IMPLEMENTATION OF RIVER BASIN MANAGEMENT IN MEXICO

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Abstract

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There has been a growing trend to manage natural resources on the basis of ecological boundaries; however, it has proven challenging to superimpose these boundaries over traditional political boundaries. The implementation of river basin-based water management in Mexico was evaluated in order to better understand its complex institutional and participatory dynamics. Results show that in spite of considerable reforms and innovative concepts incorporated into water management legislation, there has been difficulty institutionalizing these reforms and translating them into practice. The most notable obstacles include competition between institutions, the vision of water independent of the environment, resistance to integrated management, limitations on localized decision making and substantive participation, and impediments of political boundaries on management by ecological boundaries. In spite of these challenges, Mexico has made considerable progress in laying the foundations of environmental and water management policy.

Approved:

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<th>Description</th>
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<tr>
<td>CNA</td>
<td>Comisión Nacional del Agua (National Water Commission)</td>
</tr>
<tr>
<td>CONAFOR</td>
<td>Comisión Nacional Forestal (National Forest Commission)</td>
</tr>
<tr>
<td>CONANP</td>
<td>Comisión Nacional de Áreas Naturales Protegidas (National Commission for Protected Areas)</td>
</tr>
<tr>
<td>COTAS</td>
<td>Comités Tecnico de Aguas Subterráneas (Groundwater Technical Committees)</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>INE</td>
<td>Instituto Nacional de Ecología (National Institute of Ecology)</td>
</tr>
<tr>
<td>IIS</td>
<td>Instituto de Investigaciones Sociales (Institute for Social Research)</td>
</tr>
<tr>
<td>IMTA</td>
<td>Instituto Mexicano de Tecnología del Agua (Mexican Institute of Water Technology)</td>
</tr>
<tr>
<td>IWRM</td>
<td>Integrated Water Resources Management</td>
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<tr>
<td>LAN</td>
<td>Ley de Aguas Nacionales (National Water Law)</td>
</tr>
<tr>
<td>LGEEPA</td>
<td>Ley General del Equilibrio Ecológico y la Protección al Ambiente (General Law of Ecological Equilibrium and Environmental Protection)</td>
</tr>
<tr>
<td>NAAEC</td>
<td>North American Agreement on Environmental Cooperation</td>
</tr>
<tr>
<td>NAFTA</td>
<td>North American Free Trade Agreement</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-governmental organization</td>
</tr>
<tr>
<td>PAN</td>
<td>Partido Acción Nacional (National Action Party)</td>
</tr>
<tr>
<td>PND</td>
<td>Plan Nacional de Desarrollo (National Development Plan)</td>
</tr>
<tr>
<td>PNH</td>
<td>Programa Nacional Hidráulico (National Hydraulic Program)</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
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</tr>
<tr>
<td>PRI</td>
<td>Partido Revolucionario Institucional</td>
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<tr>
<td></td>
<td>Institutional Revolutionary Party</td>
</tr>
<tr>
<td>PROFEPA</td>
<td>Procuraduría Federal de Protección al Ambiente</td>
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<td></td>
<td>Federal Attorney General for Environmental Protection</td>
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<tr>
<td>PSAH</td>
<td>Pago por Servicios Ambientales Hidrológicos</td>
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<tr>
<td></td>
<td>Payment for Hydrological Environmental Services</td>
</tr>
<tr>
<td>PUMA</td>
<td>Programa Universitario de Medio Ambiente</td>
</tr>
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<td></td>
<td>University Program for the Environment</td>
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<td>RBO</td>
<td>River Basin Organisation</td>
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<td>RLAN</td>
<td>Reglamento de la Ley de Aguas Nacionales</td>
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<td></td>
<td>Regulations for the Law of National Water</td>
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<td>SACM</td>
<td>Sistema de Aguas de la Ciudad de México</td>
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<td></td>
<td>Mexico City Water System</td>
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<tr>
<td>SEMARNAP</td>
<td>Secretaría de Medio Ambiente, Recursos Naturales, y Pesca</td>
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<tr>
<td></td>
<td>Ministry of the Environment, Natural Resources, and Fisheries</td>
</tr>
<tr>
<td>SEMARNAT</td>
<td>Secretaría de Medio Ambiente y Recursos Naturales</td>
</tr>
<tr>
<td></td>
<td>Ministry of the Environment and Natural Resources</td>
</tr>
<tr>
<td>TVA</td>
<td>Tennessee Valley Authority</td>
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<tr>
<td>UNAM</td>
<td>Universidad Nacional Autónoma de México</td>
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<tr>
<td></td>
<td>National Autonomous University of Mexico</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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Chapter 1: Introduction

Natural resources and the ecosystems they are associated with are situated across a variety of administrative and political boundaries. There has been a growing trend to manage these resources on the basis of ecological boundaries rather than human-imposed boundaries. Water is no exception. The natural ecological management unit of water resources is considered to be a river basin (also referred to as watershed or catchment area). In spite of the ecological justification for this type of management, superimposing these ecological boundaries over pre-existing political boundaries has proven to be institutionally challenging.

The objective of this research is to evaluate the implementation of river basin-based water management in Mexico in order to better understand its complex institutional and participatory dynamics. This topic warrants further study in order to better understand why, in spite of wide acclaim for the management of water resources on the basis of watershed boundaries, the innovative efforts of Mexico to follow such an approach have proven challenging. In addition, this topic has broad relevance because the challenges of balancing management according to political versus ecological boundaries; the distribution of authorities between the center, regional, and local levels; and the role of participation in decision making are challenges that are being experienced by both developed and developing nations globally.
1.1 What is a River Basin?

A river basin can be defined as “the geographical area determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus (cf. art. II of the Helsinki rules)” (Mostert 2000). A conceptual model of a watershed is shown in Figure 1-1. As can be seen, the water originating in the headwaters of a stream eventually flow to a larger river, rain falling to the surface of the earth may eventually become part of the groundwater system, or overextraction of water in an upstream area may threaten the water supply of downstream users.

Figure 1-1. Conceptual Diagram of a Watershed

Source: Klamath 2004
At the same time water flows from one place to another, it also transports contaminant and sediment loads. Therefore fertilizers in runoff water could accumulate in a downstream lake, gasoline leaking from an underground tank could be present in water extracted from a downgradient well, or soils washed from a clear-cut hillside could be deposited into a streambed. In this way, water is part of a larger system that transects property boundaries, cities, states, and sometimes even countries. As a result, the concept of river basin management was proposed to deal with these complex systems.

1.2 What is River Basin Management?

Before coming up with a simple definition of river basin management, one must consider all of the diverse activities that contribute to the impacts to water as listed above. These could include agriculture, industry, dams, drinking water, transportation, and virtually every activity known to humans. Therefore managing water suddenly becomes an effort to manage virtually every activity relying on or affecting water. Add to that the importance of water for non-human living species as well, and one starts to see a daunting task. In simple terms, river basin management is “the management of water systems as part of the broader natural environment and in relation to their socio-economic environment” (Mostert 2000); however, the implementation of such a management system is far from simple.

In spite of the complexity, many in the water sector argue that water resources should be managed according to ecological boundaries thereby making river basins a logical management unit (Wester 2003). Although the concept of river basin management existed in the 1960’s and 1970’s primarily to promote a Tennessee Valley
Authority (TVA)-type economic development (Garcia 1999), it has gained renewed interest and even wider acceptance in the 1990’s as world opinion has shifted towards a more integrated form of water resource management (Tortajada 2001).

1.3 River Basin Management in Mexico

Mexico has adopted the concept of river basin management and is considered a leader for initiating such innovative water management techniques (Wester 2003). Of Latin American countries, only Brazil and Mexico have legally mandated river basin organizations (Tortajada 2001). Furthermore, Mexico’s participatory approach to water management based on river basin designations covering the entire surface area of the country was unprecedented in the world at the time it was initiated (Dourojeanni 2002).

Mexico laid out the initial legislative framework for river basin management as part of the 1992 National Water Law (LAN)\(^1\) which required that planning and managing the use of water was to be based on a watershed reference (Garduño and Felix 1999). In order to do this, the 1992 LAN formally called for the creation of regional River Basin Councils to work with the National Water Commission (CNA)\(^2\) and state water commissions (Tortajada 2001). The areas designated as River Basin Councils, as shown in Figure 1-2, cover the entire surface area of the country. The purpose of these River Basin Councils was to allow for local input into water management issues, represent user groups, promote conservation, and set priorities (NRC 1995). It was originally intended that Basin Councils be fully operational by 1999 (Garduño and Felix 1999). Although all Basin Councils except for one were formed by the year 2000 (CNA\(^2\)).

---

\(^1\) The LAN went into force on December 2, 1992.
\(^2\) The CNA, formed in 1989, is the institution currently responsible for water management and for carrying out requirements of the LAN and most other water-related legislation (Garduño and Felix 1999).
2006), they tended to exist more in name than in function. The Regulations for the Law of National Water (RLAN)³ were amended in 1997 to further define the envisioned structure of the River Basin Councils in order to facilitate their formation (Tortajada 2001).

Figure 1-2. River Basin Councils and CNA Administrative Regions

In addition to defining the structure of River Basin Councils in 1997, Mexico went a step further when it redefined its administrative regions based on hydrological boundaries rather than purely political boundaries. The CNA, outside of its federal

operations, initially consisted of regional and local agencies whose divisions were based on political boundaries. These included six regional agencies each encompassing four to six states and a local agency located in each state. The six regional agencies evolved into thirteen administrative regions (as identified by the red outlines on Figure 1-2) following the restructuring based on hydrological boundaries (Biswas 2003). Each administrative region consists of one to three River Basin Council designations (as identified by the black outlines on Figure 1-2). The administrative regions are further subdivided into 102 sub-regions based on geopolitical jurisdictions (Tortajada 1999) and contain 37 hydrologic regions and 314 watersheds for water management purposes (Biswas 2003). After the restructuring, local agencies were still maintained in each state for the purpose of water user claims (Garduño and Felix 1999). The management of these new administrative units has proven institutionally and politically challenging and has required extensive reforms in the water sector (Wester 2003).

Although 25 of the 26 planned River Basin Councils were in place by the year 2000, most were not yet operational (CNA 2006; Tortajada 2001). The latest information available from the CNA indicates that the last River Basin Council is still not in place. Numerous institutions below the River Basin Council, including River Basin Commissions, Committees, and Groundwater Technical Committees (COTAS) (Table 1-1), have come into existence as well. These correspond to sub-basins, micro-basins, and aquifers, respectively. In spite of the overall lack of organization, there are isolated examples of progress within some of the basins; however, there are still many complex factors affecting and impeding the implementation of river basin management. The situation is likely to become even more complex in the future since the most recent LAN
reforms of 2004 mandate the formation of new authoritative bodies called River Basin Agencies\(^4\).

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<tr>
<th>Territorial Level</th>
<th>Administrative Body</th>
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<td>Basin</td>
<td>Basin Council</td>
</tr>
<tr>
<td>Sub-basin</td>
<td>Basin Commission</td>
</tr>
<tr>
<td>Micro-basin</td>
<td>Basin Committee</td>
</tr>
<tr>
<td>Aquifers</td>
<td>COTAS</td>
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</tbody>
</table>

Source: CNA 2006

### 1.4 Document Overview

The remainder of this document has been divided in the following manner. Chapter 2 consists of a literature review, while the methodology of the investigation process is detailed in Chapter 3. Chapter 4 includes an analysis of results and discussion. Chapter 5 presents the conclusions of the study and includes suggestions for future research and implications.

\(^4\) “Organismos de Cuenca” in Spanish.
Chapter 2: Literature Review

The literature review included river basin management in general and more specifically experiences in Mexico. This section begins with a general discussion on river basin management and then goes into more detail on other factors identified with successful implementation of watershed management. These factors include decentralization, pre-existing institutions, public participation, legislative issues, and integrated management.

2.1 Integrated River Basin Management

The concepts of Integrated Water Resources Management (IWRM) and management based on watershed boundaries rather than political boundaries have become popular topics among international water institutions in recent years. Although IWRM was actually promoted by the United Nations as early as the 1950’s, it faded and gained renewed impetus in the 1990’s to deal with increasingly complex water management scenarios (Biswas 2004). According to the Global Water Partnership (2000, 22), IWRM is “a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.” Although impressive and widely accepted by the water management profession and international development agencies in general,
others argue that such a definition is too vague\textsuperscript{5} for effective implementation and translation into operational terms and measurement criteria (Biswas 2004). As a result, we are left somewhere between a concept that is innovative and one that is ill-defined and unable to be implemented.

The concept of watershed management can be equally as vague and difficult to implement. According to the Environmental Protection Agency (EPA), river basin management involves identifying “priority watershed problems and solutions, developing actions plans, and evaluating their effectiveness within the watershed” (EPA 2006). At the same time “watersheds transcend political, social, and economic boundaries. Therefore, it is important to involve all of the affected interests in designing and implementing goals for the watershed. Watershed teams may include representatives from all levels of government, public interest groups, industry, academic institutions, private landowners, concerned citizens and others” (EPA 2006). Although in theory this extensive participation is positive, it begins to open up questions about who prioritizes, who develops action plans, and who determines ultimate effectiveness and based on what criteria. Naturally questions of power and influence emerge, as well as questions of public versus private interests, domestic versus industrial or agricultural usage, federal versus local control, as well as the role of science in the policy process. If differing views on management, financing, and priorities can be constructively funneled into the policy and decision-making process, watershed management has the potential to be a very effective strategy. If not, such institutions are prone to being driven by the most powerful and influential stakeholders, and local participation becomes merely symbolic.

\textsuperscript{5} Biswas (2004), referring to what integration can entail, reveals a list of 35 sets of issues to be considered under this aspect of the definition alone, and this is claimed not to be comprehensive.
In addition, the concept of integrated watershed management is often confused with the concept of management of water by watershed (Dourojeanni 2004). The latter refers specifically to the management of water based on watershed boundaries, whereas the former implies the management of all resources within the watershed, among which water is included. If these concepts are not clearly defined or clearly utilized, complications arise among the role of public authorities.

In the case of Mexico, what are referred to as “watershed councils” have up until now only been responsible for water. Dourojeanni (2004) suggests that referring to them as “water councils” for the watershed would be more reflective of their responsibilities. He goes on to say that these distinctions are not trivial, and clarity is necessary when defining laws, allocating financial resources, and discerning what activities are carried out (and by whom) with respect to environmental management and water management.

According to Valencia (2004) the CNA, in theory, has envisioned the Integrated Management of Hydraulic Resources to include the following aspects:

- Integrated water use
- Interaction between surface and groundwater
- Availability of water in both quality and quantity
- Relation between water and other natural resources in the watershed
- Natural resources and their relation to social and economic development

Others, however, would argue that this has not been entirely the case in reality with respect to the relation between water and other natural resources. For example, Caire (2004) says that in Mexico the vision of water management is separate from that of environmental management. In addition, the process of issuing licenses and permits for the use of natural resources tends to be an administrative process rather than being based on the environmental reality. It could also be said that public policy in various
sectors have not considered the natural capacities of the environment either. Furthermore, the elaboration of public policy at the federal and state level has taken place fairly independently in individual sectors and often contrary to environmental programs. Often times such activities cancel out the effects of results achieved in environmental management efforts (Caire 2004).

Some efforts have also been inhibited by the nature of the concept of watershed management. There is not actually “a” project in watershed management, rather “a group” of projects. This makes organization and coordination even more critical and adds complication to financing. For example, although hydraulic projects are more expensive, it is easier to obtain loans and control investment for a single large project, whereas it is much more difficult to distribute and control funding for hundreds of small projects, and there is less certainty on the profitability of such investments (Dourojeanni 2004). In addition, these smaller projects are likely to be carried out by a large number of actors distributed over a wide geographical area.

2.2 Decentralization

After a long history of centralized decision making in water management in Mexico, the transition to a decentralized, participatory decision-making process and new type of organization has been difficult on the part of both the government and the users. Extensive reforms have been necessary to shift to water management based on watershed territories rather than the traditional political administrative units. Referring to these reforms, Vermillion and Merry (1998) state that the institutional and political challenges related to national policies can be more problematic than local level reforms (Wester 2003). This implies that even though the term decentralization inherently makes
one think of state or local institutions, such reforms cannot be successful without coordination from the center and willingness to transfer responsibilities.

Mexico has made steps towards the decentralization of functions in the water sector, although a true decentralization is not possible without changing the Constitution, as will be discussed in further detail in Section 4.2.1. For example, the CNA has decentralized functions and programs that had traditionally been executed from the center by transferring them to state and municipal governments and to organized users. Only those functions not involving acts of authority were transferred. For example, the supply of potable water and sewage services was passed on to municipalities as early as the 1980’s. In addition, operation of irrigation infrastructure has gradually been passed on to user associations (Dourojeanni 2002). This effort has been met with varying degrees of success, since some of the Irrigation Units lack technical expertise, organization, or interest by the users and have therefore been abandoned. The fact that much of the area under cultivation is unprofitable and that banks consider agriculture a high-risk sector does not help matters with regards to trying to finance such operations (Biswas 2003). As can be seen, it must be ensured prior to transferring such functions that the entity to be responsible is capable of performing such functions.

The CNA has also deconcentrated functions and tasks among thirteen administrative regions, a process referred to as regionalization. The functions are still federal jurisdiction, but this enables the CNA to administrate programs from the respective territories. State agencies still exist and fall hierarchically under their respective administrative region. Under this scheme, strategic planning, normative functions, and projects affecting multiple regions are still administered from the central CNA offices (Dourojeanni 2002).
River Basin Councils were created by the CNA, not necessarily as decentralized institutions, but with the idea of promoting the coordination of hydraulic programs and policies among the federal, state, and municipal levels of government (Dourojeanni 2002). In addition, they provide a forum for public participation in water management and planning.

Garduño and Felix (1999) discuss the capacity building efforts of the CNA. One of the four major features of the program is referred to as administrative decentralization. They state that it is for the purpose of “bringing the management of water services closer to users and allowing regional officials to make decisions and solve problems close to where they originate” (Garduño and Felix 1999, 151). The authors also mention that this is in accordance with the Public Administration Modernization Program. As a result, it appears that the efforts towards decentralization are somewhat independent of associated environmental benefits, and driven primarily from a public administration perspective.

2.3 Pre-existing Institutions

Another factor related to the effective implementation of river basin management is pre-existing institutions. The effect of such predecessor institutions could be either positive or negative. Some institutions could be logical predecessors to watershed management institutions, therefore serving to reinforce new institutions. On the other hand, pre-existing institutions with contrary views or with competing interests could serve as an impediment to effective implementation of river basin management.

The case of the Lerma-Chapala River Basin provides a good example of pre-existing institutions reinforcing new institutions. Extreme pressure on water resources
and degradation of water quality was already being experienced in the 1980’s. These conditions led to the involvement of various sectors and the signing of a coordination agreement between the federal government and the five state governments in 1989, well before River Basin Councils were mandated by law. The water management objectives set forth by this agreement were to be monitored by an Advisory Council. It was actually this Advisory Council that became the Lerma-Chapala River Basin Council in 1993 following the 1992 LAN which called for the creation of these councils (Wester 2003). The existence of this predecessor institution could help account for the rapidity of its formation as well as the relative success of the Lerma-Chapala River Basin Council when compared with other newly established Basin Councils.

On the other hand, it is possible that some pre-existing institutions, both formal and informal, can inhibit the effectiveness of river basin management. For example, the existence of river basin commissions actually goes back to the 1940’s in Mexico, when they were first established in some of the major basins to support large-scale regional development programs based on water resources (Tortajada 2001). Although these older-generation river basin commissions are not related to the current-day structure of river basin management institutions, they could impact the current perceptions of the role of these modern-day institutions due to the historical perspective of water as an unlimited resource for development. Although the modern councils do take economic considerations into account, in theory they are weighed against other competing interests (i.e., environmental and social). The older commissions did not question environmental or social impacts, were dependent on the federal authorities, and had no enforcement powers (Tortajada 2001). For this reason, there may be some uncertainty about the role that these modern institutions are to play in water management, especially since the newly planned watershed management institutions (known as River Basin
Agencies) called for in the recent reform of the LAN will actually be authoritative bodies. In addition, there may be existing institutions with competing or opposing interests which inhibit the effectiveness of river basin institutions.

Institutional resistance can also impact the effectiveness of watershed management if conditions and attitudes within pre-existing institutions are not in line with the changes envisioned. Chávez (2004), who was with the CNA for many years and responsible for the formation of the River Basin Councils, describes Mexico as “walking very slowly from the `government` to the `governability` of hydraulic resources and hydrologic basins” (176). Previously the government institutions, more specifically the federal government, was responsible for everything related to water management, but now Mexico is on a path of constructing management systems made up of various levels of government; citizen participation in decision making; decisions being made closer to the location where problems occur; accessibility to information; ordered, systematic, and participatory planning; and the consideration of multiple aspects of the environment. In spite of the progress being made, this transition has been difficult and characterized by Chávez as being filled with uncertainty and confusion. At the time of writing, he did not see the will or long-term vision required to achieve the necessary changes in institutions. In addition, there is persistent pressure by some to maintain the old centralized and authoritarian way of doing things and, as a result, inhibiting the new system of governability (Chávez 2004).

Even if institutions overcome these obstacles and become effective organizations, there are still risks in the ability to sustain this effectiveness in the long term. Referring to types of organizations in Latin America modeled after the Soil Conservation Service in the United States (i.e. that organize users, produce manuals, finance investigations, etc.), Dourojeanni (2004) states that in cases where they have
achieved a certain level of success, “they become prey to the covetousness of some that see in these networks the possibility to campaign for their political parties or that try to get rid of them because they consider them to favor the opposition parties” (143). In this case, the success of an organization can make it more vulnerable to attempts to undermine its effectiveness or to use it for purposes for which it was not intended.

### 2.4 Public participation

Another factor influencing the implementation of river basin management institutions as they were designed to function is the ability to participate. Is access to these institutions limited? Do those who have more political and financial power have greater access to institutions and weight in decision making? Are people exercising their right to participate? Are they participating in alternative institutions? Are stakeholder contributions substantive or symbolic? Are stakeholder representatives really representative?

Prior to the LAN, water administration took place at the federal level and with a decision-making structure described as being “vertical” and with little to no consideration of environmental factors or participation. The LGEEPA, passed in 1988, required Environmental Impact Assessments for hydraulic projects as well as the participation of society in the planning, execution, evaluation, and monitoring of environmental and natural resource policy. The LGEEPA served as an antecedent to the LAN, which called for the formation of River Basin Councils\(^6\) to serve the function of societal participation in water management and planning (Castelán 1999).

\(^6\) River Basin Councils are included in Article 13 of the LAN.
Mexico has, in fact, already implemented several reforms that increase citizen participation in the water sector including the Public Administration Modernization Program made compulsory by the Federal Government, the 1992 National Water Law (Garduño and Felix 1999) with further reforms in the 2004 LAN that are yet to be implemented, as well as the 2001-2006 National Water Plan (PNH)\(^7\) (Biswas 2003). In spite of the framework in place for such reforms, Wester (2003) notes that even in the Lerma-Chapala Basin, known to be one of the most advanced and functional units of all of the River Basin Councils in Mexico, management is still top-heavy and for the most part lacks substantial substantive stakeholder participation. He also cautions that if the participatory process and the selection of stakeholder representatives are not implemented carefully, power differentials could be further institutionalized rather than opening up access to already marginalized groups. There have, in fact, been 2,700 meetings organized through River Basin Councils between 1998 and 2003 (Valencia et al. 2004) which is a vital step in developing effective institutions; however, it does not ensure meaningful participation and significant contribution to integrated water management.

Although there has been extensive effort in the fields of both water management and international development to increase stakeholder participation, this participation often becomes more symbolic than substantive. According to Wester (2003), the consultation process often occurs without the reciprocal transfer of power to make decisions, thereby making participation merely token in nature. In addition, participation

\(^7\) The National Water Plan 2001-2006 (Programa Nacional Hidráulico 2001-2006 or PNH) is a plan that is produced under each administration to translate the aspects of the National Development Plan (Plan Nacional de Desarrollo or PND) into hydraulic policy. The main premises of the 2001-2006 PNH are that 1) the country’s development must take place within a sustainable framework, 2) water is a strategic resource of national security, 3) the basic unit for the administration of water is the hydrologic watershed, 4) the management of resources must be integrated, and 5) decisions must be made with the participation of users (Valencia et al. 2004). The PNH itself supposedly was prepared with input from users, local authorities, NGO’s, and citizens in general (CNA 2001).
is sometimes limited to users with recognized water rights, thereby further limiting opinions to be voiced from those that may be impacted by water management decisions. Currently only direct users of water are able to participate in the River Basin Councils. Citizens and organized civil society must be invited by the CNA in order to participate in basin-level discussions. Tortajada (2001) notes that the invitation by the CNA has been very selective based on recent experiences. Participation by societal organizations in the River Basin Councils is included in the 2004 LAN reforms; however, there are still many questionable aspects about the selection of representatives (Caire 2004).

The potential effectiveness of an institution that is based on public participation relies in part on the characteristics of the participants. According to Caire (2004), there are serious obstacles related to the culture in Mexico, most notably that it is a culture that does not value water and has a paternalistic vision of potable water as a public service. In addition, the development of an environmental culture has been slow, and knowledge on the consequences of environmental problems is limited. As a result, meaningful participation on the part of civil society is sometimes limited.

With competition for scarce resources and the lack of a constructive forum for participation, the number of conflicts between user sectors, communities, and various levels of government is growing. As resources become scarcer and more contaminated, these tensions are expected to increase and to be reflected in governability. As a result, water management institutions will be expected to serve the dual function of resolving conflicts. This makes the decentralization of decision making and cooperation among users, governments, and organized civil society groups even more important (Chávez 2004).

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8 Paternalistic is a common word in the Mexican context referring to something provided by the patrimony.
2.5 Other Factors

There are a wide variety of other factors that can contribute to effective implementation of river basin management. Some key elements noted by Dourojeanni (2004) for a river basin organization to effectively carry out its activities that have not yet been mentioned are described below. It is important to have a single recognized authority with sufficient legal power to carry out its responsibilities. In addition, the organization should consist of a hierarchy of management instruments that integrate national, regional, state, watershed, and local levels and are applied from both “the bottom up” and from the “top down.” Dourojeanni stresses the importance of the coordination of activities based on a strategic plan for the watershed and the ability to generate funding from within the watershed (i.e., self-financing). The formal acceptance and carrying out of agreements by local authorities is important, as well as the ability to allocate water use rights and ensure compliance with norms. He also mentions continuous process monitoring to ensure that desired results are obtained and that budget allocations are proportional to the results obtained. Finally, the acceptance of external and independent evaluations and informing the public of results provides transparency to the organization.

While all of these elements are important, their applicability depends somewhat on the nature of the entity created for watershed management. For example, River Basin Councils in Mexico were created to be participatory and advisory entities. Castelán (1999) points out that River Basin Councils do not have the authority to emit any official norms or take any legal actions. River Basin Councils are currently designed as bodies of coordination that can give recommendations to government bodies and users. On the other hand, River Basin Agencies are the new entities called for in the
2004 LAN reforms that will be deconcentrated agencies of the CNA and serve as watershed authorities. Correspondingly, some of the above-mentioned points would be more applicable to participative bodies, whereas others would be more applicable to authoritative bodies. In any case, they still serve as guidelines that can be modified according to the nature and objectives of the entity in question. River Basin Councils and the proposed River Basin Agencies are intended to work together; therefore the elements above could be a goal of both organizations jointly.

There is still, however, a lot of uncertainty about how this cooperation will work. The recent reforms to the LAN took place even before all of the River Basin Councils called for in the previous legislation have been consolidated. In addition, there still remains some uncertainty as to the number of hydrologic watersheds and their grouping into hydrologic regions, which will be essential for the reorganization of public administration called for under the new law. The structure and function of the future River Basin Agencies, the scope of the hydrologic plans for watersheds, the consolidation of existing River Basin Councils and their auxiliary organizations, the ease or difficulty of intervention by users and other social groups, the efficiency of intervention by local governments, and the general efficiency of water and watershed management depend on these definitions (Chávez 2004). As a result, there are still many unknowns about the instrumentation of the most recent LAN reforms.

Chávez (2004) states that there is a temptation to convert the current CNA Regional Administrations into the River Basin Agencies that are called for in the LAN reform and to convert the Regional Hydraulic Plans developed by CNA into the River Basin Hydrologic Plans, also called for in the reform. If this happens, Chávez views this as a lost opportunity in the advancement of integrated management of water and
watersheds. “Everything would change, but in reality everything would stay the same” (Chávez 2004, 179).

Dourojeanni (2004) confirms the importance of creating the legal mandate for watershed management entities (i.e. through the LAN), but that is only the first step. “They will not be converted into an operating system with legal and financial self-sufficiency if they cannot count on the continued support of the state” (147). This first step that Mexico has taken has served as a model for others, but the system is still very fragile and huge efforts are necessary to consolidate these management entities and processes (Dourojeanni 2004).
Chapter 3: Methodology

Using a qualitative methodology, this study examined the implementation of river basin-based water management in Mexico in order to better understand its complex institutional and participatory dynamics. As a starting point, criteria for effective management were identified in the literature on river basin management in Mexico. In addition, the extensive changes in the legislative and institutional framework in the area of water and the environment that have taken place since the early 90’s in Mexico are a critical part of the analysis to determine if they have created conditions conducive to the implementation of river basin management. Three main factors considered to be conducive to effective river basin management, as identified in the literature search, include decentralization, pre-existing institutions, and public participation.

The resulting research questions are as follows:

1. Do conditions of decentralization, pre-existing institutions, and public participation exist that favor the effective and inclusive implementation of river basin management?

2. What other political and institutional factors appear to be influencing effective implementation of river basin management?

3.1 Grounded Theory

Research for this investigation was carried out qualitatively according to the grounded theory method set forth in 1967 by Glaser and Strauss in their book *The Discovery of Grounded Theory* and further elaborated by Strauss and Corbin in 1998.
The theory was a reaction to criticism of qualitative research being only a preliminary stage to quantitative research. The methodology’s defining attributes include emphasis on discovery and theory development not tied to existing theoretical frameworks.

Due to the nature of the method, data collection occurs simultaneous to data analysis. This allows theory to be constructed from the data itself and for future data collection to be driven by the analysis of existing data and progressively emerging ideas. It is based on developing independent analyses rather than putting ideas into existing theoretical frameworks.

Verification under the grounded theory methodology occurs by using further observation to check emerging ideas and by systematically comparing observations. Grounded theory focuses not only on the process being studied but also on the process of the evaluation. It does not necessarily require a final interpretation, rather encourages new interpretations of the data or bringing new questions to it (Charmaz 1983).

The grounded theory methodology typically is used for studying complex social phenomena. Thus, it is an appropriate methodology for this study because the problem at hand is very complex and easy to oversimplify. The grounded theory allows the full complexity of the problem to emerge, rather than trying to group obstacles into broad categories. Furthermore, the topic involves institutional, social, environmental, and economic issues with deeply woven and historical connections. As a result, a qualitative method is most appropriate to study the dynamics of the situation.

### 3.2 Sources of Data

Data were obtained through personal interviews and review of institutional documents. The purpose of the interviews was to examine the relevance of topics
identified in the literature as well as to identify additional political and institutional issues of concern relevant to the implementation of watershed-based management. Interview and sampling methodology are described in further detail in the following subsections.

Since the functional aspects of various institutions were critical to the analysis, institutional documents were additional sources of data. These included documents on the organization and objectives of various institutions, as well as papers or publications produced by the respective institutions. Most government institutions related to the water sector in Mexico have extensive information and publications readily available on the internet.

Legislative aspects were also essential to the research, therefore applicable laws and legislative histories were reviewed. These included summaries of antecedents to laws (known in Mexico as “Exposición de Motivos”) explaining why a law was needed and the primary considerations in drafting the law. These documents were provided by a lawyer.

### 3.3 Development of Interview Guide

The interview guide, presented in Appendix A, was designed to cover a broad range of topics associated with the implementation of river-basin based water management in Mexico. Primary factors considered to be conducive to effective river basin management were identified based on the literature search as well as institutional documents. The interview guide contained both closed and open-ended questions in order to allow additional issues that were not previously identified from the literature to be included in the discussion as they arose.
In addition to the questions themselves, careful attention was placed on the order of the questions so that they flowed logically. The questions began at a more general level concerning the overall legal framework of water-related policies in Mexico, whereas the next series of questions focused on challenges specific to the Valley of Mexico. The remaining questions were placed in categories including Management/Coordination, Participation, Decision Making and Information, Water Rights, and Consumption. A final section included questions on Future Outcomes.

The interview questions underwent several iterations in order to make them more concise. In addition, the questions were modified to make them less leading. For example, in the original version the question sometimes pointed to the answer that one expected to hear rather than leaving the question unbiased and open to whatever occurs to the interviewee. For example, the original question may have read as follows: “Will limiting water rights in water-scarce areas cause an increase in clandestine use?” The revised question would read as follows: “What will be the effects of limiting water rights in water-scarce areas?” In this way, clandestine use is not immediately inferred; rather it allows the interviewee to think of an effect that they consider to be most important.

Many of the questions were followed by prompts that were given to the interviewee only if they did not have an immediate response or if they seemed unsure of the meaning of the question. For example in the question given above, prompts could include clandestine use, increased water prices, or relocation of industries.

Once the interview questions were finalized in English, a Spanish version was created for use in the actual interviews. It should be noted that the interview questions were developed as a guide only, and any deviations from the guide to discuss other relevant topics were welcomed. In addition, questions that did not seem relevant to the
position or area of expertise of an interviewee were intentionally omitted during the interview.

### 3.4 Theoretical Sampling

According to the grounded theory method, theoretical sampling was employed. This means that as categories emerge from the data, future sampling is determined such that it will strengthen the emerging theory and further define the properties of the various categories. In addition, it may also help to establish or define a relationship between distinct categories. In this way, one begins with a diverse sample; however, the sample emerges as the theory emerges.

Based on this methodology, initial interviewee selection was intended to represent a range of perspectives, expertise, and interests. The initial interviews were initiated at my request; however, subsequent interviews came about by recommendation from previous interviewees. For example, if there was a set of questions in an area in which an interviewee was less familiar, they would recommend someone that was more knowledgeable in that specific area. In this way, the sample was emergent in nature.

The interviewees consisted primarily of civil servants and members of academia. Among the interviewees in academia, various areas of specialization were included. In addition, they were able to present not only an academic perspective, but also a practical perspective since several of them were contracted by the government for their support in watershed projects. Selected interviewees were from (or were previously from) the following institutions:
3.5 Description of Interviews

Interviews were conducted between the months of August and November of 2005 and took place in the respective offices of interviewees. They ranged in length from 30 minutes to 2 hours. All interviews except one were conducted in Spanish. All but two interviews were recorded on tape with the prior consent of the interviewees and various sector representatives were to be included in the pool of interviewees; however, actual interviewees were primarily civil servants and members of academia. During the interview process, I realized that greater underlying issues at the federal level were influencing water management at the watershed level; therefore, it became obvious that these underlying themes should be the focus of the thesis rather than a specific river basin. For this reason, the sampling was focused on interviewees that were thought to be able to provide information most relevant to the topic at hand.
the assurance that the information obtained in the interview would be used solely for the purpose of this thesis.

Initial interviews were free flowing and primarily guided by the interests and experience of the interviewees rather than by the interview guide. Later interviews adhered more closely to the interview guide; however, at all times the discussion was free to diverge from the pre-established interview questions. In addition, interviewees were encouraged not to answer questions if they were outside of their area of experience. Furthermore, the set of interview questions was condensed in some cases in order to make it more applicable to the area of expertise of the interviewee and to utilize the allotted interview time more effectively.

Although the questions from the interview guide were specifically designed to avoid the questions leading into the answer, I felt that the generality of some of the questions was misinterpreted as a lack of existing knowledge about the topic on my part. I think this is due to the fact that many interviewees are more accustomed to very specific questions on very specific topics. As a result, I often needed to follow up the original question with more specific information, with a more targeted question, or with the prompts that had been written in advance. This may have resulted in my questions being more leading than I would have liked, but I felt it was necessary in order to proceed with the interview and to demonstrate that we could speak about the topic at a more advanced level.

In general, I felt that the interviewees were willing to speak very candidly about the situation of water management and institutions in Mexico. I found varying degrees of both optimism and pessimism about the existing situation and the path forward. In addition, I found an overall willingness among the interviewees to share both time and information.
3.6 Coding and Analysis of Results

The general methodology for coding and analysis of results described in this section is based on the procedure described by Kathy Charmaz in “The Grounded Theory Method: An Explication and Interpretation” (Charmaz 1983).

Upon completion of the interviews, transcripts were made of each interview dialogue. The transcripts were then coded according to conceptual categories in order to organize the data and to develop the analysis. It is important to note that the categories were developed upon review of the data, rather than creating categories first and forcing the data to fit within these categories. This is consistent with the nature of the grounded theory in that data is not forced into a preconceived theoretical framework. Once conceptual categories were identified, these categories were analyzed to determine how they fit together to make up a process. In this type of analysis, it was also important to keep in mind that what is not said is sometimes just as important as what is said.

Coding took place in several different phases. In the initial phase, coding took place under broad categories such as legal, institutional framework, decentralization/deconcentration, environment/water connection, decision making, integrated management (or lack thereof), information, divisions/boundaries, Federal District, and Mexico Valley, among others. During the initial phase of coding, categories emerged that were unanticipated at the outset of interviews, a phenomenon that is to be expected when conducting research according to the grounded theory methodology.

As a result of this initial coding that was performed in an ongoing manner throughout the interview process, it became clear that there are issues that need to be addressed at a federal and institutional level prior to evaluating a specific river basin.
council. Until these issues are resolved, it seems that the implementation of policies at a watershed level will continue to be impeded. As a result, it became obvious that the thesis should focus on themes such as the struggle for autonomy in water management, decentralization, water as part of the environment, and recent water management legislation. Rather than focusing the research on a specific watershed, examples are given from specific watersheds only as they support the broader objectives of the thesis.

In addition, the original focus was specifically on river basin councils; however, the interview process revealed the importance of other watershed-level institutions relevant to the implementation of river basin management. These include both existing institutions and institutions set forth by new laws, as they are both relevant to the function and understanding of river basin management in Mexico.

The next phase was a more focused coding. In this phase, data was coded according to a selected set of categories that were determined to be the most relevant and applicable after the initial phase of coding. The focused phase was more an analytical phase than merely an organizational phase. Coding according to succinct categories allowed each category to be fully developed and defined by looking at all the components making up that category. In addition, it allowed for the natural delineation of subcategories within a larger category. It was also in this phase that information obtained from the literature was incorporated into the analysis. The categories that emerged from the focused coding are those presented in the analysis of results in Chapter 4.
Chapter 4: Analysis of Results

In order to understand the implementation of water management in Mexico based on the river basin framework, it is important to understand its institutional embeddedness. Such origins have affected the ability to implement the extensive water and environmental legislation passed since the early 1990’s. Along with other factors, they have continued to present challenges in the development and the implementation of the recent reforms to the 2004 National Water Law. These reforms have the potential to reinforce the foundation for an innovative system of watershed management if they can be effectively integrated within the existing institutional conditions in Mexico.

4.1 Institutional Embeddedness Related to Water Management

4.1.1 Centralization

The strong centralization historically present in Mexico has manifested itself in past and present water management practices, particularly with regards to efforts to decentralize, as will be discussed later. As one interviewee described, "in Mexico there has always been a very strong centralization. All decisions are made here [in the center], all decisions are made by the president, made by the federal government, and the states and municipalities almost do not participate" (personal communication, Nov. 21, 2005).

The Mexican legal system has what is known as the Federal Pact which establishes the distribution of authorities between the federal government and the
states. Basically it says that any material that is not expressly granted to the federal government in the Constitution is material for the states (i.e., states only have the authority on matters not expressly granted to the federal government). Currently water resources are under the control of the federal government according to Article 27 of the Constitution. This article defines national waters, and it states that they can be used by concessions awarded by the federal government. This is particularly important to decentralization because it implies the following. “To be able to change so that material [related to water] is not federal but state, the Constitution would have to be changed. It will not happen with an agreement or a functional decentralization” (personal communication, Nov. 21, 2005). As a result, it is legally difficult to truly decentralize decision-making authority.

4.1.2 Struggle for an Autonomous Water Ministry

In addition to a long history of maintaining the authority for water at the federal level, there has also been a long history of trying to maintain authority for water within a single ministry. One interviewee who studies institutional organization said “what one needs to understand is that this process of the centralization of water management is not only argued against the states and the regions rather among the ministries, among the secretaries of state. That is to say, hydraulic engineers always wanted water to be managed by an autonomous ministry” (personal communication, Nov. 23, 2005). This phenomenon will help to explain many of the institutional obstacles being experienced relative to the implementation of watershed management in Mexico today.

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9 The Federal Pact is found in Article 124 of the Constitution.
To demonstrate the attempts to maintain water authority within a single ministry, it is helpful to look back at earlier times in Mexico. At one time water was managed under the National Irrigation Commission\(^{10}\), and later as urbanization increased it came to be the Ministry of Hydraulic Resources\(^{11}\). One interviewee considered this era to be the highest point (i.e. most centralized) with regards to centralization of water management. Later, however, power was again taken away when this Ministry was converted to a Sub-secretary of the Ministry of Agriculture and Water Resources\(^{12}\). As a result, water was again viewed from an agricultural and development perspective rather than being viewed autonomously (personal communication, Nov. 23, 2005).

By the late 1980’s, the CNA\(^{13}\) was formed which is the institution still responsible for water management today. It was initially placed under the Ministry of Agriculture and Water Resources, because at that time “anything hydraulic was closely related to rural agricultural interests.” Even though this connection had a lot of influence on water-related decisions, the CNA was subject to relative autonomy. In fact, when the CNA was created, the idea was actually to create an agency with its own technical identity in order to be able to make autonomous decisions. Soon thereafter “the need to manage water from an environmental perspective more than the interests of rural agriculture was recognized” in spite of the fact that the relationship with rural agriculture was stronger than that with the environment (personal communication, Aug. 4, 2005). As a result, the CNA was moved to the Ministry of the Environment, Natural Resources, and Fisheries (SEMARNAP) in 1994, although the CNA itself was more interested in autonomous

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\(^{10}\) The National Irrigation Commission replaced the Bureau of Water, Land, and Colonization in 1926 when water supply for agricultural needs was a growing concern.

\(^{11}\) The Ministry of Hydraulic Resources was formed in 1946 and was associated with a shift toward integrated development of water resources and the construction of multi-purpose dams.

\(^{12}\) The Ministry of Agriculture and Water Resources was formed in 1976 with a priority on increasing food production and hydraulic infrastructure in rural zones.

\(^{13}\) The CNA was formed in 1989 to provide hydraulic infrastructure for drinking water services, promote efficient use of water, and restore and improve water quality.
decision making than being associated with either the environment or agriculture. SEMARNAP was later converted to the Ministry of the Environment and Natural Resources (SEMARNAT) in 2000.

Referring to the early years of the formation of the CNA, one respondent commented that “with the National Water Commission they once again accomplished being a more or less autonomous agency that makes decisions on all aspects of water, but when the Secretary of the Environment came into existence, they once again felt competition because now the idea was to manage water as if it were one more resource related to the environment” (personal communication, Nov. 23, 2005), to manage water in an integrated manner.

4.1.3 Water and the Environment

The historical origins of integrated management are much more recent than other aspects of water management. When speaking of the connection between water and the environment, one interviewee said “the notion of the environment is recent. It did not exist. The prior notion up to this period is of hydraulic resources, development. There was not a vision of the environment, sustainable development” (personal communication, Nov. 23, 2005). In order to better understand the state of integrated management and this connection, or lack thereof, between water and environment, it is important to understand its historical origins.

Going back to the 1992 National Water Law, one interviewee stated that “now it is very evident that the subject of water and environmental services and the relationship between water and forests are environmental topics, but at that time it was not as evident that water was an environmental matter” (personal communication, Nov. 21,
When asked why water was finally considered to be an environmental matter, she mentioned the 1996 reform of the General Law of Ecological Equilibrium and Environmental Protection (LGEEPA) when criteria for the use of aquatic ecosystems, water criteria, and a linkage between the concepts of environmental use and the protection of soils were first seen.

The 1990`s brought a windfall of environmental legislation in Mexico, which one interviewee partially related to the signing of the North American Free Trade Agreement (NAFTA) in 1994. Along with the signing of NAFTA came the signing of the Environmental Side Agreement. As of the signing of the Environmental Side Agreement, SEMARNAT began to propose a lot of environmental legislation including the Regulations of the National Water Law, a nearly complete reform of the Forestry Law, and a modification to the aforementioned LGEEPA. Environmental legislation included the right to information as well as systems of social participation (personal communication, Nov. 21, 2005).

Change has also resulted from a 1999 reform to the Constitution. Article 25 of the Constitution describes how national development should occur. It previously stated that it had to be integral, and in 1999 the concept of sustainable was added. Now the Constitution says that national development must be “integral and sustainable.” The Planning Law, which tells how to implement public administration programs at a federal level, was also modified. As a result of the changes in the Planning Law, all agencies are required to consider economic, social, and environmental variables in their programs. They are also required to consider the environmental impacts of their policies by incorporating them into their planning, and in that way aligning themselves with

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14 Formally the North American Agreement on Environmental Cooperation (NAAEC).
15 Integral is understood to be "as a whole" although its exact definition relative to its usage in the Constitution has not been identified.
16 The Planning Law was originally published in 1983; the most recent reform was in 2003.
SEMARNAT. “It was not a question isolated to SEMARNAT. From there [the change in
the law], all of the programs of the entire federal government have to incorporate the
environmental variable” (personal communication, Nov. 21, 2005).

Shortly after the change to the Planning Law, the new administration of President
Fox entered. In their National Development Plan\textsuperscript{17}, they stated that “the forests and the
water are items of national security; they are strategic issues and issues of national
security” (personal communication, Nov. 21, 2005). This raises forests and water to an
even higher level and has implications for their management. For example, the army
may become involved if there are problems with clandestine logging activities. “As result
[of the National Development Plan], forestry and water issues which were previously
very isolated became linked together. There was a Forestry Law in 1992 that had no
connection to the Water Law, and now the Forestry Law\textsuperscript{18} and the Water Law are linked
together”. As can be seen, the legal foundation for the linkage between water and other
natural resources is in place; however, in practice this linkage is still limited, as will be
demonstrated in later sections.

4.2 Institutional Organization

4.2.1 What is Decentralization?

Decentralization is often spoken of generically to represent distinct administrative
conditions. There are various types of decentralization, each having different effects on
the implementation of watershed management. In addition, decentralization is often

\textsuperscript{17} The National Development Plan is a document produced by every incoming administration that presents
the country’s political, economic and social development policies.

\textsuperscript{18} The General Law on Sustainable Forestry Development was passed in 2003 and reformed in 2005.
used interchangeably with deconcentration, the latter of which seems much more prevalent in Mexico today. Furthermore, decentralization is used not only to refer to the distribution of powers among various levels of government but also to the distribution of powers among various sectors or ministries. Clarification on these distinct meanings of decentralization is essential in order to understand their implications in the context of watershed management.

Mestre (2004) characterizes the evolution of the process of decentralization as going from centralized to deconcentrated to partially decentralized to fully decentralized (Figure 4-1). It should be noted that this process may be reversed for centralization, and that the process does not always include all fours steps. For example, potable water went from being centralized to being fully decentralized, whereas other aspects of water management pass through some or all of the intermediate steps.

**Figure 4-1. Evolution of the Process of Decentralization/Centralization**

![Diagram showing evolution of decentralization/centralization](source: Modified from Mestre 2004)

Deconcentration is commonly referred to as decentralization; however, it is really a distinct form of administration with characteristics different from decentralization. In practical terms a lawyer differentiated these two administrative forms as follows: “to decentralize [either partially or fully] you would have to pass it [a certain power] to another level of government, to the state or the municipality, and deconcentration is only a way for the same federal authority to carry out its activities, but fragmented” (personal communication, Nov. 21, 2005). Passing a certain responsibility on to the state level

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19 According to Merriam-Webster (2006), the definition of deconcentrate is decentralize.
would be different than transferring this power to a SEMARNAT\textsuperscript{20} delegation located in that (or any) state, with the former being decentralization and the latter being deconcentration. For example, the delegation of SEMARNAT in Oaxaca is not a state agency; rather it is a federal level agency located in Oaxaca (personal communication, Nov. 21, 2005).

A lawyer proceeded to distinguish between the two types of decentralization, referring to one as the \textit{decentralization of functions} (comparable to Mestre’s partial decentralization) and the other as the \textit{decentralization of authority} (comparable to Mestre’s full decentralization). With regards to the decentralization of functions, the interviewee said that “it is only transferring it [the power] for a specific objective” (personal communication, Nov. 21, 2005). This is a way to push decision making towards the local, but in such a way that the center never loses control. In this case, certain functions can be transferred to a lower level of government, but these functions can be taken away at any time because the legal authority still remains with the higher level of government. This in itself results in instability if responsibilities are not clearly defined or can change at any time. The decentralization of authority, on the other hand, refers to the transfer of authority to a lower level of government in such a way that the higher level permanently gives up authority on the respective issue at hand.

Deconcentration could be considered an intermediate step to either full or partial decentralization that would allow a federal entity to function better because of more contact in the place where decisions are made. There is no real transfer of authority to another order of government; however, it is a more functional way of organization in the interim.

\textsuperscript{20} SEMARNAT has a delegation in each state that is responsible for the execution of the environmental programs in that state including managing the budget and having dialogue with the governor and state ministers. They are in charge of implementing the programs of SEMARNAT.
4.2.2 CNA-SEMARNAT Relationship

Understanding the relationship between SEMARNAT and the CNA is critical to understanding the dynamics of institutional issues and barriers related to water management, as well as the connection between water management and environmental management. In order to understand this relationship, it is important to define the organizational structure of SEMARNAT (Figure 4-2).

Figure 4-2. Organizational Structure of SEMARNAT

One interviewee (personal communication, Nov. 21, 2005) described the organization of entities under SEMARNAT from a public administration perspective. She explained that you can have many deconcentrated agencies under a ministry that engage in specific topics but are still part of the ministry and do not have their own legal entity. The deconcentrated agencies under SEMARNAT include the Federal Attorney General for Environmental Protection (PROFEPA)\textsuperscript{21}, INE, CNA, and the National Commission for Protected Areas (CONANP) (Figure 4-2). In addition, there are decentralized agencies that are part of the environmental sector but have their own legal entity. Decentralized agencies of SEMARNAT include the National Forestry

\textsuperscript{21} PROFEPA (Procuraduría Federal de Protección al Ambiente) is responsible for environmental enforcement, with the exclusion of water until the LAN reforms of 2004 are implemented.
Commission (CONAFOR) and the Mexican Institute of Water Technology (IMTA) (Figure 4-2). The decentralized agencies have their own budget, and their directors have more authority and autonomy, but this is not the case for CNA.

One interviewee (personal communication, Aug. 4, 2005) commented that the relationship between the CNA and SEMARNAT “is a rather unique relationship because the CNA is an agency administratively subordinated to SEMARNAT, but in practice the CNA has much more power than SEMARNAT.” Financially speaking, the new budget of SEMARNAT is 70% CNA. In addition, the director of the CNA is appointed directly by the President and not by the Secretary of SEMARNAT. For these reasons, the CNA seems more like a decentralized agency than a deconcentrated agency; whereas in reality it is not a legal entity independent of SEMARNAT. Another interviewee, also speaking of the relationship between CNA and SEMARNAT, said that the CNA cannot receive money directly from Congress so it is given to SEMARNAT, which then gives it to the CNA. In spite of this, CNA is “an entity politically much more powerful than SEMARNAT” (personal communication, Nov. 17, 2005). As can be seen, there is a very unique relationship between the CNA and SEMARNAT which will be demonstrated to manifest itself in various aspects of watershed management.

4.2.3 Administrative Units

Watershed management is typically associated with administrative units based on hydrological boundaries. In Mexico, the entire surface area of the country is divided into these administrative units. When asked if the CNA redefining its administrative regions from six based on political boundaries to thirteen based on hydrological boundaries (see Section 1.3) has improved water management or made it more
complicated, one interviewee responded as follows. “There is one thing that must be clarified. It does not forget management based on political boundaries. From an institutional point of view, the government cannot act more than within political boundaries” (personal communication, Nov. 17, 2005). The following describes how management occurs within river basin boundaries and between multiple river basins, as well as how management is affected by political boundaries.

Traditionally the federal government has had state administration, and this does not work very well in the context of watershed management. “You can not have state representations when you want integrated management,” but the federal government cannot impose natural boundaries over political boundaries in their administration. Watershed boundaries do not correspond with state boundaries, but what the federal government can do is divide watersheds by municipalities which are smaller units that are more easily assigned to a specific watershed. This works if the municipalities are small, but can be challenging in the north of the country where some municipalities are very large (personal communication, Nov. 17, 2005). Placing more importance on municipalities also seems consistent with the idea of decentralization of water management and participatory watershed management.

Implementation of an agreement within a watershed is made more challenging due to political boundaries. One interviewee gave the example of a sustainability agreement within the Lerma-Chapala River Basin that defines actions by state. “Each state carries out its own actions. Each state invests in its own state because that is another one of the obstacles of this type of agreement, that no state and no municipality can exert money or resources outside of its jurisdictional limit. The governors are the main ones responsible for this new agreement [without participation by users or society], because in the end they are the ones that make the allocations from their own budgets”
(personal communication, Aug. 4, 2005). As a result, it is difficult to work on a watershed basis and engage in watershed planning when funding is so closely linked to states.

In addition to financing issues, effective watershed planning and the ability to implement plans depends on the political will of the respective state governments. One interviewee, commenting on agreements or plans, said that “you can not be sure that all of the actors will always cooperate.” Generally plans and agreements are based on good faith and depend on the ability and finances of each party, especially when these plans involve different states. “Once the government changes, it [the plan or agreement] can change” (personal communication, Aug. 4, 2005). As an example, she explained that during the time that the head of government of the Federal District was still appointed\(^{22}\), a regional development plan was actually created. When the first elected government of the Federal District entered and was from an opposing party, they refused to follow it and were not willing to cooperate even though it previously had been approved. She clarified that “plans are instruments that are useful to institutionalize a concept and give it continuity, but it is not as reliable as a law. A plan is much weaker than a law or regulations” (personal communication, Aug. 4, 2005). This situation results in an institutional weakness if governments entering into an agreement do not have the confidence that the other parties will fulfill their obligations. In addition, it provides a disincentive for long-term planning.

The State of Mexico and the Federal District provide a good example of different visions among states within a single watershed. Speaking of the State of Mexico, one interviewee said that “they have a very clear long-term strategy about the implications of

\(^{22}\) Until 1997, the Federal District was a department of the federal government. For that reason, the head of government of the Federal District was appointed by the President as the Director of the Department of the Federal District rather than being directly elected.
the water-use decisions and the construction of infrastructure, because they are looking at the development of the State of Mexico in 20 years”, and they are really placing a lot of importance on water issues (personal communication, Nov. 17, 2005). He contrasted this to the Federal District where “you do not see an equivalent, because in the Federal District the priority was to construct road infrastructure and that is it. From an environmental perspective, there is not a clear policy and the use of water is a mute topic” (personal communication, Nov. 17, 2005). He speculated that it does not seem to be a priority as long as the engineering alternatives exist to conduct water. It is as if other policy options are not necessary. In this way, it can be seen that differences in priorities among states can make water-management and long-term planning difficult. As the options for water supply continue to decrease, cooperation in the implementation of watershed management becomes increasingly more important.

When trying to implement watershed management, timing also becomes an important issue with regards to state governments. State governors are elected for six year terms; however, states are on different election cycles meaning that the governors within the states of any given watershed could be elected at different times. This can result in difficulty in coming to agreements since there are differences in political agendas and timing depending on the phase of the term (Caire 2004).

Although municipal governments are not the focus of this research, it is important to keep in mind that if true decentralization is to occur and water management is to be effective, it will be necessary to have local-level institutions with a long-term vision, sufficient resources, and technical capabilities. Ideally these conditions would be met prior to decentralization rather than as a response to decentralization. One interviewee spoke of municipal level institutions and how they currently affect water management. Since the terms of the presidents of municipalities are only three years without possibility
of re-election, they have short-term interests. “The first year they begin to learn, they try. The second, they get what is happening more or less, they begin to plan. The third, they are already leaving, so how much can they really apply themselves to this type of long-term projects” (personal communication, Aug. 4, 2005). She added that normally when a municipal president is elected (although it could be an elected official at any level of government), he comes associated with certain things or people. As a result, he will vote for decisions according to these things or people, and therefore consensus building will not occur (personal communication, Aug. 4, 2005). This demonstrates how political boundaries at a municipal level can impede water management based on the watershed boundary.

Although management based on natural boundaries seems logical from an environmental perspective, it does not take into account that water can be extracted or transported from another watershed. One interviewee mentioned a new concept which is a “hydropolitan region” referring to the connection of watersheds by hydraulic infrastructure, as is the case for the Mexico Valley (Perló and Gonzalez 2006). The “hydropolitan region” includes areas from which water is provided to the city as well as areas to which waters leaving the city are drained” (personal communication, Nov. 23, 2005). This seems to be an appropriate scale for evaluation given the complexity of the hydrologic situation in the Mexico Valley; however, even the Mexico Valley alone has proven to be a very large administrative region that has been difficult to work with in the past. It is likely to be a recurring problem in the future since the people of the Mexico Valley rely on the importation of water to survive. As a result, it is an administrative region that needs to be dealt with in the future in spite of its complexity.

A common comment among interviewees was that institutions for coordination among multiple watersheds, as mentioned above, do not exist. For example, when
talking about the difficulties within the Mexico Valley River Basin and how it has not served as a forum for conflict resolution, one interviewee stated that “you only add to it that the hydrological functioning of this region is not only restricted to the Mexico Valley watershed but you are connected with the Tula watershed, the Lerma watershed, and the Cutzamala watershed. It is a system of four watersheds and sometimes the problems are in the other watersheds and there is not a manner of representation in this one [referring to the Mexico Valley]” (personal communication, Nov. 23, 2005). He mentioned that the CNA supposedly is to help the watersheds coordinate, but as far as he knew it was not working in the case of the Mexico Valley.

Another interviewee added that “the system is everything you’ve heard. It’s madness.” So in this scheme, it is not watershed management that you need rather management of multiple watersheds” (personal communication, Nov. 17, 2005). As a result, the discussion is expanded beyond political versus natural boundaries when manmade structures are used to connect water from various natural regions. Unless there is a forum that is capable of dealing with these exchanges between river basins, water management based on watersheds is unlikely to be able to sufficiently address problems in some of the most water-stressed areas of Mexico.

Another aspect that makes coordination more difficult is that different government entities are administered by different regions. One interviewee commented that it would be a good idea to have SEMARNAT and the CNA administered by the same regions. “It makes a lot more sense, because what you have right now is a mixed system. You have SEMARNAT working by states and the CNA working by watersheds, so that creates problems” (personal communication, Nov. 17, 2005). He mentioned that SEMARNAT tried to decentralize its administration by watersheds rather than by states, but it was not carried out. Another interviewee added that many instruments are a
function of the urban zone and not a function of either the watershed or the state (personal communication, Aug. 4, 2005).

4.3 2004 Reform of the National Water Law

4.3.1 Passing the 2004 Reform

The process of passing the 2004 revision of the LAN is illustrative of the challenges faced in developing unified and integrated water management policy, as well as the competition between ministries responsible for implementing these policies. As succinctly described by one respondent, the process was “a huge conflict” and a “very, very serious political conflict” (personal communication, Nov. 17, 2005). The conflict was between the CNA and SEMARNAT with each of them submitting drafts of the reform independently. One of the fundamental problems was that SEMARNAT thought the consideration of environmental factors was minimal in the original version presented by the CNA. Some environmental aspects were eventually included in the final version, but only after a complicated political process. As is often the case, water management in Mexico seems to be more about politics than about water, and this is a good example of such a situation.

One interviewee who was very involved in the reform process said that there were many separate initiatives to reform the law, thus originating the complications. “An initiative from the PRI [Institutional Revolutionary Party] was presented, an initiative from the PAN [National Action Party] was presented, SEMARNAT had its own initiative, and there was something quite chaotic which was that the National Water Commission also had its own initiative separate from that of SEMARNAT” (personal communication, Nov.
Given that the CNA is a deconcentrated agency of SEMARNAT and not a decentralized agency with its own legal entity (see Section 4.2.2 for organizational structure), this situation is especially noteworthy. In addition, the SEMARNAT project and the CNA project presented to Congress were contrary to each other and had opposing ideas.

The content of the proposals themselves is indicative of the nature of water management envisioned by each of the institutions. A lawyer described the differences between the proposals of SEMARNAT and the CNA as follows. “The SEMARNAT project was to make a law called the Law of Waters and Watersheds, and the CNA project was nothing more than to reform the National Water Law to decentralize [according to Section 4.2.2] the National Water Commission to give independence and autonomy to the National Water Commission” (personal communication, Nov. 21, 2005).

Both proposals agreed on either a decentralization or deconcentration but in very different ways.

The SEMARNAT proposal would have given much more autonomy to watershed-level institutions and moved decision making away from the federal level. “What SEMARNAT wanted was to get rid of the National Water Law and make a new watershed law that had a scheme in which the CNA was only left with the act of authority to regulate.” They envisioned there to continue to be a central authority, but that decentralized river basin agencies would be created that would not heed to anyone. These river basin agencies would have been decentralized authorities in each watershed (as opposed to deconcentrated authorities) and would have been the maximum authorities in each watershed. “They would have been the ones that would have looked at permits, made plans, defined the use of water in the watershed, charged

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23 The river basin agencies envisioned by SEMARNAT were different than the River Basin Agencies eventually included in the final version of the law.
taxes.” In addition, any money collected in a watershed (i.e., through taxes, permit fees, fines, etc.) would have been put back into the same watershed in which it was generated. This scheme proposed thirteen river basin agencies, in other words thirteen water authorities, along with the CNA as a central authoritative body. Under this proposal, the CNA would have been responsible for nothing more than planning and standards, and the remainder of the responsibilities would be completely decentralized towards the watersheds (personal communication, Nov. 21, 2005).

The proposal of the CNA was very different and reflected the historical vision of autonomy in water management. The proposal of the CNA consisted of making the CNA a decentralized agency of SEMARNAT (in terms of Section 4.2.2) meaning “that the CNA would not be dependent on any ministry, not on SEMARNAT nor any other, that it would have its own legal entity like CONAFOR [National Forest Commission]” (personal communication, Nov. 21, 2005). There would have been regional offices of the CNA to perform all activities of watershed management in a deconcentrated manner (see Section 4.2.1). The CNA was not going to transfer authority; rather the CNA was going to do nothing more than work in a deconcentrated manner.

In addition to the SEMARNAT and CNA initiatives, there were also initiatives from the PRI and the PAN, two of the three major political parties in Mexico, making the discussion process in Congress even more complicated. Finally, the Ministry of Government (Secretaría de Gobernación) had to serve as an intermediary between SEMARNAT and CNA to see which model would be used in the President’s proposal.

In the generation of this new proposal, some meetings with Congress involved only SEMARNAT, some only CNA, some involved both, and others did not involve either so it was “quite disorganized, not very transparent, and very authoritarian.” Congress

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24 The accepted proposal would become the proposal of the President.
eventually passed a law which would have reformed the National Water Law and decentralized the CNA. In spite of Congress` efforts to come up with a single proposal, the President vetoed the law\textsuperscript{25} passed by Congress which was described by one interviewee as “something that never happens.” This was, in fact, the first time an environmental law had ever been vetoed (personal communication, Nov. 21, 2005).

The President vetoed the law saying that it was unconstitutional for two reasons, with neither being directly related to the environment. One had to do with a technical aspect of the worker regimen from Article 123 of the Constitution. If the CNA were to decentralize, workers would be classified under a different labor regime, and the government cannot change their fiscal regime from one scheme to another. In addition, there was an invasion of municipal responsibilities, because the Constitution says that the municipalities are responsible for the potable water system. As can be seen, the law was not vetoed for any reason directly related to environmental aspects of water, rather more for administrative reasons. According to one lawyer, “it was vetoed for other very valid legal reasons, and I think the law had to be vetoed.” As a result, the decentralization of the CNA was not allowed and a revised National Water Law was published (personal communication, Nov. 21, 2005).

The process of passing the 2004 reform of the LAN illustrates the fragmented nature of institutions responsible for water management. In spite of the law being passed, its potential effectiveness immediately comes into question without the total support of the primary institution responsible for its implementation, in this case the CNA. In addition, the necessity of mediation in the drafting of the final law by the Government Ministry rather than taking place directly between SEMARNAT and CNA speaks of the ability for them to be able to communicate and negotiate independently.

\textsuperscript{25} The President has the right to veto a law of Congress one time.
4.3.2 What Reforms Are Expected from the Reform?

It remains to be seen how the provisions of the 2004 reform of the LAN will affect the implementation of water management based on watersheds, since these changes still only exist on paper. The law will not go into effect until the publication of its regulations, which will tell more precisely how the reform is to be implemented. Regulations include procedures and administrative details and provide more specifics on time periods and administrative actions (Biswas 2003). Since the regulations have not been published for the 2004 reform of the LAN, the changes discussed in this section have not yet been implemented, but in theory will be those that are implemented once the regulations are published.

Two of the main points of the 2004 reform of the LAN are 1) the restructuring of the CNA and 2) adding an environmental dimension to water. The new law calls for an institutional scheme in which the CNA is restructured to function in a more deconcentrated manner. In order to do this, the CNA is to exercise its authority in the integrated management of hydraulic resources through River Basin Agencies as set forth in Article 12 BIS of the LAN.

The newly planned River Basin Agencies (to be distinguished from River Basin Councils) will be extensions of federal authority acting in various geographic locations. As a result, they will function as deconcentrated agencies and not decentralized agencies (personal communication, Nov. 21, 2005). Supposedly the River Basin Councils and River Basin Agencies are to work together. To distinguish them, one interviewee concisely defined the difference as follows. “The River Basin Councils are bodies of social participation to make decisions in a watershed, but the River Basin Agencies are the new authorities of the watersheds. In one you are in an advisory body
of participation, and in the other it is an authoritative body." The relationship is envisioned such that “the River Basin Council will propose things to the River Basin Agency, […] will verify that the management of the River Basin Agency is transparent, will represent the interests of the users in the watershed, will be an advisory body of the River Basin Agency, but the authority will be the River Basin Agency” (personal communication, Nov. 21, 2005). She went on to say that they complement each other and that River Basin Councils, which are made up of a combination of government and civil society, will advise the River Basin Agencies in decision making. The organizational structure of institutions within the watershed framework as envisioned by the 2004 LAN reforms is shown in Figure 4-3.

**Figure 4-3. River Basin Institutional Organization Envisioned in 2004 LAN Reform**
Although the River Basin Agencies will serve as regional authorities, it is important to keep in mind that they are still the CNA and therefore cannot be considered decentralized rather only deconcentrated (personal communication, Nov. 21, 2005). This is different from the original SEMARNAT proposal in which river basin agencies were to be created but were to serve as autonomous authorities within each watershed, and therefore would have been truly decentralized.

In spite of the fact that the River Basin Agencies will not be truly decentralized, during the LAN reform “a lot of emphasis was placed on the regional in how the acts of authority and the decisions that have to be made are less and less in the center and [more and more] where the users are” (personal communication, Nov. 21, 2005). In theory, the River Basin Agencies will be able to define water use within the watershed, thereby allowing the priorities of water use to be established on a watershed-by-watershed basis depending on the social, economic, and environmental situation. The idea is to “let each watershed make its own decisions with more autonomy than before.” For example in Quintana Roo (Cancun) where there is a lot of tourism, they need a potable water system that functions perfectly. This is quite different than what the priorities would be in a primarily agricultural zone (personal communication, Nov. 21, 2005). Supposedly, the new law would allow each watershed to deal with these unique situations and establish their own priorities.

The second main point of the reform was to add an environmental dimension to water management and to include the valuation of environmental services. Historically in Mexico, water and the environment have been considered two separate sectors (see Section 4.1.3). The 2004 reforms to the LAN lay the framework for a management system that adopts characteristics of “integrated management of watersheds” (as
opposed to the concept of “management of water by watershed” as described in Section 2.1) by beginning to require the consideration of other environmental factors in water management.

The concept of environmental services is one of the many factors considered in integrated management. It is a relatively new concept referring, in the case of water, to the idea that a certain amount of water is necessary to maintain healthy ecosystems. Examples of environmental services include maintaining water resources, providing habitat for flora and fauna, or climate regulation. This implies that in water planning, allocations of water need to be set aside for environmental services. With regard to this concept, one researcher said that water allocated for environmental purposes is a fairly undeveloped concept in Mexico (personal communication 2, Aug. 4, 2005). Its consideration is, however, called for in the 2004 reform of the LAN.

One interviewee commented that “for the first time, principles of environmental policy were included [in the National Water Law].” She explained that “the National Water Commission WAS made up of engineers. It IS made up of engineers. There was not a concept of an environmental dimension in the management of water” (personal communication, Nov. 21, 2005). Now, by law, it will be required to have an environmental dimension to water management, and this in turn, will require a greater integration of the other SEMARNAT agencies with what CNA does.

Other changes called for in the reformed law include the integration of forests and water and the principle of “el agua paga el agua” (in English “the water pays for the water”). This is the principle that what is collected in a watershed is reinvested in the same watershed. The reform also included the provision that PROFEPA would cooperate with the CNA in inspection and surveillance, because previously water corresponded only to the CNA and was outside of PROFEPA’s jurisdiction (personal
communication, Nov. 21, 2005). This seems logical since the idea is to bring an environmental dimension to water management. Since PROFEPA is the arm of environmental enforcement, it would now have the authority to inspect water issues.

In addition, many aspects of the River Basin Councils that were previously included in the regulations were elevated to law in the 2004 reform of the LAN\textsuperscript{26}. These include details on the functions of the River Basin Council and its organizational structure. A lawyer commented that there were no fundamental changes in the River Basin Councils; however, it should be noted that there were some changes in their structure such as greater non-governmental organization (NGO) participation. Since some additional aspects of the River Basin Councils are now in the law, this also means that the pending regulations for the 2004 LAN will have to detail certain aspects of the River Basin Councils that previously were not specified. This is due to the fact that the purpose of the regulations is to provide details on how to implement the LAN (personal communication, Nov. 21, 2005).

4.3.3 Implementation Issues

It is difficult to evaluate aspects of implementation until the regulations are published detailing how the LAN reform is to be carried out and its implementation actually begins. Some preliminary comments can, however, be made. A lawyer confirmed that until the new regulations are published, the old regulations remain in force in spite of the passage of a new law. She did not seem surprised at the delay in the publication of the regulations, stating that the 2004 LAN was quite complicated.

\textsuperscript{26} The 1992 LAN included two short paragraphs on River Basin Councils, whereas the 2004 LAN contains five pages on River Basin Councils.
(personal communication, Nov. 21, 2005). This degree of complexity could also be an indicator of the difficulty in implementing the reforms.

In addition, the timing of institutional changes is critical. Speaking of the slowness of institutional and legal changes, specifically the publication of the regulations of the 2004 LAN, one interviewee commented that “the problem is that these changes, in some way, if they are not done quickly, the players in the arena begin to move. […] They know how to manipulate so if you don’t produce a quick decision, you are giving the players opportunities to negotiate.” She added that “they begin to wrestle for a position favorable to them more than being favorable in government or social terms.” This delay in action or implementation can serve to undermine the objectives. “I think there are windows of opportunity, and they can be important” (personal communication, Aug. 4, 2005). This helps to explain why some institutions, such as River Basin Councils, exist formally but their effectiveness has been considered questionable. In addition, when there are power struggles “the people who oppose something learn to defend themselves, to defend their spaces of power” (personal communication, Aug. 4, 2005). When processes move slowly, they are better able to defend these spaces and thereby defend their interests, which can negatively impact or undermine upcoming changes before they even have a chance to be implemented. It can not be known if this will be the case for the most recent LAN reforms; however, the delay in the publication of the regulations is certainly allowing a window of opportunity for those who wish to undermine it.

If it functions as intended, governance under the new law would be carried out by various sectors, and decision making would take place closer to where water resources and users are. In turn, this would allow for individual watersheds to deal more uniquely with their specific problems. One interviewee recalled discussion in Congress about the
inequality between rich watersheds and poor watersheds, “how the upstream users would have to be regulated more, because what they did had a big affect on the downstream users, so they had to look for a scheme where you could hear more specific questions, not regulate everything, even the general things, because the situation in all the country’s watersheds is not the same” (personal communication, Nov. 21, 2005).

Talking about the need to begin to push decision making to the place where things happen rather than taking place from the center, one interviewee gave the example of Environmental Impact Evaluations. They are often done from the desk of an official in the center who has never been to the location of the project that is being evaluated, but “really the decisions and the evaluations would have to be made by the people who live in the places where they happen” (personal communication, Nov. 21, 2005). The same is true for water management activities. The fact that some government entities want to maintain centralized decision making while others prefer more localized decision making causes problems not only between these entities, but also in both the adoption and implementation of consistent policies.

With regards to integrated management, it will be the CNA who will be primarily responsible for incorporating environmental aspects into watershed management once the reforms of the 2004 LAN are implemented. However, the concept of integrated management has been met with resistance by the CNA in the past. In addition, the CNA has only had the responsibility to manage water, and legally they have not been able to deal with land use issues. This has created problems in trying to manage watersheds in an integrated manner through River Basin Councils (personal communication, Nov. 17, 2005).

One interviewee commented on what currently happens when the Advisory Council proposes a project with integrated aspects of the environment. “The CNA will
put in everything required for aspects of water, but the other part will not go through because it is the environmental part. The CNA will not put in the studies on the environment because that does not concern them” (personal communication, Aug. 4, 2005). As a result, “the CNA and SEMARNAT are distant more than united [and] this creates tremendous problems the moment you try to instrument a River Basin Council scheme” (personal communication, Nov. 17, 2005). The legislative context will be different when the LAN reforms are implemented; however, the institutional memory will likely still remain.

Although integrated management is intended to promote the coordination of management activities, it could be associated with the opposite effect in Mexico due to the historic separation of the water sector from the environmental sector, which translates into competition between ministries even today. Although it seems logical to many that water is a natural resource associated with the environment, that perspective is not as commonplace in Mexico.

With respect to integrated management of natural resources, one interviewee commented that “what is related to water in Mexico is very seldom related to the environment.” She went on to say that what little relationship that exists is generally through NGO’s. Almost everything in Mexico is looked at by sector, and water and the environment are like two sectors. “Although administratively it is one, the environment and the CNA within the environment, in practice they are two big sectors, water and the environment and each one has its own separate structure” (personal communication, Aug. 4, 2005). The separate structure of these two institutions seems to manifest itself in the relationship between water management and the environment. Just as the CNA tends to act relatively autonomously, decisions related to watershed management also seem to take place independently of other aspects of the environment.
One interviewee said that if you ask people from the CNA, the majority will tell you that they do not think the CNA should be linked to the environmental sector. She went on to say that they think they should be linked to the Ministry of Agriculture before being linked to the SEMARNAT, although a connection is beginning to develop since they are now legally linked to SEMARNAT as one of its deconcentrated agencies (personal communication, Nov. 21, 2005). This was an opinion that was repeated over and over again throughout the interview process. Although I knew this was the case in the past, I was surprised to find out that this division between water and the environment, as well as between the corresponding institutions, is still so noticeable. It is this same competition to keep water decisions centralized and within a single autonomous sector that threatens to impede the implementation of watershed management through the mechanisms that have been set up by law, especially with respect to integrated management.

In order to promote the concept that a watershed is not only about water but about the many dynamics of the natural resources that are found within the watershed, Regional River Basin Coordinations [Coordinaciones Regionales de Cuenca] were created under the Fox administration. These Coordinations were deconcentrated agencies of SEMARNAT, and were created since River Basin Councils were only responsible for water issues. The Coordination of the Mexico Valley, created by Presidential Decree, existed but did not work. This would have joined the personnel from the state delegations of SEMARNAT into a regional group, meaning that people would have to be moved to wherever the Coordination was going to be. Many did not want this and used their position in unions to form obstacles against this type of organization. “Since it was a very slow process, it was aborted very easily” (personal communication, Aug. 4, 2005). As seen in other examples such as the proposals for the LAN reform, the
undermining of this effort seems to be fairly independent of environmental factors. Speaking again of the Regional River Basin Coordinations, the interviewee said “this was the setting to have integrated management from an environmental perspective, not just from a water perspective but from an environmental perspective, but it did not turn out well” (personal communication, Aug. 4, 2005). Hopefully lessons were learned from this past attempt at integrated management in order to lay a solid foundation for the integrated management called for in the 2004 LAN Reform.

In addition, there seem to be distinct visions as to what is meant by integrated management (see Section 2.1 for the wide array of interpretations of integrated management). One interviewee clarified two distinct visions. “One is to look at the integrality of one specific resource, nothing more, and the other is to look at the integrality of all natural resources among which is water, but it is not the only one. They are two different visions” (personal communication, Nov. 23, 2005). These visions are similar to what Dourojeanni (2004) refers to as the “integrated management of watersheds” and the “management of water by watershed.” The former refers to managing all resources within the watershed in an integrated manner and the latter is managing water based on the hydrological boundaries of the watershed (see Section 2.1). Unless each of these concepts is clearly distinguished and defined, there will be confusion among the role of public authorities as well as the implementation of legislation pertaining to integrated management.

The concept of environmental services is another concept that is relatively new and not very well defined in practical terms. Often it involves setting up schemes in which those who provide environmental services (i.e. upstream users) get paid by those who receive environmental services (i.e. downstream users) or in some cases receive government subsidies. One interviewee who coordinates with NGOs and government
institutions said that a program of payment for environmental services does exist for water and is being looked at for forestry and some other areas. He said that it currently follows more of a subsidy-based model, but his organization is looking at and recommending more of a market-based model (personal communication, Nov. 22, 2005). A program called Payment for Hydrological Environmental Services (Pago por Servicios Ambientales Hidrológicos, or PSAH) is actually a program of the National Forestry Commission and not the CNA (CONAFOR 2004). The concept of environmental services and how to implement and account for them is a concept that will need to be further developed in the near future, since it is included in the LAN reform of 2004. The reform requires environmental services to be considered in watershed management. This is another concept that will be quickly undermined if concrete methods for its consideration in practical terms are not developed.

Regarding the enforcement ability under the new law, some say that it will impose excessive sanctions, and others say that it will strengthen the government’s enforcement authority. A lawyer said that under the new law there are almost double the conducts that are considered to be infractions, and that now there are also conducts related to the environmental protection of water. “Now you have [the concept of] he who contaminates the water will be sanctioned.” Whether this will be true in practice remains to be seen. In addition, PROFEPA and the CNA will concur in the inspection and surveillance of water under a scheme that is not as fragmented as the current scheme, so this also should improve the enforcement ability. However, the details of how the CNA and PROFEPA will concurrently carry out their duties are still to be determined in the upcoming regulations (personal communication, Nov. 21, 2005). Regardless of the provisions of the new law with regards to sanctions and enforcement, a change will only be seen if the resources and will to achieve compliance also exist.
Opinions of the 2004 LAN reform are mixed. Based on communication with engineers from the CNA, one interviewee said they gave the impression that it was a serious mistake in two senses. “One is that it gives more power to the states, that all the concentration of federal power that has been achieved from 1930 to the present begins to fall apart. The other opinion is that the new River Basin Agencies are very large and will not be able to function. At the level of River Basin Council, it takes a lot of effort to make things work and this new division by River Basin Agencies is anti-functional” (personal communication, Nov. 23, 2005). He clarified that this is the opinion he has heard from people who are very familiar with the reform.

Contrarily, another interviewee who coordinates work with NGOs viewed the 2004 laws as positive, although he did not give specific reasons. He went on to say that now it is not a matter of passing new laws but of how to implement existing laws (personal communication, Nov. 22, 2005).

According to the Mexican Bar Association (2004), the 2004 LAN “expands the powers and responsibilities of the National Water Commission.” A lawyer that was interviewed said that she agrees that “it expands their power in the sense that they have more attributions.” She did not, however, think the scheme had changed fundamentally since the 1990’s stating that the CNA was the hydraulic authority and still is today. It issued water use permits and imposed sanctions, and it still does all these things now. There are more materials in the law now, so there are also more attributions to be regulated. “For example, before in the law, environmental services did not exist, the concept of valuation and the payment for environmental services did not exist. Now it does.” So it is obvious that you have to give this attribution or responsibility to some authority, in this case the CNA (personal communication, Nov. 21, 2005). The aforementioned attributions were not part of the original proposal submitted by the CNA,
but now are part of their expanded responsibilities. As a result, the extent to which they will be implemented and enforced remains to be seen.

The lawyer thought that whether the CNA will have expanded powers and responsibilities was subjective, because some are of the opinion that the CNA will have less power since it will be required, by law, to act through River Basin Agencies whose Advisory Council [Consejo Consultivo] will be made up of governors, users\textsuperscript{27}, and municipal presidents. This means “a decision-making scheme that is not as centralized, rather one that is much more oriented to the regional, the plural.” In addition, the Transparency Law (see Section 4.4) was published in 2003, and as a result there is much more weight placed on social participation and transparency in water-related decisions and the environment (personal communication, Nov. 21, 2005). Furthermore, there could be the perception of less power, because the CNA will be required to take other environmental factors into consideration rather than just water.

Overall, one interviewee was of the opinion that although there were changes, there were few fundamental changes, and the result would make things much more complicated. As an example, she said that “the central point was the decentralization in water management. It was on the table, but it was not decentralized” (personal communication, Nov. 21, 2005). Although a true decentralization did not occur, there will still be another layer of watershed management institutions created, which are the River Basin Agencies. They are unique in that they are an authoritative body; however, this results in the formation of new watershed institutions before the existing River Basin Councils have even become fully functional. These new bodies are not replacing the River Basin Councils rather supplementing their functions. In this way, the situation becomes more complicated without a significant change, in this case, in decentralization.

\textsuperscript{27} The user representative has a voice but not a vote.
Another contentious point was whether to include environmental considerations or keep water isolated from environmental policy. In the end, provisions for environmental considerations were included, but if they continue to be met with resistance by those responsible for implementation, little change is likely to be seen.

Even if significant changes are included in the law, in the words of one interviewee “changes in the law do not necessarily mean changes in the institutions” (personal communication, Nov. 21, 2005). This comment seemed particularly revealing and reflective of the current situation with regards to water management in Mexico. Even with progressive laws including innovative concepts of institutional organization, participation, and integrated management, these concepts do not necessarily get translated into practice. As a result, the changes in water management relative to the corresponding legislation, such as the 2004 LAN reform, may not be as extensive as one would expect.

### 4.3.4 Concluding Remarks

Many aspects of water management and the respective institutions responsible for implementation can be explained in terms of struggles for power. One interviewee stated that decisions and changes are evaluated with respect to “losing power or gaining power, losing space for decision making or gaining it” (personal communication, Nov. 23, 2005). Therefore the CNA fighting for its autonomy from both the states and ministries may be because the transfer of powers to the states or to other government ministries would be considered a loss of power by the CNA. In this and other cases, it seems that there is a propensity to make decisions based on power rather than on aspects of water management itself.
These struggles for power between the central and the decentralized with regards to both federal-state-local and among ministries create unstable conditions for effective watershed management. In addition, it is not conducive to integrated and consistent policy and planning. For example, regarding the vision of water management independent of other aspects of the environment, I asked another interviewee if this was a way for the CNA to maintain autonomy, or if they themselves [the CNA] actually wanted to look at other environmental aspects affecting water but without involvement of other entities. He responded that “all they want is autonomy, and in fact the subject of the environment or ecology has not really penetrated the National Water Commission. The division of water management continues to be big hydraulic projects or management in the sense of covering adequate tariffs, eliminating leaks, or efficient use or adequate commercial service, but as far as protection of aquifers, of watersheds, the CNA has not dealt with it directly. I don’t think so” (personal communication, Nov. 23, 2005). In this way (i.e. dealing with hydraulic projects, tariffs, etc.), they maintain their power as an institution.

With regards to environmental material, there is currently considerable effort being put forth to transfer responsibilities of the federal government to the states and the municipalities. Even if it is only functional in nature (see difference between decentralization of functions and decentralization of authority in Section 4.2.1), this gradual transfer seems to threaten the power of many highly centralized institutions, such as the CNA, that have put forth extensive efforts to consolidate power. As a result, the transfer is sometimes met with resistance. Mestre (2001) refers to the “centralization pendulum” speaking of the cycle of decentralization followed by attempts to recentralize if such activities affect the establishment and its interests.
Struggles for power can also be manifested through individuals, yet still have a significant impact, for the positive or the negative, on water management institutions. In the case of the Mexico Valley River Basin Council, the representatives that are sent are low level and do not have the power to make decisions. For this reason, there have not been a lot of results produced from this institution. In addition, powerful actors that have alternative interests have prohibited it from functioning as intended (personal communication, Jul. 25, 2005).

On the other hand, powerful actors in support of watershed management can have the opposite effect. For example, “the strategy of the State of Mexico for water is very interesting, because in positions such as directors of bodies [i.e. Advisory Councils and water management institutions] are ex-governors of the State of Mexico, political figures” (personal communication, Jul. 25, 2005). In this way, individuals can serve to empower or undermine institutions depending on the power and connections that they possess.

As Wester (2003) emphasizes, the consultation process must take place with the reciprocal transfer of power to make decisions to those involved in the process. Power differentials also play a critical role in access to and substantive participation in water management institutions, as will be seen in the following section.

4.4 Participation

Participation was identified in the literature as being important for the implementation of river basin management; however, the institutional context and competition seemed to be the most explanatory of the current situation in Mexico. There
are, however, some preliminary observations on participation based on the data that was obtained.

Increased citizen participation is actually one of the requirements of the Public Administration Modernization Program made compulsory by the Federal Government. This program requires administrative decentralization to bring water management closer to users, among other things (Garduño and Felix 1999). One channel for increased user participation is through River Basin Councils which, in addition to government representatives, include representatives from various user groups. Participation by users requires one to be a concession-holder of national waters and to have a title of direct exploitation of national waters that has been given to you by the CNA (personal communication, Nov. 23, 2005). A user of national waters according to these criteria has the right to vote to elect his/her respective user representative within the River Basin Council.

After a long history of centralized decision making, the transition to a participatory decision-making process has been difficult on the part of both the government and the users. Although public participation is generally seen in a positive light, it can also be the cause of problems. One interviewee concisely stated that "in any participative process, you have problems in defining the nature of representation. Who? How many? How? Why?" (personal communication, Nov. 17, 2005). These are exactly the kinds of issues that have been faced in Mexico in trying to implement participatory river basin management.

Although the regulations formally establish the structure of the River Basin Councils, there are still various lines of thought about who should participate. One interviewee elaborated that some say that the River Basin Councils should only be made up of users (i.e., someone who holds a water concession from the CNA). Others say
that in addition to users, River Basin Councils should also include government authorities to act as executors\(^\text{28}\) (personal communication, Aug. 4, 2005). Still others are of the opinion that the means of participation should be correlated to the government. This is based on the argument that since society elects their representatives (i.e., mayor, governor, representatives in Congress), then decision making by these representatives is, in fact, a form of participation.

Even under the current scheme which includes user representatives rather than only government representatives, the government still has considerable and in some cases over-representation. As an example, one interviewee mentioned that the problem within urban zones is that the government has the concession, so it is considered to be the user of national waters for representation purposes. He concluded that “the government of the Federal District represents me as a user, all of the millions of domestic users” (personal communication, Nov. 23, 2005). In this case, the government not only has its representation as a designated authority, but it also has representation as a user. It should be noted that in spite of representation by government authorities on the Governing Board of River Basin Councils, the Councils themselves are advisory bodies and not authoritative bodies; however, the 2004 LAN reforms do, in fact, call for authoritative bodies called River Basin Agencies.

Apart from users and government authorities, one interviewee says that “to speak of real social participation, NGOs would have to enter [the River Basin Council]. Those on the other side say, well, let the NGOs enter, but also make them fulfill their concession” (personal communication, Aug. 4, 2005). It is important to note that the 2004 changes to the National Water Law do call for greater NGO participation. It

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\(^{28}\) Currently River Basin Councils include both user and government representatives. User representatives are selected from various sectors, and government representatives include the governors of states making up that watershed as well as the General Director of the CNA (Wester 2003). The structure of River Basin Councils will change somewhat upon the formation of River Basin Agencies.
specifies that at least 50% of the representation on the council must consist of user representatives from the various user groups and of citizen organizations or non-governmental organizations (LAN 2004, Artículo 13 BIS).

Regarding the access to water management institutions and thereby input into the water management decision-making process, one interviewee said that “I think they have tried to open it [the participation] up, but it is not for every citizen. That does not make much sense either” (personal communication, Nov. 17, 2005). This is logical since participation should involve some level of knowledge or interest in the issue at hand, and uninformed participation can be less valuable than no participation in making informed and rational decisions. Added to this is the fact that, until recently, much information was not made accessible to the public.

Transparency and access to information has historically been quite limited in Mexico, although the Federal Law on Transparency and Access to Public Government Information29 (hereafter referred to as the Transparency Law) has resulted in considerable improvement in the access to information. One interviewee commented that previously there were enormous problems in getting information. He said that there has been “a tradition that the data should not be released because it is dangerous” (personal communication, Nov. 17, 2005).

A subsequent interviewee confirmed that the situation has improved greatly and that it is now much easier to obtain information, associating this improvement with the Transparency Law. Describing her experience she recalled, “I had asked for information for more than 20 years, and first they refused, and then they said they would give it to you, but they never said when, and they did not give it to you, even if you would ask for it

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officially on university letterhead and say why you wanted it, they didn’t give it to you” (personal communication 2, Nov. 23, 2005). She went on to say that things have changed. “I am surprised with the Transparency Law. You ask for the information and they give it to you.” She mentioned that the response to her most recent requests has been incredible, and that they have been given everything. As a result, she was of the opinion that the situation has changed” (personal communication 2, Nov. 23, 2005).

There are, however, exceptions in some situations such as the Mexico City Water System (Sistema de Aguas de la Ciudad de Mexico or SACM, previously the Dirección Federal de Construcción) which has classified their information as confidential for a period of ten years (Padgett 2005). Concerning this situation, one interviewee commented that the Government of the Federal District and the Mexico City Water System do not act as they should. “It wouldn’t be beneficial for them. They are extracting a lot of water and are discharging a lot of residual water” (personal communication 2, Nov. 23, 2005).

This presents two problems with respect to water management. First of all, information is considered to be dangerous rather than useful for improving the future situation; therefore potential political repercussions are dealt with by hiding data. Secondly, the ability to access information varies by time and place, and this makes watershed management and planning difficult.

Not surprisingly, Mexican society in general tends to be skeptical of government institutions. As a result, the implementation of watershed management through institutions such as River Basins Councils and its respective hierarchical sublevels is made more complicated. If the population has a lot of distrust, especially distrust of institutions, implementation of a type of management that relies on participation becomes very difficult (personal communication, Nov. 23, 2005).
Acceptance of institutions cannot be automatically assumed in Mexico. On the contrary, an institution is likely to be rejected at first until it proves its worth and its benefits. This also leads back to the question of power. Society in general is likely to think that somebody else will gain power through such an institution, and that they themselves will lose power. Another common reaction may be that even if participation were to take place, those with more power would gain the voice and therefore the decision-making ability.

The same interviewee as above commented that it is difficult because you need organized groups that are well consolidated, and even if you have this the CNA can still prevent you from entering the River Basin Council, if they have not given you a water concession (personal communication, Nov. 23, 2005). As a result, this tends to discourage the development of informal societal institutions and the optimism that they can participate constructively. Furthermore, when societal organization does take place relative to water issues, it is often in the form of a demonstration which would be viewed as a nuisance rather than an avenue of constructive participation.

Other interviewees were able to give examples that were slightly more optimistic. One interviewee spoke of a few places in Mexico where he had observed people who had decided to look at the River Basin Council as an opportunity to participate, rather than immediately rejecting it because of its relation to the government (personal communication, Nov. 22, 2005). However, as of now it seems to be a situation outside of the normal for people to see such institutions as an opportunity to express and resolve their problems. Another interviewee (personal communication, Jul. 25, 2005) made reference to Oaxaca in the south of Mexico, saying that there the authorities are closer to the people than in the Mexico Valley, for example. Civil society has tended to organize itself because they see the problems with their water resources and realize
they need to protect and improve them. This type of empowerment is what is necessary for participatory forms of water management, as exist on paper in Mexico, to function. The effectiveness of participatory watershed management depends not only on the watershed institutions themselves, but also the society's trust in them and their willingness and ability to participate constructively.

It does not appear that this trust has been established yet. Although the changes in watershed management organizations were intended to result in increased participation, it has really been quite limited in practice. Even if one is able to participate according to the official rules governing participation, one may be limited from constructive participation through the unwritten or unofficial rules. One interviewee illustrated this by saying that it is not as simple as having your well, “rather that it depends on your political capacity and your power.” For example, big agriculture or those who belong to the National Federation of Peasant Farmers (Confederación Nacional de Campesinos) are those that are generally represented. It is not the isolated user, rather those who win their spaces (personal communication, Nov. 23, 2005). It is not only having the right to participate, but also having the power and influence to affect the process.

As a result, it is important to evaluate not only the ability to participate, but also the effect of participation on decision making. One interviewee commented that some people are of the opinion that if technical decisions are made, than socializing the decision or discussing it too much is to be avoided (personal communication, Aug. 4, 2005). This would apparently imply a more complicated decision-making process. In addition, she commented that the decisions of the majority are not always the most accepted. For example, a decision that benefits many could be good, or it could also be
technically very costly or cause a lot of environmental damage. In cases like this, the
tendency could be to try to minimize participation in the decision-making process.

If institutional processes have a tendency to minimize participation, this also
reduces the ability of these institutions to serve as forums for conflict resolution. One
interviewee (personal communication 2, Aug. 4, 2005) who focuses on conflict resolution
is involved in the evaluation of information to determine the probability of water-related
incidences escalating into conflict. He has looked somewhat into River Basin Councils
but has found little evidence to demonstrate that they serve as a forum for conflict
resolution. Speaking more specifically of the Mexico Valley, one interviewee said that
when there is a conflict between the State of Mexico and the Federal District, the River
Basin Council does not work at all. It is not taken into account” (personal
communication, Nov. 23, 2005). He described it as an institutional creation, but that
neither the government nor society recognizes it. In other words, it is a forum that exists
but is not used. He contrasted this with the Lerma-Chapala where the River Basin
Council is recognized and used.

There seemed to be various levels of optimism about the role of participation in
water management in Mexico. One interviewee who is focused more on legal aspects
emphasized the importance of the ability to participate in the River Basin Councils. She
was of the opinion that it allows each watershed to define priorities for water use in the
watershed. “It is very important that the users are there determining the water priorities
they want in their region” (personal communication, Nov. 21, 2005). Another interviewee
who focuses on social aspects was less optimistic saying that according to his research,
River Basin Councils do not provide a forum to resolve social problems. He went on to
say that this is not only the case in the River Basin Councils, but also for the World
Water Forum held in Mexico City in March of 2006. The CNA and its organizers had the
idea that it would be a participatory event, and the plan was to present local experiences; however, the interviewee said that access was not easy and that the actors in the social sector in Mexico felt somewhat excluded (personal communication, Nov. 23, 2005). This seemed ironic since the Forum was entitled “Local Actions for a Global Challenge”.

The resistance to participation could be associated with the historical lack of such participation in the water sector in Mexico. “It is an opposing inertia. It is not like we have 50 years managing water in a participatory manner.” He refers to the long history of managing water from the center and that “it has a way of defending its monopoly.” Referring to the changes he says “we barely have ten years in which the society and various actors are trying to intervene and trying to express their opinion and trying to participate, but it is not easy” (personal communication, Nov. 23, 2005).
Institutional resistance and embeddedness continue to affect the ability to implement water management in Mexico in the context of a river basin framework. This includes the strong centralization and the control of water by the federal government, the struggle for an autonomous water ministry, and the historical disconnect between water and the environment. These aspects lead to challenges in decentralization, resistance to integrated management of natural resources, and competition between water management and environmental management institutions.

Although true decentralization cannot occur without changing the Constitution, efforts have been made at deconcentration as an interim step to decentralization. This allows decision making to take place closer to where water users and resources are. Deconcentration is different than decentralization in that it is still a federal agency making decisions but at a regional level. These terms are often not very clearly distinguished, although the difference can have important policy implications. In addition, decentralization should be carried out with prior consideration of whether lower levels of government have the capacity to carry out the responsibilities to be transferred, and whether such decentralization compromises efficient implementation.

The progressive legislation calling for integrated management would indicate that it is a widely accepted concept; however, upon deeper investigation there is still significant resistance to managing water as an integrated part of broader environmental management. The extent to which water is still considered to be separate from the environment was largely underestimated prior to the study. This resistance not only results in challenges for watershed management, but also competition between the
regulatory agencies pertaining to the environment (SEMARNAT) and water resources (CNA).

The CNA and its predecessor water authorities have a history of struggling for autonomy and have considered water to be a sector separate from the environment; therefore water has not been viewed or managed as a component of the environment. Although it is currently a dependent agency of SEMARNAT, the uncertainty of this balance of power was very evident in the process of the reform of the 2004 National Water Law when both the CNA and SEMARNAT submitted independent proposals. Both had very different ideas about organizational structure, decentralization, and the consideration of environmental factors in the management of water. In the end, integrated resource management was called for in the reform; however, effective implementation of such a concept is limited if the implementing agency and its personnel do not have a vision of integrated management and planning.

Overall, the LAN reform of 2004 includes aspects that, in theory, can be very advantageous to effective watershed-based management. Their success will not be known until the regulations further define how they are to be implemented; however, the slowness of the process allows for changes to be undermined by powerful actors before they even go into effect. One of the most significant aspects is the formation of new watershed-based management institutions (River Basin Agencies) that will serve as authorities and not only as advisory bodies, as is the case for River Basin Councils. At the same time that this could put more teeth into watershed management, it also results in another layer of organization even before the already-existing River Basin Councils have become fully functional.

Another strong point of the reforms is that they will give watersheds greater ability to establish their water use priorities on a watershed-by-watershed basis. In
addition, the money that is collected from within a watershed is to be reinvested within the same watershed. These concepts have the potential to result in much more effective water management; however, unless the institutions responsible for carrying out these activities are firmly in place and operating in a transparent manner, it is unlikely that they will get translated into effective practices.

The system of water management in Mexico seems to be a system constantly in transition, whether because of legislative changes, reorganization, or changes in administration. Furthermore, the changes often take place slowly enough to give actors time to develop strategies to undermine regulations in order to better suit their needs and interests. As a result, water management becomes more about politics than about water. Not surprisingly, water management decisions are based on the will of those in power rather than on accomplishing water management objectives.

Although seemingly logical from an environmental perspective, boundaries based on hydrological characteristics have also proven challenging. Watershed management cannot ignore political boundaries, since the government carries out most of its activities based on political boundaries. As a result, jurisdictional limits create obstacles for regional planning, because investments are often limited by jurisdiction even if a project could clearly benefit an entire region extending beyond a political jurisdiction. The situation becomes even more challenging with regards to integrating water and environmental management, since the CNA has established watershed-based administrative regions, whereas SEMARNAT maintains administrative regions based on political boundaries after unsuccessfully trying to implement watershed-based administrative regions. In addition, there is sometimes confusion and lack of clarity about the concepts of water management by watershed and integrated watershed management. Furthermore, the existing River Basin Councils in Mexico have not yet
proven to be a forum that is able to coordinate between multiple river basins, in spite of the fact that huge hydraulic infrastructure projects are used to transfer water between various watersheds. Even more troubling is that River Basin Councils have not generally been viewed as a forum to resolve conflicts within a watershed region.

The aforementioned issues can have important policy implications in Mexico. From a public administration perspective, it is important to clearly distinguish between the various forms of deconcentration and decentralization, especially as they affect the responsibilities and obligations of distinct agencies or levels of government. In addition, the potential benefits of decentralization are limited if the lower-level institution does not have the capacity or skills to take on new responsibilities.

Secondly, the effectiveness of innovative policies is limited by the ability and willingness of responsible authorities to implement them. Legislative changes need to occur with the support and input from those agencies that ultimately will be responsible for implementing them, in order to improve the likelihood of getting implemented in the manner in which they were intended. It is unrealistic to expect an agency that does not fully support a policy, or does not have sufficient funding or qualified staff, to implement such a policy. Furthermore, if tensions between agencies exist at a federal level, it is also unrealistic to think that these tensions will not manifest themselves at lower levels of government as well, thereby creating obstacles to water management at the local level.

Thirdly, if water management is to occur based on a long-term vision, incentives need to exist within government institutions to promote this kind of long-term planning. In addition, information needs to be made freely available and easily accessible in order to make informed decisions and to accurately assess trends in water quality and quantity.
Fourthly, although change can be important and necessary to improve water management based on watershed boundaries, too much change can result in unstable institutions and a lack of a clear direction. Changes with regards to water management in Mexico have taken place rapidly enough that it is difficult to fully form institutions and fully develop processes before they change again. At the same time, changes happen slowly enough that it allows powerful actors to take advantage of the instability and gives parties with vested interests enough time to find means to undermine policies before they can be effectively implemented.

Because of the complexity of the topic, not nearly all of the aspects of river basin management in Mexico could be addressed within this investigation. As a result, there are numerous opportunities for future research including, but by no means limited to, the following:

- How the 2004 LAN revisions are translated into implementable policy objectives in the regulations that are pending publication
- The extent to which water management decisions are carried out in an integrated manner as a result of the 2004 LAN reforms
- How and whether coordination occurs between the newly planned River Basin Agencies and the already existing River Basin Councils
- If the increased participation of NGOs and civil society in River Basin Councils, as called for by the 2004 LAN reforms, results in more participatory and representative decision making
- How the future cooperation between PROFEPA and the CNA affects the enforcement of water standards
- Mechanisms for cooperation between multiple watersheds
- Impediments to effective river basin management caused by governance based on political boundaries
- Perceptions of civil society on the importance of water and other natural resources and their willingness to take action to protect them
• How the change in administration in 2006 affects water management policy, what importance is given to water and the environment in the National Development Plan of the next sexenio, and how overall objectives of this plan will get translated into the National Water Plan and the National Environment and Natural Resources Plan.

Many of the suggestions above could be looked at through a case study in a particular watershed, while others are best looked at from a national perspective.

Although this study focuses on river basin management in Mexico, it has broader relevance to natural resources management in various geographical locations. The challenges of balancing management according to political versus ecological boundaries; the distribution of authorities between the center, regional, and local levels; and the role of participation in decision making are being experienced by both developed and developing nations globally. There is not a black and white solution, rather a balancing act involving tradeoffs and efforts to match institutional structures with environmental, economic, and social needs and capacities. As a result, it is not meaningful to try to categorize river basin management as effective or not effective according to a generic definition, rather to evaluate it according to the unique characteristics under which it must operate and the way that it was envisioned to function according to the legislative and institutional framework.

Legislatively, Mexico has taken huge steps towards a more integrated and participatory form of water management based on river basin boundaries, including the creation of new river basin agencies that will be recognized as authoritative bodies. The coming years will be critical for Mexico to seize the opportunity to protect its water and environmental resources before the effects of degradation and shortage further manifest themselves in other aspects of society. Will Mexico be able to say five or even ten years from now that everything has changed, or will they still be saying that everything changes but everything stays the same? Ultimately, with respect to water management,
it comes down to whether legislation can be a driver for change, or if legislation needs to be driven by the demand among the broader society for the need to change.
References


CNA. See Comisión Nacional del Agua.


CONAFOR. See Comisión Nacional Forestal.


EPA. See Environmental Protection Agency.


LAN. See Ley de Aguas Nacionales.


NRC. See National Research Council.


RLAN. See Reglamento de la Ley de Aguas Nacionales.


SEMARNAT. See Secretaría de Medio Ambiente y Recursos Naturales.


Appendix A

INTERVIEW GUIDES

English

Spanish
INTERVIEW GUIDE

River Basin Councils and Their Legal Framework in Mexico

1. What were the primary drivers for using the watershed as a reference for water planning and management as first required in the 1992 LAN?

2. Was the RLAN of 1997 instrumental in facilitating formation of basin councils? Why or why not?

3. What are the main purposes of the river basin councils
   a) in theory, and
   b) in practice?

   PROMPT: local input into water management issues, represent user groups, promote conservation, set priorities, more scientific management

4. What obstacles caused delay in the organization of the river basin councils?

   Why was the Mexico Valley Council, initiated in 1995, able to be one of the earlier developed councils?

   PROMPT: River basin councils were supposed to be fully operational by 1999

5. In 1997, the CNA redefined its administrative regions. It converted from 6 administrative regions based on political boundaries to 13 administrative regions based on hydrological boundaries. Do you think the restructuring of the CNA administrative regions based on hydrological boundaries has:

   (a) Improved water management? How?
   (b) Made water management more complicated? How?

6. How have the LAN reforms of 2004 affected the implementation of river basin councils?

Mexico Valley Basin Council and Distinct Challenges

7. Are river basin council regulations that, as I understand, are based heavily on experiences from the Lerma-Chapala Basin and the state of Guanajuato, appropriate for watershed management in the Mexico Valley?

   Does the existing legal framework allow for flexibility in management that is suitable for distinct geographical areas?
If not, can you give me examples of how effective implementation in the Mexico Valley is inhibited by current regulations?

8. What are the main challenges related to watershed management in the Mexico Valley in light of the fact that it is a closed basin in a heavily populated area?

How are these unique challenges addressed?

9. Can you give examples of related water management institutions and their interactions with and/or participation in the Council (i.e. Mexico City Water System)?

Did these institutions exist prior to the formation of the Council?

Did these institutions serve to reinforce or impede the objectives of the Mexico Valley River Basin Council?

10. Is the legal framework in place to operate effectively? If so, is this true in practice?

PROMPT: autonomy; funding; responsibility

11. What do you think could be done to make the Mexico Valley River Basin Council function more effectively, if anything?

Management/Coordination

12. Could you comment on the structure of the governing board? How has it changed since the river basin council was formed, if at all?

PROMPTS: top-heavy; representative of users; made up mostly of politicians, scientists, etc.

13. How would you characterize the type of management occurring within the Mexico Valley River Basin Council? Do you think this is typical of other River Basin Councils?

PROMPTS: “top-down” or “bottom-up”; effect of having Federal District within its boundaries

14. Based on available information, only one River Basin Committee (Cañada de Madero) exists within the Mexico Valley River Basin and there are not yet any River Basin Commissions or Groundwater Technical Committees. Is this information correct?
What is the reason for the lack of these institutions within the framework of river basin management in the Mexico Valley?

Do you envision their existence in the future?

15. Could you describe the coordination between the Mexico Valley River Basin Council and the other river basins which help supply the Mexico Valley with water (Lerma and Cutzamala)?

**Participation**

16. Is access to river basin management institutions limited or can anyone participate?

   PROMPTS: limited to users with recognized water rights; appointment to an official position

17. Are there other barriers to participation?

   PROMPTS: language; awareness of the existence of watershed institutions

18. How would you describe stakeholder contributions?

   PROMPTS: substantive; symbolic; representative of the sectors they are responsible for representing

19. Which stakeholders have the best access to institutions and the most weight in decision making?

   PROMPTS: those with political power, financial power, scientific expertise

**Decision Making and Information**

20. What factors have the greatest influence on decision making?

   PROMPTS: scientific information; political factors

21. Is sufficient information available for informed decision making?

   PROMPT: hydrological and water quality data; user data

   Are there sufficient human resources available for informed decision making?
22. Has the decision by the Mexico City Water System to classify information related to water as confidential affected the work of the Basin Council? If so, how?

23. Is the watershed council able to incorporate social, economic, as well as environmental issues in decision making? How?

   Can you provide an example?

   Does one tend to take priority over the others?

Water Rights

24. What is your view of the Public Water Rights Registry?

   PROMPTS: complete and accurate; useful in the administration of water

25. What will be the effects of limiting water rights in water-scarce areas?

   If negative effects are anticipated, how will they be prevented?

   PROMPTS: clandestine use; increased water prices; relocation of industries

Consumption

26. What is being done to promote a water culture? Who is targeted?

   PROMPTS: What? Announcements on television; education in schools
             Who? Children, businesses, wealthy

   How effective have these efforts been in promoting efficient use of water/reducing consumption?

27. Can you comment on fee scales and how that affects water consumption, treatment, and supply in the Mexico Valley?

Future Outcomes

28. Can water management through river basin councils be effectively institutionalized in Mexico over time?
29. Can you comment on the long-term stability of River basin Councils and what factors might affect it?

PROMPT: elected officials; water quality/quantity; budget; international pressure
GUIA DE ENTREVISTA

Consejos de Cuenca y su Marco Jurídico en México

1. ¿Qué fueron los motivos más importantes para usar la cuenca como referencia para la planeación y gestión del agua según los primeros requerimientos en el LAN de 1992?

2. ¿Era el RLAN de 1997 instrumental para facilitar la formación de los consejos de cuenca? ¿Por qué o por qué no?

3. ¿Cuales son los funciones principales de los consejos de cuenca
   a) en teoría, y
   b) en la práctica?

   AVISOS: contribuciones locales en asuntos de la gestión del agua, representación de grupos de usuarios, promover conservación, establecer prioridades, gestión más científica

4. ¿Qué obstáculos han causado retrasos en la organización de los consejos de cuenca?

   ¿Por qué podría ser el Consejo del Valle de México, establecido en 1995, uno de los primeros consejos que eran desarrollados?

   AVISO: Los consejos de cuenca debían de estar completamente funcionales para el año 1999.

5. En el año 1997, la CNA redefinió las regiones administrativas. Convirtió de 6 regiones administrativas basadas en fronteras políticas a 13 regiones administrativas basadas en fronteras hidrológicas. ¿Piensa Usted que la reestructuración de las regiones administrativas de la CNA basadas en fronteras hidrológicas ha:

   (a) mejorado la gestión del agua? ¿Cómo?
   (b) hecho más complicado la gestión del agua? ¿Cómo?

6. ¿Cómo han afectado las reformas de la LAN de 2004 a la implementación de los consejos de cuenca?
El Consejo de Cuenca del Valle de México y sus Distintos Retos

7. ¿Piensa Usted que las regulaciones relacionados con los consejos de cuenca son adecuadas para la gestión de cuenca en el Valle de México, a pesar de que esas regulaciones, como yo entiendo, son basadas en las experiencias de la Cuenca de Lerma-Chapala y el Estado de Guanajuato?

¿El marco jurídico actual permite flexibilidad en la gestión apropiada para distintas zonas geográficas?

¿Si no, puede darme ejemplos como la implementación eficaz en el Valle de México está limitado por las regulaciones actuales?

8. ¿Qué son los retos principales relacionados con la gestión de cuencas en México considerando el hecho que es una cuenca cerrada en una zona muy urbanizada? ¿Cómo son manejados esos distintos retos?

9. ¿Puede darme ejemplos de instituciones para la gestión del agua que realizan actividades relacionados con el trabajo del consejo de cuenca? ¿Qué interacciones y/o participación tienen en el Consejo de Cuenca (ej. Sistema de Aguas de la Ciudad de México)?

¿Esas instituciones ya existían antes del establecimiento del Consejo de Cuenca?

¿Esas instituciones sirvieron para reforzar o impedir los objetivos del Consejo de Cuenca del Valle de México?

10. ¿Existe el marco jurídico para operar con eficacia? Si existe, es cierto en la practica?

AVISOS: autonomía, finanzas, y responsabilidad

11. ¿Qué hay que hacer para que el Consejo de Cuenca del Valle de México funcione mejor?

Gestión/Coordinación

12. ¿Puede comentar sobre la estructura de la junta de gobernación? ¿Cómo ha cambiado desde el inicio del consejo de cuenca?

AVISOS: demasiado alto con gente de alto nivel; representativa de los usuarios; consiste principalmente de políticos, científicos, etcétera
13. ¿Cómo caracterizaría el tipo de gestión ocurriendo dentro el Consejo de Cuenca del Valle de México? ¿Cree que eso es típico de los otros consejos de cuenca?

AVISOS: “top-down” o “bottom-up” (“de arriba hacia abajo” o “de abajo hacia arriba”); el efecto de tener el Distrito Federal dentro sus fronteras

14. Basado en la información disponible, solo un comité de cuenca (Cañada de Madero) existe dentro la Cuenca del Valle de México y todavía no existen comisiones de cuenca ni comités técnicos de aguas subterráneas (COTAS). ¿Está correcta ésta información?

¿Por qué faltan estas instituciones dentro del marco de gestión de cuencas en el Valle de México?

¿Cree Usted que van a existir en el futuro?

15. ¿Puede describir la coordinación entre el Consejo de Cuenca del Valle de México y las otras cuencas de que depende el Valle de México para el suministro de agua (Lerma y Cutzamala)?

Participación

16. ¿Hay limitaciones en el acceso a las instituciones para la gestión del agua o puede cualquiera persona participar?

AVISOS: limitada a usuarios con derechos de agua reconocidos (formales); designación a un puesto oficial

17. ¿Existen otros impedimentos para participar?

AVISOS: idioma; conciencia de la existencia de instituciones de cuencas

18. ¿Cómo describiría las contribuciones de los interesados?

AVISOS: sustantiva; simbólica; actuar de una manera representativa de los sectores para que sean responsables al representar

19. ¿Cuál interesados tienen el mejor acceso a los instituciones y más influencia en la toma de decisiones?

AVISOS: los que tienen poder político, poder económico, o experiencia científico
Toma de Decisiones y Información

20. ¿Cuáles factores tienen la mayor influencia en la toma de decisiones?

AVISOS: información científica; factores políticos

21. ¿Existe suficiente información para tomar decisiones bien informados?

AVISOS: datos de la hidrología y la calidad del agua; datos de los usuarios

¿Existen suficientes recursos humanos para tomar decisiones bien informados?

22. ¿Está el trabajo del Consejo de Cuenca afectado por la decisión del Sistema de Aguas de la Ciudad de México para clasificar información relacionada con el agua de manera confidencial? ¿Cómo?

23. ¿Tiene el consejo de cuenca la capacidad de incorporar consecuencias sociales, económicas, y ambientales en la toma de decisiones? ¿Cómo?

¿Puede dar un ejemplo?

¿Tiene una de éstas, la tendencia de tomar prioridad sobre las otras?

Derechos de Agua

24. ¿Cuál es su opinión sobre el Registro Público de Derechos de Agua (REPDA)?

AVISOS: completo y correcto; útil en la administración del agua

25. ¿Cuáles serán los efectos de limitar los derechos a agua en zonas con escasez del agua?

¿Si anticipa consecuencias negativas, cómo puede evitarlas?

AVISOS: uso clandestino; precios de agua más altos; reubicación de industrias

Consumo

26. ¿Qué se hace para promover una cultura de agua? ¿Quién está enfocado?

AVISOS: ¿Qué? Anuncios en la televisión; educación en las escuelas
¿Quién? Niños, empresas, gente rica

¿Qué tan efectivo han sido estos esfuerzos en promover el uso de agua más eficaz y la reducción del consumo?

27. ¿Puede comentar sobre el esquema de pagos y cómo lo afecta el uso, tratamiento, y suministro del agua?

Consecuencias en el Futuro

28. ¿Puede la gestión del agua por consejos de cuenca ser institucionalizado efectivamente en México con el tiempo?

29. ¿Puede Usted comentar sobre la estabilidad a largo plazo de los consejos de cuenca y qué factores pueden ser importantes?

PROMPT: funcionarios elegidos; calidad o cantidad de agua; presupuesto; presión internacional