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# Voluntary Environmental Regulation in Developing Countries: A Mexican Case Study

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## ABSTRACT

*The past two decades have witnessed an explosion in the popularity of "voluntary" environmental regulation that provides incentives – but not mandates – for pollution control. Advocates claim that such regulation holds particular promise in developing countries where conventional command-and-control policies often perform poorly. Yet evaluative research on voluntary regulation has focused almost exclusively on industrialized countries. This article presents a case study of four high-profile voluntary environmental agreements used during the 1980s and 1990s in an attempt to control pollution from leather tanneries in León, Guanajuato – Mexico's leather goods capital and a notorious environmental hotspot. To understand why environmental authorities made voluntary agreements the centerpiece of their pollution control efforts in León, and why this approach ultimately failed, we reconstruct the history of the voluntary agreements along with that of local, state, and federal environmental regulatory capacity. Juxtaposing these two timelines suggests that the four voluntary agreements were both motivated by – and eventually undermined by – gaps in the legal, institutional, physical, and civic infrastructures that regulators needed to implement command-and-control policies. To the extent that our findings may be generalized, they imply that voluntary regulation is not likely to be an effective means of shoring up poorly performing command-and-control regimes in developing countries.*


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## INTRODUCTION

The conventional command-and-control approach to industrial environmental management is to establish laws requiring firms to cut emissions.[1] So-called voluntary regulation, by contrast, provides incentives—but not mandates—for pollution control. In industrialized countries, the popularity of voluntary regulation has exploded over the past two decades. For example, the U.S. Environmental Protection Agency now administers 133 voluntary programs.[2]

A considerable literature examines voluntary regulation in industrialized countries.[3] Although explanations are varied, a recurrent theme is that regulators resort to voluntary approaches when they lack the wherewithal to mandate emissions reductions. For example, Lyon argues that U.S. regulators have relied solely on voluntary programs to address climate change because political support for mandatory greenhouse gas emissions controls is weak.[4] As for firms, the literature suggests that they participate in voluntary programs either because regulators offer inducements such as positive publicity, technical assistance, and regulatory relief or, more commonly, because regulators implicitly threaten sanctions. An article by Maxwell, Lyon, and Hackett, suggests that firms may collectively volunteer for self-regulation in order to preempt even more restrictive mandatory standards.[5] Similarly, in an article by Segerson and Miceli, a "background legislative threat" motivates participation in voluntary environmental agreements.[6] Empirical research demonstrates that the track record of voluntary regulation in industrialized countries is decidedly mixed.[7]

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1. *See* THE THEORY AND PRACTICE OF COMMAND AND CONTROL IN ENVIRONMENTAL POLICY, at xv (Gloria E. Helfand & Peter Berck eds., 2003).

2. U.S. ENVTL. PROT. AGENCY, EVERYDAY CHOICES: OPPORTUNITIES FOR ENVIRONMENTAL STEWARDSHIP 7 (2005).

3. *See generally* Kathryn Harrison, *Talking with the Donkey: Cooperative Approaches to Environmental Protection*, 2 J. INDUS. ECOLOGY 51 (1999); Madhu Khanna, *Non-Mandatory Approaches to Environmental Protection*, 15 J. ECON. SURVS. 291 (2001); Thomas P. Lyon & John W. Maxwell, *"Voluntary" Approaches to Environmental Regulation, in* ECONOMIC INSTITUTIONS AND ENVIRONMENTAL POLICY (Maurizio Franzini & Antonio Nicita eds., 2002).

4. THOMAS P. LYON, RES. FOR THE FUTURE, RFF IB 03-01, VOLUNTARY VERSUS MANDATORY APPROACHES TO CLIMATE CHANGE MITIGATION 2 (2003).

5. *See* John W. Maxwell et al., *Self-Regulation and Social Welfare: The Political Economy of Corporate Environmentalism*, 43 J.L. & ECON. 583 (2000).

6. Kathleen Segerson & Thomas J. Miceli, *Voluntary Environmental Agreements: Good or Bad News for Environmental Protection?*, 36 J. ENVTL. ECON. & MGMT. 109, 111 (1998).

7. *See generally* Andrew A. King & Michael J. Lenox, *Industry Self-Regulation Without Sanctions: The Chemical Industry's Responsible Care Program*, 43 ACAD. MGMT. J. 698 (2000).

While comprehensive data do not exist, scattered studies indicate that, like their counterparts in the west, regulators in developing countries are increasingly relying on voluntary regulation. For example, environmental authorities in Colombia negotiated over 50 voluntary compacts with industrial associations between 1995 and 2003, and in Mexico, ten such agreements involving over 600 firms were signed during the 1990s.[8] Proponents tout voluntary regulation as a promising strategy for shoring up command-and-control regimes in developing countries that, historically, have performed poorly.[9]

Despite the growing popularity and alleged benefits of voluntary regulation in developing countries, literature on the topic is quite thin. Little is known about the reasons regulators in developing countries use voluntary regulation, its effectiveness, and the drivers of success and failure. To help fill this gap, this article presents a Mexican case study. We focus on the city of León, Guanajuato, where pollution from hundreds of tanneries and leather goods factories has earned the city an international reputation as an environmental hotspot.[10] The centerpiece of efforts to control tannery pollution during the 1980s and 1990s was a series of four high-profile voluntary agreements, each backed by top federal, state, and local authorities.[11] Unfortunately, these agreements yielded few concrete results. Why did regulators resort to voluntary regulation to control tannery pollution in León, and why did this approach fail?

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8. ALLEN BLACKMAN ET AL., RES. FOR THE FUTURE, ASSESSMENT OF COLUMBIA'S NATIONAL ENVIRONMENTAL SYSTEM (SINA) 81-82 (2005); Jonathon Hanks, *A Role for Negotiated Environmental Agreements in Developing Countries?*, *in* VOLUNTARY ENVIRONMENTAL AGREEMENTS: PROCESS, PRACTICE AND FUTURE USE 159, 165 (Patrick ten Brink ed., 2002). *See also* Jorge Rivera, *Assessing a Voluntary Environmental Initiative in the Developing World: The Costa Rican Certification for Sustainable Tourism*, 35 POL'Y SCI. 333 (2002); VOLUNTARY ENVIRONMENTAL AGREEMENTS: PROCESS, PRACTICE AND FUTURE USE 155-240 (Patrick ten Brink ed., 2002).

9. Hanks, *supra* note 8, at 160. *See also* WORLD BANK, GREENING INDUSTRY: NEW ROLES FOR COMMUNITIES, MARKETS, AND GOVERNMENTS 82-94 (2000).

10. *See, e.g.*, COMM'N FOR ENVTL. COOPERATION SECRETARIAT, CEC SECRETARIAT REPORT ON THE DEATH OF MIGRATORY BIRDS AT THE SILVA RESERVOIR (1994-95), at 1 (1995).

11. SECRETARIA DE DESARROLLO URBANO Y ECOLOGIA, CONVENIO REALIZADO PARA PREVENIR Y CONTROLAR LA CONTAMINACIÓN DE LA INDUSTRIA CURTIDORA EN LEÓN, GTO. Y SU AREA METROPOLITANA [COVENANT TO PREVENT & CONTROL CONTAMINATION BY THE TANNERY INDUSTRY] (1987) [hereinafter Convenio I]; CONVENIO DE CONCERTACIÓN PARA UN PROGRAMA INTEGRAL DE SANEAMIENTO DEL AMBIENTE EVITANDO LA CONTAMINACIÓN GENERADA POR LAS ACTIVIDADES DE LA CURTIDURÍA EN EL MUNICIPIO DE LEÓN (1991) [hereinafter Convenio II]; ACTA DE LA QUINTA SESIÓN ORDINARIA DE LA COMISIÓN PARA EL SANEAMIENTO INTEGRAL DEL RÍO TURBIO (1995) [hereinafter Convenio III]; CONVENIO DE COORDINACIÓN Y CONCERTACIÓN (1997) [hereinafter Convenio IV]

We argue that voluntary pollution control efforts in León were both motivated by—and undermined by—gaps in the four types of "regulatory infrastructure": (1) "legal infrastructure" such as regulations implementing federal and state environmental laws; (2) "institutional infrastructure" such as state and municipal environmental management agencies; (3) "physical infrastructure" including liquid and solid waste treatment facilities; and (4) "civic infrastructure" such as environmental advocacy groups and an environmentally aware citizenry. A lack of these four types of infrastructure at federal, state, and municipal levels effectively ruled out reliance on conventional command-and-control regulations such as mandatory emissions and technology standards.[12] Environmental authorities attempted to overcome this constraint by negotiating voluntary agreements with the tanning industry in which both authorities and tanners agreed to implement various pollution control measures by specified deadlines.

A lack of regulatory infrastructure also undermined these voluntary agreements. It did so in at least three ways. First, it implied that the tanners who acceded to the agreements needed to construct much of the requisite physical infrastructure from scratch. Tanners were not likely to make such investments without strong incentives. Second, it implied that regulators could not credibly threaten the tanning industry with mandatory command-and-control regulation in the event that firms failed to comply with their voluntary commitments—the "stick" often thought to be responsible for successful voluntary agreements. Finally, the lack of a wide range of elements of regulatory infrastructure, many of which were interdependent (for example, a competent local enforcement institution and clear written regulations), implied that most, if not all, of the key signatories to the voluntary agreements needed to simultaneously make good on their commitments in order for the agreement to be successful. This situation inevitably led to bottlenecks and finger pointing.

The methodology for our analysis is qualitative and historical. We use a variety of sources—including an original survey of 137 tanneries in León, interviews with key local stakeholders, and primary as

12. Lack of regulatory infrastructure has also ruled out reliance on less conventional economic incentive pollution control instruments such as emissions charges and tradable permits. Economic incentive instruments are generally considered to be at least as demanding of regulatory infrastructure as command-and-control instruments and have a spotty record in developing countries. *See, e.g.*, Allen Blackman & Winston Harrington, *The Use of Economic Incentives in Developing Countries: Lessons from International Experience with Industrial Air Pollution*, 9 J. ENV'T & DEV. 5 (2000); RUTH GREENSPAN BELL, ORG. FOR ECON. COOPERATION & DEV., CHOOSING ENVIRONMENTAL POLICY INSTRUMENTS IN THE REAL WORLD 12–13 (2003) (prepared for OECD Global Forum on Sustainable Development).

well as secondary documents—to reconstruct two histories: that of pollution control in León between 1980 and 2001 and that of environmental regulatory capacity at the federal level, the state level (in Guanajuato), and the municipal level (in León) during the same time period. We analyze and juxtapose these two histories using the four categories of regulatory infrastructure listed above as an organizing framework.

The article is organized as follows. Section 1 presents background information on the leather tanning sector in León, including its economic importance and environmental impacts. Section II discusses the evolution of environmental regulatory capacity at the national, state, and local levels from 1980 to 2001. Section III presents a brief history of efforts to control tannery pollution, focusing on the voluntary environmental agreements of 1987, 1991, 1995, and 1997. Finally, section IV summarizes our findings and considers their policy implications.

## I. LEATHER TANNING IN LEÓN

### A. Economic Profile

Located in the state of Guanajuato in north-central Mexico, León is a sprawling industrial city of 1.1 million inhabitants.[13] The city produces 63 percent of Mexico's tanned leather and is known as the country's leather goods capital.[14] Leather tanning and leather goods manufacturing—most notably shoemaking—dominate the city's economy, providing 64 percent of its manufacturing jobs.[15]

According to official statistics, León is home to 859 tanneries.[16] The real number is higher, however, because many tanneries are

13. INSTITUTO NACIONAL DE ESTADÍSTICA, GEOGRAFÍA E INFORMÁTICA [NAT'L INST. OF STATISTICS, GEOGRAPHY & COMPUTING], XII CENSO GENERAL DE POBLACIÓN Y VIVIENDA [12TH GEN'L POPULATION & HOUSING CENSUS] (2000), http://www.inegi.gob.mx/inegi/default.asp.

14. INSTITUTO NACIONAL DE ESTADÍSTICA, GEOGRAFÍA E INFORMÁTICA [NAT'L INST. OF STATISTICS, GEOGRAPHY AND COMPUTING], CENSOS ECONÓMICOS [ECONOMIC CENSUS] (1999), http://www.inegi.gob.mx/est/default.asp?c=6340 [hereinafter ECONOMIC CENSUS]. The figure is obtained by comparing the municipality's production value to the national total for code 3161 of the North American Industry Classification System (NAICS). *See* NAT'L TECHNICAL INFO. SERV., NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (2002), http://www.census.gov/epcd/www/naics.html.

15. ECONOMIC CENSUS, *supra* note 14. The figure is obtained by comparing employment for NAICS codes 3161 and 31-32-33 for the municipality.

16. *Id.* The figure is the number of establishments for NAICS code 3161 for the municipality. Some tanneries are also located in the much smaller neighboring cities of San Francisco del Rincón and Purísima del Rincón. To make the analysis more manageable, we have restricted our attention to the city of León.

"informal"—unlicensed and unregistered—a status that enables them to evade tax authorities and other regulators. Guanajuato's environmental regulatory authority estimates that approximately 400 informal tanneries are scattered throughout the city.[17] Although data on the size distribution of León's tanneries are somewhat confused, the vast majority of tanneries are small in scale.[18] The large number, small size, dispersion, and informality of León's tanneries make them a difficult target for regulatory authorities. In addition, the leather industry's status as the economic mainstay of the region affords it considerable public support and political power.[19]

### B. Environmental Impacts

Leather tanning generates liquid wastes containing salt, sulfur, and chromium and dissolved solids and high levels of chemical and biological oxygen demand.[20] Tanning also generates solid wastes, mainly sludge, trimmings, and fleshings.[21] Sludge, which accumulates in the sedimentation tanks tanneries employ to keep drain pipes from clogging, contains hazardous pollutants, including sulfur, phosphorous, and chromium VI, a highly toxic byproduct of the chromium III used in the tanning process.[22]

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17. Interview with J.L. Villalobos, Subprocurador de Verificación Normativa, Procuraduría de Protección al Ambiente del Estado de Guanajuato (PPAEG), in Guanajuato, Gto., Mex. (Jan. 27, 1999).

18. A study in the early 1990s found that 96 percent of a sample of 583 tanneries had 16 or fewer employees. Carl R. Bartone & Livia Benavides, *Local Management of Hazardous Wastes from Small-Scale and Cottage Industries*, 15 WASTE MGMT. & RESEARCH 3, 9 (1997). A January 2000 survey of 137 tanneries in León found that the average tannery employed 16 workers and produced 499 semi-finished hides per week. *See* Allen Blackman, *Small Firms and Clean Technologies: Part II: Leather Tanning in León, Mexico*, *in* SMALL FIRMS AND THE ENVIRONMENT IN DEVELOPING COUNTRIES: COLLECTIVE IMPACTS, COLLECTIVE ACTION 191, 194 (Allen Blackman ed., 2006).

19. Interview with A. Azuela, Former Director, Procuraduría de Protección al Ambiente (PROFEPA), in Austin, Tex. (May 6, 2002); Interview with José Angel Oyarvide Polo, Former Delegado, PROFEPA, in León, Gto., Mex. (May 31, 2002); Interview with M. Hernández, Director de Verificación Normativa, PPAEG, in Guanajuato, Gto., Mex. (May 29, 2002).

20. U.N. ENV'T PROGRAMME & INDUS. & ENV'T OFF., TECHNICAL REP. SERIES NO. 4, TANNERIES AND THE ENVIRONMENT: A TECHNICAL GUIDE 21-22, U.N. Sales No. E.91.III.D.1 (1991). Collectively, León's tanneries emit roughly 43,000 tons of total dissolved solids and 500 tons of chromium per year. Bartone & Benavides, *supra* note 18, at 9.

21. U.N. ENV'T PROGRAMME & INDUS. & ENV'T OFF., *supra* note 20, at 21.

22. U.N. Indus. Dev. Org. [UNIDO], *Technical Report: Sources, Detection and Avoidance of Hexavalent Chromium in Leather and Leather Products*, ¶ 2, U.N. Doc. US/RAS/92/120 (Aug. 1999). Collectively, León's tanneries generate approximately 200 tons of sludge per day. Guevara E. Socorro, *Comenzaría a operar el Parque de Lodos el próximo lunes, aunque aún no se*

Although tannery liquid and solid wastes are highly polluting, almost all are uncontrolled and untreated. Virtually all of León's tanneries lack pollution-control equipment aside from sedimentation tanks.[23] Thus, tannery liquid wastes are discharged untreated into municipal sewers. Until late 2000, when León's first municipal wastewater treatment plant began operation, these wastes flowed untreated into the Turbio River (also known as the Goméz River in the vicinity of Léon). Like most Mexican cities, León has no hazardous waste disposal facilities.[24] Until 2001, tannery sludge was dumped directly into the Turbio River just outside the city by the companies hired by the tanneries to empty their sedimentation tanks.[25]

Pollution from León's tanneries degrades surface-water quality. The state water authority classified the Turbio River as the most contaminated in Guanajuato and as unfit for any type of use.[26] In 1997, the Federal Environmental Attorney General's Office, (*Procuraduría Federal de Protección al Ambiente* (PROFEPA)), carried out a detailed analysis of a site just downstream from León. It found levels of chromium III and chromium IV in the river hundreds of times above the maximum federal standards.[27]

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*tiene autorización* [Parque de Lodos Would Start Operating Next Monday Without Authorization], CORREO, May 17, 2000, at 23.

23. Bartone & Benavides, *supra* note 18, at 9-10. Of 137 tanneries surveyed in January 2000, none had wastewater treatment systems. Blackman, *supra* note 18, at 192-93.

24. The nearest hazardous waste disposal facility is 800 kilometers away in Mina, Nuevo León, near Monterrey.

25. Guevara E. Socorro, *Autoridades Federales Interpondrán Demanda Penal Contra CICUR [Federal Authorities to Interpose Sanction Against CICUR]*, CORREO, May 21, 2000, at 19.

26. COMISIÓN ESTATAL DE AGUA Y SANEAMIENTO DE GUANAJUATO, PLAN ESTATAL HIDRÁULICO DE GUANAJUATO 2000-2005: DIAGNÓSTICO DE LA SITUACIÓN HIDRÁULICA DEL ESTADO DE GUANAJUATO Y ESTRATEGIA EN MATERIA DE AGUA [GUANAJUATO STATE HYDRAULIC PLAN 2000-2005: HYDRAULIC DIAGNOSTIC & WATER STRATEGY] 91 (1999).

27. Interview with José Angel Oyarvide, *supra* note 19. Tanneries also contribute to groundwater degradation. Chromium contamination of León's drinking water wells has been documented since at least the mid 1980s, although authorities at the time did not seem to be concerned. *See* Federico Velio Ortega, *No Representan Peligro los Residuos de Cromo en el Agua [Chromium Residue in Water Does Not Present Danger]*, EL NACIONAL, Apr. 17, 1987, at 3. Later studies suggest that the problem is significant, although tanneries are only one of several sources of chromium that contaminate the aquifer. M.A. Armienta et al., *Groundwater Pollution with Chromium in Leon Valley, Mexico*, 54 INT'L J. ENVTL. ANALYTICAL CHEMISTRY 1, 12-13 (1993).

## II. THE EVOLUTION OF ENVIRONMENTAL REGULATORY CAPACITY

To understand how gaps in regulatory infrastructure have impeded pollution control efforts in León, this section sketches the evolution of environmental regulatory capacity at the federal, state, and municipal levels over the past several decades. Figure 1 highlights milestones in this evolution.

### A. Federal

*1. General Laws and Institutions.*

The evolution of Mexico's federal environmental infrastructure has been complex and somewhat circuitous. The country's first comprehensive environmental law was passed in 1971.[28] However, federal environmental regulatory authority was weak during the 1970s.[29] It was split among several agencies—chiefly the Secretariat of Health and Welfare (*Secretaría de Salubridad y Asistencia)* and the Secretariat of Hydraulic Resources (*Secretaría de Recursos Hidráulicos)*, Secretariat of Agriculture and Cattle Ranching (*Secretaría de Agricultura y Ganaderia*), and Secretariat of Industry and Commerce (*Secretaría de Industria y Comercio*)—none of which was devoted principally to environmental regulation.[30] In 1982, new federal environmental legislation superseded the 1971 law but did little to address this problem.[31] The creation of a new federal department, the Secretariat of Urban Development and Ecology (*Secretaría de Desarrollo Urbano y Ecología* (SEDUE)), at the end of 1982 signaled a first attempt at unifying federal environmental authority.[32]

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28. Ley Federal para Prevenir y Controlar la Contaminación Ambiental [Law for the Prevention & Control of Environmental Contamination], Diario Oficial de la Federación [D.O.], 23 de Marzo de 1971 (Mex.) [hereinafter L.F.P.C.C.A.].

29. Comm'n for Envtl. Cooperation, Summary of Environmental Law in Mexico, http://www.cec.org/pubs_info_resources/law_treat_agree/summary_enviro_law/publication/mxdoc.cfm?varlan=english&topic=1 (follow "chapter 2" hyperlink; then examine "Historical Background").

30. L.F.P.C.C.A., *supra* note 28, § 5o.

31. Ley Federal de Protección al Ambiente [L.F.P.A.] [Environmental Protection Law], Primera Sección, Diario Oficial de la Federación [D.O.] § 5, 11 de Enero de 1982 (Mex.).

32. SEDUE was still required to coordinate the formulation and application of environmental policy with SSA, however. Ley Orgánica de la Administración Pública Federal [L.O.A.P.F.], *as reformed and amended*, Diario Oficial de la Federación [D.O.] § 37-XV, 29 de Diciembre de 1982 (Mex.).

Figure 1a: Evolution of regulatory capacity in León, Guanajuato 1972-1991

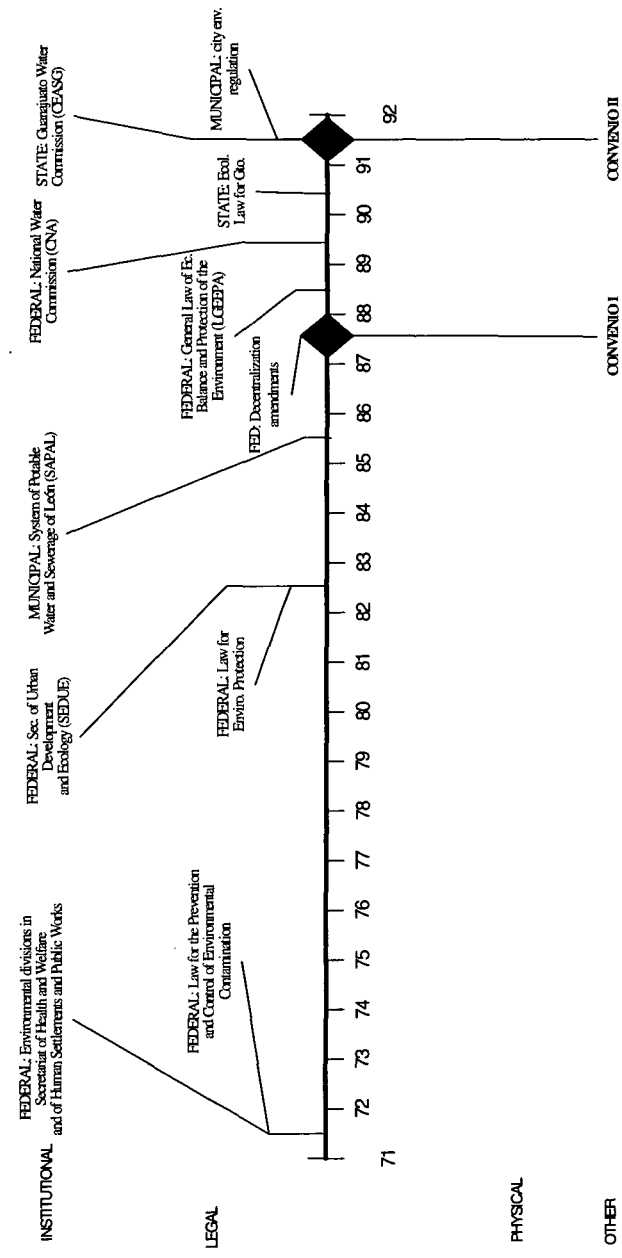
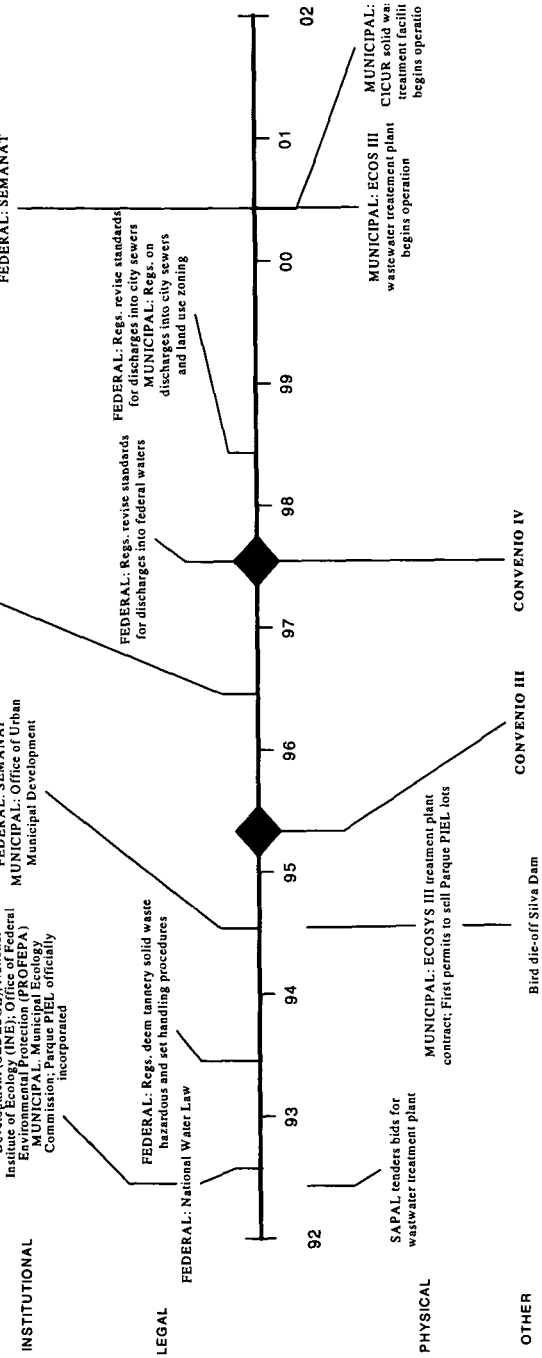


Figure 1b: Evolution of regulatory capacity in León, Guanajuato 1992–2001



The institutional capacity needed to implement federal environmental laws at the state and municipal levels has been slow to develop. Such gaps in local administrative capacity are pervasive in Mexico—since its inception, a defining characteristic of Mexican government has been a concentration of legal authority, power, and resources at the federal level.[33] In the early 1980s, recognizing that this concentration of power and resources in Mexico City was impeding effective provision of all sorts of public services, including environmental protection, Mexico initiated a gradual process of transferring certain responsibilities to states and municipalities.[34] Known as "decentralization," this process, which included amendments to the Mexican Constitution in 1987, resulted in the requirement that the federal government adopt legislation granting state and municipal governments some authority over environmental matters.[35]

New, comprehensive federal environmental legislation passed in 1988—the General Law of Ecological Balance and Protection of the Environment (*Ley General del Equilibrio Ecológico y la Protección al Ambiente* (LGEEPA))—established a new division of responsibilities between federal and local (state and municipal) governments.[36] Although the LGEEPA, which remains in force today, left considerable room for interpretation in determining the scope of federal control, it drew the following broad distinctions. The federal government alone was charged with handling effluents discharged into national waters (in practice, virtually all surface and ground water) as well as hazardous wastes, while local governments were charged with regulating non-hazardous solid wastes and discharges into municipal sewer systems.[37]

Several changes in federal environmental regulatory institutions in the late 1980s and early 1990s complemented the LGEEPA. The National Water Commission (*Comisión Nacional del Agua* (CNA)) was created in 1989. Housed in the Secretariat of Agriculture and

33. Donna Lybecker & Steven P. Mumme, *Decentralization and Environmental Protection on Mexico's Northern and Southern Boundaries*, 11 J. ENV'T & DEV. 402, 412 (2002).

34. *Id.*

35. Comm'n for Envtl. Cooperation, *supra* note 29, at 2.

36. Ley General del Equilibrio Ecológico y la Protección al Ambiente [Environment Protection Law], Diario Oficial de la Federación [D.O.] capitulo II, 28 de Enero de 1988 (Mex.) [hereinafter L.G.E.E.].

37. ENVTL. LAW INST., ELI PROJECT NO. 931500, DECENTRALIZATION OF ENVIRONMENTAL PROTECTION IN MEXICO: AN OVERVIEW OF STATE AND LOCAL INSTITUTIONS, at iii, 14–15 (1996). For other areas such as air pollution and environmental impact review, federal and local governments were to divide jurisdiction based on factors such as the location and nature of the source and the severity of pollution. *Id.* The LGEEPA also conferred upon states and municipalities all environmental powers within their jurisdictions not expressly reserved to the federal government. *Id.*

Hydrological Resources (*Secretaria de Agricultura y Recursos Hidraulicos* (SARH)) rather than SEDUE, the CNA assumed jurisdiction over water quantity and water quality issues including enforcing standards on industrial discharges and wastewater treatment.[38]

The federal environmental regulatory system was restructured in 1992. SEDUE was recast as the Secretariat of Social Development (*Secretaría de Desarrollo Social* (SEDESOL)). Within SEDESOL, one subsecretariat, the Federal Environmental Attorney General's Office (PROFEPA) was charged with enforcement, and a second, the National Institute of Ecology (*Instituto Nacional de Ecología* (INE)) was charged with standard setting.[39]

In 1994, the environmental bureaucracy was restructured yet again in order to streamline federal policy making. The key change was to create a new agency called the Secretariat of the Environment, Natural Resources and Fisheries (*Secretaría de Medio Ambiente, Recursos Naturales y Pesca* (SEMARNAP)), which amalgamated all of the key federal offices and agencies related to the environment and natural resources, including offices formerly housed at SEDESOL, the CNA, and agencies concerned with fisheries and forests.[40]

In 1996, LGEEPA was reformed to further decentralize environmental responsibilities, establish a right of access to environmental information, and modernize regulation by, among other things, promoting multimedia integrated permitting.[41] The most recent major change in federal environmental infrastructure occurred in 2000 when the Fox administration stripped SEMANAP of its jurisdiction over fisheries and renamed the agency the Secretariat of the Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales* (SEMARNAT)).[42]

*2. Hazardous Waste and Water Pollution Law and Institutions*

From the point of view of controlling tannery pollution, the most important aspects of federal environmental law are the provisions covering hazardous wastes and liquid effluents. Regarding hazardous waste, one development was critical, the 1993 promulgation of several federal regulations (*Normas Oficiales Mexicanas* (NOMs)) implementing

38. Comm'n for Envtl. Cooperation, *supra* note 29, at 2.

39. *Id.*

40. *Id.*

41. ORG. FOR ECON. CO-OPERATION & DEV., ENVIRONMENTAL PERFORMANCE REVIEWS: MEXICO 47 (1998).

42. ORG. FOR ECON. CO-OPERATION & DEV., ENVIRONMENTAL PERFORMANCE REVIEWS: MEXICO 127 (2003).

various provisions of the 1988 LGEEPA.[43] These NOMs classify the solid wastes from selected industrial processes—including leather tanning—as "hazardous" and spell out requisite handling, management, and disposal procedures.[44] Other regulations spelled out how such wastes were to be handled, stored, and managed. According to state level regulators in León, prior to these 1993 NOMs, hazardous waste regulation was so piecemeal and confused as to be incomprehensible and virtually useless to enforcement authorities.[45]

With regard to water pollution, as noted above, under the 1988 LGEEPA, the federal government—through the CNA—is charged with regulating discharges into all national waters, while local governments are charged with regulating discharges into public sewer systems. For both federal and local authorities, regulation consists of establishing effluent standards (for example, maximum allowable limits for pollutants), issuing permits, keeping an inventory of dischargers and discharges, collecting discharge fees, monitoring compliance with permits, and sanctioning violations.[46] As with hazardous waste, prior to the early 1990s, federal laws governing water quality were confused and, therefore, often ignored at the local level. In León, for example, according to state regulators, there was absolutely no effort on the part of any regulatory authority to enforce effluent standards until the 1990s.[47]

In 1997 and 1998, two comprehensive federal regulations greatly mitigated this confusion by replacing the pre-existing system of industry-specific federal standards with a simplified system of effluent standards for all types of emissions sources. The first regulation established standards for discharges into national waters by all types of sources including municipal sewerage authorities.[48] The second regulation applied to discharges into municipal sewer systems.[49] To give municipal authorities time to build the physical, legal, and institutional

43. L.G.E.E., *supra* note 36, capitulo IV, § VI.

44. Norma Oficial Mexicana [NOM-CRP-001-ECOL/93], Diario Oficial de la Federación [D.O.], Anexo 2, § 4.2, 22 de Octubre de 1993 (Mex.); Norma Oficial Mexicana [NOM-CRP-006-ECOL/93], Diario Oficial de la Federación [D.O.], 22 de Octubre de 1993 (Mex.).

45. Interview with M. Hernández, *supra* note 19.

46. *See* Comm'n for Envtl. Cooperation, *supra* note 29, at 9; ORG. FOR ECON. CO-OPERATION & DEV., *supra* note 41, at 64.

47. Interview with Carlos Oliverio Pantoja, Director de Techología Ambiental, Universidad Tecnológica de León, in León, Gto., Mex. (May 30, 2002).

48. Norma Oficial Mexicana [NOM-001-ECOL-1996], Diario Oficial de la Federación [D.O.], 6 de Enero de 1997 (Mex.).

49. Norma Oficial Mexicana [NOM-002-ECOL-1996], Diario Oficial de la Federación [D.O.], 3 de Junio de 1998 (Mex.).

infrastructure needed to meet those standards, the two regulations established grace periods for compliance that depended on the size of the city.[50] Large cities like León were given until 2000 to comply with effluent standards for discharges into national waters and until 1999 to comply with effluent standards for discharges into municipal sewers.[51] Municipalities were charged with establishing industry-specific standards for discharges into their sewer systems.[52] The regulations provided guidelines for such standards.[53]

**B. State**

Although the 1988 LGEEPA established a legal foundation for the transfer of environmental authority to the local level, actual decentralization has occurred slowly as a result of limited resources at the local level, along with the low priority that many states give environmental issues.[54] The first step in environmental decentralization was for states to pass their own comprehensive environmental laws.[55] Guanajuato, León's home state, passed such laws in 1990.[56] The next step was to establish state-level regulatory institutions. Although Guanajuato founded a water regulatory authority—the Guanajuato State Water Commission (*Comisión Estatal del Agua de Guanajuato* (CEAG))—in 1991, it did not establish an environmental enforcement agency (*Procuraduría de Protección al Ambiente del Estado de Guanajuato* (PPAEG)) or a standard setting organization (*Instituto de Ecología del Estado de Guanajuato* (IEEG)) until 1996.[57] Unfortunately, PPAEG has been chronically under funded and under manned. From 1997 to 2002, it employed a total of seven inspectors and had an operating budget of less than $500,000 per year.[58] In addition, questions have been raised about the PPAEG's independence. According to federal regulators, PPAEG has often taken

50. NOM-001-ECOL-1996 § 4.5b; NOM-002-ECOL-1996 § 3.5.

51. *Id.*

52. Norma Oficial Mexicana [NOM-002-ECOL-1996], *supra* note 49, § 4.9.

53. *Id.*

54. ORG. FOR ECON. CO-OPERATION & DEV., *supra* note 41, at 144; Lybecker & Mumme, *supra* note 33, at 414.

55. Lybecker & Mumme, *supra* note 33, at 413.

56. Decreto Número 127 [Decree Number 127], PERIÓDICO OFICIAL DEL ESTADO DE GUANAJUATO, 28 de Agosto 1990 (Mex).

57. Decreto Número 16, Periódico oficial del estado de Guanajuato, no. 15, parte II, at 1230, 20 de febrero de 1996 (Mex.); Decreto Número 28, periódico oficial del estado de Guanajuato, no. 39, parte II, 14 de mayo de 1996 (Mex.).

58. Interview with José Angel Oyarvide, *supra* note 19.

the side of the powerful industrial lobbies (notably tanners) in disputes about compliance with federal environmental agencies.[59]

## C. Municipal

Decentralization of environmental authority permeated to the municipal level in the early 1990s. The city of León passed its first environmental regulation in 1991.[60] The following year, it established a Municipal Ecology Commission, which was renamed the Environment and Ecology Office (*Dirección de Medio Ambiente y Ecología del Municipio de León*) in 1994.[61]

The city of León has regulatory authority for one type of tannery pollution: discharges of liquid effluents into municipal sewers.[62] The city built the legal infrastructure needed to regulate this pollution during the 1980s and 1990s; it established a formal water and sewer authority (*Sistema de Agua Potable y Alcantarillado de León* (SAPAL)) in 1985.[63] In principal, SAPAL was responsible for regulating discharges into the city's sewers to meet federal standards. However, as discussed earlier, federal guidelines for regulating industrial discharges into municipal sewers were not established until 1997, and the city of León did not promulgate such regulations until 1998.[64] The 1998 regulations rely mainly upon command-and-control approaches, namely permitting and discharge standards for over a dozen specific pollutants.[65]

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59. Interview with A. Azuela, *supra* note 19; Interview with José Angel Oyarvide, *supra* note 19.

60. Reglamento Municipal para el Control de la Calidad Ambiental en la Ciudad de León, Guanajuato [Municipal Regulations for the Control of Air Quality in León, Guanajuato], PERIÓDICO OFICIAL DEL ESTADO DE GUANAJUATO § 2 , 17 de Diciembre 1991 (Mex.).

61. Reglamento de la Comisión Municipal de Ecología de la Ciudad de León, Guanajuato [Regulations for the Municipal Ecology Commission of León, Guanajuato], PERIÓDICO OFICIAL DEL ESTADO DE GUANAJUATO, 3 de Marzo 1992 (Mex.); Acuerdo por virtud del cual, se define la Competencia de la Dirección del Medio Ambiente y Ecología del Municipio de León, Guanajuato [Agreement to Define the Environment and Ecology Office of León, Guanajuato] PERIÓDICO OFICIAL DEL ESTADO DE GUANAJUATO § 2, 30 de Diciembre 1994 (Mex.).

62. *See* ENVTL. LAW INST., *supra* note 37, at 25.

63. Reglamento de Uso de la Red de Alcantarillado del Sistema de Agua Potable y Alcantarillado de León, Gto. [Regulations for the Use of the Municipal Sewage Network for Potable and Waste Water of Léon, Guanajuato], PERIÓDICO OFICIAL DEL ESTADO DE GUANAJUATO 9 de Abril 1985 (Mex.).

64. *See* Reglamento de Uso de la Red de Alcantarillado del Sistema de Agua Potable y Alcantarillado de León, Gto. [Regulations for the Use of the Municipal Sewage Network for Potable and Waste Water of Léon, Guanajuato] § 2, 1998 PERIÓDICO OFICIAL DEL ESTADO DE GUANAJUATO 3 de Febrero1998 (Mex.).

65. *Id.*

In addition to controlling tannery discharges *into* the sewer system, the municipal government of León is also responsible for meeting federal standards for discharges *from* the sewer system into the Turbio River.[66] In order to meet these standards, the city needed to construct and operate a wastewater treatment plant. SAPAL tendered bids for the construction and operation of such a plant in late 1992 and granted a contract to ECOSYS III, a private German-Mexican consortium, in 1994.[67] Unfortunately, the Mexican financial crisis of 1994 and 1995 significantly delayed the project, and the plant did not come on line until the fall of 2000.[68]

In 2000, a second municipal treatment facility was opened, the *Parque de Lodos*, a solid waste treatment center built, financed, and operated by the Guanajuato State Tannery Chamber of Commerce (*Camara de la Industria de Curtiduria del Estado de Guanajuato* (CICUR)). The facility has very little infrastructure or management. Essentially a collection of simple open-air pits, it provides no protection against seepage and groundwater contamination.[69]

In addition to the mandates contained in the 1998 regulation on use of the municipal sewer system, as discussed below, the city of León has attempted to control tannery pollution by creating incentives for certain types of tanneries to relocate to specified sectors of the city.[70] The land use zoning needed for this approach was put in place in 1998, the same year that the sewer system regulations were finally passed.[71] However, the 1998 regulation mostly enshrined the existing patchwork of land uses rather than reshaping them into more desirable patterns.

## III. HISTORY OF POLLUTION CONTROL EFFORTS

### A. Heightened Demand for Pollution Control

Developments on the national, regional, and local level dramatically boosted demand for environmental quality in León in the

66. L.G.E.E., *supra* note 36, art. 119.

67. Decreto Número 281 [Decree Number 281], 1994 PERIÓDICO OFICIAL DEL ESTADO DE GUANAJUATO § 3, 17 de Marzo 1994 (Mex.).

68. See Rossana Aguilar Aguirre, *Fue Inaugurada Planta de Tratamiento de Aguas Residuales [Waste Water Treatment Plant Is Inaugurated]*, CORREO DE HOY, 21 de Septiembre, at 21 (Mex.).

69. Socorro Guevara, *Aun no Concluye la Primera Etapa del Parque de Lodos [The First Stage of Sludge Park Is Not Completed]*, CORREO DE HOY, 30 de Mayo 2000, at 21 (Mex.).

70. Convenio II, *supra* note 11, at 4; Convenio IV, *supra* note 11, §§ 10i-10l.

71. Regalamento de Zonificación y Usos del Suelo de Municipio de León, Gto. periodico oficial del estado de Guanajuato, no. 10, parte 111, at 1034, 3 de febrero 1998 (Mex.).

mid-1980s and gave rise to the city's first concerted efforts to control tannery pollution. Several of these developments relate to the institutional and legal evolution discussed above. On the national level, an important impetus was the creation of an improved legal and institutional infrastructure for environmental management, most notably the passage of the 1982 Federal Law for the Protection of the Environment and the creation of SEDUE.[72] On the regional level, an important driver was an effort to improve surface-water quality in the severely polluted Lerma-Chapala River basin and to restore Lake Chapala, Mexico's largest lake.[73] The federal and state bureaucrats who focused their attention on this issue in the mid-1980s viewed untreated industrial and municipal discharges emanating from León—the largest population and industrial center in the northern section of the river basin—as a major contributor to the problem.[74] On the local level, concern about tannery pollution was heightened by the establishment of a municipal water and sewer authority, SAPAL, in 1985. SAPAL's first order of business was to deal with the continual clogging of León's antiquated sewer system, which resulted from the high concentrations of suspended solids in tannery liquid effluents.[75]

### B. Convenio I

#### *1. Background*

"Convenios"—voluntary written agreements among public- and private-sector agents—are fairly common in Mexico and are often used to promote coordination in areas where jurisdiction and legal underpinnings are fuzzy. For example, SEMARNAT has signed convenios with 25 of 32 state environmental authorities in order to facilitate federal intervention where a state lacks the infrastructure or resources needed to implement environmental regulations on its own.[76] Convenios are also signed to encourage polluters to improve their environmental performance. For example, SEMARNAT has signed

72. *See* L.G.E.E., *supra* note 36, § 37-XV.

73. *See* Philippus Webster et al., *Managing the Water Transition in the Lerma-Chapala Basin, Mexico, in* INTERSECTORAL MANAGEMENT OF RIVER BASINS 161 (Charles L. Abernathy ed., 2001).

74. Interview with Carlos Oliverio, *supra* note 47; Interview with José Angel Oyarvide, *supra* note 19.

75. Interview with Carlos Oliverio, *supra* note 47.

76. ORG. FOR ECON. CO-OPERATION & DEV., *supra* note 41, at 144; ENVTL. LAW INST., *supra* note 37, at v.

convenios with PEMEX, the state-owned oil giant, and with several industry subsectors such as coffee processing and textiles.[77]

As discussed in the introduction, we argue that the 1987 convenio with León's tanning industry—like the three similar convenios that followed it—represented an attempt to compensate for missing legal, institutional, physical, and civic infrastructures that would normally be used to control tannery pollution. The state of such infrastructures at the time of the first convenio can be gleaned from section II. With regard to legal infrastructure, Mexican hazardous waste law was confused, and standards for industrial discharges into León's sewers had not yet been established. Very little institutional infrastructure for environmental management existed at the local level. As for physical infrastructure, no treatment facilities for liquid waste or hazardous solid waste existed. Finally, concerning civic infrastructure, there is little evidence to indicate that tanners were aware of their legal responsibilities for environmental protection in 1987, nor is there any evidence that tanners or the public were aware of the need to control tannery pollution.

The first convenio was signed on July 8, 1987, by a collection of federal, state, municipal, private-sector, and quasi-public institutions including SEDUE, the state of Guanajuato, SAPAL, and León's three tannery trade associations.[78] Table 1 includes a complete list of signatories. The convenio consists of 12 clauses that lay out the obligations of the signatories in implementing a tannery pollution control program for León. The entire program was scheduled to be completed in just 21 months.[79] The main points of the convenio, categorized according to the type of infrastructure they promote, are described below and are summarized in Table 2.

77. ORG. FOR ECON. CO-OPERATION & DEV., *supra* note 461 at 72, 143; Hanks, *supra* note 8, at 165.

78. *See* Convenio I, *supra* note 11.

79. *Id.* cl. 12.

**Table 1. Convenio Signatories**

| Signatory | Convenio I July 1987 | II Oct. 1991 | III June 1995 | IV March 1997 |
|---|---|---|---|---|
| **Federal** | | | | |
| Enviro. Agency (SEDUE / SEMARNAP) | X | X | X† | X |
| Attny. General for Enviro. (PROFEPA) | n/a | n/a | X† | X |
| Nat. Institute of Ecology (INE) | n/a | n/a | | X |
| Ag. & Water Resources Agency (SARH) | X | X | | |
| Secretariat of Health and Social Security (SSSS) | X | | | |
| National Water Commission (CNA) | n/a | X | X† | X |
| **State** | | | | |
| State of Guanajuato Executive | X | X | X* | X |
| Health and Social Security Dept. | | X | | |
| Development and Public Works Dept. | | X | X | |
| Water and Health (CEASG) | n/a | | X | X |
| Institute of Ecology Gto. (IEEG) | n/a | n/a | n/a | X |
| State Attny. General for Enviro. (PPAEG) | n/a | n/a | n/a | X |
| **Municipal** | | | | |
| City of León Executive | X | X | X* | X |
| Water and Sewer Auth. León (SAPAL) | X | X | X | X |
| City of San Francisco de Rincón Executive | X | | X | X |
| Water and Sewer Auth. S.F. de Rn. (SAPAF) | n/a | n/a | X | X |
| City of Purísima del Rincón Executive | X | | | X |
| Water and Sewer Auth. Pur. del Rn. (SAPAP) | n/a | n/a | n/a | X |
| **Private-sector** | | | | |
| Tanners trade assn. (CICUR) | X | X | X | X |
| Tanners trade assn. (ANACU) | X | X | X | X |
| Quimica Central de Mexico, S.A. de C.V. | X | | | |
| Nat. Chamb. Comm., León (CANACINTRA) | | | X | |
| Parque PIEL | n/a | n/a | X | |
| Fideiconiso Cd, Industrial de León | | | X | |
| **Other** | | | | |
| Leather research institute (CIATEC) | X | | | |
| University of Guanajuato | X | | | |
| Assn. of Leather Professionals (AQTCL) | X | | | |
| Fundación Ecológica de Gto., A.C. (FUNDAE) | | | X | |

*"Witness" only, not "participant"

†Federal office as "witness" only, state and regional offices as "participant"

n/a = not applicable as institution not yet established.

*2. Legal and Institutional Infrastructure*

The three federal signatories—SEDUE, SARH, and the Health and Social Security Agency (*Secretaría de Salud y Seguridad Social* (SSSS))—were charged with establishing legal standards for tannery liquid and solid wastes within five months of the signing of the convenio.[80] SAPAL was charged with both enforcing emissions standards to be promulgated by the federal signatories and meeting the federal standards for municipal wastewater released into national waters (including the Turbio River).[81] In addition, the convenio established a new advisory committee called the Regional Committee for Promotion and Technical Assistance (*Comité Regional de Promoción y Asesoría Técnica*), comprised of representatives of the signatories of the convenio.[82] The committee was made responsible for vetting specific pollution control projects, evaluating compliance with the convenio, submitting quarterly progress reports to SEDUE and SARH, and modifying the cleanup plan if necessary.[83]

*3. Physical Infrastructure*

Responsibilities for various pollution control and prevention infrastructure investments were split among various stakeholders. Tanners were only specifically charged with adopting relatively low-cost pollution control measures, namely sedimentation tanks urgently needed to prevent city sewers from clogging within four months, and two pollution prevention strategies: recycling tanning liquors and recycling chromium (both within 11 months).[84] A larger set of signatories—SEDUE, the Center for Investigation and Technical Assistance in Tanning and Shoemaking (*Centro de Investigación y Asesoría Tenológica, en Cuero y Calzado* (CIATEC)), the National Association of Tanners (*Asosiación Nacional de Curtidores* (ANACU)), and tanners—were made responsible for installing less well-defined "equipment needed to comply with discharge standards" within 20 months.[85] Finally, SEDUE, the state of Guanajuato, and tanners were responsible for making the investments needed for environmentally friendly solid waste disposal within 15 months[86]

80. *Id.* cls. 2d-3d; *see also id.* cl. 6, tbl.
81. *Id.* cl. 4.
82. *Id.* cl. 7.
83. *Id.* cls. 8-9.
84. Convenio I, *supra* note 11, cl. 6, tbl.
85. *Id.*
86. *Id.*

*4. Civic Infrastructure*

As representatives of the tanneries, three trade associations—CICUR, ANACU, and the Association of Chemists and Technicians of León (*Asociación de Químicos y Técnicos de León* (AQTCL))—were charged with verifying that tanners installed sedimentation tanks, informing tanners of applicable laws, and promoting the installation of pollution control and prevention equipment.[87]

*5. Analysis*

Given the lack of regulatory capacity in 1987, even a well-designed voluntary agreement aimed at enhancing pollution control probably would have been difficult to implement successfully. However, several features of the 1987 convenio appear particularly impractical. First, the convenio mandated sizable pollution control investments at hundreds of tanneries, a solid waste disposal solution, and improved capacity for monitoring, enforcement, and administration.[88] By making SAPAL responsible for meeting federal effluent standards, it also implicitly mandated building a municipal wastewater treatment plant.[89] Yet, the convenio lacked any provisions for financing other than a statement that the three federal signatories would "assist polluters in securing funding for the implementation of necessary measures."[90] Second, the convenio deferred important issues to an advisory committee that had little chance of resolving them. For example, the plan mandated the installation of equipment and infrastructure needed to meet emissions standards, but it left to the advisory committee decisions about what specific investments to mandate and how to finance them.[91] Moreover, the advisory committee had no clear legal authority or fiscal foundation and was made up of a hodgepodge of representatives from 16 institutions.[92] Third, the timetable for completion of the tasks mandated by the pollution control program was exceedingly ambitious: all tasks were scheduled to be completed in under two years.[93] Fourth, the document was internally inconsistent in that it required tanneries to comply with existing environmental law but also charged SEDUE, SARH, and SSSS with establishing emissions standards.[94] Finally, the

87. *Id.* cls. 6, 7, 10.
88. *Id.* cl. 6, tbl.
89. *Id.* cl. 4.
90. Convenio I, *supra* note 11, cl. 3d.
91. *Id.* cls. 6, 8, tbl.
92. *Id.* cl. 7.
93. *Id.* cl. 6, tbl.
94. *Id.* cls. 2d-3d, cls. 5–6, tbl.

tanning sector as a whole, not a specific representative of the sector, was responsible for several critical elements of the program, including investments in chromium recycling, solid waste disposal, and the installation of equipment needed to comply with emissions standards.[95]

Not surprisingly, none of the first convenio's key goals were achieved. Sedimentation tank use barely increased over the 21-month period contemplated by the convenio, the specified pollution and waste control measures were not implemented, and authorities did not define standards for discharges. As a result, in 1989, the convenio's original term was extended for another two years. However, this period saw only one significant accomplishment: the installation of sedimentation tanks. Among a sample of 137 tanneries surveyed in 2000, 52 percent had installed a sedimentation tank by 1991.[96]

## C. Convenio II

### *1. Background*

By 1991, Mexico's environmental regulatory infrastructure had improved but was still fundamentally inadequate, especially at the municipal level. The main accomplishments between 1987 and 1991 on the federal level were the passage of a new comprehensive environmental law (LGEEPA) in 1988 and the creation of the National Water Commission (CNA) in 1989.[97] At the local level, key milestones were passage of the Guanajuato State Environmental Law in 1990 and the creation of the Guanajuato State Water Commission (CEASG) in 1991.[98]

The second convenio was signed on October 24, 1991.[99] It was meant to restart the effort to control tannery pollution after four years of inaction and the failure in 1991 of ECO-AZUL, a private-sector effort to replace hundreds of tanneries in León with a single large facility that would use environmental controls.[100] The second convenio was candid about the lack of progress during the first convenio—its stated goal was

95. *Id.* cl. 6, tbl.

96. Original survey data collected by the authors.

97. *See generally* L.G.E.E., *supra* note 36; Comm'n for Envtl. Cooperation, *supra* note 29, ch. 2.

98. Ley de Ecología para el Estado de Guanajuato [Law of Ecology for the State of Guanajuato], *supra* note 56; Decreto Gubernativo Número 16 [Gubernatorial Decree Number 16], *supra* note 57.

99. Convenio II, *supra* note 11, at 8. The second convenio is less formal in its structure than the first—it is introduced as a *minuta* [memorandum]. As such, it is rather haphazardly constructed and is not divided into numbered clauses.

100. Interview with Carlos Oliverio, *supra* note 47.

to "determine the actions necessary to follow up on the first convenio" given that there had been "no significant advances."[101] The signatories to the second convenio differ slightly from those of the first convenio (Table 1). The main points of the second convenio are as follows (Table 2).

**Table 2. Provisions of the Four Convenios**
**(► Key Provision)**

| *Topic* | I (Jul. 1987) | II (Oct. 1991) | III (Jun. 1995) | IV (Mar. 1997) |
|---|---|---|---|---|
| **Legal Infrastructure** | | | | |
| Standard setting | ► Federal signatories to set new tannery effluent standards | • Federal, state, and city authorities to set zoning rules | ►City to set standards for discharges into sewers<br>►CNA to set standards for discharges into rivers | • City to set standards for discharges into sewers<br>• CNA to set standards for discharges into rivers<br>►Authorities to establish new regs. on tannery solid wastes |
| **Institutional Infrastructure** | | | | |
| Enforcement | ►SAPAL to enforce liquid effluent standards | • No concrete provisions | ►State to pass laws to make SAPAL responsible for regulating discharges into sewers | • State to pass laws to make SAPAL responsible for regulating discharges into sewers<br>►City to publish records of enforcement activities |
| Registration | • Not addressed | ►Tanners to register with city authorities | ►Tanners to register with SAPAL and submit compliance plans<br>►Tanners to register with INE as hazardous waste generators | • Tanners to register with SAPAL and submit compliance plans<br>• Tanners to register with INE as hazardous waste generators |

101. Convenio II, *supra* note 11, at 1, 3.

(Table 2 continued)

| Topic | I (Jul. 1987) | II (Oct. 1991) | III (Jun. 1995) | IV (Mar. 1997) |
|---|---|---|---|---|
| New committees | • Committee established to analyze and finance pollution control projects | • No concrete provisions | • No concrete provisions | • Committee established to monitor compliance with convenio |
| **Physical Infrastructure** | | | | |
| Pre-treatment | ▶Tanners to install sedimentation tanks and recycling<br>• SEDUE and tanners responsible for unspecified pre-treatment investments | • No concrete provisions | • No concrete provisions | ▶Wastewater segregation and common effluent treatment plants to eliminate need for individual investments at plants in authorized industrial zones<br>• Tanners to pay fees for wastewater treatment |
| Relocation | • Not addressed | ▶Tanners to relocate wet-blue processes to authorized industrial zones. Authorities to define zones | • Not addressed | • Tanners to relocate wet-blue processes to authorized industrial zones |
| Industrial parks | • Not addressed | • Not addressed | ▶Parque PIEL to build treatment plant within 2 years | • Treatment facilities to be built in authorized industrial zones |
| Municipal wastewater | • SAPAL charged with meeting federal standards | ▶SAPAL to build wastewater treatment plant within 2 years | • SAPAL to build wastewater treatment plant within 1 year | • SAPAL and city to build wastewater treatment plants within 1 year |
| Solid waste | • Federal and state authorities responsible for unspecified investments | ▶Tanners to finance new solid waste disposal facility | • No concrete provisions | • State and INE to build disposal site<br>• Tanners to obtain hazardous waste permits from INE<br>• Tanners to finance new solid waste disposal facility |

(Table 2 continued)

| *Topic* | I (Jul. 1987) | II (Oct. 1991) | III (Jun. 1995) | IV (Mar. 1997) |
|---|---|---|---|---|
| **Civic Infrastructure** | | | | |
| Tannery Representation | • CICUR, ANACU, and AQTCL | • CICUR and ANACU | • CICUR and ANACU | ▶Tanners may join individually; non-joiners face immediate strict enforcement |
| Education & research | • Not addressed | • Not addressed | ▶City to finance education & research center<br>▶Federal, state, and municipal authorities to establish trust fund for environmental research<br>▶Public education on use of municipal sewer | • Public education on use of municipal sewer |

*2. Physical Infrastructure*

Represented by CICUR and ANACU, the tanners agreed to relocate the wet-blue stages of the tanning to authorized zones reserved exclusively for industry and to install unspecified pre-treatment facilities needed to comply with effluent standards.[102] The purpose of the relocation was primarily to facilitate private investments in common effluent treatment plants—treatment plants shared by more than one tannery.[103] The deadline for relocation was five years.[104] The tanners committed to building and then utilizing a solid waste disposal facility.[105] Finally, SAPAL was charged explicitly with designing a wastewater treatment plant within one year and building it within two years.[106]

*3. Legal and Institutional Infrastructure*

Federal, state, and municipal authorities jointly committed to legally define the boundaries of the authorized industrial zones to which tanners were to relocate.[107] Also, the tanners agreed to register with

102. *Id.* at 5–7.
103. Interview with Carlos Oliverio, *supra* note 47.
104. Convenio II, *supra* note 11, at 5–6.
105. *Id.* at 8.
106. *Id.* at 4.
107. *Id.*

municipal authorities (stating their plans for relocation and abatement) and again pledged to promote compliance with all applicable pollution control regulations.[108]

*4. Analysis*

The second convenio introduced two important new strategies: registering all tanneries and relocating tanneries to industrial zones where they could build common effluent treatment plants, and explicitly assigning responsibilities for constructing a wastewater treatment plant to SAPAL.[109] Despite these innovations, the second convenio suffered from many of the same failings as the first. Critical financing issues were not addressed. Also, gaps in regulatory infrastructure created bottlenecks. The convenio hinged on relocating tanneries to authorized zones, but the necessary first step of defining authorized zones did not actually occur until seven years later in 1998, and, as discussed below, the first industrial park did not become operational until 2001.[110] Perhaps not surprisingly then, none of the objectives of the second convenio were met.

**D. Ecological Industrial Park of León**

In late 1992, following the tannery relocation strategy introduced in the second convenio, federal, state, and municipal authorities provided seed capital for the Ecological Industrial Park of León (*Parque Industrial Ecológico de León* (PIEL)), a new tannery industrial park that was to include a common effluent treatment plant. The plan was to sell 250 lots in the park to large-scale tanneries to recoup the initial investment. By 1994, seed funding had been used to acquire unimproved agricultural land south of the city. Progress on improving this land was far slower than anticipated and, as a result, so was the relocation of tanneries to the park.[111] It was not until 2001, when the municipal government contributed 12 million pesos in financing, that PIEL's electric power substation was completed.[112] By the end of 2002, only a

108. *Id.* at 5–6.

109. *Id.* at 5–7.

110. Regalamento de Zonificación Uses del Suelo de Municipio de León, Gto., *supra* note 71.

111. Interview with Carlos Oliverio, *supra* note 47; Ignacio Velásquez, *La Crisis Frena la Compra de Terrenos en el Parque Industrial Ecológico*, HERALDO DE LEÓN (Mex.), Apr. 12, 1999, at 7.

112. Sandra Muñoz Vázquez, *Con Una Inversión de 12 mdp Terminarán Subestación Eléctrica del Parque Piel [The Electric Substation of the Piel Park will be completed with a 12 million pesos Investment]*, CORREO DE HOY (Mex.), Sept. 4, 2001, at 18.

dozen lots were physically occupied, with several buildings still under construction.[113]

### E. The *Presa de Silva* Bird Die-off

By early 1994, efforts to control tannery pollution in León had almost completely stalled. However, a widely publicized ecological calamity rekindled progress. In October and November 1994, tens of thousands of native and migratory aquatic birds died while wintering at a reservoir called the *Presa de Silva*,[114] located 35 kilometers downstream from León. A common suspicion was that industrial pollution originating in León was the cause.[115] By December 1994, national and international media were covering the story. In June 1995, six months after the incident, the Audubon Society and two Mexican nongovernmental organizations petitioned the Commission for Environmental Cooperation (CEC), a trilateral body set up under the North American Agreement on Environmental Cooperation, to investigate.[116] The CNA and researchers from the *Universidad Nacional Autonoma de Mexico* (UNAM), Mexico's largest university, also conducted studies of the incident.[117] The CEC report made a link between the die-off and industrial pollution in León.[118] Among the report's recommendations were treating and recycling industrial effluents by building an industrial park with the requisite equipment. [119] Although an internationally financed reclamation project eventually restored the reservoir and international interest soon waned, the bird die-off greatly increased local concerns about tannery pollution.[120] A few years later, the reservoir and adjacent lands were made a protected natural area by the state.[121]

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113. Visit to PIEL by the authors, fall 2002.

114. Comm'n for Envtl. Cooperation, *supra* note 10, at 1.

115. *Id.* at 12.

116. *Id.* at 1.

117. COMISIÓN NACIONAL DEL AGUA, REPORTE DE AVANCE DE LA INVESTIGACIÓN PARA DETERMINAR LAS CAUSAS DE LA MORTANDAD MASIVA DE AVES EN LA PRESA DE SILVA EN EL ESTADO DE GUANAJUATO (1995) (cited in COMM'N FOR ENVTL. COOPERATION SECRETARIAT, *supra* note 10); M. GÓMEZ RUIZ & C. HUMBERTO, MORTANDAD DE AVES MIGRATORIAS, PRESA DE SILVA, GUANJUATO (Universidad Nacional Autónoma de México, Facultad de Química) (1995) (cited in COMM'N FOR ENVTL. COOPERATION SECRETARIAT, *supra* note 10).

118. Comm'n for Envtl. Cooperation, *supra* note 10, at 4.

119. *Id.* at 63–69.

120. Interview with Azuela, *supra* note 19; Interview with Oliverio, *supra* note 47; Interview with Oyarvide, *supra* note 27.

121. Decreto Gubernativo Número 80 [Gubernatorial Decree Number 80], PERIÓDICO OFICIAL DEL ESTADO DE GUANAJUATO, Segunda Parte, 16 de Enero de 1998 (Mex.).

## F. Convenio III

### 1. Background

The years between the second and third convenios (1991 to 1995) were marked by a number of significant legal and institutional developments, which were discussed in section III. Regulations were promulgated for hazardous wastes in 1993.[122] The federal environmental regulatory authority was restructured in 1992 to create SEDESOL, PROFEPA, and INE, and in 1994 to create SEMARNAP.[123] On the local level, PIEL was incorporated in 1992.[124] Finally, a contract to build a municipal wastewater treatment plant in León was granted to ECOSYS III in 1994.[125]

In February 1995, at the height of the *Presa de Silva* controversy, the CNA and Guanajuato state authorities created the Turbio River Comprehensive Clean up Program (*Programa de Saneamiento Integral del Rio Turbio*), a commission meant to jump-start efforts to cut tannery pollution in León.[126] The commission met four times in spring and early summer to hammer out a new covenant, which was signed at the commission's fifth meeting on June 16, 1995.[127] Signatories to the 1995 convenio once again included top federal, state, and local officials (Table 1). The convenio consisted of 12 clauses that contained the following substantive elements (Table 2).

### 2. Legal and Institutional Infrastructure

Many of the legal and institutional provisions of the third convenio repeat or amplify those of the previous two. The city of León and the state of Guanajuato committed to creating the legal and institutional infrastructure that SAPAL would need to regulate discharges into municipal sewer systems. Specifically, the city of León was to compile an inventory of industrial facilities discharging into the sewer system, promulgate regulations governing such discharges, and establish "administrative systems" to enforce these regulations, while the state of Guanajuato agreed to undertake the legal reforms needed to authorize SAPAL to monitor and enforce compliance with these regulations.[128] The third convenio also included provisions aimed at

122. *See* NOM-CRP-001-ECOL/93, Anexo 2, § 4.2; NOM-CRP-006-ECOL/93.
123. Comm'n for Envtl. Cooperation, *supra* note 29, ch. 2.
124. Interview with Carlos Oliverio Pantajo, *supra* note 47.
125. Decreto Número 281, *supra* note 67, § 3.
126. Interview with Oliverio, *supra* note 47; CEC, *supra* note 10, at 23.
127. *See* Convenio III, *supra* note 11.
128. *Id.* §§ 4b, 5a–b, 5d.

putting into place the legal infrastructure that the CNA would need to regulate discharges of municipal wastewaters into the Turbio River. Specifically, the CNA committed to establishing specific standards for such discharges by June 30, 1995; making an inventory of such discharges by July 31, 1995; and intensifying monitoring and enforcement of the national water laws.[129] The tanners—represented in all provisions of the convenio by CICUR, ANACU, and the National Industrial Chamber of Commerce (*Cámara Nacional de la Industria de Transformación* (CANACINTRA))—agreed to register with SAPAL and present a pollution control plan.[130] They also agreed to register with INE as solid waste generators and to comply with the hazardous waste treatment procedures[131] to be outlined in a new compliance document.

*3. Physical Infrastructure*

SAPAL and the city of León again committed to building a municipal wastewater treatment plant for León along with the required water mains.[132] The CNA was charged with monitoring compliance with this obligation.[133] PIEL, for its part, committed to building a treatment plant and to begin operating it by July 1997.[134] The city of León pledged to guarantee financing for the plant and to "support" the relocation of tanneries to the park.[135] SAPAL agreed to operate the PIEL treatment plant.[136] Finally, the convenio included vague and non-committal provisions regarding in-house treatment facilities in tanneries.[137] Specifically, the representatives of the tanners agreed to "ensure that the tanning industry continues mitigating the environmental impacts of the tanning process and the disposal of its wastes and avoids emitting pollutants through the use of wastewater treatment plants, thus reinforcing pollution prevention programs in the Turbio watershed."[138]

*4. Civic Infrastructure*

Provisions regarding civic infrastructure focused on registration, education, and research. The city of León agreed to finance an education

129. *Id.* § 3.
130. *Id.* § 9d.
131. *Id.* § 9e.
132. *Id.* § 6b, c.
133. Convenio III, *supra* note 11, § 3e.
134. *Id.* § 10a.
135. *Id.* § 5f, k.
136. *Id.* § 6b.
137. *Id.* §§ 9c, 12.
138. *Id.* § 9c.

and research center.[139] SEMARNAP, the state of Guanajuato, and the municipality of León were to contribute equal shares toward a trust fund that would finance research on local environmental issues, particularly water pollution.[140] A local nongovernmental organization, *Fundación Ecológica de Guanajuato A.C.* (FUNDAE), was charged with compiling relevant existing information and research, liaising with other organizations for this purpose, and promoting environmental awareness at the educational center.[141] Finally, SEMARNAP, the state, and the municipalities all made vague general commitments to educate citizens about environmental issues and, in particular, the need to keep toxic substances out of municipal sewers.[142]

*5. Analysis*

While the 1995 convenio repeated several provisions of earlier convenios, it also completely ignored initiatives that were centerpieces of these convenios, in particular relocating tanneries to industrial parks and building a solid waste disposal facility. The 1995 convenio also introduced several new measures: the CNA was to establish specific standards for and to monitor wastewater discharges into the Turbio River watershed, SAPAL was to be legally empowered to enforce pollution control laws, the city of León and SAPAL agreed to take a number of steps to promote PIEL, and tanners were to register with INE and comply with new hazardous waste requirements.[143] Finally, unlike the agreements that preceded it, the third convenio emphasized education and research and included plans to establish a center and a trust fund to support these activities.[144]

Several of the problems that characterized earlier convenios are evident in the 1995 agreement. Once again, important financial obligations are ill-defined, most notably those concerning effluent treatment and relocation.[145] Additionally, the convenio does not acknowledge, much less resolve, inconsistencies that were likely to create bottlenecks. For example, SAPAL was charged with meeting standards for discharges into national waters, despite the fact that

139. *Id.* §§ 5h, 11.
140. *Id.* § 8.
141. *Id.* § 11a.
142. *Id.* §§ 2a, 4c, 5e.
143. *Id.* §§ 3, 4b, 5a, b, d, 6b, 9e.
144. *Id.* §§ 5h, 8.
145. SEMARNAP agreed to provide "support to firms seeking financing"; the state committed to "financially support the municipalities' clean up initiatives"; and municipalities agreed to "support the relocation of firms to Parque PIEL." *Id.* §§ 2c, 4a, 5f.

standards for discharges into its sewer system had yet to be established.[146] Similarly, tanners were charged with abiding by a manual describing their obligations regarding hazardous waste, even though no such manual existed at the time.[147]

The 1995 convenio had some positive impacts but ultimately failed to significantly enhance pollution control. SAPAL made a concerted effort to register tanneries and make them commit in writing to a pollution control plan. By February 1996, 217 tanneries had submitted a form committing them to one of eight pollution control options.[148] A second positive impact was an effort to inform tanners of the relevant legal standards and procedures needed for compliance. In 1996, CIATEC produced a document detailing this information.[149] Although this document faithfully describes the existing regulation, it reflects the gaps and weaknesses of that regulation and leaves open a number of important questions about how the regulations apply to tanneries. SAPAL, in collaboration with federal and state regulators, undertook a more ambitious project—producing a document explaining in plain language how federal hazardous waste regulations apply to leather tanneries and making recommendations for handling, transporting, and storing tannery wastes.[150] However, this manual was not completed and distributed until December 1997, nine months after the fourth convenio. Lastly, the education and research initiatives never materialized because financial resources were not made available.[151]

### G. Convenio IV

#### *1. Background*

Although only 20 months passed between the third and fourth convenios, a number of developments significantly enhanced regulatory capacity in León during this period. In 1996, two new state regulatory institutions—IEEG and PPAEG—were established and LGEEPA, the federal environmental law, was revised to promote further

146. *Id.* § 6a.

147. *Id.* § 9e.

148. S. Naya Reynaud, *Proyecto de Saneamineto de Aguas Residuales Domésticas e Industriales de la Ciudad de León, Guanajuato*, 62 DINÁMICA DE LA CURIDURÍA 9, 9–10 (1996).

149. CIATEC, APPÉNDICE ECOLÓGICO PARA LA INDUSTRIA DEL CUERO 13–45 (1996).

150. INSTITUTO NACIONAL DE ECOLOGÍA (SEMARNAP) ET AL., MANUAL PARA LA CLASIFICACÓN Y MANEJO DE LOS RESIDUOS DE LA CURTIDURÍA (1997).

151. Interview with Biól. Robert Aviña Carlín, Director of FUNDAE, in Guanajuato, Gto. (July 15, 2002).

decentralization of environmental authority, to establish the right of access to environmental information, and to modernize regulation.[152]

The stated purpose of the fourth convenio was once again to clean up the Turbio River watershed.[153] The signatories were more or less the same as those of the third convenio, with some exceptions (Table 1). New signatories included IEEG and PPAEG, while old signatories that dropped out included FUNDAE. Longer than the preceding three convenios put together, the 1997 convenio consists of 16 clauses containing the following substantive elements (Table 2).

*2. Legal and Institutional Infrastructure*

The parties once again promised to finish promulgating liquid waste regulations. As in the previous convenio, the state of Guanajuato committed to undertake the legal reforms needed to enable SAPAL to monitor and enforce water pollution laws, and the city of León agreed to formulate standards for discharges into sewers.[154] The CNA pledged to conclude the studies needed to set standards for direct discharges into the river by SAPAL and industries by July 1997.[155] With regard to hazardous waste, authorities agreed to complete the aforementioned compliance manual and the tanners agreed to submit applications for permits to INE 30 days thereafter.[156] The signatories also pledged to establish a working committee to monitor compliance with the convenio and to handle disputes.[157] Both the CNA and the municipal authorities were once again charged with developing a list of industrial wastewater dischargers.[158] Finally, tanners agreed to register with the local water authority and to register with INE as generators of hazardous waste.[159]

*3. Physical Infrastructure*

The key innovation of the 1997 convenio was a plan to build a series of specialized treatment plants for tanneries. Specifically, individual tanneries were to segregate their effluents by inorganic pollutant (salt, sulfur, and chromium) and pipe them through dedicated sewer lines to the corresponding treatment plant.[160] SAPAL was charged

152. Decreto Número 16, *supra* note 57; Decreto Número 28, *supra* note 57.
153. Convenio IV, *supra* note 11.
154. *Id.* §§ 6b, 7c.
155. *Id.* § 3l.
156. *Id.* §§ 4, 10g.
157. *Id.* §§ 12, 13, 14, 15, 16.
158. *Id.* § 3c.
159. Convenio IV, *supra* note 11, § 7b.
160. *Id.* § 8b.

with designing, building, and operating these treatment plants by July 1, 1999.[161] Because the plants would only service authorized industrial zones, tanneries outside of these zones agreed to either (1) stop producing wet blues within one year, (2) relocate to authorized zones, or (3) install the pretreatment equipment needed to meet SAPAL's forthcoming standards for discharges into the sewers.[162] With regard to solid and hazardous waste, the state once again committed to creating a disposal facility, this time within three months.[163] The state also agreed to develop plans to rehabilitate sites contaminated by improper disposal of hazardous wastes.[164] Regarding municipal wastewater treatment (i.e., treatment of organic pollutants), SAPAL and the municipality of León committed to building a plant. The deadline was set at January 1998 for construction and April 1998 for operation.[165]

Who was to finance these investments? Tanners pledged to pay fees that would facilitate the construction of treatment facilities.[166] The city of León agreed to provide land for the new industrial wastewater treatment plants.[167] The state, municipalities, and SAPAL committed to "support" relocation of the tanneries to industrial parks.[168] Although most of the language was noncommittal, SAPAL was charged with building new sewer mains needed to segregate effluent streams as well as the associated infrastructure for the industrial parks, all while adhering to a strict timeline.[169]

*4. Civic Infrastructure*

The city of León agreed to carry out information campaigns on the dumping of toxic substances into sewers and to strengthen educational centers (by unspecified means).[170] In addition, the municipality was to issue monthly reports on fines imposed by PROFEPA for violations of environmental standards in the city.[171]

161. *Id.*
162. *Id.* § 10i, j, k, l.
163. *Id.* § 6g, f.
164. *Id.* § 6h.
165. Convenio IV, *supra* note 11, § 8a.
166. *Id.* § 10b.
167. *Id.* § 7k.
168. *Id.* §§ 6e, 7i, 8c.
169. *Id.* § 8b.
170. *Id.* § 7e, g.
171. Convenio IV, *supra* note 11, § 7o.

*5. Miscellaneous*

Two miscellaneous provisions of the convenio are noteworthy. First, while trade organizations represented the tanners in the previous three convenios, individual tanners were invited to sign the 1997 convenio.[172] There was an important incentive: PROFEPA would apply less pressure on tanners who signed.[173] Second, INE agreed to promote economic incentives for reducing tannery pollution, including an exemption from tariffs on imported pollution control equipment and accelerated depreciation of environmental investments.[174]

*6. Analysis*

In many respects, the fourth convenio simply restated provisions from earlier convenios. However, there were also a number of important innovations. First, the convenio moved toward resolving a key sticking point in earlier convenios: assigning responsibility for investments in industrial wastewater treatment. In previous convenios, tanners themselves were allocated the lion's share of this burden, a provision that practically guaranteed that they would not cooperate. The 1997 convenio established a plan that relieved tanners of the responsibility for financing up-front construction costs. The local sewer authorities would finance and build the dedicated sewer mains and industrial wastewater treatment plants and would recoup some of the costs through treatment fees.[175] However, tanners outside of approved industrial parks would still need to relocate in order to have access to the effluent treatment plants.

Second, the 1997 convenio was intended to ratchet up pressure for compliance. Individual tanners were invited to sign the convenio and pledge to adhere to its provisions.[176] Also, the municipality was charged with issuing monthly reports on the number and amount of environmental fines.[177]

Although these innovations represented some degree of progress, the 1997 convenio was plagued by many of the same problems and internal inconsistencies as the first three convenios. Most important, although relocating tanneries to industrial parks was the lynchpin of the

172. *Id.* § 10h.

173. Speech by Rafael Arriaga, Director of IEEG, to a CICUR Extraordinary Assembly, 77 DINÁMICA DE LA CURIDURÍA (May 1997).

174. Convenio IV, *supra* note 11, § 10i, j, k, l.

175. *Id.* § 10b.

176. *Id.* § 10h.

177. *Id.* § 7o.

clean-up strategy, it was still not clear who would pay for the relocation expense or even where these parks would be sited since the only industrial park that existed at the time was PIEL. Furthermore, although tanners agreed to comply with regulations for industrial wastes, a manual on these regulations had not yet been published and a hazardous waste facility still had not been built. Finally, the timing of several of the provisions within the covenio was extremely ambitious.

In the three-and-a-half years prior to the convenio's expiration in November 2000, no progress was made on its single most important provision—building industrial wastewater treatment plants. Thus, the fourth convenio, like the preceding convenios, failed to have a significant impact on industrial wastes from tanneries. The only real progress that occurred during the term of the fourth convenio resulted from initiatives that had long been in the works. SAPAL finally promulgated standards for discharges into the city sewers in February 1998.[178] In addition, on the day that the convenio expired, SAPAL's municipal wastewater treatment plant finally came on line.[179]

## IV. CONCLUSION

We have sought to answer two questions: why did environmental regulators in León make voluntary agreements the centerpiece of their efforts to control tannery pollution during the 1980s and 1990s, and why did these agreements fail to achieve almost all of their objectives? The historical information presented in sections 3 and 4 suggests that a single factor—significant gaps in the infrastructure needed to enforce conventional command-and-control environmental policies—is the key to answering both questions.

Exactly what environmental regulatory infrastructure was needed to enforce command-and-control policies and what infrastructure was missing? The requisite legal infrastructure included clear regulations governing both discharges of liquid wastes into municipal sewers and the handling and storage of hazardous solid wastes. The former were not promulgated until 1998. Although hazardous waste regulations were promulgated in 1993, written materials clarifying how they applied to tanneries were not available until 1997.

The institutional infrastructure needed to regulate tanneries included capable state and municipal regulatory authorities, yet

178. Reglamento de Uso de la Red de Alcantarillado del Sistema de Agua Potable y Alcantarillado de León, Gto., *supra* note 64.

179. *Fue Inaugurada Planta de Tratamiento de Aguas Residuales*, *supra* note 68.

Guanajuato's environmental regulatory agency was not established until the mid-1990s, León's water and sewer authorities were not founded until 1985, and a municipal environmental authority was not established until the next decade.

The physical infrastructure needed to control tannery pollution included facilities to treat inorganic liquid wastes (salt, sulfur, and chromium), organic liquid wastes, and hazardous solid wastes. Of these three types of infrastructure, to date, only one—a facility to treat organic wastes—has been built and it did not begin operating until 2000.

Finally, the civic infrastructure needed to control tannery pollution included public support for—or at least acquiescence to—regulation of tanneries in León. This infrastructure is difficult to measure. However, there is no evidence that the citizens of León have ever placed significant political pressure on tanners to improve pollution control. Nor is there much evidence—aside from the *Presa de Silva* incident in the winter of 1994/1995—that environmental advocacy groups have pressured tanners.

Given these gaps in regulatory infrastructure, local environmental management authorities had limited ability to employ conventional regulatory tools in León. Voluntary regulation likely represented the only available means of addressing an urgent and increasingly politically sensitive environmental problem.[180]

We hypothesize that, in addition to motivating the voluntary environmental agreements in León, a lack of environmental regulatory infrastructure also undermined them. It did so in three ways. First, it implied that the cost of constructing the physical infrastructure needed to control tannery pollution was daunting since it had to be constructed from scratch. For example, except for in-house facilities in a handful of tanneries, infrastructure for treating industrial wastewater in metropolitan León did not, and still does not, exist. All of the various options for building such infrastructure—in-house individual treatment plants, common effluent treatment plants for groups of tanneries along with infrastructure needed to connect the tanneries to the treatment plants, and relocating tanneries to industrial parks—are exceptionally costly. Although they contain vague, non-committal language about public-sector financial assistance, the four convenios implicitly assigned responsibility for these investments to the tanners (only the fourth convenio split responsibility between tanners and municipal authorities).

180. A more cynical—and not necessarily mutually exclusive—interpretation is that the convenios provided political cover to local regulators who were unable or unwilling to use conventional regulatory tools.

Tanners were unlikely to undertake these investments without strong incentives.

Second, the obvious lack of environmental regulatory infrastructure implied that regulators could not create such incentives in the typical fashion: threatening polluters with mandatory regulation if they failed to comply with voluntary commitments. Indeed, the 20-year history of efforts to control tannery pollution summarized here is notable for the almost complete absence of enforcement actions against tanners (the only exceptions being consistent enforcement of rules mandating sedimentation tanks and much more sporadic enforcement of rules on illegal dumping of sludge). As each failed convenio was followed not by sanctions, but by a new convenio, the credibility of the threat of meaningful enforcement further diminished.

Third, the lack of a wide range of interdependent regulatory infrastructure virtually guaranteed that bottlenecks would arise, and, moreover, that the signatories to the voluntary agreements would dodge their commitments by making their own compliance contingent on that of others. For example, the ability of regulators to meet key commitments such as promulgating discharge standards and financing wastewater treatment facilities was constrained by a host of factors including a chronic scarcity of fiscal resources and the slow pace of the federal and state legal and institutional reforms needed to create effective municipal regulations and regulatory institutions. These failings provided tanners with excuses—as well as valid reasons—for abrogating their own commitments to invest in pollution control.

Hence, key themes from previous research on voluntary regulation in industrialized countries clearly apply to the León experience, but with an important twist. As the industrialized-country literature suggests, regulators in León likely resorted to voluntary agreements because they lacked the capacity to enforce mandatory regulations, and these agreements floundered in large part because firms did not face a credible "background threat" of more stringent mandatory regulation. The caveat concerns the types of pollution problems addressed by voluntary regulation in industrialized countries versus León. In industrialized countries, voluntary regulation almost always complements command-and-control policies and therefore is typically used to create incentives for firms to "overcomply" with pre-existing mandatory regulations, that is, to reduce emissions of conventional pollutants below mandated levels or to cut emissions of unconventional pollutants like greenhouse gases that are not covered by mandatory

regulations.[181] In León, by contrast, regulators used voluntary regulation to boost compliance with command-and-control policies covering conventional water and solid waste pollution that were ill-defined, incomplete, and infrequently enforced. Instead of overcompliance, voluntary regulation in León aimed at simple compliance. One implication was that the stakes for the success of voluntary environmental agreements in León were relatively high.

What are the implications of our case study for other developing countries? Although further research is needed, intuition suggests the poor performance of voluntary regulation in León is not likely to be an unusual outcome. In our view, the same two factors that drove this lackluster performance—gaps in regulatory infrastructure and the use of voluntary regulation to improve compliance with "mandatory" regulations—are frequently observed in developing countries. Unfortunately, our case study suggests that voluntary regulatory policies (at least negotiated agreements of the type used in León) are not likely to prove a particularly effective tool for shoring up poorly performing command-and-control regimes in developing countries.

181. Lyon, *supra* note 4.