Pergamon

www.elsevier.com/locate/worlddev

World Development Vol. 31, No. 5, pp. 797–812, 2003

Printed in Great Britain
0305-750X/03/$ - see front matter

doi:10.1016/S0305-750X(03)00017-2

Boundaries of Consent: Stakeholder Representation in River Basin Management in Mexico and South Africa

PHILIPPUS WESTER
Wageningen University, The Netherlands

and

DOUGLAS J. MERREY, MARNA DE LANGE *
International Water Management Institute, Pretoria, South Africa

Summary. — Increasing the capacity of water users to influence decision-making is crucial in river basin management reforms. This article assesses emerging forums for river basin management in Mexico and South Africa and concludes that the pace of democratization of water management in both is slow. Mexico is characterized by continued government dominance and attempts to include already organized stakeholders in decision-making, while substantive stakeholder representation is lacking. South Africa is placing emphasis on social mobilization and transformation, leading to a slower implementation process and struggles over the redistribution of resources. While not a panacea, moving from stakeholder participation to substantive stakeholder representation in river basin management holds more promise of achieving equitable water management.

Key words — river basin management, institutional change, Mexico, Latin America, South Africa, Africa

1. INTRODUCTION

The second World Water Forum (WWF) held in March 2000 highlighted the growing global concern about freshwater, and the complexity of the challenges facing developing countries striving to attain effective water governance (Cosgrove & Rijsberman, 2000). In the 20th century, freshwater withdrawals grew dramatically, resulting in water stress in many countries of the world (Seckler, Amarasinghe, De Silva, & Barker, 1998). While it has become conventional to cite water scarcity as a significant threat to human well-being, a danger of the water scarcity narrative is that it obscures issues concerning unequal access to and control over water (Mehta, 2000). While freshwater supplies are clearly limited, for most people water scarcity is caused by competition between water uses and by political, technological and economic barriers that limit their access to water (Falkenmark & Lundqvist, 1998).

As a result of water overexploitation many river basins have become "closed" from a water

* The research underlying this article received staffing support from the Dutch Ministry of Foreign Affairs through its Associate Expert Program and financial support from a grant to IWMI from the German Federal Ministry for Economic Cooperation and Development (BMZ: Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung) through a contract administered by the German Agency for Technical Cooperation (GTZ: Deutsche Gesellschaft für Technische Zusammenarbeit). Our analysis has greatly benefited from discussions with many government officials, researchers and water users in Mexico and South Africa, too numerous to mention by name, to whom we are deeply grateful. The constructive and insightful comments of Alex Bolding, Barbara van Koppen, Margreet Zwarteveen and Jeroen Warner on earlier drafts of this paper are highly appreciated. Final revision accepted: 16 December 2002.

perspective, meaning they no longer have utilizable outflows as consumptive water use equals or exceeds the amount of annual renewable water (Keller, Keller, & Seckler, 1996; Seckler, 1996). The closure of river basins results in a complex interplay among declines in water quality, intersectoral water transfers, inequitable water allocation and reduced access to water, especially by poor people. The serious inequality in access to and control over water and the conflicts between the different uses and users of water lie at the heart of the need for new approaches to water management (Mehta, 2000; Vermillion & Merrey, 1998). This need is widely recognized as is the belief that existing institutional arrangements for water management are inappropriate and a major constraint for achieving sustainable water management (Cosgrove & Rijsberman, 2000; Gleick, 2000; Merrey, 1997).

To make the transition to more sustainable water management, most analysts recommend managing water based on river basins and increasing stakeholder participation in water management. These prescriptions build on the experiences gained with decentralizing water management for agriculture in the past 25 years, which saw much attention directed at creating or strengthening Water Users' Associations (WUAs) and transferring financial and management responsibility for irrigation services to these associations. In the irrigation sector the record is mixed, and even where Irrigation Management Transfer (IMT) policies are judged as "successful," it is rare to find dramatic changes in agricultural productivity (Kloezen, Garcés-Restrepo, & Johnson III, 1997; Samad & Vermillion, 1999; Vermillion, Samad, Pusposutardjo, Arif, & Rochdyanto, 1999).

Many policy-makers, researchers, and water managers advocate that water must be managed at the level of river basins, based on the argument that river basins are a "natural" unit and thus the "logical" unit for water management (see Newson, 1997 for a summary of the literature). This new territoriality in water management has become the basis for a new breed of policy instruments (Buller, 1996) and has led many countries to embark on a new round of water reforms, focused on national policies, and on creating new institutions for managing river basins. These reforms pose profound institutional and political challenges and are even more complex and problematic than reforms at the local level (Vermillion & Merrey, 1998). The few examples of functioning coordinating bodies at the river basin level are in rich countries such as France, Australia and England (Betlem, 1999; Buller, 1996; Chenoweth, 1999; Malano, Bryant, & Turral, 1999; Pigram, 2000). For countries where implementing even local level reforms strains the financial and implementation capacities, trying to reform river basin management is difficult indeed. The political economy of such reforms is daunting, with strong vested interests and weak institutions affecting the capacity of the rural and urban poor and small-scale farmers to gain a voice in water management.

Although stakeholder participation in water management is frequently advocated, actually including the poor and achieving substantive stakeholder representation has proven elusive in practice (Cleaver, 1999). More often than not, participation is little more than token consultation, with no decision-making power in the hands of the people concerned (Wester & Bron, 1998). Too often, the participation discourse draws attention away from the very real social and economic differences between people and the need for the redistribution of resources, entitlements, and opportunities. This is typified by the definition of stakeholders as water users with recognized water rights, thereby excluding those without water rights. The participation discourse also obscures that water is a politically contested resource (Mehta, 2000; Mollinga, 2001), although there is growing recognition that there is a need to move beyond mere participation. As the Chairman and Rapporteur of the second WWF stated,

> Support for "participation" has become an accepted principle for many countries and organizations. The user representatives in the Forum [pointed out] that this should not be limited to asking users to participate in government programs. Participation implies sharing power: democratic participation of citizens in elaborating or implementing water policies and projects and in managing water resources (HRH The Prince of Orange & Rijsberman, 2000, pp. 391–392).

This concern for democracy in water management is both timely and important. As decision-making moves to the river basin level, serious thought needs to be given to how hard-won democratic rights in conventional social and political domains are assured in the river basin domain (Barham, 2001). This raises the question which type of democracy is implied. Liberal democratic theory is premised on a notion of abstract individualism and assumes

that all people are equal in the public sphere, which is characterized by modern values of rationality and impartiality (Held, 1995; Luckham, Goetz, & Kaldor, 2000). In water reforms informed by liberal democracy, it is assumed that it is possible for water management stakeholders to bracket status differentials and power inequalities and to deliberate "as if" they were equals in water management forums such as WUAs or river basin councils. Social democracy, on the other hand, departs from social inequalities and attempts to increase citizen involvement in the affairs of government and expand the concept of citizenship to cover economic and social rights as well as political rights. Thus, it aims at a redistribution of power and resources to enable citizens to participate in the decisions that affect their lives (Luckham *et al*., 2000). In water reforms informed by social democracy, water is seen as a basic human right and a politically contested resource (Gleick, 1998; Mehta, 2000).

Choice and consent are central to both liberal and social democracy, with the legitimacy of government premised on the notion that a majority has consented to be represented by it (Held, 1995; Luckham *et al*., 2000). In water management, the boundaries of consent are shifting, through increased stakeholder participation in decision-making at both the water-use and water resource (river basin) levels. To understand if and how current water reforms are deepening democracy, empirical research is needed to assess emerging forums for river basin management and their democratic content. This entails studying where the line is drawn between token stakeholder participation and actual control over water management decision-making by water users and citizens. It also entails questioning whether liberal or social notions of democracy inform current water reforms, that is, whether emphasis is placed on protecting proven productive capacity and assuming that growth will lead to redistribution or whether real attempts are made to redistribute productive resources.

This article reviews how Mexico and South Africa are putting democratic stakeholder representation in river basin management into practice. Both are committed to the ideals of equitable, productive and sustainable water management and stakeholder participation. Based on the recognition of the unitary nature of water in river basins and the need to deal with the interrelations between surface and groundwater, water quantity and quality and land–water-ecosystem interactions, both governments are sponsoring attempts to create new institutional arrangements for river basin management. This article is based on extensive research in the Lerma-Chapala River Basin in Mexico and the Olifants River Basin in South Africa, which consisted of in-depth interviews with policy-makers, water managers and water users, analysis of policy documents pertaining to these basins, and participant observation at numerous water meetings.

This article does not analyze the goals, efficiency, and effectiveness of river basin management in the two basins studied. Rather, we focus on the process of stakeholder representation, paying attention to variables such as stakeholder composition, involvement of stakeholders in decision-making, and the types of participation allowed (cf. Griffen, 1999). Our analysis is informed by the notion that water is a politically contested resource and that water management institutions and policies are effects of political practices (Mehta *et al*., 1999; Mollinga, 1998, 2001; Mosse, 1997). Thus, institutions are not seen simply as "the rules of the game" (cf. North, 1990) but as embedded in practice where they are reproduced, transformed and subverted through interactions and negotiations between actors (Cleaver, 2000). Such a notion of institutions opens avenues to analyze how power pervades institutional arrangements and gives rise to differentiated access to and control over water, and, more importantly, how to design processes to redress inequities.

2. RIVER BASIN MANAGEMENT IN MEXICO AND SOUTH AFRICA

Internationally, Mexico and South Africa are at the forefront of applying innovative approaches to water and river basin management. By comparing their attempt to arrive at substantive stakeholder representation in water management important lessons can be learned for other countries. Although comparisons between countries pertaining to water management are notoriously difficult to make, the similarities between Mexico and South Africa are striking. Both are middle-income countries with comparable levels of income (US$7,719/capita in Mexico and US$8,318/capita in South Africa in 1999 measured at Purchasing Power Parity (PPP)), poverty (17.9% in Mexico and 11.5% in South Africa of the population below

US$1 PPP/day), and marked inequalities in income distribution (10% of the population enjoys 42.8% of income in Mexico and 45.9% in South Africa) (World Bank, 2000). Both countries are also undergoing significant political and social transformations, with free and fair national elections held for the first time in 1994 in both South Africa and Mexico. Agriculture accounts for 5% of GDP and withdraws 78% of freshwater in Mexico (World Bank, 2000), while in South Africa this is 4.5% and close to 60% respectively (DWAF, 2002). Both countries have embarked on extensive and comparable water reforms, with water defined as national property held in trust by the national government, in line with modern water resources legislation (Burchi, 1991).

Even more complicated than comparing countries is the comparison of river basins. But, the Olifants Basin in South Africa and the Lerma-Chapala Basin in Mexico share a sufficient number of physical and social characteristics to validate drawing conclusions from a comparison between them (see Table 1). Both basins exhibit a similar pattern of development, with their upper catchment areas located close to the capitals of their respective countries and containing significant industrial development. Their middle reaches contain extensive irrigated areas while in the lower reaches both basins contain important environmental areas (Lake Chapala in the Lerma-Chapala Basin and Kruger National Park in the Olifants Basin). In addition, both basins form part of a larger basin (the Limpopo for the Olifants and the Lerma-Chapala-Santiago for the Lerma-Chapala), and cross administrative boundaries. Although both basins cover nearly the same area, water availability in the Lerma-Chapala is nearly three times that of the Olifants, while consumptive water use is nearly 10 times higher. The two basins are increasingly water-stressed, characterized by mounting competition among domestic, industrial and agricultural uses of water, serious environmental issues, and significant water deprivation among large segments of the population. Finally, both basins are in the early stages of serious and far-reaching institutional reform at the water use and river basin levels.

Table 1. *Salient features of the Lerma-Chapala and the Olifants Basins*

	Lerma-Chapala Basin Mexico	Olifants Basin South Africa
Area (km^2)	54,300	54,388
Population (in 1999)	11,000,000	3,400,000
Irrigated area (ha)	700,000	107,000
Mean annual runoff (million m^3)	5,757	1,992
Groundwater safe yield (million m^3)	3,980	1,800
Annual renewable water (million m^3)	9,737	3,792
Consumptive water use (million m^3)	10,637	1,135

Sources: BKS (2000) and CNA (1999a).

(a) *Mexico: the Lerma-Chapala Basin*

The Lerma-Chapala Basin in central Mexico lies between Mexico City and Guadalajara and crosses five states: Querétaro, Guanajuato, Michoacán, Mexico and Jalisco (see Figure 1). The basin accounts for 9% of Mexico's GNP and is the source of water for around 15 million people (11 million in the basin and two million each in Guadalajara and Mexico City) (CNA, 1999a). Irrigated agriculture, covering some 700,000 ha, accounts for 68% of current water use in the basin, while evaporation from water bodies (Lake Chapala and storage reservoirs) accounts for 23% of water consumed (Wester, Melville, & Ramos-Osorio, 2001). Eleven large-scale canal irrigation districts (formerly state-managed) cover around 285,000 ha, while some 16,000 farmer-managed or private irrigation systems (termed "irrigation units" in Mexico) cover 510,000 ha. Twenty-seven reservoirs provide 235,000 ha in the irrigation districts with surface water while around 1,500 smaller reservoirs serve 180,000 ha in the units. An estimated 17,500 tubewells provide around 380,000 ha in the basin with groundwater, of which 47,000 ha is located in irrigation districts (CNA, 1993; CNA/MW, 1999). In the irrigation districts there are an estimated 88,000 water users compared to 100,000 water users in the irrigation units (CNA/MW, 1999).

The average annual runoff in the basin during 1940–95 was 5,757 million cubic meters (MCM), while annual groundwater recharge is estimated to be 3,980 MCM giving a total of 9,737 MCM annual renewable water (CNA, 1999a). The best available estimates place total process and nonprocess water depletion at 10,637 MCM, yielding an annual deficit of 900 MCM (CNA, 1999a). As a consequence of the

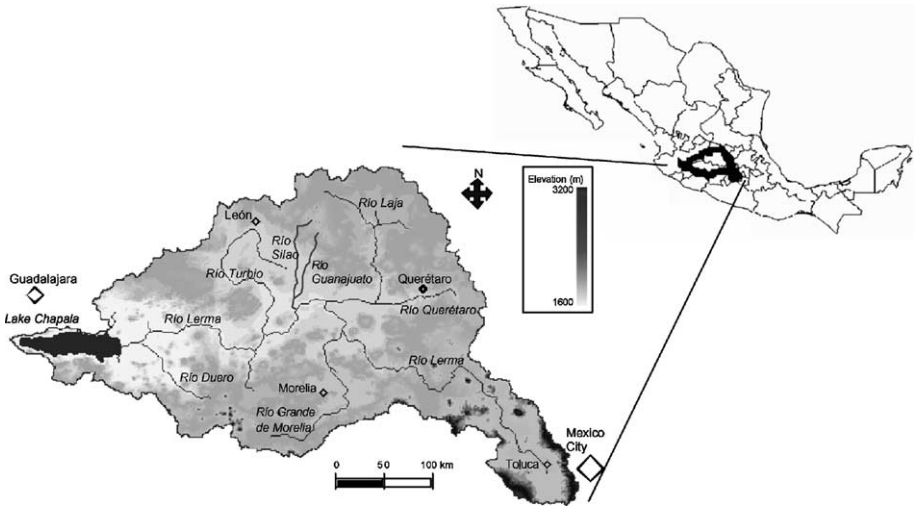

Figure 1. *Map of the Lerma-Chapala Basin.*

overexploitation of water in the basin groundwater is being mined, with sustained declines in aquifer levels of 1.00–2.58 m year^{-1} (Scott & Garcés-Restrepo, 2001), and the flows in the Lerma River have been reduced to a trickle as a result of which Lake Chapala, into which the river flows, is rapidly drying up. This Lake is the largest in Mexico, giving it a high symbolic value, and it generates significant tourism revenues.

In response to the deterioration in the basin's water resources, several institutional innovations have occurred in the basin since 1989, including the signing of a river basin coordination agreement (1989), the creation of a river basin council (1993) and the establishment of aquifer management councils (1995-onward). Water reforms at the national level, such as the creation of a national water agency in 1989, the decentralization of domestic water supply and sanitation to states and municipalities (starting in 1983), the transfer of government irrigation districts to users (1991–present), the creation of state water commissions from 1991 onward, and the promulgation of a new water law in 1992, have also significantly altered institutional arrangements for water management in the basin. Driving the water reforms in Mexico are increasing water overexploitation, the institutional resources of Mexican society to deal with this overexploitation, the vested interests of the hydraulic bureaucracy, and the neoliberal policies pursued by the Mexican government.

Although states, municipalities and water users currently have a larger say in water management decision-making, the role of the federal government is still paramount as surface water is defined in the constitution as national property placed in the trust of the federal government. As the trustee, the federal government has the right to concession surface water-use rights to users for periods ranging from five to 50 years (Kloezen, 1998). The concession titles set out the volume of water a user is entitled to, although CNA may adjust the actual quantity a user receives annually to reflect water availability, with priority accorded to domestic water use (CNA, 1999b). For allocating surface water, Mexico follows the proportional appropriation doctrine and in theory all concession holders share proportionally in any shortages or surpluses of water. Once issued, water concessions need to be registered in the Public Registry of Water Rights, maintained by CNA. After registration the concessions become fully tradable within river basins, although the CNA needs to be notified of the trade and needs to approve it (Kloezen, 1998).

The situation surrounding groundwater is more complex, as the constitution does not define it as national property, but rather states that overlying landowners may bring groundwater to the surface as long as this does not affect other users. In 1946 the constitution was amended to the effect that the federal government can intervene in aquifers in overdraft, by

issuing pump permits or declaring that new pumps may not be installed. Based on a ruling of the Supreme Court in 1983 groundwater is now considered national property, although this is not reflected in the constitution or the 1992 water law. Groundwater concessions in Mexico are granted by CNA on a volumetric basis with a maximum extraction or pumping rate specified.

Mexico has proceeded quickly in establishing new institutions for irrigation management and has followed what is sometimes called a ''big bang'' approach. As part of the Mexican IMT program in the 1990s 10 irrigation districts in the Lerma-Chapala Basin were transferred to WUAs, that now manage secondary canal units varying in size from 1,500 to 30,000 ha. The WUAs were formed as legally recognized non-profit associations to whom CNA granted concessions for the use of water and irrigation infrastructure. In all the districts CNA continues to manage the dams and main canals and delivers water in bulk to the WUAs, except in the Alto Río Lerma irrigation district where a federation of WUAs has been formed to manage the main system (Kloezen, 2000). Research carried out by Kloezen *et al*. (1997) and Johnson (1997a, 1997b) shows that the new WUAs have been effective in improving the provision of services and recovering costs from water users, though the impact on agricultural productivity is minimal. More recent work in one district in the Lerma-Chapala Basin raises questions about the WUAs' long-term sustainability and shows how they are an important form of political capital for their leaders (Kloezen, 2000; Monsalvo, 1999).

The management structures in the irrigation units are much more diverse, and may consist of informal WUAs, government-recognized WUAs, water judges, pump groups or commercial management. As state intervention in the units has been piecemeal in comparison to the districts and has usually only consisted of assistance in construction and the concessioning of water rights, their representation in formal decision-making forums is weak (Silva-Ochoa, 2000).

The federal government agency responsible for water management in the Lerma-Chapala Basin is the CNA, which is charged with defining water policy, granting water concessions and wastewater discharge permits, establishing norms for water use and water quality, and formulating regional and national water management plans (Herrera-Toledo, 1997). The official aim of vesting all government responsibilities and powers related to water in the CNA was to create the necessary conditions for moving toward sustainable water management. To complement this move a modern and comprehensive water law was promulgated in 1992 (CNA, 1999b). Unlike in South Africa, this law was not preceded by an extensive consultation process, but rather was written by CNA's legal experts with input from engineering staff and an extensive review of international experiences. This law defines an integral approach for managing surface and groundwater in the context of river basins, which it considers as the ideal geographical unit for the planning, development and management of water. It also promotes decentralization, stakeholder participation, control over wastewater discharges and full-cost pricing (Herrera-Toledo, 1997).

Although Mexico has a long tradition in river basin development and in using river basins as the basic unit for water management (Barkin & King, 1970), including the Lerma-Chapala Basin (Wester *et al*., 2001), an important provision of the 1992 water law is the stipulation that stakeholder participation is mandatory in water management at the river basin level. To this end river basin councils, defined in the water law as coordinating and consensus-building bodies between the CNA, federal, state and municipal governments and water user representatives (CNA, 1999b), have been established by CNA in 25 river basins (CNA, 2000a). To facilitate river basin planning and interaction with stakeholders CNA has divided the country into 13 hydrologic regions and established an office in each region. The stated goal of the councils is to foster the integral management of water in their respective river basins through proposing and promoting programs to improve water management, develop hydraulic infrastructure and the corresponding services and preserve the resources of the river basin. Formally, the river basin councils have very little decision-making powers, as CNA remains responsible for water licensing, the collection of water taxes and water investment programs. The formal role of the councils is to assist CNA in the execution of its vested powers and to ensure that stakeholders' opinions are taken into account (CNA, 2000b). The original intent behind the creation of river basin councils was that they would function as water parliaments that would approve water programs and proposals by the federal water management agency as well as control the budgets to fund these programs. It

was hoped that Mexico would choose a dual structure for river basin management as used in France and vest more substantive powers in the river basin councils. Due to resistance by the water bureaucracy, this did not come to pass.

Mexico's first river basin council was established in the Lerma-Chapala Basin, in response to the drying up of Lake Chapala in the 1980s, combined with the severe contamination of the Lerma River. According to Mestre, "A wide-ranging water diagnosis existing by mid 1989 clearly presented four capital problems in the Lerma River Basin: scarcity, as well as unsuitable water allocation, pollution, inefficiency of water use, and environmental depredation" (1997, p. 144). He adds that "To turn the tide, it became clear that it would be insufficient and imprudent to maintain that the federal government was solely responsible for this chaos and for its solution or mitigation" (Mestre, 1997, p. 144). In April 1989, the federal government and the five state governments signed a coordination agreement to improve water management in the basin, by (a) allocating surface and groundwater fairly among users and regulating water use; (b) improving water quality by treating municipal and industrial effluents; (c) increasing water-use efficiency; and (d) conserving the river basin ecosystem and watersheds.

On September 1, 1989 a formal Consultative Council was formed to follow up on these objectives. Based on the 1992 water law the Consultative Council became the Lerma-Chapala River Basin Council on January 28, 1993. Until the end of 1997, the Governing Board of the Council was very top heavy: its president was the federal minister of agriculture until 1995 and the federal minister of the environment during 1995–97, while its members were the governors of the five states making up the basin, five federal ministers and the Directors General (DG) of CNA and the federal oil and electricity companies. In 1998 this changed, based on a modification in 1997 of the water law and its regulations to allow for greater user representation, with user representatives from six sectors (agriculture, fisheries, services, industry, livestock and urban) being appointed to the Governing Board by CNA. Moreover, the DG of CNA became the president of the Council and the five state governors continued as members, yielding a total of 12 members on the Governing Board.

The Lerma-Chapala River Basin Council has been in flux in the past 10 years, and only in August 2000 was its structure formalized by CNA (2000b). It now consists of the Governing Council, a Monitoring and Evaluation Group (MEG), an Assembly of User Representatives and Special Working Groups, while CNA's regional office forms the Council's secretariat (see Figure 2). The actual decision-making body of the River Basin Council is the MEG, which is a carbon-copy of the Governing Board except that state governors send representatives in their stead, while CNA is represented by the head of its regional office. The MEG meets on a

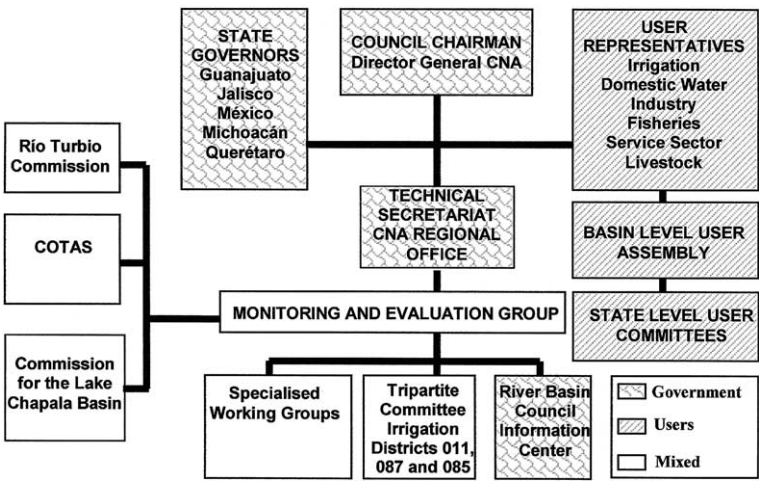

Figure 2. *Structure of the Lerma-Chapala River Basin Council.*

regular basis and is charged with preparing and convening Council meetings and more importantly drafting agreements to be signed at formal Council meetings. The structure of the River Basin Council is complemented by a stepped form of user representation consisting of water user committees for the six water-use sectors represented on the Council. These sectoral committees can be formed at the regional, state or local level, where possible building on already existing WUAs or other legally recognized water management groups. The water user committees form the Assembly of User Representatives which elects the six user representatives on the Council. In addition, forums at the subbasin level, such as watershed commissions and aquifer management councils (user organizations formed to reverse groundwater depletion, see CNA, 2000b; Marañón & Wester, 2000), form part of the structure of the River Basin Council.

A challenge for the River Basin Council has been ensuring effective user representation—critical in the consensus-building and coordination role envisioned in the law. The six user representatives on the Council have been nominated by CNA, and are not known to, nor do they necessarily reflect the interests of the water-use sector they represent. At present the water user committees are still being formed, but it is unclear at which levels they will be formed (regional, state or local), how many members these committees will have, and how they will be elected. What is clear is that only water users with a water license will be eligible to elect committee members, thus excluding the vast majority of the basin's population. Mestre (1997) emphasizes the Council is intended to be "an open and plural forum." The role of "Society" is seen as paramount and "comprises nongovernmental organizations, private sector organisms and individuals, academic and scientific actors, as well as a myriad of other social groups who participate in a regional water scenario" (1997, p. 142). He notes society is "commonly organized through diverse groups." The assumption that society is already organized and ready to participate in the new Councils is an important one, and understandable in light of the corporatist structure of Mexican society (Camp, 1999). It also explains why Mexico has not felt it necessary to consider the significant numbers of rural poor who are voiceless, and facing "water deprivation" and to invest in social mobilization for the establishment of river basin councils. This is especially relevant for the irrigation units that depend on surface water, which cover some 180,000 ha and currently have no voice in the Council (Silva-Ochoa, 2000).

A recent development has been that agricultural water users have started to organize themselves to gain a larger voice in the Council. At the fourth ordinary session of the Council, held on August 24, 2000, agricultural water users were present in large numbers for the first time and demanded a larger say in the Council's deliberations. The River Basin Council is becoming an important forum for the agricultural sector, as the annual surface water allocations to the irrigation districts and units are discussed in the MEG of the Council. Due to poor rainfall the allocations for the 1999–2000 and the 2000–01 growing seasons have been very low; as a result the WUAs in the irrigation districts decided to forego the 2000–01 growing season altogether, letting 200,000 ha of irrigated land lie fallow. Scott, Silva-Ochoa, Florencio-Cruz, and Wester (2001) calculate that the benefits foregone in the 1999–2000 growing season for one irrigation district where 27,000 ha were not irrigated amounted to US$14 million, giving some indication of the devastating impact on both large and small farmers of the current situation.

Before 1999 none of the WUA leaders in the largest irrigation district of the basin were aware of the existence of the River Basin Council, but the lack of irrigation water in the past two years have galvanized them to take action. Together with the agricultural user representative on the Council, the WUA presidents of the irrigation districts in Guanajuato, Michoacán and Jalisco have formed a Specialized Working Group in the Council. This working group consists of representatives from the five State Agricultural Water User Committees, made up of the governing boards of all the WUAs in the state, both from irrigation districts and units. An interesting aspect of this development is that it has been fully carried out by the water users themselves without external support. Essentially, they are filling the void of ineffectual user representation on the Council.

The lack of substantive stakeholder representation in the River Basin Council to date is indicative of the difficulties of decentralizing water management. After nearly 70 years of strongly centralized control over water, the past 10 years have seen the five states in the Lerma-Chapala Basin gain much more control over water management decision-making through

negotiations in the River Basin Council. In itself this is no small feat and from a liberal democratic standpoint it could be argued that all is well as water users are represented on the Council through their elected governments. But, the institutional arrangements for water management in the Lerma-Chapala Basin revolve around who controls water. With basin closure, the competition for access to water is becoming more severe and poor people are losing their access to water, due to reductions in surface irrigation and increased costs for groundwater irrigation. Meeting the water needs of poor people and substantive stakeholder representation at all levels of water management decision-making is not a priority of the Council, nor of the larger set of institutional arrangements for water management in Mexico. The Mexico case can be characterized as a combination of continued government dominance and attempts to include already organized stakeholders in the river basin decision-making process. South Africa is placing greater emphasis on social mobilization and on transformation from a social democratic perspective, leading to a slower implementation process and protracted struggles over the redistribution of resources.

(b) *South Africa: the Olifants Basin*

The Olifants River in the north-east of South Africa has it source in Gauteng province and traverses Mpumalanga and Limpopo provinces into the Kruger National Park before crossing the border into Mozambique, where it joins the Limpopo River (see Figure 3). Irrigation is the largest single user of water (48%) in the basin, covering some 107,000 ha. In the upper catchment of the basin, thermal power plants generate almost 55% of the country's power, using coal from over 50 mines. Some water is imported into the basin to satisfy the power plants' requirement but this is not a significant percentage of the total available water; very small amounts are also exported from the basin for cities. Pollution, largely from the mines, is a serious problem. In all there are over 200 active mines in the basin for gold, platinum, tin, etc.; these are expected to expand significantly over the next decade (BKS, 2000; Stimie, Richters, Thompson, & Perret, 2001).

Over half of the Olifants flow enters the river below its midsection, making the middle area, where much of the irrigation is located, particularly water-short. About 65% of the total available water in the basin is already used, and

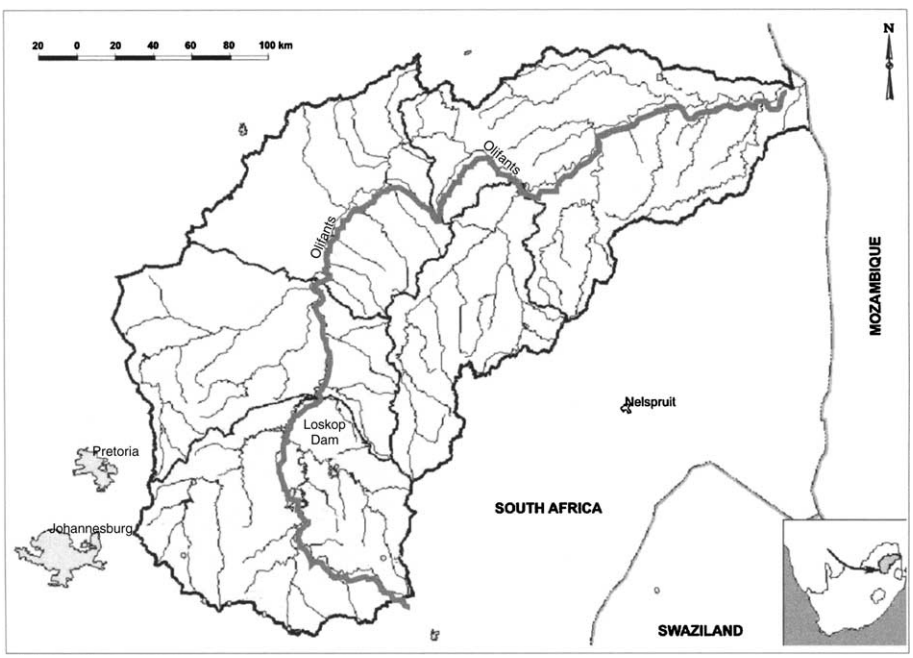

Figure 3. *Map of the Olifants Basin. Source: Ligthelm (2001).*

much of the remaining water is in the lower tributaries and is difficult to develop for use in South Africa, though this may be seen as an opportunity for Mozambique in future. In some years there is no flow at all into the national park at the downstream end of the basin; and continued development of the upper catchment is likely to prolong these low- or no-flow periods in future. Although the basin is not as stressed as is the Lerma-Chapala, it is also a "closing" basin under increasing pressure.

An important feature of this river basin is that large areas, particularly in the middle portion, pass through former "homelands" or *bantustans* set up under the previous regime. These marginal areas probably account for more than half of the basin's population, who are desperately poor with inadequate access to basic services and infrastructure. Of the irrigated area in the basin, white commercial farming controls 95%.

Since 1994 the new democratic government has devoted enormous effort to restructuring the constitution, legal system, policies and institutions to overcome the legacy of the apartheid system. Its water reforms must be seen in this context. The new water management policies were developed through a detailed process of public consultations and commissioned studies, and culminated in the National Water Act (No. 36 of 1998) and its companion Water Services Act (No. 108 of 1997) (see Thompson, Stimie, Richters, & Perret, 2001). The new legal framework adopts integrated water resources management at the "catchment," i.e., river basin level. Local water services are to be provided through Water Service Providers (for municipal supplies) and WUAs (for agricultural supplies) while river basin management will be through Catchment Management Agencies (CMAs). The law embodies the following principles (see Karodia & Weston, 2001; Muller, 2001; Schreiner & van Koppen, 2001 for discussions of the new National Water Act and water policies):

—equity in access to water resources, benefits and services;
—sustainability;
—optimal beneficial use;
—redress of past racial and gender discrimination and inequities;
—participation by stakeholders in decision-making about water resources;
—"representivity" to ensure consideration of all stakeholder needs, interests and values;
—subsidiarity, i.e., devolution of responsibility to the lowest appropriate level;
—integration of water management functions;
—alignment of water management with other related departments' functions, and
—transparency to foster cooperation and encourage stakeholder support for decisions.

The Department of Water Affairs and Forestry (DWAF) is the lead agency in implementing the new policy. The National Water Act makes the Government responsible for overall water resources management as public trustee, and provides for licensing of water uses as in Mexico. But it also provides for reservation of minimum flows for environmental purposes and basic human needs, and allows any person to use water for "reasonable" domestic use, gardening, stock watering and recreation. The Act also includes a specific "good neighbor" provision applicable to its internationally shared rivers.

An important thrust of the new water act is to replace the previous system of centralized water management by DWAF with decentralized water management at the river basin level. For this purpose DWAF has divided South Africa into 19 water management areas; defined as a large river basin, or several adjacent smaller basins to be managed by CMAs. The CMAs are intended to be statutory bodies established under Chapter 7 of the National Water Act, with five initial functions assigned to them under the law (Section 80): (i) investigate and advise on the protection, use, development and control over water in the catchment, (ii) develop a catchment management strategy, (iii) coordinate related activities of water users and institutions, (iv) promote coordination of the implementation of the catchment management strategy with development plans resulting from the Water Services Act, and (v) promote community participation. Additional functions, powers and duties may be delegated or assigned to the CMAs by the Minister, including the review, authorization, extension and registration of water licenses. It is foreseen that CMAs will be primarily funded from water-use charges in their respective water management areas and that they may choose to carry out their functions in-house or delegate functions to other parties such as Catchment Management Committees, other water-related institutions, DWAF, contractors or even neighboring CMAs.

The establishment of CMAs consists of four stages: initiating participation; formalizing participation; interim management arrangements; and the formation of the CMA and the appointment of its Governing Board (DWAF, 1999). The exact structure of a CMA depends on the consultation process but will probably be a variation of the structure shown in Figure 4. The Governing Board is accountable to the Minister of Water Affairs and Forestry for the performance of the CMA and must set the vision, mission, and strategic direction of the CMA. It will consist of nine to 15 members, to be appointed by the Minister, based on recommendations of an Advisory Committee, in turn also established by the Minister. As detailed in Section 81 of the National Water Act, in making the appointments the Minister must strive to achieve a balance among the interests of water users, potential water users, local and provincial government and environmental interest groups as well as ensure that there is sufficient gender representation, demographic representation and representation of disadvantaged persons or communities. Although stakeholders will not directly elect user representatives on the CMA and formal provisions for the election of representatives as in place in Mexico do not exist in South Africa, the Advisory Committee must consult with the relevant organs of state and interest groups before making recommendations to the Minister. This approach to selecting stakeholder representatives for river basin management would appear to conflict with the general thrust of democratization in the new South Africa, but was eventually chosen to ensure that well-organized interests would not capture the CMA. Through the provisions of the National Water Act the Minister is bound to ensure representivity and the inclusion of the poor.

Currently, the development of proposals for the establishment of CMAs is at different stages for about a third of the 19 designated water management areas, including the Olifants River. DWAF uses consulting firms to lead the process of developing catchment management proposals. The proposal is intended to be developed through consultation with stakeholders, and in its final form should lay out the broad scope and shape of the proposed CMA. After a period of public comment on the draft proposal, the final version goes to the Minister for approval. To date, there are no approved CMA proposals as the process only began in 1998. The first proposal, for the Inkomati Basin, is currently under review within DWAF. The Olifants proposal was scheduled to be sent to the Minister by early 2001, but has been delayed pending the decision on the Inkomati proposal. Proposals are to be accompanied by an independent review of the process of

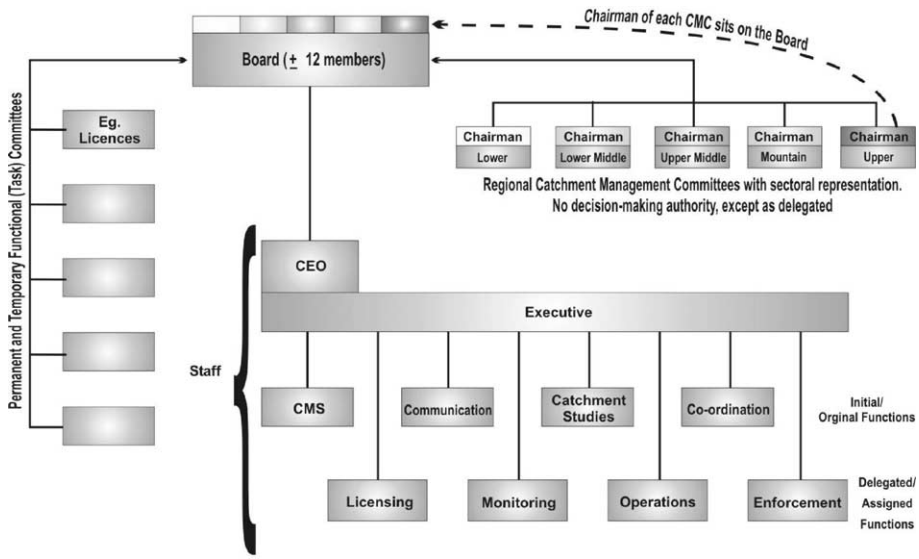

Figure 4. *Proposed Structure of the Olifants Catchment Management Agency. Source: Ligthelm (2001).*

developing the proposal and its provisions, assessing whether it meets the requirements of the policy and Act.

An enormous effort is being devoted to developing the CMA proposal (see Ligthelm, 2001). It will include the proposed name and defined water management area of the CMA, a description of the existing water resources and their management, proposed functions and institutional structure of the CMA, the feasibility of the CMA in terms of technical, financial and administrative matters, and a description of the consultation process followed.

Our research on the consultation process in the Olifants Basin brings out that the mining and industrial sectors, the suppliers of water to larger towns, and the commercial farmers are well-organized to represent and articulate their interests. The commercial farms are large modern farms, using the latest irrigation technologies, some producing citrus and other high-value products for export. The government is seeking to balance the need for established users to have a reasonable and secure water supply with its policy to redress previous inequities. All of these interests are not only well-organized but speak the language of, and come from the same culture as, the consultants and DWAF officials.

On the other hand, the millions of rural poor in the former homelands are not well-organized to participate effectively in a consultation process on water. There are a number of small-scale irrigation schemes in the basin, many of which were originally built and managed by the previous government. These are in the process of being transferred to the users, but the smallholder sector is still struggling to get organized. Currently, one finds both "traditional" tribal chiefs, many of whom emerged in the apartheid era as a means of social control, and newly elected local councils which as yet have little financial or managerial capacity. Neither of these entities are effective representatives of local communities. The government has a major investment program to supply domestic water to these areas, but its approach has emphasized rapid construction of infrastructure to make up a huge backlog of some 12 million people with no access to safe drinking water. Therefore, insufficient attention has been paid to strengthening local domestic water entities. Similarly, the small-scale irrigation sector is still unorganized, and in most cases not profitable. DWAF has not yet approved the establishment of WUAs for smallholders under the new legislation. Currently there is an interministerial process underway to agree on a consistent policy for "revitalizing" South Africa's smallholder irrigation sector.

A study carried out in the Steelpoort Basin, a major tributary basin to the Olifants, found that rural communities are unaware of the provisions of the new water law and of the CMA process, despite efforts to inform people and offer them opportunities for expressing their views. Small-scale farmers had not heard about the CMA, and municipalities and mining companies were mixed—some knew, some did not. Some of the Irrigation Boards providing water to commercial farmers were however participating actively in the process (Stimie *et al.*, 2001).

Our initial observations of the public consultation process have surfaced many important issues. In short, the effectiveness of the process in the poor rural areas is doubtful. Two reasons for this seem most important. First, the consultants do not speak the prevalent languages of the rural areas, and indeed do not understand the cultures of the rural poor. They have sought to overcome this by using facilitators who do speak the common languages, with only partial success. The minutes of the meetings demonstrate that poor people raise issues of immediate concern to them such as the lack of drinking water, while the consultants are focused on higher level issues, with little attempt to relate the solutions to immediate problems to this higher level process. One fear is that the well-organized sectors may yet monopolize access to most of the water, depriving the poor rural communities, in spite of the strong political commitment to redress these inequities.

Second, the consultants and some DWAF officials appear to see developing the CMA as a largely technical process, and do not recognize that it is a quintessentially political process. Similar concerns are raised by Rogers, Roux, and Biggs (2000), who state that,

> There is a tendency to superimpose the adaptive management process on old, usually bureaucratic, institutional structures and processes. (...) ignor[ing] the fundamental management axiom of "form must follow function" when planning or changing institutions. Recent conferences and workshops on CMAs revealed that many regional DWAF offices are falling foul of this axiom. There is a rush to set up structures to form the precursors of CMAs, without due regard for the processes needed to perform their intended functions (2000, pp. 506–507).

Water is a political issue, especially when it is a scarce and valuable good, and when access is so skewed. There are many conflicting views—and real conflicts—among stakeholders over water issues, which need to be articulated clearly as part of the CMA establishment process. Experience from developing the first CMA proposal on the Inkomati Basin, where disagreements of some stakeholders with the proposal delayed its finalization, suggests that not addressing or at least identifying these conflicts may yet lead to similar problems in the Olifants. Again, the economic power of well-organized sectors may lead to continuing inequity in access to water.

3. DISCUSSION

On the face of it, stakeholder platforms for river basin management such as river basin councils or catchment management agencies democratize water management by giving voice to a multiplicity of stakeholders. Much depends, however, on how new institutions for river basin management are established and from which social/material practices they emerge, as many roles and rights (sanctioned or informal, established or highly flexible), and certainly the technologies and physical infrastructure for controlling water are already in place. In river basins, it is the norm that water management stakeholders have different levels and kinds of education, speak different languages, differ in access to politics, and hold different beliefs about how nature and society function (see Edmunds & Wollenberg, 2001). If this is not taken into account when creating new rules, roles and rights, participatory processes may further institutionalize power differentials, a real danger in both Mexico and South Africa. Much depends then on the measures taken to ensure inclusive stakeholder representation.

It is clear that the size of the population in most river basins is such that it precludes the direct participation of all stakeholders in basin-level decision-making. The question of who will represent groups of stakeholders in river basin management is a highly political one. The relationship of the people participating in any multistakeholder process to their constituents is problematic, especially when third parties are involved. It is a nostrum of development work that third-party facilitators (researchers, consultants, NGOs) are needed to identify, mobilize, organize and inform stakeholder groups. But, as pointed out by Edmunds and Wollenberg:

> the relationship of a representative to his/her constituency is perhaps most politically charged when representatives of a group are designated by outsiders or are accountable to them, as is often the case in multi-stakeholder negotiations. From the start, outside convenors and facilitators influence representation by the selection of stakeholder groups, the people to represent each group and how the expression of interests is facilitated in the meeting (2001, p. 240).

In both Mexico and South Africa the relationship of stakeholder representatives with their constituencies is problematic, not least because the government had a decisive say in their selection. As poverty is not a condition, but an outcome of how societies are structured, it is to be expected that marginal groups are excluded from decision-making. This points to the need for the redistribution of resources, entitlements, and opportunities, as marginal groups will only gain a voice in river basin management when they are no longer marginal.

4. CONCLUSIONS

This paper does not provide a complete analysis of the complex issues that arise when countries seek to implement new policies and create new institutional arrangements for river basin management. Indeed the processes are on-going, as is research on this subject. But several general observations emerge from this overview.

First, there are important contrasts among developing countries in how they go about crafting new policies and implementation arrangements. On one extreme, one finds a top-down, almost entirely bureaucratic approach, driven by government agencies as the major stakeholders. In these cases, the process is essentially driven by a combination of technical and economic concerns and interagency politics. There is no room in such approaches for less organized, ''informal'' interests, especially poor people, to participate and gain access to water. In countries characterized by large groups of voiceless poor people, such an approach is unlikely to lead to overcoming water deprivation as a central element of poverty and will see the continued dependence of the poor on the random goodwill of the state.

Second, the Mexico case exhibits a combination of a top-down, government-driven process with inclusion of representatives of the organized users. An important result in Mexico is that the Council has been able to begin addressing serious water issues; and including representatives of organized users lends the Council legitimacy. This approach is appropriate in conditions where the major stakeholders are organized, as is partly the case in Mexico, or where economic growth is providing opportunities for poor people to improve their lives through other means. It is questionable however, whether many developing countries are characterized by these conditions. Therefore, following such an approach, while ensuring key organized sectors are represented, and enabling rapid attention to problem-solving, also presents the danger of excluding large numbers of poor water users, as is happening in Mexico. As water becomes scarcer, this will amplify the degree of water deprivation among poor people.

The South African approach should be of special interest to developing countries considering how to design new policies and institutional arrangements for river basin management. A clear disadvantage is the time it takes before the basin institution is able to address water management problems. In South Africa, there are parallel processes underway to respond to demands for water from new mines, for example, and decisions will either be postponed at potentially considerable cost in terms of economic development and job creation, or will be made by DWAF, with little involvement of stakeholders. On the other hand, successful empowerment of poor rural stakeholders could enable them to gain access to significant water rights. These could be valuable assets which they could use for productive uses (provided the necessary water infrastructure is put in place), or for bargaining with mines and other commercial users needing additional water.

Mexico and South Africa are two middle-income countries that are at the forefront of applying innovative approaches to water and river basin management. Their experiences show however, that the ''democratization'' of water management is fraught with difficulties and largely informed by liberal notions of democracy and a concern not to disrupt the productive capacity of advanced sectors of the economy through the redistribution of resources. From a social democratic perspective, including the poor and achieving substantive stakeholder representation in river basin management is premised on the redistribution of power and resources to enable citizens to participate in decisions that affect their lives. Although few would disagree that the institutions for managing river basins should be broadly democratic, where the boundaries of consent for river basin management are drawn is a political choice, and should be treated as such in current water reforms.

REFERENCES

Barham, E. (2001). Ecological boundaries as community boundaries: the politics of watersheds. *Society and Natural Resources, 14*, 181–191.

Barkin, D., & King, T. (1970). *Regional economic development: the river basin approach in Mexico*. London: Cambridge University Press.

Betlem, I. (1999). River basin planning and management. In F. N. Correia (Ed.), *Water resources management in Europe: vol. II. Selected issues in water resources management in Europe* (pp. 73–104). Rotterdam, The Netherlands: Balkema.

BKS (2000). *Development of a proposal for the Olifants River CMA: technical situation assessment for the Olifants River Catchment*. Pretoria, South Africa: BKS (Pvt) Ltd.

Buller, H. (1996). Towards sustainable water management: catchment planning in France and Britain. *Land Use Policy, 13*, 289–302.

Burchi, S. (1991). Current developments and trends in the law and administration of water resources—a comparative state-of-the-art appraisal. *Journal of Environmental Law, 3*, 69–91.

Camp, R. (1999). *Politics in Mexico: the decline of authoritarianism*. New York: Oxford University Press.

Chenoweth, J. (1999). Effective multi-jurisdictional river basin management: data collection and exchange in the Murray-Darling and Mekong river basins. *Water International, 24*, 368–376.

Cleaver, F. (1999). Paradoxes of participation: questioning participatory approaches to development. *Journal of International Development, 11*, 597–612.

Cleaver, F. (2000). Moral ecological rationality, institutions and the management of common property resources. *Development and Change, 31*, 361–383.

CNA (1993). *Plan maestro de la cuenca Lerma-Chapala: Documento de referencia*. Mexico City, Mexico: CNA.

CNA (1999a). *El Consejo de Cuenca Lerma-Chapala 1989–1999: 10 años de trabajo en favor de la gestión*

integral y manejo sustentable del agua y de los recursos naturales de la cuenca. Guadalajara, Mexico: CNA.

CNA (1999b). *Ley de aguas nacionales y su reglamento*. Mexico City, Mexico: CNA.

CNA (2000a). *El agua en México: Retos y avances*. Mexico City, Mexico: CNA.

CNA(2000b). *Reglasdeorganizaciónyfuncionamientodelos Consejos de Cuenca*. Mexico City, Mexico: CNA.

CNA/MW (1999). *Proyecto lineamientos estratégicos para el desarrollo hidráulico de la región Lerma-Santiago-Pacifico: Diagnostico regional*. Guadalajara, Mexico: CNA and Montgomery Watson.

Cosgrove, W., & Rijsberman, F. (2000). *World water vision: making water everybody's business*. London: Earthscan Publications.

DWAF (1999). How to establish a CMA. *National Water Act News* (November), 2–3.

DWAF (2002). *National water resources strategy*. Pretoria, South Africa: DWAF.

Edmunds, D., & Wollenberg, E. (2001). A strategic approach to multistakeholder negotiations. *Development and Change, 32*, 231–253.

Falkenmark, M., & Lundqvist, J. (1998). Towards water security: political determination and human adaptation crucial. *Natural Resources Forum, 21*, 37–51.

Gleick, P. (1998). The human right to water. *Water Policy, 1*, 487–503.

Gleick, P. (2000). The changing water paradigm: a look at twenty-first century water resources development. *Water International, 25*, 127–138.

Griffen, G. (1999). Watershed councils: an emerging form of public participation in natural resource management. *Journal of the American Water Resources Association, 35*, 505–518.

Held, D. (1995). *Democracy and the global order: from the modern state to cosmopolitan governance*. Cambridge, UK: Polity Press.

Herrera-Toledo, C. (1997). National water master planning in Mexico. In A. K. Biswas, C. Herrera-Toledo, H. Garduño, & C. Tortajada (Eds.), *National water master plans for developing countries* (pp. 8–53). New Dehli, India: Oxford University Press.

HRH The Prince of Orange, & Rijsberman, F. (2000). Summary report of the 2nd world water forum: from vision to action. *Water Policy, 2*, 387–395.

Johnson III, S. (1997a). *Irrigation management transfer in Mexico: a strategy to achieve irrigation district sustainability*. Colombo, Sri Lanka: IWMI.

Johnson III, S. (1997b). Irrigation management transfer: decentralizing public irrigation in Mexico. *Water International, 22*, 159–167.

Karodia, H., & Weston, D. R. (2001). South Africa's new water policy and law. In C. Abernethy (Ed.), *Intersectoral management of river basins: proceedings of an international workshop on "integrated water management in water-stressed river basins in developing countries: strategies for poverty alleviation and agricultural growth"* (pp. 13–21). Colombo, Sri Lanka: IWMI and DSE.

Keller, A., Keller, J., & Seckler, D. (1996). *Integrated water resource systems: theory and policy implications*. Colombo, Sri Lanka: IWMI.

Kloezen, W. (1998). Water markets between Mexican water user associations. *Water Policy, 1*, 437–455.

Kloezen, W. (2000). *Viabilidad de los arreglos institucionales para el riego después la transferencia del manejo en el Distrito de Riego Alto Río Lerma, México*. Mexico City, Mexico: IWMI.

Kloezen, W., Garcés-Restrepo, C., & Johnson III, S. (1997). *Impact assessment of irrigation management transfer in the Alto Rio Lerma Irrigation District, Mexico*. Colombo, Sri Lanka: IWMI.

Ligthelm, M. (2001). Olifants water management area: catchment management agency establishement. In C. Abernethy (Ed.), *Intersectoral management of river basins: proceedings of an international workshop on "integrated water management in water-stressed river basins in developing countries: strategies for poverty alleviation and agricultural growth"* (pp. 23–43). Colombo, Sri Lanka: IWMI and DSE.

Luckham, R., Goetz, A., & Kaldor, M. (2000). *Democratic institutions and politics in contexts of inequality, poverty, and conflict. A conceptual framework*. Brighton, UK: IDS.

Malano, H., Bryant, M., & Turral, H. (1999). Management of water resources: can Australian experiences be transferred to Vietnam? *Water International, 24*, 307–315.

Marañón, B., & Wester, P. (2000). *Respuestas institucionales para el manejo de los acuíferos en la cuenca Lerma-Chapala, México*. Mexico City, Mexico: IWMI.

Mehta, L. (2000). *Water for the twenty-first century: challenges and misconceptions*. Brighton, UK: IDS.

Mehta, L., Leach, M., Newell, P., Scoones, I., Sivaramakrishnan, K., & Way, S. (1999). *Exploring understandings of institutions and uncertainty: new directions in natural resources management*. Brighton, UK: IDS.

Merrey, D. (1997). *Expanding the frontiers of irrigation management research: results of research and development at the International Irrigation Management Institute 1984–1995*. Colombo, Sri Lanka: IWMI.

Mestre, J. E. (1997). Integrated approach to river basin management: Lerma-Chapala case study—attributions and experiences in water management in Mexico. *Water International, 22*, 140–152.

Mollinga, P. P. (1998). *On the waterfront. Water distribution, technology and agrarian change in a South Indian canal irrigation system.* Published doctoral dissertation, Wageningen Agricultural University, Wageningen, The Netherlands.

Mollinga, P. P. (2001). Water and politics: levels, rational choice and South Indian canal irrigation. *Futures, 33*, 733–752.

Monsalvo, G. (1999). *Sostenibilidad institucional de las asociaciones de riego en México*. Mexico City, Mexico: IWMI.

Mosse, D. (1997). The symbolic making of a common property resource: history, ecology and locality in a tank-irrigated landscape in South-India. *Development and Change, 28*, 467–504.

Muller, M. (2001). How national water policy is helping to achieve South Africa's development vision. In C. Abernethy (Ed.), *Intersectoral management of river*

basins: proceedings of an international workshop on "integrated water management in water-stressed river basins in developing countries: strategies for poverty alleviation and agricultural growth" (pp. 3–10). Colombo, Sri Lanka: IWMI and DSE.

Newson, M. (1997). *Land, water and development: sustainable management of river basin systems*. London and New York: Routledge.

North, D. (1990). *Institutions, institutional change and economic performance*. Cambridge, UK: Cambridge University Press.

Pigram, J. (2000). Towards upstream-downstream hydrosolidarity: Australia's Murray-Darling river basin. *Water International, 25*, 222–226.

Rogers, K., Roux, D., & Biggs, H. (2000). Challenges for catchment management agencies: lessons from bureaucracies, business and resource management. *Water SA, 26*, 505–511.

Samad, M., & Vermillion, D. (1999). An assessment of the impact of participatory irrigation management in Sri Lanka. *International Journal of Water Resources Development, 15*, 219–240.

Schreiner, B., & van Koppen, B. (2001). From bucket to basin: poverty, gender and integrated water management in South Africa. In C. Abernethy (Ed.), *Intersectoral management of river basins: proceedings of an international workshop on "integrated water management in water-stressed river basins in developing countries: strategies for poverty alleviation and agricultural growth"* (pp. 45–69). Colombo, Sri Lanka: IWMI and DSE.

Scott, C. A., & Garcés-Restrepo, C. (2001). Conjunctive management of surface water and groundwater in the middle Río Lerma Basin, Mexico. In A. K. Biswas, & C. Tortajada (Eds.), *Integrated river basin management: the Latin American experience* (pp. 176–198). New Delhi, India: Oxford University Press.

Scott, C. A., Silva-Ochoa, P., Florencio-Cruz, V., & Wester, P. (2001). Competition for water in the Lerma-Chapala Basin: economic and policy implications of water transfers from agricultural to urban uses. In A. M. Hansen, & M. van Affreden (Eds.), *The Lerma-Chapala watershed: evaluation and management* (pp. 291–323). New York: Kluwer Academic/Plenum Publishers.

Seckler, D. (1996). *The new era of water resources management: from "dry" to "wet" water savings*. Colombo, Sri Lanka: IIMI.

Seckler, D., Amarasinghe, U., De Silva, R., & Barker, R. (1998). *World water demand and supply, 1990–2025: scenarios and issues*. Colombo, Sri Lanka: IWMI.

Silva-Ochoa, P. (2000). *Unidades de Riego: La otra mitad del sector agrícola bajo riego*. Mexico City, Mexico: IWMI.

Stimie, C., Richters, E., Thompson, H., & Perret, S. (2001). *Hydro-Institutional mapping in the Steelpoort River Basin*. Colombo, Sri Lanka: IWMI and ARC-ILI.

Thompson, H., Stimie, C., Richters, E., & Perret, S. (2001). *Policies, legislation and organisations related to water in South Africa, with special reference to the Olifants River Basin*. Colombo, Sri Lanka: IWMI and ARC-ILI.

Vermillion, D., & Merrey, D. (1998). What the 21st century will demand of water management institutions. *Journal of Applied Irrigation Science, 33*, 165–187.

Vermillion, D., Samad, M., Pusposutardjo, S., Arif, S., & Rochdyanto, S. (1999). *An assessment of the small-scale irrigation management turnover program in Indonesia*. Colombo, Sri Lanka: IWMI.

Wester, P., & Bron, J. (1998). *Coping with water: water management in flood control and drainage systems in Bangladesh*. Wageningen The Netherlands: Wageningen Agricultural University and ILRI.

Wester, P., Melville, R., & Ramos-Osorio, S. (2001). Institutional arrangements for water management in the Lerma-Chapala Basin. In A. M. Hansen, & M. van Affreden (Eds.), *The Lerma-Chapala watershed: evaluation and management* (pp. 343–369). New York: Kluwer Academic/Plenum Publishers.

World Bank (2000). *World development report 2000/2001: attacking poverty*. New York: Oxford University Press.