and Forestry	Mining	Manufacturing	Construction	Electricity	Services and Communication
1960	100	34.90	2.5	4.80	3.10	1.50	53.09
1970	100	26.00	1.92	7.05	3.91	1.88	58.46
1980	100	16.75	7.89	11.00	10.04	1.38	52.93
1990	100	14.50	8.73	12.05	8.59	1.86	54.34
2000	100	16.30	7.3	12.4	10.0	3.9	50.0

Sources: State Government of Sonora, Current Situation of the Agricultural, Livestock and Forestry Sectors in Sonora, 1997 and Ministry of Development Planning and Public Expenditure, State Government of Sonora, 2001.

Today, approximately 3.8% of the state – 700,000 hectares – is used for agricultural production (see Table 4). Although the 1999 total ranked Sonora only 18th in planted acreage among states in Mexico, almost 95% of this area was irrigated, and only the state of Sinaloa had more irrigated agricultural land (see Table 5).

Table 4. Distribution of Soil Use, State of Sonora, 1997

Activity	Hectares	Percent
Agriculture	700,000	3.8
Irrigated	650,000	3.5
Rain-fed	50,000	0.3
Ranches	15,402,950	83.0
Forest	200,000	1.1
Other Uses, including Urban/Industrial	2,240,100	12.1
Total	**18,543,050**	**100.0**

Source: Government of the State of Sonora, Current Situation of the Agricultural, Livestock and Forestry Sectors in Sonora, 1997

As with many other states, the leading agriculture products are traditional crops such as wheat, corn, beans, safflower and cotton. There is a marked increase in the production of non-traditional crops, however, such as fruits – oranges, watermelon and grapes – and vegetables – tomatoes, green chiles and potatoes. In general, basic grain production has fallen in recent years while the production of fruits and vegetables has increased. Of all Mexican states, Sonora produced the most wheat for grain, jalapeño chiles, watermelons, grapes and asparagus and was second in garbanzos, potatoes, melon, Mexican Succotash and alfalfa (Table 6).

Table 5. Summary of Planted Crops in Sonora, Compared to other States, 1999

State	Planted Area, Irrigated (hectares)	State Rank	Total Planted Area, Irrigated + Rain-fed (hectares)	State Rank
Chiapas	59,598	25	1,533,913	3
Guanajuato	478,298	3	1,059,248	9
Jalisco	231,233	6	1,413,421	4
Michoacán	408,493	4	1,152,699	8
Oaxaca	81,053	19	1,183,781	7
Puebla	147,861	11	1,001,771	10
Sinaloa	754,855	1	1,283,078	5
Sonora	531,173	2	569,317	18
Tamaulipas	213,882	7	1,579,611	2
Veracruz	87,188	18	1,664,157	1
Zacatecas	157,992	9	1,300,683	6
Total	4,904,014		21,983,180	

Source: SAGAR, Center for Agricultural Statistics, Annual Agricultural Statistic Bulletin, 1999.

Table 6. Cyclical and Perennial Irrigated Crops, State of Sonora, 1999

Crop	Planted Area (Ha.)	Harvested Area (Ha.)	Production (Tons)
Alfalfa	17,421	16,499	193,480
Cotton	37,631	37,138	125,012
Safflower	65,956	65,956	164,059
Green Chiles	6,083	6,083	87,015
Beans	8,945	8,722	13,990
White Garbanzos	7,301	7,301	14,047
Corn	56,925	55,075	305,263
Oranges	8,998	8,812	168,637
Potatoes	5,389	5,379	140,576
Watermelon	7,058	6,905	217,321
Wheat	203,476	202,819	1,242,524
Pecans	2,891	2,889	5,008
Green Tomatoes	3,283	3,283	32,568
Grapes	28,147	28,138	374,617

Source: SAGAR, Center for Agricultural Statistics, Annual Agricultural Statistic Bulletin, 1999.

Many of the products that have seen increased production are destined for export (Table 7). Between 1998 and 1999, agricultural exports grew from $295 million to $475 million. Among the most exported products are wheat, grapes, watermelon, melons, green chiles and oranges (Table 8). While wheat is exported to Africa and Europe, fruits and vegetables mostly go to the United States.

Table 7. Exports by Sector, State of Sonora, 1998 – 1999 (millions of dollars)

Sector	1998	1999	Rate of Growth (%)
Total	**5,512**	**5,495**	**(0.3)**
Primary	**451**	**768**	**70.5**
Agriculture	295	475	60.9
Livestock	112	143	28.3
Fisheries	44	150	243.0
Industry	**5,062**	**4,726**	**(6.6)**
Mining	496	338	(31.9)
Maquiladora	2,811	2,818	0.2
Automotive	1,588	1,411	(11.1)
Other Manufacturing	167	160	(4.0)

Sources: SECOFI, Bank of Mexico, Ministry of Development Planning and Public Expenditure, State Government of Sonora, Ford Plant, CEMEX, Ministry of Agricultural Development and Ministry of Livestock Development.

Table 8. Volume of Agricultural Exports in Sonora, by Crop (Tons)

Crops	1997-1998	1998 –1999
Total	**654,291**	**748,575**
Broccoli	2,132	1,263
Mexican Succotash	23,883	1,058
Kabocha Squash	4,371	8,881
Cauliflower	0	54
Scallion	13,401	23,051
Chiles	19,628	19,039
Asparagus	15,000	25,760

Crops	1997-1998	1998 –1999
Radish	2,366	6,294
Cabbage	2,237	3,772
Tomato	19,516	11,656
Honey Dew Melon	49,437	37,404
Cantaloupe Melon	43,349	44,700
Watermelon	86,184	94,017
Table Grape	94,775	99,706
Orange	13,898	34,435
Pecan	1,280	0
Wheat	226,838	337,472
Garbanzos	4,479	13
Vegetables	31,517	0

Source: Secretary of Agricultural Development, State Government of Sonora.

The majority of Sonora's agricultural production is contained within 7 irrigation districts in the state of Sonora. These districts are briefly described in Table 9.

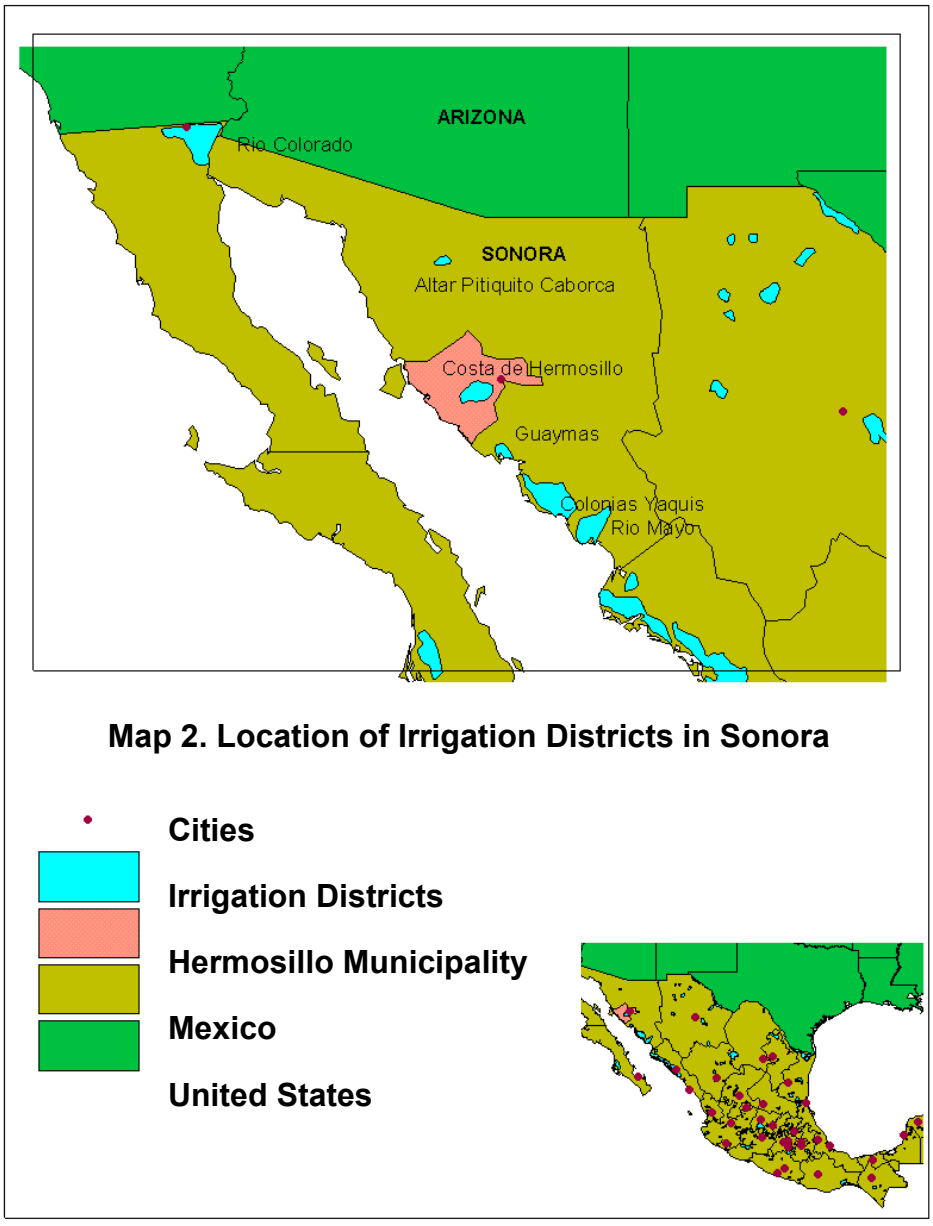
Table 9. Irrigation Districts Operating in the State of Sonora, 2000

Number	Name	State	Thousands of Planted Hectares	Number of Users
014	Colorado River	Baja California and Sonora	208.8	15,182
018	Colonias Yaquis	Sonora	22.8	N/A
037	Altar Pitiquito	Sonora	57.6	3,111
038	Río Mayo	Sonora	97.0	11,563
041	Río Yaqui	Sonora	232.9	22,056
051	Hermosillo Coast	Sonora	66.3	1,957
084	Guaymas	Sonora	16.7	2,179

Source: CNA, Basic Water Compendium for Mexico, January 2001

B. Location of the Hermosillo Coast and Regional Importance

Located in central-western Sonora, the Hermosillo Coast is a semiarid region approximately 200,000 hectares in size (see Map 2). Irrigation District 051 (DDR 051) – which covers an area of 1,738.76 km^2 – supplies the region from an aquifer located at the edge of the Bacoachi River basin.



Map 2. Location of Irrigation Districts in Sonora

Wheat and cotton had traditionally accounted for most of the region's agricultural production. Over the past half decade, however, the production of new crops such as fruits and vegetables has displaced the traditional products of the Hermosillo Coast. Table 10 shows a significant change in land area dedicated to different crops in the Hermosillo Coast irrigation district. These data show the clear drop in wheat and cotton harvesting, which fell from 80% of the land planted to less than 25% in recent years. This decline can also be seen in terms of the land planted, which fell from 270,000 hectares in 1970 to less than 50,000 hectares in 2000.

At the same time, perennial crop production – including grapes, citrus and pecans – grew to represent more than 40% of the land area planted. Vegetables have also become more important in the last decade, now accounting for more than 10% of the planted area and generating 13% of the daily wages.

These changes in crop patterns are mostly due to different profit margins for different crops. Each crop has an impact in terms of the investment it attracts, the technological innovation it brings, and the jobs it creates. As shown in Table 10, traditional crops have been reduced to half the total surface area in the District, while perennial crops and vegetables already cover 50% of the remaining area. In terms of production value, the traditional crops represent only 13.3% while industrial and table grapes account for two thirds of the total regional value.

Table 10. Planted Area and Percentage of Participation of the Principal Crops in Irrigation District 051, Hermosillo Coast (1955-2000)

Crop	1955	%	1960	%	1965	%	1970	%	1975	%	1980	%	1985	%	1990	%	1995	%	2000	%
Wheat	51,000	65.0	71,730	62.0	65,000	52.0	77,472	61.0	71,840	61.0	46,244	43.0	42,10	48.0	24,790	36.0	10,800	21.4	10,000	21.1
Cotton	21,000	26.0	18,500	16.0	32,770	26.0	33,000	26.0	14,000	12.0	16,200	15.0	2,467	2.8	475	0.7	3,000	5.9	0	0.0
Vegetables											250	0.2	390	0.4	5,292	7.8	4,250	8.4	5,280	11.1
Table Grapes			40	0.03	65	0.05	400	0.30	1,000	0.8	2,266	2.0	2,219	2.5	4,408	6.5	4,505	9.0	7,934	16.8
Indust. Grapes			230	0.19	285	0.2	1,200	0.9	3,400	3.0	7,134	7.0	8,381	9.6	5,881	8.6	7,310	14.5	4,165	8.8
Citrus	200	0.2	900	0.77	3,100	2.5	4,088	3.0	2,600	2.0	2,200	2.0	2,350	2.7	4,660	6.8	5,500	11.0	5,473	11.6
Pecans					200	0.1	650	0.5	1,500	1.0	2,210	2.0	2,300	2.6	1,928	2.8	1,870	3.7	2,392	5.0
Other	6,300	8.0	24,600	21.2	23,900	19,0	10,112	7.9	23,347	19.8	29,966	28.1	26,401	30.0	20,539	30.2	13,170	26.0	12,037	25.4
Totals	78,500	100	116,00	100	125,320	100	126,92	100	117,687	100	106,47	100	86,608	100	67,973	100	50,405	100	47,281	100

Source: Figures from Irrigation District 051, Hermosillo Coast, and Author Calculations

Table 11 demonstrates that producing 1 kilogram of traditional crops requires 1.2 liters of water, while producing the same amount of new crops uses half as much. Vegetables use 0.55 L / kg, grapes 0.65 L and other perennial crops 0.54 L per kilogram. In terms of production value, each liter of irrigation water generates $1.94 in traditional crops, $6.22 in vegetables, $9.25 in grapes and $1.79 in other perennials. The effects on labor are equally significant. Traditional crops account for less than 6% of the daily wages generated in the region, while other perennial crops represent 8.8%, vegetables 13.7% and grapes more than 70% of the total number of workers in the region.

Table 11. Cultivation Patterns for Irrigation District 051, Hermosillo Coast (2000)

Crops	Planted Area (Hectares)	%	Production Volume (Tons)	%	Production Value (Thousands of Pesos)	%	Volume of Water Extracted (thousand cubic meters)	%	Daily Wages Generated	%
Traditional	22,037	49.0	91,357	20.7	211,502	13.3	108,993	34.0	158,040	5.4
Vegetables	3,599	7.7	54,192	12.3	185,958	11.7	29,871	9.3	395,890	13.0
Grapes	13,752	29.6	176,124	40.0	1,069,269	67.5	115,516	36.0	2,076,552	72.0
Other Perennials	6,354	13.6	118,080	26.8	116,568	7.3	64,810	20.0	254,160	8.8
Totals	46,412		439,753		1,583,297		319,190		2,884,642	

Traditional Crops: Wheat, Garbanzos, Beans, Corn and Safflower
Vegetables: Lettuce, Sweet Corn, Mexican Succotash, Potatoes, Broccoli, Chiles, Melon, Watermelon, Cauliflower, Kabocha Squash, etc.
Grape: Industrial and Table
Other Perennials: Orange and Pecan

Source: SAGAR, Rural Development District 144 and Author Calculations.

In addition to the use of considerable quantities of water, agricultural production depends on both chemical and biological products. Of the principal insecticides, fungicides, fumigants and herbicides authorized for use on crops in Mexico, about 30 of them are used on the crops destined for export to the U.S., while traditional crops rely on only 13 types of pesticides.[43]

It should be noted that use of pesticides on export crops is to some degree determined by the restrictions and regulations imposed by the United States on agricultural products from Mexico. The producers of the Hermosillo Coast now have considerable experience in U.S. regulations, intended to assure compliance with sanitation standards. Therefore, producers are both careful not to use certain substances banned in the U.S., but use sufficient quantities to assure that no pests are present on crops intended for export. Still, there is considerable concern that high amounts of pesticides and herbicides could directly impact both worker help and the aquifer itself.

The Hermosillo Coast has been characterized from its inception by a vast physical infrastructure, a notable degree of technical productivity and high levels of capitilization,

[43] Bejarano Gonzalez F. La Espiral del Veneno. RAPAM. México. 2002: and interviews by author.

combined with a capitalistic agrarian structure. These characterisitcs put the Coast in an advantageous position for the changes brought through the comercial opening and state deregulation since the inception of NAFTA. It has also brought about differing impacts on social actors in the region.

The distribution of groundwater rights is one example of these different impacts.[44] Following changes to the National Waters Law, the growers in the Coast became the first private entity to receive underground water concessions through the creation of the *Irrigation District 051 Users' Association of the Hermosillo Coast*. Under the concession, all water rights are controlled by the Association itself. This delegation of powers was a government measure intended to make water use more efficient and make water use more transparent.

However, this greater access to underground hydrologic resources has in actuality led to a concentration of water rights for the largest growers in Sonora, and consequently led to the reconfiguration and segregation of the Coastal property structure. This segregation between large-scale and small-scale growers has gradually forced numerous growers out of the market. On the one hand, large-scale agricultural companies are becoming more and more integrated, with greater access to public resources and an understanding of how to meet international standards. This permits them greater competitiveness within the commercial networks which have been generated through the globalization process.

On the other hand, the "traditional" communal producers, who operate in *colonos* and *ejidos, have gradually been abandoning their agricultural activity. Colonos* are agricultural organizations which own individual privately-held property, but farm these fields communally with significant political oversight and government control. Ejidos, on the other hand, own and farm their land collectively. The *ejidos* have suffered from a series of historical conflicts and a lack of government support.

The diminishing power of ejidos and colonos can seen clearly by the number of wells they control. In 1991, ejidos and colonos were accessing water from nearly 25 percent of the wells and were using 30 percent of the water (see Table 12). Ten years later, their water use and control of wells has plummeted. For example, of the 100 agricultural colonías which operated over a hundred wells a decade ago, only 30 were operating at the end of the 1990s, some of which were actually renting wells, water rights and lands to private growers. None of the four ejidos which have water rights and utilized nine wells in 1991 are currently operating.

The shift from *colonos* and *ejidos* to large-scale, privatized farms has been accelerated by the transfer of water rights from these traditional growers to private growers. Although both *colonos* and *ejidatarios* are represented in the Users' Association, each colono or ejido receives one, collective vote in the forum, even though most colonias have at least 100 associates and ejidos are often made up of some 40 farmers. While there are

[44] José Luis Moreno presents a detailed analysis of the concentration of resources among users in the aquifer *in El uso del Agua en un Distrito Agrícola de Riego por Bombeo: El Caso de la Costa de Hermosillo, Sonora. México*. In: Doode Shoko y Emma Paulina Pérez (Comp.) Sociedad, Economía y Cultura Alimentaria. CIAD. 1994.

ejidatarios and colonos in the General Assembly of the Users' Association, and even at the Board of Director and Advisory Board level their power is considerably diminished.[45]

Table 12. Distribution of Wells and Water Use by Type of Property in the Hermosillo Coast, 1991

Type of Grower and Property	Number of Wells	Percent (%)	Volume of Water Extracted (thousand cubic meters per year)
Private	378	76	284,585
Ejidos	9	2	107,830
Colonos	111	22	17,301
Total	498	100	409,716

Source: : District 144, Hermosillo

The majority of regional agricultural investment now goes toward the cultivation of fruits and vegetables. Consequently, the most influential agricultural organizations in the Coast are those that grow table grapes, citrus, pecans and vegetables. Table 13 shows the available distribution of fruit and vegetable growers in the Hermosillo Coast. According to the table, a total of 8 families control half the production area for table grapes. Three other large families control a fifth of the pecan production in the district. Approximately 15 large families control nearly a third of the productive activity in the Coast, while around 270 small and medium growers try to stay in business with less advantages of economies of scale or government support.

This growing concentration of productive resources has been linked to a specialization of the agrocommercial businesses in export crops. Recent data[46] shows the importance of the financial corridor in Sonora-Arizona fruit and vegetable products.

[45] León, G. Analísis del Programa de Transferencia de los Distritos de Riego en México: El Caso de Riego 051 – Costa de Hermosillo, Tesis El Colegio de Sonora, 1995.

[46] For example, in a recent seminar in Río Rico, Arizona on financing and commercialization of agricultural export products in which bankers, disrtibutors, officials and growers from both states participated, it was estimated that some $100 million is invested annually in moving fruit and vegetable products from Sonora to Arizona. As reported in Periódico El Imparcial, August 16, 2002.

Table 13. Distribution of Fruit and Vegetable Growers in the Hermosillo Coast, by Crop

CATEGORY	Small	Medium	Large	Very Large	
Table Grape					
Area (Hectares)	140	1,026	1,882	2,975	
Producers	8	18	15	8	
Total Area					6,023
Industrial Grape					
Area (HA)	627	1,747	784	744	
Producers	31	33	9	3	
Total Area					3,902
Citrus					
Area (HA)	1,649	1,949	789	1,086	
Producers	98	31	4	3	
Total Area					5,473
Pecan					
Area (HA)	195	346	1,399	452	
Producers	25	26	5	2	
Total Area					2,392

Source: SAGARPA and Authors' Calculations

The growth in the planted area, production and value of fruit and vegetable crops in the Coast of Hermosillo has outstripped the growth in the other agricultural districts in Sonora in the last two decades (see Table 14).

Table 14. Participation by Agricultural District in Fruit and Vegetable Production in Sonora

(1980 – 1998)

	AVERAGE, 1980-1989				AVERAGE, 1990-1998			
	Caborca	Guaymas	Hermosillo	TOTAL	Caborca	Guaymas	Hermosillo	TOTAL
Planted Area	45.0%	11.3%	43.8%	100%	44.7%	7.8%	47.4%	100%
Production	38.3%	10.4%	51.4%	100%	34.2%	8.9%	56.9%	100%
Value	35.7%	10.1%	54.2%	100%	34.7%	6.2%	59.1%	100%

Source: Salazar V y Y. Borbón Costa de Hermosillo: Configuración Hortofrutícola e Intermediarios Comerciales Internacionales. CIAD. 2000.

The dynamism of this export activity has increased the production index and the value of the crops oriented toward international markets (see Table 15). Fruits and vegetables destined for the export markets now represent half of the total production in the district

and supply three-fourths of the total value generated in this important agricultural zone in the state.

Table 15. Production in the Hermosillo Coast by Crop Type (1998)

Crop Type	Production		Value ($)	
Feed	191,588	20.7%	282,323,100	11.1%
Fruits and Vegetables	462,877	49.9%	1,892,853,100	74.8%
Industrial	134,700	14.5%	186,074,100	7.3%
No Feed	137,424	14.8%	168,063,800	6.6%
Others	217	0.0%	2,821,000	0.1%
Total	**926,806**	**100%**	**2,532,135,100**	**100%**

Source: Salazar V y Y. Borbón Costa de Hermosillo: Configuración Hortofrutícola e Intermediarios Comerciales Internacionales. CIAD. 2000.

The new opportunities for fruit and vegetable growers offered by NAFTA has required more than simply technical capacity. It has required a new organization of production which in many cases has required alliances with foreign companies, and, simultaneously, an ability to take advantage of governmental assistance programs. This dual support has allowed growers the ability to meet the demands of international markets.

If these growers have shown important tendencies to integrate the marketing of their product, their insertion in the agrobusiness chains have also shown, like the producers of goods destined for national markets, disadvantages in dealing with the distribution companies. A recent work regarding table grapes makes this clear. Approximately 30 vegetable and fruit distribution companies control the export of these products from Sonora. According to one of the exporting Mexican companies' chief lawyer, the Mexican exporters have suffered the consequences of an unequal commercial relationship, evidenced by their incapacity to reach a common contract which would permit them to overcome financial difficulties, the establishments of insurance, the lack of legal assistance and better access to U.S. regulatory authorities.[47]

Recently, the "Producer Foundation" (*la Fundación Produce*[48]*)* began taking the first steps toward helping producers who have not been able to maintain a more equal relationship with the distribution companies, as well as those producers unable to meet the competitive demands of the international market.

[47]Newspaper Interview of Richard D. Burris, by Leyla Cattan, Periódico El Imparcial December 11, 12 y 13, 2001.

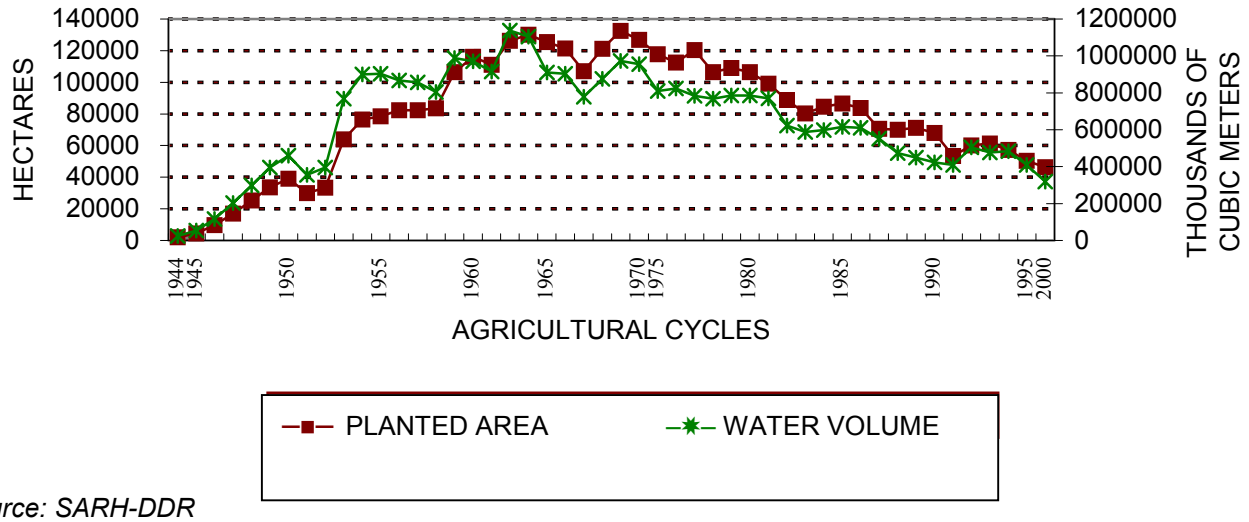
[48] A foundation administered by private farmers which establishes research projects and channels resources to producer association priorities.

IV. IMPACT OF NAFTA ON THE HERMOSILLO AQUIFER

Without question, the existence of large water reserves permitted the economic activity described in this report. After fifty years of exploiting these reserves, however, water levels and quality are suffering.

Figure 1 charts the rhythm of water extraction as a function of the registered planted areas in the Hermosillo Coast, since its inception. As the figure shows, agricultural activity grew constantly during the first two decades until peaking near 130,000 hectares of cultivated area. Beginning in the 1970s planted areas fell, leaving the 2000 values below 50,000 hectares. In 2001, there were 498 wells administered by the User's Association of Irrigation District 51.

Figure 1 – Evolution of the Planted Area and Volume of Water Extracted from the Hermosillo Coast Irrigation District (1944-2000)



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Source: SARH-DDR

A 1968 study estimated the volume of annual recharge in the aquifers of the district to be 350 million cubic meters. Aquifer rehabilitation programs have been coordinated based on this figure, and these have led to the relocation of some wells, the reduction of water rights per user, changes in crops, modernization of irrigation systems, and even pumping prohibitions in some areas during the 1950s, 60s and 70s. The goal was to balance extraction with the recharge estimation, to minimize the annual average water loss. Despite these measures, concerns remain regarding the increased saltwater intrusion, principally in the area closest to the Coast.[49]

Recently, the state government proposed to extract water from the Hermosillo aquifer for the operation of a desalinization plant, with the goal of producing potable water for the state capital. The project included the drilling of numerous wells to extract 3,400 liters per second and to use reverse osmosis to desalinate 2,500 liters per second that would be sent to Hermosillo in a 110 km-long aqueduct. Fierce opposition by the growers on

[49] Office of the Governor, Fourth Annual Report of the Government, State of Sonora, 2001, 374.

the Coast forced the modification of the proposal,and the government then proposed to desalinate seawater. This change raised the cost of the project so high that it was rejected by citizen movements in the capital and rejected by the Hermosillo municipal government.

A study done for the failed project, however, provides valuable information on the current state of the only hydrologic reserve that supports economic activity in the Coast. According to the study, excessive water use has forced people to drill deeper for water, which led to increased saltwater intrusion in some parts of the aquifer. Other studies by the same authors also discount the existence of a deeper aquifer supplying the Hermosillo Coast aquifer. Perhaps of more immediate concerns, data show that in 1967, water was pumped from 11 meters *above* sea level, while in 2001, the estimated cone of depression was at 60 meters *below* sea level. Meanwhile, saltwater intrusion has increased to such an extent that currently within a zone some 10 to 15 kilometers wide, the amount of salt has increased from approximately 500 parts per million to between two to eight thousand parts per million.[50] It is important to note that the studies to date have focused on the section of the aquifer nearest the coast and do not include other areas of the district that have seen even higher levels of crop production.

Other recent calculations indicate that aquifer recovery levels are well below historical estimates. Various experts have indicated that annual recharge levels are now less than 150 million cubic meters. Based upon the rapidly depleted levels of the aquifer, some studies have suggested that the estimates of water use in the Coast may have been severely understated, perhaps by a factor of two. When added to the poor implementation of water reduction programs, the prospects for sustainability in Hermosillo are challenging. There is consensus among experts that a new, more precise study is needed, incorporating the *dynamic recharge* through the creation of a mathematic, hydrodynamic and hydrodispersive model.

The expulsion of growers from agricultural activity recorded in recent years has led to a reduction in the area set aside for non-competitive crops. As a consequence, many small growers have stopped using their wells, and as a consequence water use has declined overall. At the same time, however, large agricultural farms dedicted to export crops have increased, and to some extent used water that would have been used by the traditional exporters. The active water market in the Coast, linked to the high returns on certain productive sectors, is intensifying the exploitation of hydrologic reserves in certain areas along the Coast. This explains why despite more growers closing their wells, the cone of depression continues to fall and the aquifer suffers from increased salinity levels.

Moreover, the water in the aquifer is now at the center of the dispute between continued agricultural use of the Hermosillo Coast Aquifer and the Municipality of Hermosillo, which hopes to continue to attract foreign investment in large industrial plants, but needs additional water resources to do so. The Municipality of Hermosillo currently supplies 98.22% of its population with potable water, and residents use 97 million cubic meters annually. The water tariff structure in the municipality is such that those who use between 0 and 50 cubic meters per month – mostly domestic residences – account for 92.6% of the total users of water. The prospects of water scarcity and increased tariffs are mobilizing previously dormant social groups against the inefficiencies and

[50] Ibid.

inequalities in the administration of water use and rights in the state. For example, a recent citizen movement which arose in opposition to the desalination plant called for repairing the supply network –which potentially loses 45 percent of the water through leaks -- a more precise metering system, and for water conservation measures.

At the same time, the aquifer of the coast – traditionally seen as exclusive property of agricultural interests -- has now become part of the public discussion about water conservation, use and distribution. Not surprisingly, growers have responded with outright rejection of any consideration of industrial or urban use of their water.

V. CONCLUSIONS AND RECOMMENDATIONS

The panorama presented in this report demonstrates the growing divergence between urban and rural interests in the central valleys of Sonora. Where once a flourishing agricultural sector with state support had played a central role in regional development, today the forces of economic liberalization and political modernization are driving political and economic decisions about crop choice, water use and exploitation of natural resources.

The opening of trade areas in the dynamic United States-Mexico border region has increased the pressure that social actors exert on natural resources. In particular, the North American Free Trade Agreement has changed the way that resources are managed, generally at the expense of the diversity and quantity of regional biological resources. The transformations to property and technology on the Hermosillo Coast present serious conflicts in a desert region becoming increasingly concerned with its most strategic resource: water.

A detailed analysis of the structure and production in the District has served to reinforce the need to effectively regulate both the volumes and the types of exploitation of the aquifer. The often-contaminated, always-dwindling water supply in the Hermosillo Coast aquifer indicates the necessity to implement an acquisition and payment program for water rights among the small producers in the District. These growers have expressed interest in exchanging part or all of their water concessions for economic benefits or through the implementation of programs that would modernize their facilities. Such a system might not only guarantee a cheap and secure water source for urban uses, but might also lead to a more effective fiscalization process to control the unchecked exploitation by large companies that has been occurring in the Coast for years.

Nonetheless, such steps would also be open to abuse, becoming a means to subsidize urban and industrial development characterized by further exploitation of this important natural resource, or further social inequity with the water flowing to those most able to pay. Discussions over water use in the Hermosillo Coast region must be tied to a discussion about the type of urban, industrial and agricultural development appropriate for an arid environment. In addition, this discussion about establishing mechanisms for sustainable use of water and possible transfer of agricultural rights to city dwellers must be accompanied by implementation of a real “culture of water” which emphasizes conservation and reuse, as well as waters’ other uses – recreation, aesthetic and environmental – the source of life for the unique biodiversity of the Sonoran desert region.

This study was produced by the **Red Fronteriza de Salud y Ambiente, A.C.** as one of the joint projects between the Texas Center for Policy Studies, Fronteras Comunes and La Neta: Proyecto Emisiones investigating the environmental and health impacts of NAFTA. The project and reports were made possible through a grant from the Charles Stewart Mott Foundation in Michigan.

To request copies of the report, entitled, *Acuíferos y Libre Comercio: El Caso de la Costa de Hermosillo*, which is available only in Spanish and includes full citations, contact either of the organizations below. The report is also available on both TCPS's and RFSA's website.

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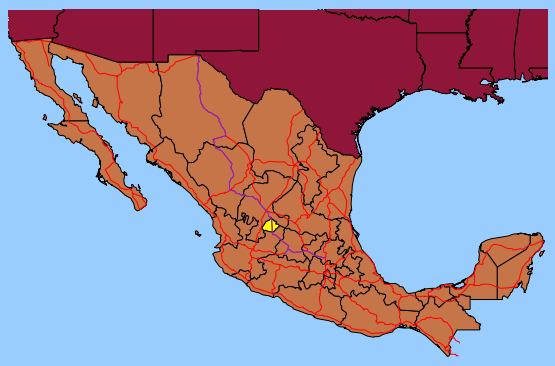
The Effects of Industrialization and the Maquiladora Export Industry on the Economy, Health and Environment of Aguascalientes



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The Effects of Industrialization and the Maquiladora Export Industry on the Economy, Health and Environment of Aguascalientes

Since the enactment of the North American Free Trade Agreement (NAFTA) in 1994, the economic, social and environmental structures of Mexico, the United States and Canada have changed, while the governing structures confront new challenges in decisionmaking which according to one's perspective either represent new opportunities for growth and improved quality of life or new problems in equitable development.

This document summarizes a new report by Periodismo para Elevar la Conciencia Ecológica (PECE) and the Texas Center for Policy Studies on the initial effects of industrialization and the maquiladora export industry on the economy, health and environment of the Mexican state of Aguascalientes. The Mexican state of Aguascalientes is a prime example of the changing economic structure in Mexico since NAFTA. Although growth in maquiladoras and other manufacturing industries has led to job growth and higher exports of products, it has also created economic, social, and environmental problems. Many of these problems seem to derive from an industry more focused on international supply and demand than on local or regional development.

Following a brief introduction and examination of NAFTA itself, the report examines changes in the region since the enactment of NAFTA. The social profile presents the state demographics as they relate to industrialization, and the economic profile emphasizes growth in the maquiladora export program. Finally, an environmental profile of the state considers the impacts of industrialization and provides policy recommendations for the future.

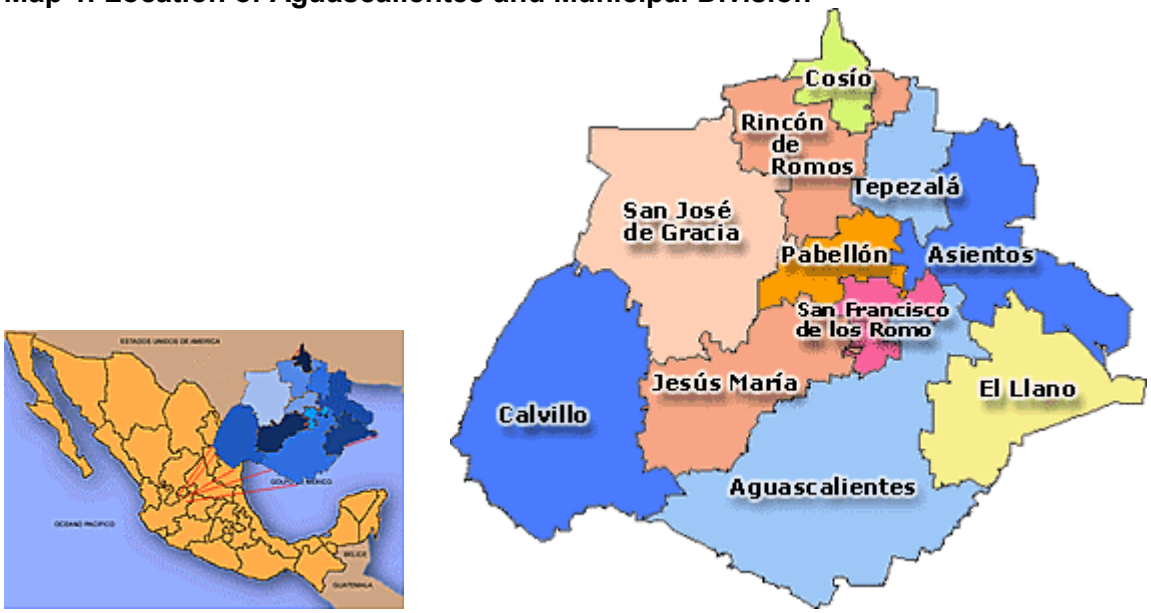
I. Introduction and Historic Background

The State of Aguascalientes takes its name from the thermal waters that – until recently – were the area's main attraction. Despite being one of the smallest Mexican states, Aguascalientes has experienced spectacular economic growth in the last decade. One might see this growth embodied in the buses and vans that carry thousands of workers to their jobs in the *maquiladora export industry* every day, at times from as far away as communities in the neighboring states of Zacatecas, San Luis Potosí and Jalisco.

This scenario is a relatively new one for Aguascalientes. Although many industries already existed in the 1980s – including major foreign operations such as Nissan -- with the signing of NAFTA in 1994, expansion of existing facilities as well the arrival of new industries occured. Dozens of new textile maquiladoras appeared in the region to take advantage of tariff reductions and other incentives. Non-maquiladora industries also operate in the region, mostly through significant foreign investment and mainly in the automotive and electronics sectors. Virtually all of these industries are geared toward the export of goods, mainly to the United States.

The last 25 years have also seen a shift in Aguascalientes from a rural to an urban population.[51] Known nationally as a center of milk production as well as the leader in the production of the fruit *guayaba* (or guava), currently these activities have lost much of their importance.

Map 1. Location of Aguascalientes and Municipal Division



Source: State Government of Aguascalientes Website

A combination of freezes and droughts have significantly curbed guava production. Wine production is no longer as profitable due to changes in Mexican import regulations and tariffs. In fact, it is now cheaper to import grapes from Chile than it is to buy them from regional vineyards. The decline of the grape industry has also meant the end of local table wine and brandy production, for which Aguascalientes had become widely recognized.

The region's agriculture has been affected by a shift in resources to recruit industrial export facilities as part of a concerted effort to attract large foreign firms. This effort helped bring Nissan, Texas Instruments and Xerox to Aguascalientes in the early 1980s. To accomplish this, federal, state and municipal governments have expanded energy grids, water management networks and interstate highways to accommodate both the industries themselves and the resulting rapid urbanization.

Offers to investors in Aguascalientes included cheap and abundant labor, free or subsidized utilities and – according to the state government's official website -- a peaceful labor climate characterized by more than 40 years without strikes. In addition, Aguascalientes offered roads in good condition and train connections to the United States and Mexico City.

[51] According to the latest Mexican Population Census, some 80 percent of the population in Aguascalientes lives in urban areas.

II. Relationship between Industrialization in Aguascalientes and the North American Free Trade Agreement

This section will explore the relationship between the expansion of export companies, the increase in direct investment and the growth in the number of maquiladoras in Aguascalientes since NAFTA. Rules governing investor rights and tariff and non-tariff barriers are essential components in setting economic and environmental policy.

Disappearing Tariffs

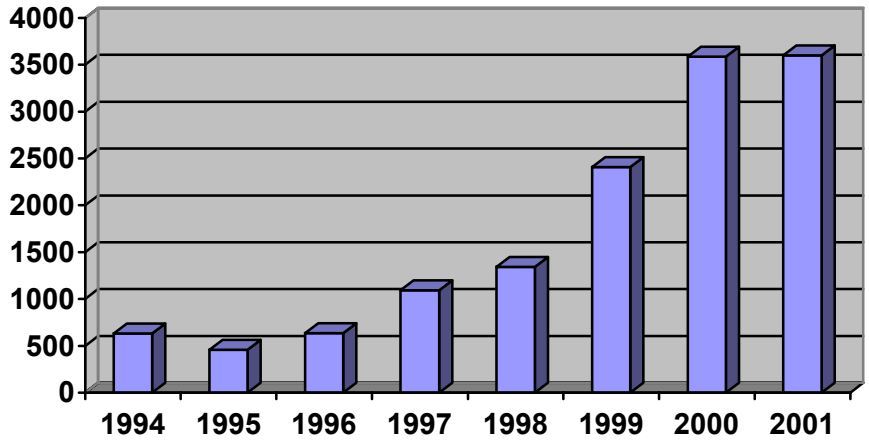
NAFTA is really a treaty about how to *administer* not how to completely *open* trade between Mexico, the United States and Canada. Although it called for the immediate elimination of certain tariffs, NAFTA has served more as a system to gradually reduce tariffs over time and to carefully regulate trade between the three countries. In the majority of cases, the elimination of tariffs takes up to 15 years to complete.

The devaluation of the peso between 1995 and 2000 also facilitated commercial growth in Mexico. This fallout heavily favored export industries, and the growing demand for products in the United States during that same period fueled international trade, as the average tariff imposed by the United States on Mexican products fell from almost 4% to less than 1%.

Five years after NAFTA, 76.2% of Mexico's exports to the United States and 66.2% of Mexico's imports from the United States crossed the border without tariff. Most of this trade involved the import of inputs for the maquiladora export sector and the export of its maquiladora-made products to the United States.

Between 1993 and 1999, textile exports and clothing assembly, an industry which is particularly strong in Aguascalientes, in Mexico grew by 419%, and by 1998 Mexico passed China to become the largest exporter of these products to the United States.

Figure 1. Value of Apparel Exported from Mexico to the United States, 1994-2001, in Millions of Dollars



Source: United States International Trade Commission, HTS Code 62, available at http://dataweb.usitc.gov/.

Another beneficiary of tariff elimination has been the automotive export sector. In 1999, this sector in Mexico exported $19.9 billion of products, representing the second most important sector behind electronics. For its part, Mexico imported $8.2 billion in automobile parts and vehicles in 2001, further evidence of the impact of tariff reductions.

Direct Investment and NAFTA

Although NAFTA serves principally to facilitate commercial exchange between the three countries, it also promotes foreign direct investment in the region. According to four of the Agreement's objectives, NAFTA seeks to:

- *Promote conditions of fair competition in the free trade area;*
- *Increase substantially investment opportunities in the territories of the Parties;*
- *Provide adequate and effective protection and enforcement of intellectual property rights in each Party's territory: and*
- *Create effective procedures for the implementation and application of this Agreement, for joint administration and for the resolution of disputes.*

These provisions offer much more explicit protection of foreign investment, including Chapter 11 of NAFTA, which has been controversial. In addition, anticipating NAFTA, Mexico passed the Law of Foreign Investment in 1993. Previously, Mexican laws had not permitted foreign investment without majority Mexican participation in the project, except for the maquiladora program. The new law permits up to 100% of an investment to be made with foreign capital, with few exceptions. With the passing of the new investment law and NAFTA, United States foreign direct investment in Mexico grew from an average of $2.2 billion per year between 1990-1993 to $3.6 billion per year between 1994-1998.

NAFTA and the Maquiladora Export Industry

Mexico began the Maquiladora Export Program in 1965 by setting up various manufacturing and assembly plants owned mainly by non-Mexican firms. Under the Program, raw materials are delivered to the maquiladoras for assembly, and the final product is exported with minimal taxation. Instead of paying tariffs on imports, these firms pay a temporary bond and agree to manufacture products solely for export using duty-free imported products specifically for this purpose. This system allows 100% of the investment to be foreign.

After witnessing the success of the border maquiladoras, Mexico began to promote the establishment of maquiladoras in the interior of the country. States like Puebla, Jalisco and even Yucatan began to receive investments under the program. The greatest employment growth in the maquiladora export industry occurred from post-NAFTA 1995 until late 2000, when the United States economic growth and demand for products slowed considerably.

Although there is no specific chapter in NAFTA related to the maquiladora export program, certain provisions do affect the program. Under Article 303, for example, NAFTA continues to permit the temporary payment of tariffs on inputs and refunds when the final products are exported. At the same time, NAFTA eliminated the tariffs on products exported from Mexico to the United States, further lowering the costs of export. Strategically, Article 303 did not permit temporary payment on inputs that came from non-NAFTA countries like China.

Article 304 eliminated the requirement that a certain percentage of the maquiladora's production be exported. Today a maquiladora has the option of selling 100% of its products in Mexico. Essentially, NAFTA eliminated the differences that exist between a maquiladora, a national company and a composite company. The maquiladoras, however, still have certain tax advantages over non-maquiladora plants.

Maquiladoras pay social severance payments and social security, but they traditionally do not pay corporate income tax because, in general, they do not sell directly but rather transfer products to foreign companies. In the years since NAFTA, the tax code has been changed repeatedly, including the creation of a lump-sum tax payment for maquiladoras. Certainly, maquiladoras do not want to pay additional taxes, because that would put them at a comparative disadvantage with Asian producers. Maquiladoras are also wary of being taxed twice – once in Mexico and once where they are based, which is usually the United States. A recent agreement involving high level officials of the U.S. and Mexico has temporarily resolved this issue, at least for several years. Maquiladoras now do pay higher taxes than they once did, but lower than most other industrial sectors.

NAFTA and Environmental Protection

Although NAFTA is a commercial agreement and not an environmental one, it does specify that each country should develop and enforce its own environmental and public health laws. Article 114(2) stipulates that it is "inappropriate" to eliminate environmental, health or safety laws in order to promote commercial expansion or to attract direct investment. If a country determines that another country is violating these principles to attract investment, it can present a complaint to the Free Trade Commission and the Council of the Commission on Environmental Cooperation (CEC).

NAFTA includes a side agreement on the environment called the North American Agreement on Environmental Cooperation (NAAEC). Under the Agreement, any *citizen or non-governmental organization* in the three countries can denounce a government that is violating its environmental laws. A petition is presented to the CEC, which can then call for the preparation of a detailed report of the case and publish "a factual record of its findings." Although this process has helped bring violations to light, the CEC reports have no legal bearing. As of the time of publication, citizens and organizations from the three countries had presented 33 petitions, including 14 in Mexico. None of the 14 petitions in Mexico have concerned the state of Aguascalientes.

The NAAEC also outlines the procedure for a *government* to denounce another government for violating its environmental protection laws. Unlike the citizen petition process, the government procedure can result in the selection of an arbitration panel to study the case and develop a plan of action to mediate the environmental problems. If the country at fault does not comply with the Commission's ruling, then it can be fined

and can lose its benefits, such as reduced tariffs. To this date, no government has brought a dispute related to failure to enforce its environmental laws.

Under NAFTA and its side agreements, a country cannot adopt an environmental law that, in reality, is a "non-tariff barrier" with the intention of preventing investment or inhibiting trade. Countries and states can theoretically enforce all of their laws unless they restrict or impede free trade. The General Agreement on Tariffs and Trade (GATT) permits the restriction of the import of a good when it is "necessary to protect the life or health of humans, animals or plants." However, whether or not such a restriction is "necessary" itself can be the subject of a trade dispute and those challenged must show it is the least restrictive measure possible.

A Mexican law derived from the 1983 La Paz Agreement requires maquiladoras and other export industries that import inputs to also export any hazardous wastes generated during the production process. In theory, this provision implies that many of the 3,000 maquiladoras operating in Mexico must export their hazardous wastes to the United States, where most of the inputs originate. The reality is that much of this waste has remained in Mexico. According to the National Institute of Ecology (Instituto Nacional de Ecología), the maquiladoras exported more than 50,000 tons of hazardous wastes to the United States in 1999, and other Mexican industries exported almost 31,828 tons. Many suggest that these quantities are relatively small compared to the amount of wastes actually generated. If maquiladoras change their status and become domestic Mexican companies, then they will be able to "avoid" exporting hazardous wastes without losing the ability to export 100% of their products. So far there has not been a large conversion of maquiladoras to Mexican corporations, largely because tax incentives for maquiladoras are still in place.

NAFTA Summary

The goal of the North American Free Trade Agreement is to facilitate trade and investment between Mexico, the United States and Canada. Specifically, the Agreement reduces and in most cases eliminates tariffs imposed on imports and exports between the countries, especially in the textile and apparel sectors. At the same time, it offers certain protections to investors and eliminates preferential treatment of domestic investors. The Agreement includes a controversial provision – Chapter 11 – that investors have used against governments to obtain financial compensation for acts of "expropriation."

NAFTA theoretically supports government rights to enforce environmental laws, but these laws do not have the same weight as those that support the investor, and thus far countries have not used provisions to ensure environmental compliance by their competitors, although citizens have used a relatively weak provision contained in the NAFTA side agreement to highlight issues of non-enforcement. The maquiladora export industry began as a binational program for the creation of jobs along the United States-Mexico border. Thanks to the program's success, the Mexican government expanded the program to include other parts of the country, including the state of Aguascalientes. Although NAFTA has no direct relationship to the maquiladora program, it does eliminate many of the advantages that the maquiladoras had in comparison to other industries, although tax advantages and the freedom to both sell domestically and to export continue to make the maquiladora industry an attractive business strategy.

How does Chapter 11 protect the investor, and why is it controversial?

Under NAFTA's Chapter 11, investors from Canada, the United States or Mexico must be treated equally by the country, state or province in which they invest (Article 1102). Article 1110 of the Treaty declares, "no Party may directly or indirectly nationalize or expropriate an investment of an investor of another Party in its territory or take a measure tantamount to nationalization or expropriation of such an investment," with few exceptions. If a country or state, through its actions, does expropriate an investment, then an arbitration panel may require the country at fault to compensate the investor for the lost investment. This means, for example, that Aguascalientes cannot give preference to investors from Monterrey over investors from Canada in the establishment, direction, operation or sale of a factory.

Under Article 1115, private investors can initiate an arbitration process against a national government if they claim that the government regulatory actions have unduly interfered with their business investment. The organizations through which one can effect this process are the International Center for the Settlement of Investment Disputes (ICSID) – a dependent of the World Bank – and the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL).

These international organizations use arbitration panels selected behind closed doors and do not offer appeals. To this date, investors in all three countries have used Chapter 11 stipulations to try to receive remuneration for lost investments. The arbitration panels are highly controversial not only because of their secretive and antidemocratic selection process but also because of their often loose interpretation of which measures are "equivalent to expropriation." In one recent case, Mexico had to pay $16 million to a private California company because the state government of San Luis Potosi did not authorize the operation of a hazardous waste landfill in the state.

NAFTA-related changes have increased investment in and exports from Aguascalientes. The following sections will both detail this growth as well as examine questions arising from this growth. First, to what extent has economic growth come at the expense of the environment and public health? Is economic growth accompanied by a commitment for a clean environmental and a growth in environmental infrastructure? Have governmental authorities sold Aguascalientes as a viable and attractive place to invest because of the lack of environmental and labor regulations and their enforcement? In addition, the report will also examine to what extent industrial growth has improved quality of life and the economic well-being of Aguascalientes workers and residents.

III. Aguascalientes: A Social Profile

Located in central Mexico, the state of Aguascalientes borders Zacatecas to the north, east and west, and borders Jalisco to the south and east. Nearly one million people live in the state, with over two-thirds of them concentrated in the capital municipality of Aguascalientes. Partly as a function of increasing industrialization – attracting migrants to the cities – the state is increasingly urbanized, with the percentage of citizens living in urban areas increasing from 76.5 to 80.2 percent between 1990 and 2000.[52] Large numbers of immigrants help bolster city populations, as people from neighboring states move to Aguascalientes in search of manufacturing jobs. Between 1990 and 2000, the percentage of residents born outside the state rose from 19.2 to 19.9% with the percentage of resident in the municipality of Aguascalientes born outside of the state slightly higher, at 24.3%.

In 2000, Aguascalientes had a higher percentage (more than 95 percent) of residents over the age of 14 who were literate and a higher percentage of children (more than 92 %) between the ages of six and 14 in school than any states with the exception of the capital municipality of Distrito Federal and the northern border state of Nuevo León. The live birth rate in Aguascalientes fell from 2.71 to 2.65 per woman between 1990 and 2000, with rates significantly higher in rural areas than in the urbanized capital.

In terms of employment, the 2000 Census indicated that 50.8% of the residents over the age of 12 are economically active. Between 1990 and 2000, employment in the primary sector – agriculture – fell from 15% to 7.4%, the secondary sector – principally manufacturing – grew slightly from 34.2% to 35.3%, and the tertiary sector – services – grew from 48.9% to 54.8%. Wages grew overall, with 53.4 percent of the economically active population earning at least twice the minimum wage, as opposed to 35 percent in 1990. It should be noted that the capital municipality of Aguascalientes is the only municipality where more than 50 percent of the economically active population earns at least twice the minimum salary.

In 2000 most private residences in the state – 86% – had three or more rooms and 75.3% were privately owned. Of the residences, 91.6% had running water in the home and 97.9% had electricity. Of the 2,370 residences lacking running water most relied on a well, local river or stream to supply their water needs, while about 40 percent bought their water from a truck.

About 4.5 percent of residences lacked wastewater service in 2000. Of those that had service, more than 97 percent connected to a wastewater treatment system, while others relied on septic tanks, pit privies or simply discharged wastewater directly to a river, stream or ditch.

The capital municipality is the only city in the state with a landfill that meets official specifications. About 15 percent of households in the state receive direct pick-up at their resident, while about 3/4 make use of public bins or containers. The other 10 municipalities – and residents from surrounding states – have trash transported to open air dumps or dump directly on abandoned land and lack basic services.

[52] INEGI, XII Censo General de Población y Vivienda, 2001.

These basic figures of income, services, educational levels and birth rates demonstrate that their have been significant improvements for the residents of Aguascalientes over the last 10 years. At the same time, the numbers also point to the vast needs which are not being met in the state. And the statistics tell just one part of the story. Beggars in the city streets, pockets of dilapidated neighborhoods, deteriorating public infrastructure, lack of public transportation, the near impossibility for the working classes to gain access to universities, and state and local governing structures with less resources to meet even basic needs tell another.

The corporations and businesses which have benefited from an economic "boom" over the last 10 years, on the other hand, have donated resources to "good" causes to help meet a small percentage of these needs, including to education and worker housing. What is needed, however, is a sound fiscal policy which makes sure that the taxes they do pay help meet these needs and are invested for the good of the community, and that some percentage of their profits also flow to community and social development.

IV. Aguascalientes: An Economic Profile

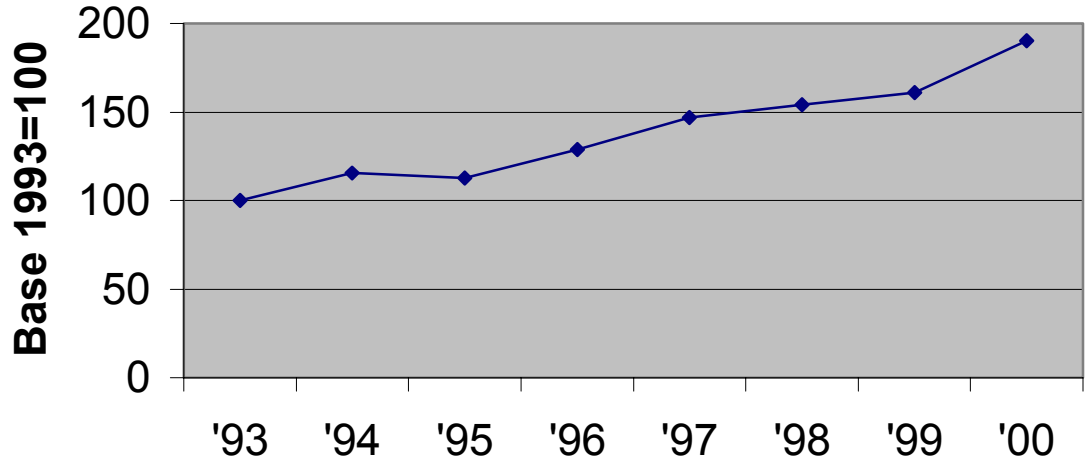
The municipality of Aguascalientes stands as an island in the regional context. In general, its population has an acceptable – by Mexican standards – standard of living. There are plenty of advertisements for jobs in factories or services, and activity in the industrial parks and commercial centers are the envy of neighboring states.

The massive production for the export market – initiated in the 1980s but strengthened in the 1990s with the arrival of maquiladoras – the generation of consumer goods like textiles, food and drinks for the regional market and business services to attend these demands are at the center of the state's economic growth.

Although the country as a whole had economic difficulties after 1995, in part because of the peso devaluation, Aguascalientes' economy grew at a rapid pace until the U.S and world recession caught up with it in 2001. In 2000, the commercial and service sector supplied more than 60 percent of the state's gross domestic product, with the primary sector supplying about 4.4 percent and the industrial sector supplying the other 33.4 percent. Between 1993 and 2000, the industrial sector accounted for the majority of the growth in the economy, increasing its share of the gross domestic product from 29 to 33 percent. Overall, Aguascalientes's growth outstripped the nations, particularly in the manufacturing sector.

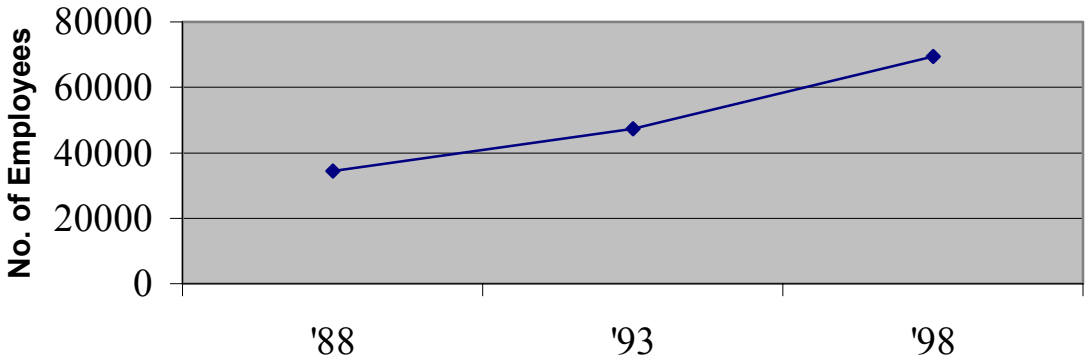
Between 1993 and 2000, the manufacturing industry in Aguascalientes nearly doubled its production value, number of facilities, production volume and aggregate value (see Figure 2). In addition, the number of employees in the manufacturing industry grew from less than 35,000 to 69,441 between 1988 and 1998 (see Figure 3).

Figure 2. Production Volume of the Aguascalientes Manufacturing Industry, 1993-2000



Source: INEGI, Censo Económico 1989, 1994 y 1999.

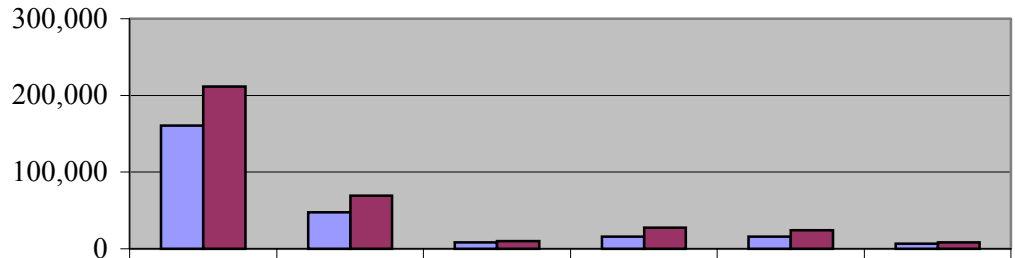
Figure 3. Number of Employees in Manufacturing Industry in Aguascalientes, 1988-1998



Source: INEGI, Censo Económico 1989, 1994 y 1999.

The major subsectors involved in this growth were *food, drink and tobacco*; *apparel and textiles*, and *metal products and machinery*. These three subsectors represented nearly 92% of the employment in 2000 and 96% of the production value in the manufacturing industry (see Figure 4). According to the 1999 Economic Census, 64.7% of the employees occupied in manufacturing industries were located in the municipality of Aguascalientes, with 44,962 workers out of a total of 69,441.

Figure 4. Employees by Major Manufacturing Sector in Aguascalientes, 1993-98



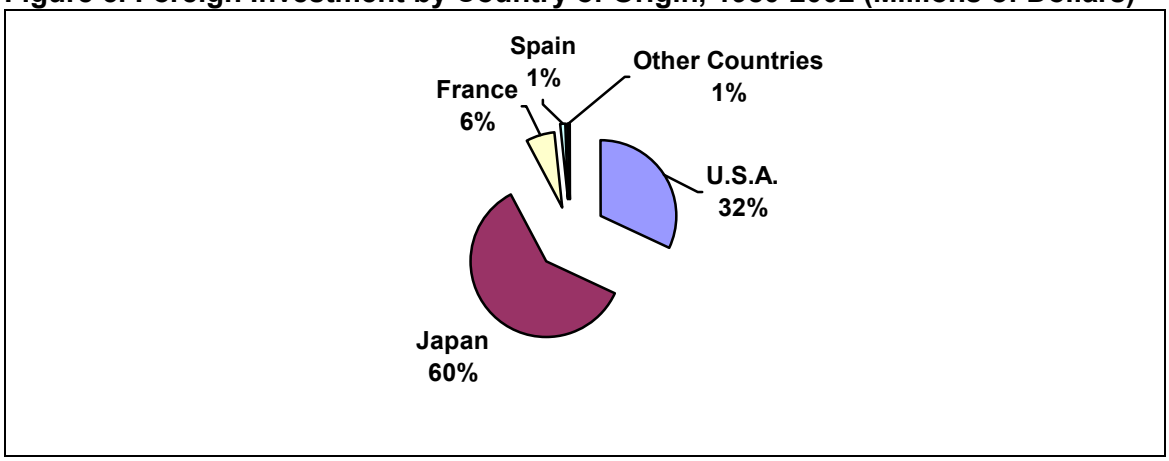
	Total	Manufacturing	Food and Beverage	Textiles	Metal/Auto Parts	Others
Employees, 1993	160,443	47,264	8,554	16,117	16,259	6,334
Employees, 1998	211,075	69,441	10,017	27,325	24,059	8,040

Fuente: INEGI, Censo Económico 1994 y 1999.

Foreign Direct Investment

Foreign direct investment has played a significant role in the industrialization of Aguascalientes. Between 1980 and 2002, foreign investment in Aguascalientes totaled $3.9 billion dollars and generated over 30,000 jobs during that period. Most of the investment came from Japan, although in recent years investment by U.S. companies – in both auto parts and textiles -- has grown more rapidly and generated more job growth (Figure 5).

Figure 5. Foreign Investment by Country of Origin, 1980-2002 (Millions of Dollars)



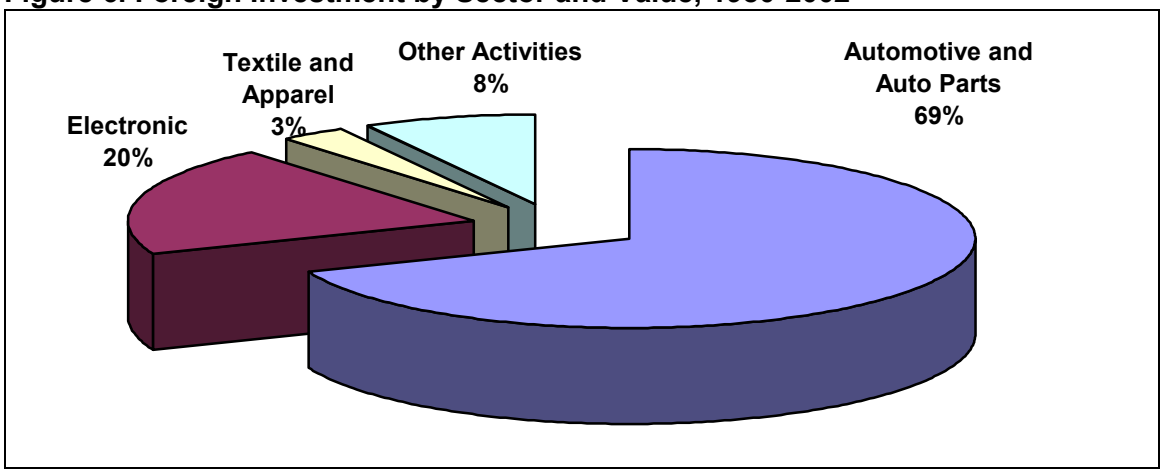
Source: State Government of Aguascalientes, Secretaría de Desarrollo Económico, Dirección General de Estadística

The arrival of the Japanese giant Nissan in the 1980s signaled the beginning of this large-scale arrival of foreign investment as well as the industrialization of the state and its importance as a center of the automotive industry. This has continued to the present day, in particular with the recent joint venture between Nissan and the french company

Renault in Aguascalientes. To date, nearly 70 percent of foreign investment has occurred in the automotive industry, followed by the electronic, and the textile and apparel industry (see Figure 6). Similarly, according to state figures, the number of jobs generated by foreign investment has been greatest in the automotive (36 %), textile and apparel (33%) and electronic industries (19%).

Another recent report found that virtually all of the investments – 98 out of 111 companies – had occurred in the capital municipality of Aguascalientes. Most of this investment has been recent. Thus, in 1993, there were only 12 companies composed of mainly foreign investment. Between 1999 and 2002 alone, more than 23 new foreign companies invested in Aguascalientes, including companies from France, Brazil, Switzerland and Spain. Investment in the textile and clothing assembly industries comes not only from the United States but also from Hong Kong and from other Mexican regions, and includes companies such as Modas de Aguascalientes, Salomón Exports, Ropa de Ciénaga, Continental Colors, Cydsa-San Marcos, Beatrice Products, Kappler de México, Bodywear de México and Lucky Star.

Figure 6. Foreign Investment by Sector and Value, 1980-2002

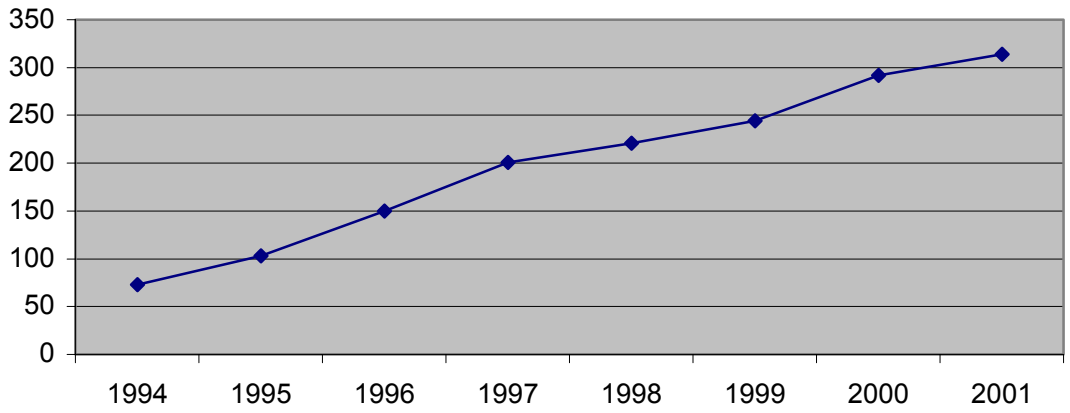


Source: State of Aguascalientes (Secretaría de Desarrollo Económico, Dirección General de Estadística), 2002.

These foreign-owned companies are mostly engaged in the export of goods to the U.S. and other countries. Companies dedicated to producing for the export market increased their level of exports both in volume and value over the last several years, indicating that the economy of Aguascalientes has become more and more connected to that of the U.S. and the world. While companies in the food and beverage sector produce mainly for the local and regional market, companies in the auto parts and automotive, textiles and apparel and electronics sectors are nearly exclusively concerned with exporting their products abroad. Most of those firms exporting from the apparel and textile sector are maquiladoras (for more discussion see text below). Overall, the number of all facilities exporting outside of Mexico located in Aguascalientes grew from some 60 in 1995 to over 300 in 2001 (see Figure 7).[53]

[53] Government of State of Aguascalientes, Secretaría de Desarrollo Económico.

Figure 7. Number of Export Firms in Aguascalientes



Source: State Government of Aguascalientes Secretary of Economic Development, SEDEC.

Most of this export activity has occurred recently. A 1997 study of 161 export companies found that 83% of the companies started exporting after 1990. Automotive and auto parts constitute the largest exporting sector, with Nissan by far the largest within that sector. (See Table 1).

Table 1. Growth in Exports in Aguascalientes and Leading Export Sectors, 1993 – 2000 (millions of dollars/year)

Year	Automotive/ Auto parts	Electrical/ Electronics	Clothing/ Apparel	Agroindustry, Food / Beverage	Total
1993	425.4	167.6	44.6	9.6	683
1994	660.6	161.5	48.8	15.8	936
1995	941.9	266.6	66.6	18.7	1,366
1996	1,162.4	279.0	170.5	27.0	1,743
1997	1,237.5	357.9	195.5	41.3	1,970
1998	700.9	380.9	279.7	41.9	1,579
1999	819.7	389.8	389.5	42.8	1,822
2000	2,061.5	515.5	469.5	43.0	3,320

Source: Secretary of Economic Development, SEDEC, and State Commission on Economic Development and Foreign Trade, State Government of Aguascalientes

Textiles and Apparels

Textile and apparel production has a long tradition in the state predating NAFTA. However, since the passage of NAFTA, the sector has received considerably more foreign investment principally by U.S. and Asian investors. Several local companies have switched from domestic to export production and in some cases registered as maquiladoras, contracting with larger companies abroad to produce lines of clothing.

Both the industry and the state and municipal governments have taken a number of steps to help this industry survive and flourish in the difficult transition from domestic to export production. Steps taken have included commercial expositions, promotional trips to the U.S. and other markets, and the creation of a new formal "cluster" composed of both foreign and local businesses, educational institutions and governmental agencies dedicated to helping the industry meet international demands for products. In addition, a technology center has been created with public and private money to help the sector.

The Maquiladora Export Sector in Aguascalientes

In recent years the number of export maquiladoras in Aguascalientes has grown dramatically (see Table 3). After the federal government created a program to encourage this type of industry in the 1960's, most early maquiladoras were found only in the six northern border states (Baja California, Sonora, Chihuahua, Coahuila, Tamaulipas, Nuevo León). In fact, in 1992 there were only four facilities in Aguascalientes. This number grew to 49 by 1996 and by 2001, there were 93. A combination of provisions in NAFTA encouraging foreign investment, the tax structure and the peso devaluation helped promote growth in the maquiladora export sector throughout the 1990s. Much of the growth occurred away from the border in states like Aguascalientes, whose maquila growth outpaced the nation's.

Table 2. Number of Export Maquiladoras in Mexico, Aguascalientes and Border States, 1990 – 2001

Year	Mexico	Aguascalientes	% of the Total	Border States	% of the Total
1990	1,703	4	0.00%	1,527	89.62%
1991	1,914	4	0.00%	1,693	88.43%
1992	2,075	4	0.00%	1,828	88.09%
1993	2,114	6	0.00%	1,848	87.38%
1994	2,085	8	0.00%	1,801	86.35%
1995	2,130	29	0.00%	1,776	83.36%
1996	2,411	49	2.01%	1,974	81.88%
1997	2,717	65	2.39%	2,204	81.11%
1998	2,983	73	2.43%	2,367	79.35%
1999	3,297	89	2.70%	2,552	77.39%
2000	3,590	89	2.48%	2,759	76.85%
2001	3,729	93	2.49%	2,860	76.70%

Source: INEGI, Statistics of the Maquiladora Export Industry.

The number of people employed in Aguascalientes maquiladoras grew by more than 3,000% from 1990 to 2000 (See Table 4). The majority of these employees are in the textiles, apparel and leather subsectors, and most are women. Much of the earlier investment in maquiladora production was designed to take advantage of low wages, and utilized little integration with local inputs and produced little value-added (apart from the labor itself). In addition, in the late 1990s, a greater number of maquiladoras began to move outside the capital municipality to neighboring municipalities like Jesús María and San Francisco de los Romo where salaries are slightly lower. Still, more recent maquila production shows some evidence of increasing the number of professionals employed, increasing the use of local inputs, offering more training and transfering more technology. For example, imported inputs fell slightly, from about 94 percent in 1996 to

91 percent in 1999, indicating a slight increase in the use of national inputs. Still, maquiladoras continue to be connected almost exclusively to international suppliers and markets.

Table 3. Employees in the Maquiladora Export Industry in Aguascalientes

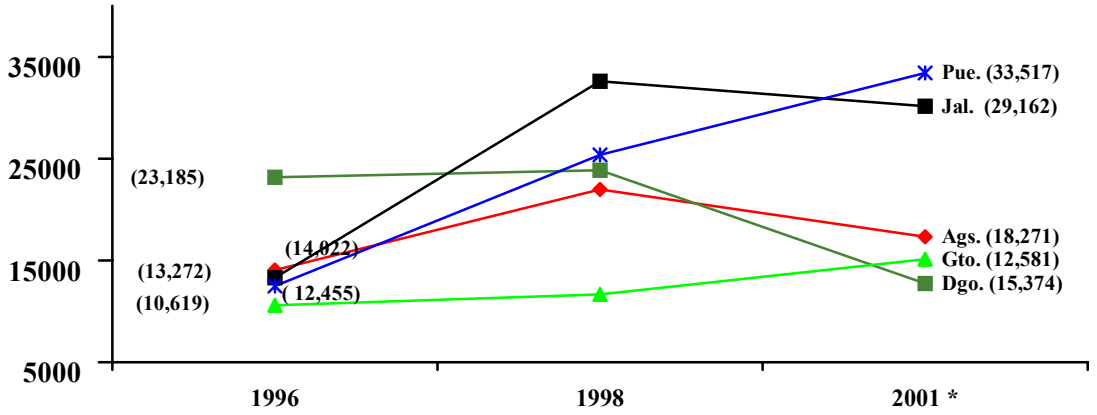
Year	Total	Textiles, Clothing and Leather
1990	828	828
1991	828	828
1992	828	828
1993	2,468	2,468
1994	5,388	5,388
1995	8,158	7,929
1996	12,321	11,918
1997	17,384	16,876
1998 p/	19,859	19,339
1999 p/	24,632	23,992

p/ Preliminary Figures *Source: INEGI. General Bureau of National Accounts.*

About 90 percent of the maquiladora employees in the textile sector are direct production workers, but their salaries only represent about a third of the total value added. While salaries have increased in terms of their percentage of value added over the last five years, the payment discrepancy between line workers and technical and administrative staff has continued to be severe. Thus, in 1990, average white collar salaries were 3.27 higher than worker salaries. In 1999, average administrative salaries were still 3.29 time higher than workers, indicating that despite some rise in median income, the gulf in incomes between the two classes of workers remained wide.

The recent recession hit the maquiladora industry in both the nation and the state hard. For example, preliminary data indicates that in March of 2002 there were some 40 percent less jobs in the state in the maquiladora industry than exactly a year before. Only Baja California and the State of Mexico saw a larger proportion of job losses. Overall, according to figures provided by the Social Security Institute, nearly 10,000 jobs were lost in the manufacturing industry, with nearly 9,000 fo them lost in the maquiladora sector in Aguascalientes (see Figure 8).

Figure 8. Changes in Number of Employees in Maquila Industry by State, 1996 - 2001



Governmental Support of Economic Development

The government of Aguascalientes has made a tremendous effort to increase the number of maquiladora export facilities and foreign investment in general in the state. The state Commission on Economic Development and Foreign Trade (CEDECE) and the Secretary of Economic Development promote foreign trade and provide information to exporters. In 1993, the state government initiated an Economic Deregulation of Business Activity Program, with the object of facilitating investment and attracting industry. Within this program, the state government has established a single-stop window for all administrative permits and application procedures.

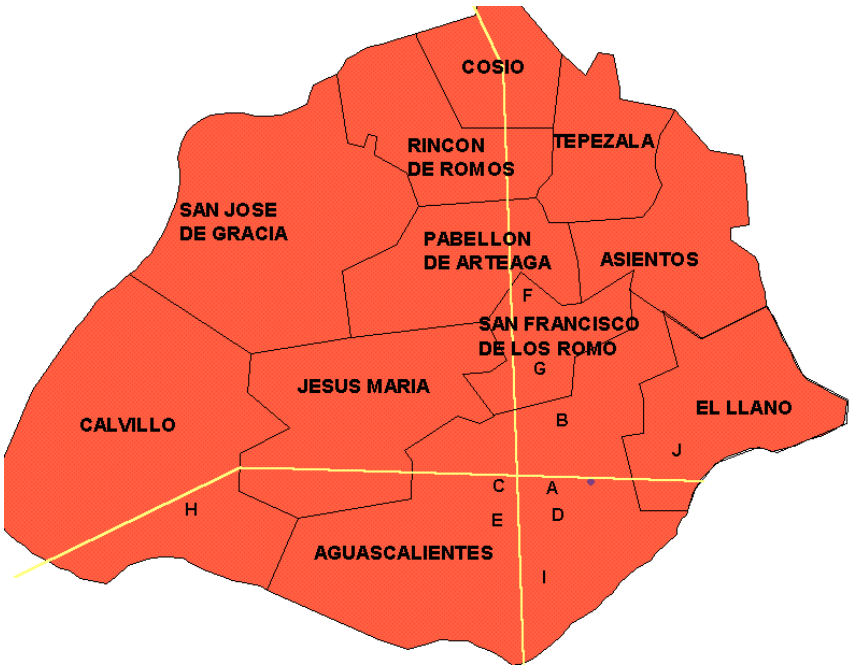
A number of other measures – including a state-supported Institute for Business Competition, an incubator program, a grant program for graduate work by business professionals – have helped foment a positive business climate in the state.

In addition, to attract business, the state has in some cases eliminated a two percent payroll tax, forgiven local property taxes and facilitated and subsidized the extension of services and infrastructure including energy, natural gas, water and telecommunications to individual industries and industrial parks. Municipalities in Aguascalientes have also offered subsidized rates for some basic services.

In addition, medical assistance, training of new employees and other state services have also been used as a way to promote job growth in the state. In Aguascalientes, the government and private industry have collaborated to build a series of industrial parks near major transit lines, including the North-South axis (see Map 2). Currently, the state government is promoting the location of new industries in the industrial parks located north of the capital to avoid further urbanization of the capital center. At the same time, the state government has sold Aguascalientes as a state with practically no air, water or land pollution, an increasingly dubious statement.

The eagerness to attract foreign industry has become the major impetus of state economic policy in Aguascalientes, above other economic criteria such as social equity or growth with social development. And the maquiladoras, responding to the ebbs and flows of the market, and constantly engaged in analysis of cost and regulatory structures, are ready to leave behind their factories at a moments notice. Proof of this is that during 2001, more than 40 maquiladoras closed either temporarily or permanently in response to the declining world economy.

Map 2. Municipalities, Principal Highways and Industrial Parks in Aguascalientes



Map Legend	
Industrial Park	Symbol
Ciudad Industrial	A
Del Valle de Aguascalientes	B
El Vergel	C
Alta Tecnología	D
Siglo XXI	E
San Francisco	F
Tecnología Avanzada	G
Calvillo	H
Nissan/Renault	I
El Llano	J

V. Aguascalientes: An Environmental Profile

This section examines the direct and indirect impacts industrialization has had on the region's environment. Direct impacts might include the toxic emissions, hazardous waste generation and water use. Indirect impacts could include the increase in the use of water and in the generation of solid waste in municipalities which have grown as a result of the attraction of industry. Nonetheless, due in part to unavailable information, it is not possible to determine with certainty the impacts of industrialization on the environment. There are, however, certain issues that concern the population of Aguascalientes, such as particulate matter levels in the air, scarcity of water, lack of public information and inadequate hazardous waste management. The major problems facing the state currently are the reduction in the quality and quantity of water, desertification and deterioration of air quality.

Part of the difficulty in assessing the direct and indirect impacts of industrialization are that unlike the border region – which has witnessed 20 to 30 years of industrial development – industrialization in Aguascalientes is a relatively recent phenemona. In addition, it is only in the last few years that both the federal and state government have begun to collect information about hazardous waste generation and toxic emissions. In fact, for many years state and local authorities deferred regulation of the maquiladora industry – as well as the automotive industries – which have led the industrialization of Aguascalientes – to federal authorities. It wasn't until the end of 2001 that Mexico passed federal legislation requiring such businesses to turn over information about toxic emissions, though a "voluntary" program had existed previously.

To be sure environmental problems predate NAFTA and the new arrival of maquiladoras. For more than a quarter of a century, the lack of water in a state whose slogan in its coat of arms is "clear water, clean sky and good people (agua clara, cielo limpio y gente buena)" has been a major concern. Still, there is little doubt that the recent arrival of maquilas and other industries supported by foreign investment has increased this concern, in addition to the more immediate concerns of the illegal dumping of waste, toxic air emissions and wastewater discharges.

In recent years, the state of Aguascalientes has taken some steps to curb the negative impacts that industrialization has had on its natural resources and environment. Recent state laws recognize these new challenges, and new efforts are being made to deal with their consequences. According to governmental objectives, thes efforts focus on four areas: protecting and rationally using natural resources, efficiently using water, rehabilitating major rivers and adequately managing municipal and industrial waste. State law now requires that both industries regulated by the federal government and those regulated by the state report their emissions and hazardous waste generation to a pollution release and transfer registry. In addition, state environmental officials and municipal leaders have begun to make water use a major condition of attracting industry. While this attention to water use is new and still being developed, it is a major shift in policy in the state.

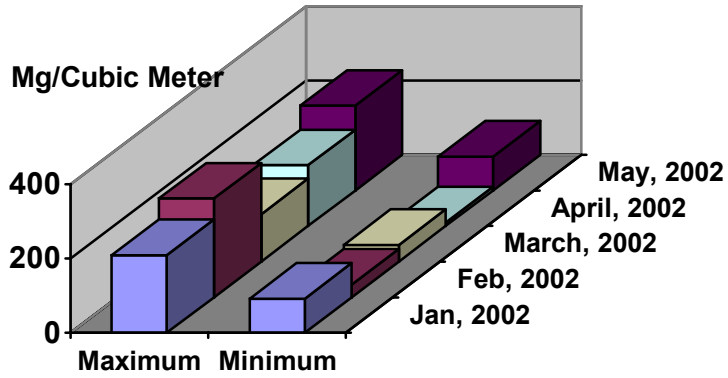
Nonetheless, serious obstacles remain to making consideration of the environment and quality of life key issues in the state. Citizens who organize and oppose industrial or waste projects are often branded by leaders as being opposed to all development, while the major media outlets continue to ignore most environmental issues.

In general, the state and its policies concentrate more on attracting industrialization and connecting to the world economy than on mitigating the harmful effects of industrialization. While the recent adoption of a new state environmental law is a positive step, this law has regulatory gaps and needs strengthening. In addiition, governmental objectives have lacked the resources and the enforcement necessary to achieve meaningful results.

Air Quality: A Growing Concern

In terms of air quality, the environmental control division of the Secretariat of Social Development (SEDESO) reports that contaminant gas levels in the city of Aguascalientes do not exceed maximum permissible levels for nitrogen oxide, sulfur dioxide or ozone. In recent years, however, total and respirable particulate matter concentrations have violated the standards, particularly in 2001 and 2002. As an example, daily levels of respirable particulate matter averaged 185 mg per cubic meters in January of 2001, well above the 150 mg/cubic meter standard (equivalent to the U.S. standard). Particulate matter comes from unpaved dirt roads, wood burning, the burning of tires and other wastes in brick making kilns, automobile and truck engines, heavy industry and power plants. These particles can cause severe damage to the respiratory system, particularly when they are attached to toxic substances.

Figure 9. Maximum and Minimum Daily Readings of Respirable Particulate Matter in City of Aguascalientes, Jan-May, 2002



Note: Daily standard for respirable particulate matter – particulate matter less than 10 microns -- is 150 mg/cubic meter.
Source: State Government of Aguascalientes. Secretaría de Planeación. Información estadística de Aguascalientes (CIFRA). Aguascalientes 2002.

Urban Deterioration and Decay

According to experts, Aguascalientes' industrialization process actually began with decisions taken in the 1960s and later reaffirmed in the 1980s to create a series of industrial zones and parks to the west of the capital city. Later, the City of Aguascalientes began instead to reorient industrial growth to the south, toward the airport. Whatever the decisions made by planning departments and directors, industrial growth in Aguascalientes has largely moved along a north-south track, closely following

the railways and pan-american highway, which links Aguascalientes with Mexico City, Guadalajara, León, Ciudad Júarez, Matamoros, Nuevo Laredo and Tijuana.

In addition to the transportation infrastructure and creation of industrial parks, industrial development occurred as a result of property tax exemptions, including a number of decisions to allow industries to locate in areas which were not properly zoned for industrial development. More recently, the 1992 constitutional amendments which allowed farmers to sell communal, ejido property has spawned a speculative industry as farmland is sold off to industrial developers.

All of these decisions have resulted in an industry which is still highly concentrated in the capital municipalities with some extension into outlying municipalities. Rather than promoting the development of intermediary cities, the policy has created a spreading, sprawling megalopolis, straining basic services and fragmenting what was previously farmland throughout the Valley of Aguascalientes.

Water Resources and Use

One of the most serious concerns for the Aguascalientes population is water scarcity. Being a semiarid zone, Aguascalientes does not have large, above-ground water sources, but instead relies on riverbeds and drainage areas (see Map 3). The most important river is the San Pedro, or Aguascalientes, which starts in the state of Zacatecas and crosses the state from north to south to empty into the Río Verde, west of the capital. The Río Calvillo – transecting the south of the state -- is also relatively important, with an annual flow of 50 million cubic meters.

Apart from these major surface water resources, Aguascalientes is home to five major aquifers. These five main aquifers have been mined, with annual extractions reaching an alarming 546 million m^3, or nearly double an estimated average natural recharge of 300 million cubic meters per year This unchecked water use has largely destroyed the thermal waters that gave Aguascalientes its name.

Despite the scarcity of water in Aguascalientes, throughout the later half of the 20^{th} century, the state government supported agricultural development through intensive irrigation of crops. Using both aquifers and water from the reservoirs developed between 1930 and 1985, water use for crop irrigation increased dramatically between 1950 and 1996, as the number of hectares planted rose from some 13,000 hectares to nearly 55,000. By 1999, the total number of hectares planted slowed to about 46,000. Not surprisingly, use of the aquifers has increased in times of drought, compounding the problems.

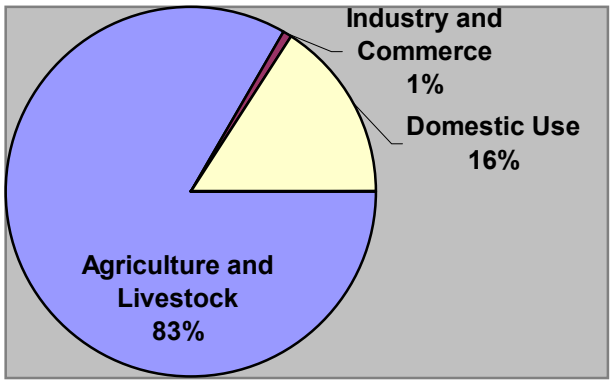
Map 3. Rivers and Dams of Aguascalientes

Source: Image - Web site, INEGI.

While most water use – whether on fields or in homes – is not measured precisely, one study estimated that in 1996, over 845 million cubic meters of water were utilized. Agriculture accounted for a total of 704 million cubic meters of water, or about 83 percent of all water used that year. Nearly 80 percent of this total came from aquifers. Residential users in municipalities used another 16 percent of the total, while industry and commercial entities used slightly more than one percent. It should be noted that in

the city of Aguascalientes, recent figures show the industrial and commercial sector use a much greater percentage of the water than in the state as a whole.

Figure 10. Estimated Water Use in 1996 in Aguascalientes by Sector



Note: Total estimated use was approximately 845 million cubic meters
Source: Joaquín Soa, Ubaldo Muñóz, Jesús Sigala, "El Agua y la sustenbalidad del desarrollo en Aguascalientes," Cuadernos de Trabajo No. 73, Gobierno del Estado de Aguascalientes, julio-agosto, 1997

Water has been used inefficiently in the domestic, industrial and agricultural sectors. For example, about half of the residences in the capital city lack water meters, and it is believed that some 40 percent of water used is actually the result of leaks and breaks. Industries such as Nissan were characterized by excessive water use in the early 1990s. Over time, however, large industries in Aguascalientes have lessened their use of water, in part responding to the high cost of water. Of water that is measured in the City of Aguascalientes, in 2000 about 87 percent was used by residents, 10 percent by commercial establishments, and three percent by industry. To resolve inefficient water use in the domestic and industrial sectors, the city of Aguascalientes has started a program called "Aguascalientes: Water Saver" ("*Aguascalientes: Ahorrador de Aguas*"). The goal of the program is to save 2.5 billion liters of water annually in the domestic sector.

Water and Sewer Service

With industrialization and population growth came increased water and sewer service in Aguascalientes. In total, through nearly 200,000 connections, more than 95% of the population receives potable water. The majority of the water used in Aguascalientes comes directly from wells and is not treated. In fact, Aguascalientes has only one water treatment plant, located in San José de García.

In terms of sewer service and wastewater treatment, more than 90 percent of the population is connected to sewer service. Much of the population that does not have connections to municipal sewer lines are located in rural areas or in recent "irregular" squatter settlements. There are a total of 93 municipal wastewater treatment plants in

Aguasacalientes, 80 of which were operating in 2000. Most of them utilize facultative lagoons to treat the wastewater. By far the largest is the capital wastewater treatment plant, constructed in 1993. In fact, it is the second largest treatment plant in all of Mexico. Both commercial, industrial and domestic wastewater is treated here, and the discharge flows directly into the San Pedro River.

While some 350 industries connect to these municipal sewer and treatment systesm, others utilize their own treatment plants. Others appear to discharge wastewater directly into rivers and streams without treatment. According to the National Water Commission, there were 24 industrial wastewater treatment plants in Aguascalientes in 2000, of which 22 were in operation. Of the 22, only seven complied with the established wastewater discharge standards, threatening the water quality, public health and ecosystem health of the state.

Water and wastewater service has been operated in the City of Aguascalientes by a private company called CAASA. Due in part to the scarce water supply, as well as to the high debts the company has incurred through loans with the National Commission of Water (CAN), the company has approved a series of rate hikes in domestic, commercial and industrial water fees. For example, the current water fees in the residential sector of Aguascalientes are five times higher than the average among Mexican state capitals. Similarly, industrial water rates are also among the highest in Mexico. The high rates have led to a high amount of nonpayment, which in turn has forced the company to announce new rate hikes in the coming years. Unfortunately, the "privatization" of water service in Aguascalientes has thus far not been a success story in Aguascalientes.

Although there is little information about water quality in Aguascalientes, municipal and industrial wastewater discharge, as well as runoff from urban streets and agricultural fields have negatively impacted water throughout the state, and particularly in the capital. The waters of the Rio San Pedro are contaminated by the runoff and wastewater discharges from Cosío, Pabellón, Jesús María, Rincón de Romos, San Francisco de los Romo and of course from the capital city itself. Currently, the state and city government have begun a program to "restore" the river. Similarly, the Presa Níagara, the reservoir that helps supply city water, also receives direct discharges resulting in a high organic content. The Río Calvillo is similarly affected, if to a lesser extent.

While industry is not a major consumer of water in Aguascalientes, it is a major discharger of pollutants and is a leading cause of water pollution. In industrial zones, wastewater discharges exceed the permit standards frequently. City sewer lines in some cases have corroded because of industrial discharges. Back in 1995, a local municipal water commission found that 36 industries or businesses were contaminating the city sewer system with unauthorized discharges, leading to high biochemical oxygen demand, dissolved solids, oils and greases and even high levels of aluminum and other metals.[54]

[54] State of Aguascalientes. 1995. Secretaría de Desarrollo Social, Subsecretaría de Ecología, Anexo 2: *Informe sobre el estado del medio ambiente en Aguascalientes*, 57-58.

Generation of Municipal Solid and Hazardous Wastes

In recent years, due to the rising generation of municipal solid waste, the state has invested in the construction of three transfer stations, which take solid waste from throughout the capital city to the landfill in San Nicolás, the only landfill built to specifications. About 26 tons a day are transported to the transfer stations.[55] Other open-air dumps have been closed over the past few years in outlying municipalities.

In terms of industrial and hazardous wastes, there has been less government action. Although there are (or were) almost 100 maquiladoras, and more than 3,000 manufacturing companies overall in Aguascalientes, there is very little public accessible information about the quantity and type of hazardous waste being generated in these facilities. Although by law these industries are expected to file a biannual report on the generation and management of industrial wastes with federal authorities, nationwide, estimates show that only about 27,000 out of 100,000 companies that potentially produce hazardous wastes have been reporting. Within Aguascalientes itself, 608 companies reported generating less than 10,000 tons of hazardous wastes. A 1994 report found that 64 companies operating in Aguascalientes were generating more than 58 types of hazardous and nonhazardous wastes, and that almost 45 percent of this waste was receiving no treatment.[56] Both in Aguascalientes and the nation as a whole, it is assumed that the quantity reported represents only a fraction of the amount generated.

Table 4. Number of Companies Reporting and Quantity of Hazardous Wastes Generated, 2000

	Number of Companies Reporting	Quantity of Hazardous Wastes Generated (tons)
Mexico	27,000	3,700,000
Aguascalientes	608	9,554

Source: National Institute of Ecology, July 2000; (http://www.semarnat.gob.mx/dgmic/rpaar/rp/volumen/volumen.shtml).

Hazardous Waste Management in Aguascalientes

There are no firms in Aguascalientes authorized to deposit or incinerate hazardous wastes. Currenly, there are three firms that collect and transport such wastes as well as a solvent recycling operator and on-site waste treatment. A total of seven companies are permitted to treat, store or transport hazardous or biological waste in the state. These companies clearly lack the capacity to manage all the hazardous waste generated in the state.

Attempts by various companies to establish storage or treatment centers in the state have been unsuccessful, due to public opposition and concerns about potential environmental and health effects. In 1998, Ecosistemas El Llano bought almost 235 hectares in the municipality of El Llano with the intent of building a storage facility for hazardous wastes. Ecosistemas El Llano is a firm with investments from the Metalclad

[55] Information from the Office of the Governor, 3rd Annual Report, 2001.
[56] State of Aguascalientes. 1995. Secretaría de Desarrollo Social, Subsecretaría de Ecología, Anexo 2: *Informe sobre el estado del medio ambiente en Aguascalientes*, 56.

Corporation of California and from Browning Ferris Industries, one of the world's largest municipal waste management firms. Due in part to fierce community opposition, Ecosistemas El Llano never received the necessary permits for its facility. According to the company, the inability to establish a storage facility in Aguascalientes – and a similar failure in the state of San Luis Potosi – caused Metalclad to remove its investments from Mexico.

Metalclad Corporation had received federal permits to open a storage facility in Guadalcazar, San Luis Potosi, but a denial of permits by municipal and state governments stopped the project. In protest, Metalclad presented an expropriation complaint under NAFTA's Chapter 11 through the International Center for Settlement of Investment Disputes. On August 30, 2000, a panel of three ICSID "experts" handed down a decision forcing the Mexican government to pay Metalclad $16.685 million. The panel decided that the state's enforcement of its environmental laws was a form of expropriation, since it had prevented Metalclad from opening the facility. After an unsuccessful appeal to the state supreme court of British Columbia, the federal government of Mexico paid Metalclad $16.002 million.

After its success in the case of the hazardous waste storage facility in San Luis de Potosi, Metalclad announced that it is considering bringing the case of Ecosistemas El Llano before a Chapter 11 arbitration panel as well. Metalclad argues that it took all legal steps necessary to open the facility in Aguascalientes and – due to arbitrary decisions – could not do so. As of the writing of this report, Metalclad had not presented a complaint.

Still, other observers note that it was Metalclad itself that withdrew from pursuing the construction of the site after opposition arose and after it was told it would need to do a full environmental assessment. People opposed the project because they were understandably suspicious since the company never revealed the full extent of the operation or provided information needed to reach a decision. One of the lessons of Metalclad's experience in Aguascalientes is that without reliable information, and without a full account of hazardous waste generation in the state and in all of Mexico, it will be difficult for citizens to accept an hazardous waste site in their own backyard. Social consensus and reliable information are needed for such operations to exist in Mexico.

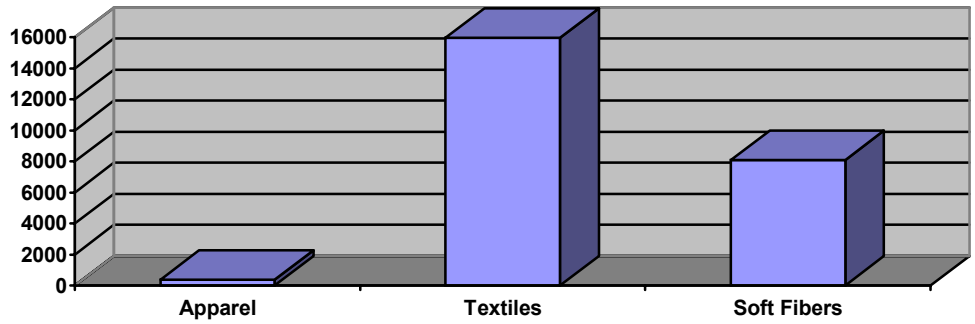
Industrial Toxic Emissions and Transfers

Recently, at the federal level, new laws were approved which will require most major industries to report the generation of hazardous wastes, toxic emissions and wastewater discharges to federal authorities. Previously, the system had been largely voluntary and few industries participated. Regulations must still be established for the federal program to become operational and ultimately accessible to the public. At the same time, a few years ago, Aguascalientes became the first state to establish its own obligatory Pollutant Release and Transfer Registry (PRTR or known as RETC in Mexico). (See box in Text)

The first RETC in Aguascalientes was recently completed. About 40 percent of the firms participating were from the textile and apparel industry, with another 13 percent from the automotive and auto parts industry, and 10 percent from the food and beverage sector. While the initial results are still being analyzed and assessed, a preliminary analysis shows that the textile, apparel and fiber industries generate significant amounts of hazardous wastes, air emissions and wastewater discharges in both Aguascalientes and Jesús María. In addition, the initial report showed several chemicals of concern, such as

nitric oxides being emitted to the air. Still, until future RETC are completed both at the state and federal level, it will be difficult to surmise whether this pollution is increasing or decreasing or whether the reporting is accurate.

Figure 9. Tons of Emissions of Criteria Air Pollutants Reported in Municipality of Aguascalientes by Sector, 1999



Note: Criteria Air Pollutants include Carbon Dioxide, Sulfur Dioxide, Nitrogen Oxides, Carbon Monoxide, Hydrocarbons and Particulate Matter.
Source: State of Aguascalientes RETC, Reporting Year 1999.

Aguascalientes takes the initiative

By Talli Nauman

When Miguel Ángel Torres requested information for his research grant on the environmental impact of textile companies in Aguascalientes, state authorities provided him emissions data that no other state government could. That's because Aguascalientes is the only one of Mexico's 32 states with its own working pollutant release and transfer register (PRTR). "I am glad my grant was for research in Aguascalientes," says Torres, an economist at the National Statistics, Geography, and Data Processing Institute.

Now in its third year of operation, the mandatory reporting system offers comparative data from the nine industries under state jurisdiction from textiles to printing to baking which account for 75 percent of the fixed pollution sources in the state.

Data is collected for 160 contaminants, 56 more than in the currently voluntary federal register. Another advance is that it packages the information in an accessible format, with user-friendly photos and summary profiles of individual plants.

For the moment, Aguascalientes's register covers 175 businesses, though that number will grow under reforms to the federal environmental law. The reforms not only require that Mexico's national PRTR become mandatory and public for all industries -- whether under federal, state, or municipal jurisdiction -- but they continue a move to decentralize authority over environmental matters. What this means for PRTR is that states with the capability will assume certain federal responsibilities, including registering federally-regulated industries located within their borders. In Aguascalientes, that could raise the number of registered enterprises to about 700. The range of substances for industries under federal jurisdiction remains to be determined.

"The PRTR is one of the reasons we want decentralization," says Marco Antonio Acero Varela, head of Aguascalientes's Ecology Undersecretariat.

Once Aguascalientes takes over the new industries, according to state officials, it will be able to release that data without federal permission, use it to build an exchange bank for firms trading their waste products for recycling, and improve local inspection and enforcement efforts. Toward that end, the federal government has agreed to chip in about US$14,000 of the state's $23,000 PRTR budget this year. Other states are receiving help as well, keyed to the size of their individual projects: US$10,000 for Colima; $17,000 for Durango; $17,000 for Michoacán; $4,800 for San Luis Potosí; and $6,000 for Tlaxcala.

Aguascalientes will be the first state to take on the new responsibilities, says Raúl Arriaga, the environmental undersecretary at Semarnat. The changeover is expected within a year, beginning with automobile manufacturing, the state's largest industrial sector, according to Armando Aguayo Patiño, environmental verification chief for the Ecology Undersecretariat. State authorities are hoping to establish a regional database by sharing their mandatory reporting system with neighboring states. So far, they have done so with officials in Durango, Colima, Guanajuato, the state of Mexico, Tamaulipas, and Yucatán.

"All we ask is that they ask us for it," says Aguayo.

Source: This article was originally published in TRIO, a publication of the North American Commission on Environmental Cooperation in Spring of 2002. Available at http://www.cec.org/trio/stories/index.cfm?ed=7&ID=88&varlan=english

Environmental Laws in Aguascalientes

Like many Mexican states, Aguascalientes has its own state environmental legislation. In 1993, the state ratified the General Law of Ecological Equilibrium and Protection of the Environment of Aguascalientes. This Law was replaced by the Environmental Protection Law in 2000, which reflected some of the 1996 structural changes to the Federal General Law of Ecological Equilibrium and the Protection of the Environment (LGEEPA). Additional changes in 2001 increased the move toward decentralization of authority toward the states.

The state law delegates the enforcement of environmental issues to the governor, the city councils and the Secretary of Social Development. It also guarantees citizen access to environmental information – with some conditions -- establishes environmental criteria for municipal programs to follow and codifies the procedures for evaluating potential environmental impacts. Like the federal LGEEPA, the state law outlines two mechanisms for evaluation: the Environmental Impact Assessment (EIA) and the preventive report. Facilities or projects that pose potential environmental impacts – but that do not require federal evaluation – must submit an EIA to state authorities. Proposals with less risk of environmental impacts require a preventative report and, occasionally, an additional risk assessment. *Public participation is these processes, is not, however, obligatory as authorities have discretion over whether to hold public hearings and companies – under certain conditions -- may specifically request that some information be kept confidential.*

The Law creates an "environmental fund" used to promote self-regulation and environmental auditing programs for companies that agree to participate. These companies must agree to comply with more stringent regulations than those required by existing legislation. In addition, the Aguascalientes law establishes the procedures to create protected areas and sets up norms for the sustainable use of natural resources, including water, soil, flora and fauna.

A section on environmental information, citizen participation and a citizen grievances process includes the establishment of a state environmental information system and the formation of a State Consultive Council on Environmental Management. The council is made up of representatives from the governmental, academic, private and non-profit sectors.

Despite these formalities, citizen requests for environmental information can be rejected for several reasons, including the authorities' decision that the subject matter is *confidential*. In practice, these exemptions have made it easy for authorities to deny petitions for environmental information.

Finally, the law establishes sanctions, enforcement orders and inspections.

As in the rest of the country, Aguascalientes' environmental laws have been established and strengthened long after industrialization and economic growth has been fostered through national programs and NAFTA. As such, these laws are often seen as secondary laws, often only partially enforced. In addition, environmental education in Aguascalientes is in its initial stages and there is not a strong recognition of the environmental and health damage that industrial activities can create.

Nonetheless, these new laws are clearly needed, as are their compliance and enforcement. While many of the larger corporations do appear to respect and abide by these laws, overall compliance and enforcement are – with the limited information available – assumed to be spotty.

Citizen participation in environmental issues has also increased over the last decade in Aguascalientes, exemplified both in the participation in environmental advisory committees and in discussions about specific issues like water or hazardous wastes. It should be noted that this participation is both encouraged and supported by the present law, which wasn't the case in the past. Still, the right to know is still routinely ignored by governmental authorities, or the law is used to deny access to information based on trade secrets or "security" concerns. More detailed regulations are needed to minimize those cases where some information must remain secret.

The proposal to create a new government office, the state attorney general for environmental protection, might improve enforcement of environmental laws if adequately funded. This would ease the strain on the federal attorney general, who has less than 10 inspectors and a few vehicles to cover the hundreds and thousands of industries now operating in the state (among other environmental issues).

Beyond this proposal, new regulations should be passed at the state level to require the proper reporting, and management of hazardous wastes by the maquiladora industry, as federal requirements continue to be ignored. As part of this effort, environmental education and citizen participation in all aspects of life –including on the factory floor – are also needed. As maquiladoras spread across Aguascalientes, more oversight by citizens and by authorities will certainly be needed to ensure environmental compliance.

While these improvements are needed, Aguascalientes is not starting from scratch. It has already been recognized by federal authorities as the state which has the most complete program of environmental decentralization, evidenced by the state-level RETC (or PRTR). It's up to citizens to keep pushing government to bring environmental laws and enforcement in line with economic programs and incentives.

VI. General Conclusions

The industrialization process has had an economic and social cost in Aguascalientes. It has helped alleviate extreme poverty for thousands of families but it has not been the ecomomic lever to assure their well-being, nor a means to provide fiscal resources to the local and state governments to pay for the costs associated with the additional infrastructure needed for industrialization to occur.

This has been part of a strategy implanted by the state to attract investment and keep a stable labor climate. Strikes are avoided through individual agreement, instead of collective bargaining, or through intimidation, layoffs, and financial disincentives.

Despite its benefits – jobs, salaries, working housing -- the export maquiladora industry is suddenly drying up and dissappearing even more quickly than it arrived. There are several reasons. First, the economic downturn in the U.S. has been much longer and deeper than anticipated, leading to the inevitable loss of jobs and closing of factories. But another factor is more structural. Mexico is losing what economist term competitiveness with other countries emerging in the world economy. The application of

more fiscal and tax obligations, and a relative increase in salaries, leading to a slight increase in production costs, has made companies rethink their ability to stay in Mexico and maximize thier profits.

From time to time the federal government announces the creation of new rules for the operation of maquiladoras and this is one of those moments. Although NAFTA allows maquiladoras now to sell their product nationally and phases out some of the fiscal and tariff benefits, it appears that the government will postpone these decisions about the program until 2005, and instead will apply new measures to attract more maquilas and attempt to keep more maquiladoras from shutting their doors. An announcement is expected soon.

Still, some maquiladoras may prefer an exit strategy -- some have already taken it -- to other greener latitudes where sufficient, cheap resources – labor and other – are guaranteed and where profits can also be guarenteed. The new destinations are Central America, the Caribbean and, increasingly, China.

In this context, the new economic reality poses a risk to the apparel and textile industry. The voices of this industry in Aguascalientes express their concern about the entrance of China into the World Trade Organization, which could signal the entrance of massive amounts of Chinese goods into the Mexican and U.S. market. Clothes are already in Mexico, legally or not, at low prices. It's often of inferior quality, but to a population with low incomes, it is a good option. Free trade impacts the interests of local producers.

The establishment of maquiladoras or other industries in Aguascalientes has not appeared to prevent the emigration of workers to the U.S., both from rural zones, as well as young professionals graduated from universities, who are attracted by the higher payoffs in the U.S., compared to what foreign companies are paying.

The maquiladoras in Aguascalientes have not helped foment or respect worker rights here. There are no true unions in maquiladoras, and workers often are unaware of who might represent them collectively before factory owners. Unions that do exist are often embroiled in corruption and financial scandals.

Against this culture of ignorance, corruption and disrespect for worker rights, various worker rights organizations and some union leaders have proposed the creation of an ombudsman to defend worker rights, similar to those that oversee the defense of human rights.

Perhaps the future of worker rights would be for workers to organize in a global scheme, parallel to the workers organized in the U.S., Asia or Europe. This has occured to some extent in the automotive and tire sectors. The work is challenging, but is necessary since maquiladoras currently operated in obscurity and are able to evade worker rights in a way that is not possible in their countries of origin.

There are of course other important industries in Aguascalientes such as the electronics and automotive industry. Here, Aguascalientes will need to continue to compete – as it has thus far done – against other Mexican states and other countries to offer highly skilled labor and adequate infrastructure in telecommunications.

But a better option for industrial development is the strengthening of programs to help small and medium-sized businesses, so that they can compete on equal grounds with companies supported by foreign investment, both in Aguascalientes and around the world. It is precisely these small and medium-sized industries which actually generate the largest number of jobs and strengthen internal markets.

Part of this strategy must involve the integration and permanence of productive chains so that more of what is produced by large industries is local in origin. It seems ludicrous and incoherent to continue to attract foreign investment which relies almost exclusively on imports from abroad for what is being produced in Mexico. Of course, as part of this strategy, the quality and timeliness of production of local producers must improve.

Progress has been made in Aguascalientes in terms of environmental education. From primary school the importance of taking care of the environment and natural resources is stressed. More businesses and industries have begun leading their own workshops on the importance of taking care of the environment, in hopes that workers will apply the lessons in work, home and in their neighborhoods. Nongovernmental organizations continue to work hand in hand with the federal, state and local governments in developing proposals and actions intended to improve environmental health. But corruption and the continued lack of access to environmental information continue to pose challenges.

Although the fear exists that maquiladoras in Aguascalientes neither adequately manage or return thier industrial wastes, no one dares point the finger at individual factories. There are no official numbers, nor information about environmental compliance, or only estimates. It is imperative that laws designed to ensure reporting of waste generation, something that is now quite possible with the federal adoption of an obligatory Pollutant Release and Transfer Registry (PRTR), are enforced. Environmental improvement must start with the industries themselves, who should take into account the impacts they have upon the environment, and the resulting social and environmental costs. Accounting devices like the Environmental Net Internal Product should be part of this effort to internalize the ecological costs of doing business.

The absence of these evaluations prevent correct and socially acceptable decision-making. The recent possibility of constructing a hazardous waste transfer station and landfill in Aguascalientes was only possible as long as the population was ignorant of the possible benefits or costs of such an undertaking, as well as the impacts on the particular site selected.

In recent years, the population has more actively engaged in successful fights involving environmental and public health issues, and their voice in the discussion has grown in the media. There is much work to be done, but many lessons have been learned from these efforts.

The maquila export industry and other industries supported by foreign investment have played an important role in the state's industrialization and the growth of the service sector, including hotels, communications and transportation. But it is not a panacea. It encourages in-migration from rural areas and other states, and then encourages worker turn-over in part because of low salaries and the temporal nature of production, all of which have an impact on the extension of services and the use of natural resources like water, scarce in the region.

This industrialization has not been able to integrate other sectors into its productive process, generating little value added apart from the labor itself; it does not lead to a culture of respect for worker rights; and it does not fulfill its environmental obligations in terms of compliance or reporting. Yet this is the model which is being encouraged on a continent-wide level, through mechanisms like the Plan Puebla Panamá and the Free Trade of the Americas. The coin has been tossed, and Aguascalientes should serve as an example to avoid the same mistakes and propose alternative – sustainable – development strategies.

For more information

You can request the complete report, entitled, *Los efectos de la industrialización y del sector industria maquiladora de exportación en la economía, la salud y el ambiente en Aguascalientes*, available only in Spanish, from:

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