

**THE U.S.-MEXICAN
BORDER ENVIRONMENT**

Binational Water
Management Planning

SCERP Monograph Series, no. 8

A series edited by Paul Ganster

Contributors

ISMAEL AGUILAR BARAJAS	INSTITUTO TECNOLÓGICO Y DE ESTUDIOS SUPERIORES DE MONTERREY
BARBARA R. BRADLEY	NOLTE ASSOCIATES
CHRISTOPHER BROWN	NEW MEXICO STATE UNIVERSITY
JOSÉ LUIS CASTRO RUIZ	EL COLEGIO DE LA FRONTERA NORTE
EMILIO DE LA FUENTE	CONSULTING ENGINEER
EDWIN HAMLYN	UNIVERSITY OF TEXAS AT EL PASO
OSCAR IBÁÑEZ HERNÁNDEZ	UNIVERSIDAD AUTÓNOMA DE CIUDAD JUÁREZ
NANCY LOWERY	SAN DIEGO STATE UNIVERSITY
DANIEL MCCOOL	UNIVERSITY OF UTAH
STEPHEN P. MUMME	COLORADO STATE UNIVERSITY
WILLIAM A. NITZE	CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES
JORGE RAMÍREZ HERNÁNDEZ	UNIVERSIDAD AUTÓNOMA DE BAJA CALIFORNIA
JESÚS ROMÁN CALLEROS	UNIVERSIDAD AUTÓNOMA DE BAJA CALIFORNIA
CHARLES TURNER	UNIVERSITY OF TEXAS AT EL PASO
D. RICK VAN SCHOIK	SOUTHWEST CENTER FOR ENVIRONMENTAL RESEARCH AND POLICY
RICHARD WRIGHT	SAN DIEGO STATE UNIVERSITY

The Southwest Center for Environmental Research and Policy (SCERP) is a consortium of U.S. and Mexican universities dedicated to addressing environmental issues in the U.S.-Mexican border region through applied research, outreach, and regional capacity building.

SCERP Universities

Arizona State University
El Colegio de la Frontera Norte
Instituto Tecnológico de Ciudad Juárez
Instituto Tecnológico y de Estudios Superiores de Monterrey
New Mexico State University
San Diego State University
Universidad Autónoma de Baja California
Universidad Autónoma de Ciudad Juárez
University of Texas at El Paso
University of Utah

SCERP website: www.scerp.org

THE U.S.-MEXICAN BORDER ENVIRONMENT

Binational Water Management Planning

Edited by Suzanne Michel

San Diego State University Press

Published by
San Diego State University Press
5500 Campanile Drive
San Diego, CA 92182-4403
<http://sdsupress.sdsu.edu>

Cover photos by U.S. Army Corps of Engineers
and National Oceanic and Atmospheric Administration

©2003 San Diego State University Press
All rights reserved.
Printed in the United States of America

ISBN 0-925613-40-1

Previously published volumes in the SCERP Monograph Series,
The U.S.-Mexican Border Environment

- No. 1 A Road Map to a Sustainable 2020
- No. 2 Water Issues Along the U.S.-Mexican Border
- No. 3 Economy and Environment for a Sustainable Border Region
- No. 4 U.S.-Mexican Border Communities in the NAFTA Era
- No. 5 Overcoming Vulnerability: The Southwest Center for Environmental
Research and Policy's Research Program (1990-2002) and Future Agenda
- No. 6 Air Quality Issues along the U.S.-Mexican Border
- No. 7 Trade, Energy, and the Environment: Challenges
and Opportunities for the Border Region, Now and in 2020

About this volume:

All times are local

All monetary figures are US\$ unless otherwise specified

The views of the authors contained herein are nor necessarily the views of SCERP, the EPA, SEMARNAT, or other Border Institute sponsors. They are presented in the interest of providing a wide range of policy recommendations to prompt discussion and action in the U.S.-Mexican border region.

Contents

Foreword

Preface and Acknowledgements

Abbreviations

Executive Summary. Opportunities, Costs, Benefits, and Unintended Consequences: Secure and Sustainable Water by 2020

Resumen Ejecutivo. Oportunidades, Costos, Beneficios y Consecuencias No Intencionales: Agua Segura y Sostenible para el Año 2020

D. Rick Van Schoik 1

I. Managing Border Water to the Year 2020: The Challenge of Sustainable Development

El Manejo del Agua en el Área Fronteriza Hasta el Año 2020: El Reto del Desarrollo Sustentable

Stephen P. Mumme and Ismael Aguilar Barajas 51

II. Interdependent Border Water Supply Issues: The Imperial and Mexicali Valleys

Aspectos de la Interdependencia en el Abasto de Agua en la Frontera: Los Valles de Imperial y Mexicali

Jesús Román Calleros and Jorge Ramírez Hernández 95

III. Meeting the Water Needs of the Border Region: A Growing Challenge for the United States and Mexico

Enfrentando las Necesidades de Agua de la Región Fronteriza: Un Reto Creciente para los Estados Unidos y México

William A. Nitze 145

IV. The Challenge of Balancing Water Supply and Demand in Paso del Norte

El Reto de Equilibrar el Abastecimiento y la Demanda de Agua en el Paso del Norte

Charles Turner, Edwin Hamlyn, and Oscar Ibáñez Hernández 185

V. Water Without Borders: A Look at Water Sharing in the San Diego-Tijuana Region <i>Agua Sin Fronteras: Una Mirada a la Repartición del Agua en la Región San Diego-Tijuana</i> Barbara R. Bradley and Emilio de la Fuente	247
VI. Comparative Analysis of Transborder Water Management Strategies: Case Studies on the U.S.-Mexican Border <i>Análisis Comparativo de Estrategias de la Gestión de Aguas Fronterizas: Estudio de Casos en la Frontera México-Estados Unidos</i> Christopher Brown, José Luis Castro Ruiz, Nancy Lowery, and Richard Wright	279
VII. Evolving Political Institutions: A New Water Policy and its Impact on the Border Region <i>Desarrollando Instituciones Políticas: Una Nueva Política del Agua y su Impacto en la Región Fronteriza</i> Daniel McCool	363
<i>Border Institute IV Participants</i> <i>Index</i>	

Foreword

I was most honored to have been asked to participate in the opening session of Border Institute IV, and was deeply appreciative to my friends at the Southwest Center for Environmental Research and Policy for the kind invitation. When I attended Border Institute II in 2000, I was able to sense the enormous importance of this type of gathering. I remember being especially impressed by the presentations made by several participants on the issues relating to water and its many uses, among others.

My concerns about the border economy and other aspects of development in this region of North America shared by Mexico and the United States goes back more than 20 years. Then I was involved in the early stages of studies that led to the creation of COLEF, the Colegio de la Frontera Norte, as a multidisciplinary center in the social sciences for research and post-graduate teaching. I must confess that I was a little surprised at the recommendation made by the original working group to establish the center in Tijuana, but I soon realized the significance of the proximity of that city to San Diego and other parts of the state of California, and to the many research and university institutions in that area. I am pleased that COLEF has been able to expand its activities along the Mexican side of the border and across to research centers and universities in the other border states of the United States.

At one of the meetings I attended in Colorado, yet another state also related to the border region through its waterways, I argued that at least in environmental matters and by implication in matters concerning water, the notion of the border should not be limited to the 100 kilometers on each side that appears on maps drafted as a result of the La Paz Agreement in the early 1980s. It should go beyond to areas on both sides that relate directly to conditions along the border areas, outside of those artificial limits. I noted that both Monterrey and Corpus Christi are beyond the 100 kilometer “limit.”

My own interest in the broader border has led me to focus on a much bigger, encompassing view of the future: the need to promote—in all its different aspects through more intensive cooperation and coordination among institutions, government agencies, and

civil society organizations—a process of sustainable development. By sustainable development I mean not only environmental improvement, but an expanded definition implicit in the original concept put forth in the Brundtland Report—the gradual creation of better conditions of social equity for ever-larger portions of the population and labor force, institutional development to help induce such improvements and conditions, and greater participation of civil society in the whole process under increasingly democratic trends. I am aware that in spite of the lofty declarations on the subject at the United Nations Conference on Environment and Development held at Rio de Janeiro in 1992, and the deluge of statements and further declarations made throughout the world since those days, very little has been achieved, even in narrowly defined environmental conditions. Reports by United Nations agencies and many national and regional reports, as well as the watchdog activities of non-governmental agencies, academic centers, and the media, are constant reminders of the lack of commitment to environmental improvements, let alone to the beginnings of a process of sustainable development. Energy savings, and in particular the limitation of carbon emissions that contribute to global warming, have not gone far enough. Nevertheless, if the future of the human species—and not only the endangered animal and plant species—is to mean anything, all efforts must move decisively and simultaneously in the direction of sustainable development.

The Mexican border region is still lacking in the kind of commitment I have in mind, involving all of the components of the local societies, be they governmental, household, or business activities. Water is evidently a resource that has become less abundant and more expensive to make available to different types of consumers, and I hope Border Institute IV will enhance the understanding and importance of a proper social and environmental valuation of water in all its qualities and forms of sourcing and delivery. I also hope it is not to be taken as an isolated issue but one closely related to other resources and environmental problems. Moreover, it is my expectation that these issues may become more closely interrelated across the many points of contact on the U.S.-Mexican border.

I believe there is a need for a long-term study of the gradual implementation of sustainable development policies on both sides of the border, taking into account, of course, all the current issues already identified, including water, energy, and waste disposal. I don't share the view, held by some scholars in both Mexico and the

United States, that we have a “seamless border,” but I think that the basic issues have to be approached through closer cooperation on both sides and a long-term evaluation of benefits for the great border region as a whole.

I am particularly glad to note from a first look at some of the papers presented to this Border Institute IV, that in matters of water policy, a number of important ideas are being put forth, for instance a move from water management as such to river ecosystems management involving a participatory process. Past practices will have to be replaced by innovative management arrangements in which changes will be required on both sides of the border. This should become one of the leading components of a growing and irreversible sustainable development process. As one of the authors says clearly: “Water management in many ways exemplifies the challenge of sustainable development.” Thus, water may lead the way, but I believe it is not enough to lead with one resource issue if other resources and sectors fail to follow.

Victor L. Urquidi, former president El Colegio de México
Rio Rico, Arizona, May 6, 2002

Me honra mucho el que se me haya propuesto participar en la sesión de bienvenida de este IV Instituto Fronterizo, y agradezco profundamente a mis amigos del Centro de Investigación y Política Ambiental del Suroeste la amable invitación que me extendieron. Cuando asistí hace dos años al II Instituto Fronterizo en 2000, me percaté de la enorme importancia de este género de reuniones. Recuerdo que me llamaron mucho la atención, entre otras, las ponencias de varios participantes acerca del agua y sus múltiples usos.

Llevo ya más de veinte años interesado en la economía de la región de la frontera y en otros aspectos del desarrollo de estos territorios compartidos por México y Estados Unidos, desde la época en que me tocó participar en estudios preliminares que condujeron a la creación del COLEF, El Colegio de la Frontera Norte, como centro multidisciplinario de las ciencias sociales en materia de investigación y docencia de posgrado. Cuando el grupo de trabajo original propuso que dicho instituto se estableciera en Tijuana, quedé un poco perplejo, pero no tardé en darme cuenta de la significación que

tenía la proximidad a San Diego y a otras partes del estado de California, así como a las muchas instituciones universitarias y de investigación en esa zona. Es satisfactorio comprobar cómo el COLEF ha extendido sus actividades a lo largo de la parte mexicana de la frontera y en contacto además con centros y universidades en los demás estados limítrofes de la Unión Americana.

En una de las reuniones a las que asistí en otro estado de la Unión Americana, Colorado, sostuve que al menos en materia ambiental, y por ende en asuntos referentes al agua, la zona de la frontera no debiera limitarse a los 100 kilómetros de cada lado que aparece en los mapas como resultado del Acuerdo de La Paz de los años ochenta, sino que sería necesario ir más allá de esos límites artificiales en asuntos que se refirieran directamente a las condiciones imperantes en la zona de la frontera. Advertí que Monterrey y Corpus Christi eran ciudades situadas fuera del límite de los 100 kilómetros.

Mi propio interés en los temas de una zona más amplia de frontera me llevaron a considerar una visión más extendida del futuro: la necesidad de promover, en todos sus variados aspectos—por medio de una cooperación y coordinación intensos entre instituciones, dependencias oficiales y organizaciones de la sociedad civil—un proceso de desarrollo sustentable. Por desarrollo sustentable entiendo no sólo el mejoramiento ambiental sino, adoptando una definición ampliada que está implícita en el concepto original propuesto en el Informe Brundtland, la creación gradual de mejores condiciones de equidad social para proporciones cada vez más amplias de la población y de la fuerza de trabajo, con el desarrollo institucional necesario para inducir tales mejoras y tales condiciones, y la participación creciente de la sociedad civil en el proceso general con base en tendencias cada vez más democráticas. Sé bien que no obstante las elevadas declaraciones sobre la materia en la Conferencia de las Naciones Unidas sobre Medio Ambiente y Desarrollo efectuada en Río de Janeiro en 1992, y los torrentes de declaraciones y tomas de posiciones anunciados en todo el mundo desde esa época, es bien poco lo que se ha logrado, aun en las situaciones ambientales concretas que suelen definirse. Los informes de los organismos de las Naciones Unidas y muchos otros de carácter regional y nacional, así como las actividades de vigilancia de las organizaciones no gubernamentales, los centros académicos y los medios de comunicación, nos recuerdan a cada instante que ha habido poco compromiso por mejorar las condiciones ambientales, y mucho menos por emprender un proceso de desarrollo sustentable. A pesar de ello, si nos ha de

importar el futuro de la especie humana—y no sólo el de especies de la fauna y la flora—será necesario dirigir todos los esfuerzos posibles de manera decisiva y simultánea hacia el objetivo del desarrollo sustentable.

La zona mexicana de la frontera no ha adquirido aún el compromiso requerido al que me refiero, que abarque todos los elementos componentes de las sociedades locales, sean autoridades gubernamentales, los hogares o los sectores empresariales. El agua es a todas luces un recurso cada vez más escaso y más costoso si se ha de satisfacer la demanda que puedan ejercer los distintos tipos de consumidores, y espero que este IV Instituto Fronterizo sirva para lograr mayor comprensión y dar mayor importancia a la valoración social y ambiental adecuada del agua en todas sus calidades y formas de obtención y de entrega al consumidor. Espero además que el agua no se considere de manera aislada sino como asunto que deba relacionarse con otros recursos y problemas del ambiente. Más aún, esperaré yo que estos temas se interrelacionen cada vez más a través de los puntos de contacto en la frontera entre los Estados Unidos y México.

Considero que hace falta emprender un estudio a largo plazo de la aplicación gradual de políticas de desarrollo sustentable en ambos lados de la frontera, teniendo en cuenta, por supuesto, todos los temas ya identificados, entre ellos los del agua, la energía y la disposición de desechos. No comparto la idea que algunos académicos sostienen tanto en los Estados Unidos como en México, de que ya tenemos una frontera sin líneas divisorias; creo sin embargo que los problemas fundamentales deberán abordarse mediante mayor cooperación entre ambas partes y con una evaluación de los beneficios a largo plazo para la gran región de la frontera en su total dimensión.

Me complace en especial advertir al examinar algunos de los trabajos presentados en esta Conferencia que, en materia del agua, se entregan algunas ideas importantes. Por ejemplo, la de que hay que pasar de la administración del agua como tal a la administración de ecosistemas hídricos en que se tenga en cuenta un proceso de participación ciudadana. Las viejas prácticas habrán de reemplazarse por sistemas de administración innovadores, que requieran cambios en uno y otro lado de la frontera. Ello deberá convertirse en uno de los componentes principales de un proceso creciente e irreversible de desarrollo sustentable. Como lo afirma con claridad uno de los autores: “La administración del agua ejemplifica de muchas maneras

el desafío que plantea el desarrollo sustentable.” Así, el agua podrá mostrar el camino a seguir, pero a mi juicio no basta abrir brecha con un sólo recurso si los demás recursos y sectores no emprenden el mismo camino.

Victor L. Urquidi, ex presidente de El Colegio de México
6 de Mayo

Preface and Acknowledgements

This volume is the record and substance of Border Institute IV, “Binational Water Management Planning,” held in Rio Rico, Arizona, May 6-8, 2002. Since the first Border Institute in 1998, this annual event has established itself as a key venue for consideration of important border environmental issues. The two days of the workshop provide time for directed and wide-ranging discussion among a diverse group of researchers, practitioners, and border stakeholders. Not only are current issues dissected, but also considerable reflection occurs regarding future scenarios in the border region. This, in turn, enriches discussions about near-term policy options.

The border institutes are based on a series of commissioned papers produced by leading scholars and practitioners. These papers, which are sent out to participants prior to of the meetings, provide the informational base upon which the discussions are constructed. These essays form the core of this present volume. Additionally, an executive summary is included that captures key points of the panels and break-out sessions at Border Institute.

Many individuals contributed to the success of Border Institute IV and this volume. Rick Van Schoik, Managing Director of the Southwest Center for Environmental Research and Policy (SCERP), organized the meetings and identified the authors of the papers. He also drafted the first version of the executive summary. The expertise and diligence of the authors who prepared papers for the Border Institute is also acknowledged. The panelists and other participants, especially commissioners Arturo Herrera Solís of the Comisión Internacional de Límites y Aguas and Carlos Ramírez of the International Boundary and Water Commission, were important in setting the tone for the discussions. The facilitators and rapporteurs for the break-out sessions deserve special recognition for their labors, especially Jessica Swartz Amezcua, Christopher Brown, Kimberly Collins, Bob Currey, Denise Moreno Ducheny, Craig Forster, Erik Lee, Nancy Lowery, Suzanne Michel, David Rohy, Paul Rasmussen, Elsa Saxod, Alan Sweedler, and Erin Ward.

Many individuals participated in the production of this book. Amy Conner, SCERP’s managing editor of publications, copy-edited and coordinated the production of this volume. Graphic artist Jenny

The U.S.-Mexican Border Environment

Carlsson reproduced many of the figures used in the volume. Guillermo Torres Moye, of the Universidad Autónoma de Baja California, provided the Spanish-language translations of the Executive Summary and chapter abstracts. The Center for Strategic and International Studies kindly granted permission for the use of Bill Nitze's key article.

The many SCERP partners who assisted in co-sponsoring Border Institute IV are also acknowledged. The U.S. Environmental Protection Agency (EPA) Office of International Affairs, the Border Trade Alliance, and the U.S.-Mexico Chamber of Commerce all provided valuable assistance. Finally, SCERP wishes to recognize the efforts of its EPA Program Officer, Paul Rasmussen. Paul has done yeoman duty in coordinating EPA participation in the annual border institutes and has provided important suggestions for substantive improvements in the program contents. His enthusiasm has set the positive and collaborative tone that characterizes this annual endeavor.

Paul Ganster
SCERP Monograph Series Editor

Executive Summary

Opportunities, Costs, Benefits, and Unintended Consequences: Secure and Sustainable Water by 2020

D. Rick Van Schoik

NADBank	California North American Development Bank
NAFTA	North American Free Trade Agreement
NEPA	National Environmental Policy Act
NGO	non-governmental organization
ppm	parts per million
SANDAG	San Diego Association of Governments
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales
TDS	total dissolved solids
TEIA	Transboundary Environmental Impact Assessment
TRW	Tijuana River Watershed
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior

INTRODUCTION

Water has emerged as a first-tier issue between the United States and Mexico, a situation that has potentially serious implications for the whole of the bilateral relationship. Border Institute IV, held in Rio Rico, Arizona, from May 6–8, 2002, successfully initiated another level of binational dialogue on border water issues, a necessary first step toward long-term planning and regional sharing of water and water-related resources.

Water management in many ways exemplifies the challenge of sustainable development. As population explodes in the border region, the demand for clean water increases. This increased demand intensifies competition among water users, including the economy, communities, and the environment itself. The challenge is to balance the needs of natural resources—which represent the future—with current demands from the two nations' economies and citizens.

Because border rivers and aquifers are inherently binational and because the institutional capacity to address groundwater issues is lacking, the Institute participants generally agreed that the federal governments of the United States and Mexico should take more proactive roles in addressing border water issues. Even top-level decision makers recognize the need for long-term planning. As the *New York Times* reported on May 24, 2002: "President [Vicente] Fox says Mexico has spent decades squandering what it has 'without planning, without sense.'" Similarly, water use and distribution are less-than-optimally distributed in the United States because water policy is based more upon precedent than principle.

Some efforts by the federal governments to implement river basin planning have been successful at integrating various components of