Water Sector Reforms in Mexico
Lessons for India’s New Water Policy

This paper analyses a decade of water sector reforms in Mexico with the specific purpose of drawing useful lessons for Indian water policy. Particularly after 1992, Mexico has implemented serious, comprehensive and far-reaching water sector reforms that required the government to create a new legal framework; restructure existing water administration; promote and support a plurality of new autonomous and quasi-autonomous water institutions; modify incentives in water use to different user groups; and struggle with a vast complex of unresolved operational issues in implementing the reforms. Mexico may not be a model for India but Mexico’s experience does suggest that changing the way a nation manages its water resources necessitates far-reaching changes in administration, institutional structure, law and operating rules, incentives and power structures, and above all consistent commitment to the reform process.

Tushaar Shah, Christopher Scott, Stephanie Buechler

India’s Water Policy, 1987 and 2002

The new water policy adopted by the government of India in 2002 [Gol 2002] has received a mixed response. The NGO community has been critical about several aspects: they would like water rights to be vested in communities instead of some abstract notion of the Indian ‘state’; they would also like the emphasis to shift from mega projects to small-scale systems, from management of ‘blue water’ to rain-water harvesting and soil-moisture management, and from government control to community control. However, this discussion has overlooked the principal limitation of the Indian Water Policy, old as well as new – the absence of an operational agenda. Like the 1987 Water Policy, which changed nothing in the way we managed our water resources, the 2002 Water Policy too may turn out to be a ‘paper policy’. What it includes is unlikely to get implemented without major reform in water institutions and what it excludes – such as a strategy for sustainable management of groundwater irrigation – makes the policy lopsided, if not irrelevant.

Mexico is one country which, in the past 20 years, has implemented serious, comprehensive and far-reaching water sector reforms. The best known aspect of these is the transfer of irrigation management to user organisations, which has been held out as a model for countries like India. In fact, however, Mexican water reforms were far more ambitious and required the government to: (i) create a new legal framework and a system of private property rights over water; (ii) restructure existing water administration; (iii) promote and support a plurality of new autonomous and quasi-autonomous water institutions; (iv) modify incentives in water use to different user groups; and (v) struggle with a vast complex of operational issues in implementing the reforms, a struggle that is likely to continue for years to come. Mexico may not be a model for India but Mexico’s experience does suggest that changing the way a nation manages its water resources is a major enterprise necessitating far-reaching changes in administration, institutional structure, law and operating rules, incentives and power structures. Moreover, Mexico’s experience suggests that change does not always produce intended outcomes; and steering water reform successfully calls for skilful course correction as the change process gets under way.

Institutional Reforms in Mexico’s Water Sector

Mexico’s irrigation reforms are a product of its agrarian history and the larger programme of restructuring the economy that began during the early 1980s. The agrarian structure we find in Mexico today can be traced back to the series of peasant uprisings that culminated in the 1915 revolution and the 1917 constitution. The far-reaching land reforms – driven by the principle ‘land belongs to those who work it’ – that were ushered in by the 1930s but that in fact took decades to consummate, declared the Mexican state as the custodian of all land and broke up large feudal estates into 100-800 ha holdings. Two different forms of land rights followed – ‘pequeña propiedad’ (small private property) and the ‘ejido’ (or agrarian collective). The former had unattenuated ownership rights over land, the ‘ejidatarios’ (or ‘ejido’ members) got a legal identity but had only usufruct rights on land; they could use and inherit land but not mortgage or sell it. Up to 1983, 25,589 ejidos were formed.

Indian policy discussions often emphasise the importance of decentralised policy-making. However, in the aftermath of the Revolution, Mexico was more centralised than India has ever been. Mexico is perhaps the only country in the world where the capital city, Mexico, has given its name to both the state that surrounds it and the entire country. It is also probably the only large country where all major cities – even as far away as 1,000 km from the capital – have road signs indicating the direction to, simply, ‘Mexico’. This degree of centralisation became synonymous with, and represented the real power base of, the Institutional Revolutionary Party (‘Partido Revolucionario Institucional’, or PRI), The National Action Party (‘Partido Acción Nacional’, or PAN) successfully waged image campaign as the decentralisers, although the process had in fact been underway in the water sector at least since the 1970s. A hallmark of Mexico’s aggressive water sector reforms has been the

Economic and Political Weekly  January 24, 2004
domination of the central government in sectoral policy-making and implementation, which has progressively diminished the operating space available to state and local governments.

Mexico enacted its first irrigation law in 1926; this was replaced by a Federal Water Law in 1972. But it was the Law of the Nation’s Waters of 1992 combined with an amendment to Article 27 of the Constitution in the same year that became a watershed in Mexican agrarian as well as water reforms. Up until 1989, all irrigation was managed by the Ministry of Agriculture and Hydraulic Resources, and like in India, government policy towards agriculture and irrigation was guided by the socialistic thinking of a welfare state. Surface irrigation rates were raised substantially in the 1970s: but with massive devaluation of the Mexican peso, the real irrigation fees declined precipitously during the 1980s [Kloesen 2002]. Whereas in the early 1950s, irrigation fees covered 95 per cent of the cost of O and M, by the turn of the 1980s, this ratio was down to less than 20 per cent [Johnson 1997]. The hydro-agricultural sector was suffering steady decline through the shrinkage of harvested areas, decline in farm prices, stagnant farm productivity and fall in water availability due to poor maintenance of hydraulic infrastructure [Johnson 1997]. The North American Free Trade Agreement (NAFTA) agreement that took effect in 1994 further squeezed farm margins as cheaper North American (mostly unirrigated) maize and wheat forced Mexican prices down. Above all, the Mexican economy as a whole was undergoing a wave of structural reforms designed to withdraw the state from most sectors of the economy agriculture and irrigation were to be no exception.

Like India and China, Mexico too suffers from chronic imbalance of population and water availability in different regions. Arid and semi-arid areas of Mexico account for 76 per cent of the population, 90 per cent of irrigated area, and 70 per cent of the industries but these receive only 20 per cent of Mexico’s total precipitation [Barker et al 2000]. As a result, groundwater depletion is rampant in north, north-western areas and in the Mexico Valley. States like Sinaloa, Sonora, Guanajuato, Coahuila and Tamaulipas are water short but have intensive agriculture. Chiapas, Tabasco, Campeche, Yucatan and Quintana Roo are water abundant but have the bulk of Mexico’s poverty. In the former, which constitute Mexico’s food baskets, dealing with groundwater depletion is a critical policy issue that Mexico’s water reforms have tried to grapple with.

Before 1992, groundwater rights in Mexico were tightly linked to land rights, much like in Asia today [Wester et al 1999]. There was some discussion of creating private water rights, separate from land rights, during the 1980s itself and a National Registry of Water Rights was created well before swiping reforms in water sector took place in 1992. In 1989, the National Water Commission (or CNA, ‘Comisión Nacional del Agua’) was created as the first step to separating the management of water from that of the agrarian economy, recognising the declining role of agriculture in the Mexican economy and the growing non-agricultural demand for water.

1992 brought about two profound changes in the way Mexico was to manage its water resources henceforth. Article 27 of the Mexican constitution that created the attenuated ejido land rights was modified by a constitutional amendment; ejidatarios, equipped with full (but qualified) ownership rights over land were now free to mortgage or sell their lands, provided two-thirds of the ejido community approved of the transaction. There were fears that ejidatarios would sell out their lands wholesale but no such exodus followed. Six years later, researchers found that renting out of ejido land certainly increased, but there was no exodus of farmers from ejidos [Cornelius and Myhre 1998]. The Ministry of agriculture and hydraulic resources, which had a national bureaucracy going down to the ‘canaleros’ (ditch riders) – with a total employee strength of 7,800 in 1990 – was dissolved forthwith; [Kloesen 2002]. A new ministry of agriculture and animal husbandry was created, leaving all water business under the unified command of the CNA, which was subsequently brought under the Federal Ministry of Environment and Natural Resources (Secretaría de Medio Ambiente, Recursos Naturales y Pesca, SEMARNAP). Mexico was also way ahead of many other emerging economies in thinking about and acting upon river basin management institutions. In 1989, five riparian states of the Lerma Chapala basin met and came to an agreement to develop an appropriate scheme for sharing the waters and a mechanism to manage the basin in an integrated fashion. This remained a paper agreement until 1992, when a water sharing formula was agreed upon. A Basin Council was created which became the forerunner of several other basin councils that got formed in the latter half of 1990s.

The new Law of the Nation’s Waters aimed to (i) provide for administrative modernization, planning and programming in the water resource sector; and (ii) reinforce a more efficient and rational use of natural resources. The National Water Registry was charged with the responsibility to maintain a national register of newly created private property rights in water. The design manual of the CNA provided that no user could impound or divert more than 1080 m³ of water except by obtaining a ‘concession’ from the CNA. In sum, all water used for purposes other than domestic personal use, had to be ‘titled’. This use, too, was concessioned to the urban water boards. It also made the CNA responsible for water administration and charged it with the responsibility of stimulating agricultural production through decentralisation of irrigation district administration, rehabilitation of hydraulic infrastructure, increasing user participation in irrigation management and to ensure financial self-sustainability in irrigation systems.

Ironically, while mandating decentralisation at the irrigation system level, the 1992 Water Law retained centralised water administration with the CNA leaving little role for the state level Water Commissions. As time passed, continued centralisation of water resource management functions within the CNA became a major bone of contention between the CNA and other water institutions, especially, at the state level. The provision of urban water and sanitation services in Mexico was decentralised to the municipalities beginning in 1983. This decentralisation trend left little role for the states. However, the fact remains that but for the concerted move steered by the federal government, nation-wide reform on the scale Mexico has attempted would not have been possible, as is evident in other federal countries like India whose Constitution made water management a subject of state governments.

Between 1992 and 1996, the CNA went about irrigation management transfer with hammer and tongs. By 1996, there were well over 430 water user associations at the level of ‘módulos’, the irrigated area starting at the secondary canal intake, which served as the basic management unit for organisations a WUA. The lion’s share of canal infrastructure covering some three million hectares of irrigated land was brought under direct farmer management. By 1995, módulos had begun to federate into district level federations locally known as SRLs or ‘Sociiedades de Responsabilidad Limitada’ (Limited Responsibility Societies) whose key role was to manage and maintain the main canal from which módulos took off, and the corresponding service roads and
drains in the irrigation district. In their early years, each modulo set its own irrigation fees but with the rise of SRLs, the determination of irrigation fees tended to be centralised in SRLs, which were governed by a board consisting of módulo presidents and CNA representatives. With the rise of Basin Councils, the CNA was also restructured, now with three levels: federal CNA, 13 basin level (or regional) CNAs and state level CNAs. Between these, the CNA structure assumed a commanding position in the water sector. Each state had its own Water Commission, however, these have been given a very insignificant role in the new institutional structure for water resource management in Mexico. They have tended to provide services, technical studies and the like, primarily to the urban water boards that were in many cases, abandoned by the CNA.

Urban water supply and sanitation systems underwent major structural reform too. In Mexico, public administration below the state level is carried out by municipal councils, each of which administers a town as well as its hinterland, including the ejido's within its ambit. The urban water supply and sanitation function was vested in specialised Urban Water Boards – a financially autonomous public utility – constituted for each town. Each urban water board is a legal entity, has its own elected board and paid staff but its annual budget is approved by the Municipal Council. The Water Board holds a concession from the CNA that covers all the water users within the town. The Water Boards have brought a greater degree of professionalism in the management of urban water supply systems, however, they do not enjoy autonomy in tariff fixation which is still a political decision of the Municipal Council. In 1999, urban water charges levied in 32 municipalities in Guanajuato state varied from Mex $ 0.6/m³ to Mex $ 2.5/m³ for users of up to 10 m³ per month [Scott et al 2001]. As a result, Urban Water Boards in states like Guanajuato are able to generate enough resources to meet their establishment and operating costs, however, they cannot make the investments necessary to keep infrastructure in good condition (Vincente Guerrero, CNA State Director for Guanajuato, pers comm). Most of them are also unable to pay the water charges due to CNA, which last year had to write off accumulated dues of Mex$ 72 billion owed to it by the Urban Water Boards.

With the rise of módulos, SRL (Limited Responsibility Societies) and Basin Councils, the reform of Mexico's surface water management was well on its way. But groundwater – which was the mainstay of farmers in central Mexico – remained a trouble spot. Groundwater depletion has been recognised as a problem area for long. The annual deficit in groundwater use in Guanajuato has been recently estimated at 0.9-1 km³ ² and the Secretary for Agriculture and Water Resources of the Federal Government started banning the drilling of new tubewells in different municipalities of Guanajuato as far back as in 1948. Since then, a total of 14 bans have been issued. However, each ban catalysed a new wave of well-drilling activity-local authorities kept licensing more wells and groundwater development continued apace. For the first time, the 1992 Water Law created a legal-administrative instrument to bring some order into the groundwater economy. Since a new tubewell could be made only after obtaining a concession from the CNA, the ban on new groundwater structures got teeth for the first time. The National Electricity Commission began insisting on concessions before acting on applications for new electricity connections for wells. Existing tubewell owners were eligible for subsidised electricity tariff (around 30 per cent of the commercial rate) only if they obtained a concession. This created a drive amongst existing tubewell owners to secure concessions and it made it very difficult, if not impossible, to make new tubewells in areas covered by the ban.

The wide-ranging course of actions the Mexican government has taken to reform the nation's water management seems driven by the following key objectives:

1. Make water infrastructure self-financing by withdrawing the government from its management;
2. Improve the efficiency of water use by establishing tradable private rights on water as well as by involving users in managing water infrastructure;
3. Restrict and even reduce groundwater depletion by the CNA by operationalising the authority to issue rights (concessions) to draw groundwater and by enforcing the concessions;
4. Achieve basin level optimality in water use through basin level co-coordinating mechanisms.

How far are these objectives achieved? In the following sections, we conclude that some of the objectives are in fact achieved, some may get achieved but will take time while others may never get achieved.

III

Irrigation Management Transfer

Management transfer of surface irrigation systems is an area in which Mexican water reforms have met with significant success even if it is somewhat variable across regions. Mexican Irrigation Management Transfer (IMT) programme produced some major impacts: first, irrigation fees increased to a level high enough to cover O and M costs in most módulos; second, the irrigation bureaucracy shrank; third, farmer participation in irrigation management increased greatly [Johnson 1997]. However, studies also found that IMT has had "very little impact, if any, on surface water allocation and distribution and the use of groundwater" [Kloesen et al 1997]. By 1996, surface irrigation systems in Mexico – covering some 3.2 million ha – were effectively turned over to 386 Water User Associations at módulo-level and their federations (SRL) at the level of the irrigation district, although the CNA retained firm control over water resource allocation. In operational terms, this implies that the surface irrigation bureaucracy has been liquidated and módulos and SRLs are firmly in charge of operational management of irrigation systems as member-owned economic enterprises. How well these member-controlled businesses have done varies from case to case and across regions. However, overall, the programme seems to have worked well [Johnson 1997, Fransisco Garcia, CNA Deputy Director of Water Management for Guanajuato, pers comm]. In general, all of them are doing better than small holder irrigation systems (called Unidades de Riego) which are still nominally under the control of the state department of agriculture and animal husbandry. Módulos and SRLs generate resources to cover their administrative and operational costs but the CNA still has to subsidise the maintenance of many módulos' hydraulic infrastructure.

Initially, each módulo functioned as an autonomous water user organisation that managed distribution of water below the off-take point. However, a few years down the line, it became necessary to create a federation (SRL) at the reservoir level that could manage the main canal. The SRL also has CNA representation besides the representatives of member módulos. While each modulo used to set its own irrigation fee to start with, with the rise of the SRL and the Hydraulic Committee at the irrigation district level, a uniform irrigation fee for a district began to get determined by the Hydraulic Committee at the level of the irrigation district.
Some of the best performing Guanajuato módulos have been generating resources not only to meet their O and M costs, but also for investing in system maintenance and improvement. The módulo at Valle de Santiago in Guanajuato, one of the best known in Mexico, has diversified in several new directions from its original role of canal irrigation management. It went heavily into input supply and output marketing. It evolved an effective mechanism for pooling and marketing barley, which encouraged many farmers to replace wheat by barley in their crop plans. This in turn helped to save water since barley takes less water than wheat to grow. Huanímaro módulo raised irrigation fees charged to members above what other módulos did in order to invest in pressurised irrigation equipment to cover 1,500 of its 2,300 ha command area.

The Irapuato modulo, which we studied in some detail has 8,300 ha of irrigation command and 1,850 members, equally divided between the ejidatarios and private farmers. Irrigation charges here were around Mex $ 50/watering/hectare in 1993, the first year of WUA formation: It stayed at that level for the next four years but between 1996 and 2002, the fee per irrigation/hectare was hiked from Mex $ 65/ha to Mex $ 250/ha. As a result, total fee income of the modulo increased 5 times from Mex $ 5,98,000/year in 1993 to Mex $ 2.55 m/year in 2002. At its current level, surface irrigation fee in Irapuato is nearly equal to the cost of groundwater irrigation at Mex $ 300/ha per irrigation. The modulo's water charge policy changed the cropping pattern: wheat area fell from 3,018 to 539 ha between 1993-2002 but sorghum area increased from 2,580 to 3,209 ha and barley area shot up from 57 to 1,941 ha. Around 60 per cent of the irrigation fee is spent on maintenance and upkeep of the system; some 15 per cent goes to administration and 25 per cent to canal operation. The modulo has generated additional revenue through levy of special cess in order to buy one ha of land to build itself an office and service facility from where it intends to operate a range of services to members, including renting out land-levelling equipment. The modulo already has a staff of around 10 including six canaleros, one for two sections of around 500 ha each. The canaleros's responsibility is to ensure proper water distribution to members who have paid for an indent.

These are, however, exceptions, representing less than 10 per cent of WUAs. While such high performing WUAs are able to increase area irrigated with the available water, overall, canal irrigation in Guanajuato has been declining. There is growing pressure from the central ministry of environment to increase inflows into Lake Chapala, and over recent years, Lerma waters have been increasingly diverted from irrigation reservoirs to Chapala. As a result, after 1997, there has been a sharp decline in the surface water availability and area irrigated by módulos in the Lerma Chapala basin.

Moreover, we must remember that IMT reform in Mexico was in some ways forced upon the government, especially from farmers in the north-western Mexico. The region has 45 per cent of Mexico's irrigated areas cultivated by commercial farmers. These strongly supported the president's decision to transfer irrigation management to farmer associations because they recognised that irrigation systems were going to get worse as
the government did not have the funds for proper O and M of the systems [Johnson 1997]. In Mexican states like Chiapas and in other developing countries where smaller, poorer subsistence landholders dominate irrigated areas, making a success of IMT would be much more difficult than where irrigated agriculture is dominated by large, commercial farmers [Shah et al. 2002].

IV
Creation of New Water Rights

Another major aspect of Mexico’s new water policy is the property rights reform considered by many to be ‘sine qua non’ for sustainable management especially of groundwater resources. Since groundwater is open access and the impact of pumping behaviour of farmers is not directly observable, groundwater depletion would continue until aquifers are exhausted or become prohibitively expensive to exploit. Once private water rights are created, it is argued, users would have strong incentives in protecting the water resource, especially if such rights were valuable and tradable [Holden and Tobani 2001]. Granting this powerful logic, the key issue is: how to create private property rights in a fungible, invisible resource such as groundwater, especially where users are small and numerous, as in south Asia? Mexico is interesting in that it has taken up this challenge head on and struggled with it. It has created tradable private property rights in water by: first, declaring water as national property, thereby severing the linkage between land rights and water rights; second, allowing existing users to get their use ‘regularised’ by obtaining a concession from the CNA; third, by setting up a structure for enforcing the concessions; and fourth by levying a volumetric water fee from concession holders (barring irrigators) which would help generate resources to maintain water infrastructure. Under the new Water Law, all diversions of water, other than for direct personal use, are allowed only through concessions. Even sand-mining in river beds – these are considered federal property – requires a concession. Concessions for different users, uses and sources are for different periods and specified volumes. The law enjoins the concession holder to abstain from over-stepping the agreed volumes, to establish mechanisms to measure volumes used and report these periodically to the CNA.

What has been the outcome and impact of this rights reform? Mixed, as of now. Large water users, especially industrial and commercial establishments have been quick to secure proper concessions and pay water fees to the CNA. This has been a significant source of revenue for the CNA. Modulos and SRLs, who operate the surface water systems, are few, organised and therefore easy to bring within the purview of the concessions, and since each modulo holds a concession on behalf of its members, it is administratively simple to formalise their water rights. Municipal Councils, similarly, are to obtain concessions that cover all users within their ambit. By and large, municipal diversion have conformed to the volumes they are entitled to but, Municipal Water Boards have regularly defaulted on the payment of water fees to the CNA, which recently had to write off Mex $ 72 billion owed to it by way of accumulated water fees. One expectation was that the new system of rights would stimulate an active market in water but this expectation has been largely belied, partly because ‘water rights are not rigidly enforced and legal processes to redress grievances are difficult, costly and drawn out’ [Scott and Silva-Ochoa 2001].

The real difficulty has been with water rights of numerous agricultural users who account for over 80 per cent of water use and seem to be at the heart of the matter. In particular, there are three problems: (i) Getting agricultural users to get ‘regularised’ by obtaining a concession; (ii) coping with the administrative workload involved in processing applications for concessions and issuing them; and (iii) enforcing the terms of the concession. Even amongst agricultural users, tubewell irrigators have responded to the law quite well. Most tubewell irrigators we interviewed, on private farms as well as in ejidos – held a concession or had already applied for one. Rather, the problem is with the CAN, which is unable to process the demand for concessions. In Jalal de Berrios, out of 334 well owners only 200 have received their concessions while the rest had applied some years ago and were still waiting to receive their concessions.

One reason why tubewell owners keenly seek ‘regularisation’ is that they are linked to the formal economy through their dependence on the Federal Electricity Commission for power supply. The Federal Electricity Commission requires a concession before issuing an electricity connection for a new tubewell. Then, there is also an incentive for existing tubewell owners. Power supply to agricultural users in Mexico is subsidised; farmers pay around Mex $ 0.23-0.28/kWh against the average power tariff of Mex $ 0.55-0.65/kWh. Although the CNA and the federal government have not yet used that stick, they have certainly issued threats that tubewells without concessions would attract commercial power tariffs, while ‘concessioned’ tubewells will keep enjoying subsidised tariffs. This is a major factor: an average tubewell in Mexico probably uses 50-80,000 kWh of power in a year; and access to power subsidies at current rates would mean a saving of Mex $12-18,000/year in electricity bills, high enough to make it worth obtaining concession.

However, it is one thing to issue a concession to a tubewell; it is quite another to specify its volumetric water right and yet another to limit its pumping to the volume specified. The ‘concession’ in itself is nothing more than the registration of a well, which is easily done from the records of the Federal Electricity Commission in the Mexican context, where all groundwater pumping is done by electric pumps. The creation of a water right lies in entitled each concessioned tubewell to a particular volume of extraction. We found, however, that the volumes entitled are based on a combination of the current use implicit in the yield of the well and the area owned. Thus, groundwater concessions merely regularise the status quo and do not aim to curtail present levels of groundwater use, except through ban on new tubewells, which can be more efficiently imposed by simply putting a cap on new agricultural power connections.

Monitoring the actual extraction and enforcing it to ‘entitled volumes’ has, however, proved impossible even in a small state like Guanajuato where agricultural tubewells are all of 15,000 in number. The CNA has legal powers to undertake surprise inspections and monitor water use under concessions. However, it has only two field teams in Guanajuato and if these were to make a single inspection visit to each irrigation well, it would take several 10 of years to complete one round. Now, the state CNA has got seven brigades of two members each against a request for 20 brigades. This is better but it is still much less than what is needed to begin to monitor actual groundwater extraction. In law, concessions are supposed to forfeit if the concessioned volumes are not used by the holder, however, this provision can be enforced only if there is regular monitoring of water use by concession holders. This is proving well nigh impossible and there is now talk of extending the ambit of the environmental police force – already created at the federal level primarily to enforce industrial pollution – to cover groundwater extraction.
Compared to tubewells, a far trickier animal is the ‘bordo’, a small tank-like water harvesting and storage structure, and ‘presas’, that are somewhat larger, which have been proliferating in uplands of Mexico at a frightening pace, especially in areas with intensive livestock farming for meat or dairying. In Guanajuato, private tubewells, bordos and around 200 large presas organised as Unidades de Riego, constitute an informal water economy that irrigates more land and supports more livelihoods than all the modulos do together. Under the new Water Law, bordos and presas which need individual concessions present a catch-22 situation for the Mexican experiment in creating private water rights. If their owners persistently avoid applying for concessions, the intent of the Water Law will be frustrated but if they begin applying for concessions in large numbers, the administrative logistics of processing a huge number of requests may prove a nightmare.

In the hilly upland areas of Mexico, rainfall is down to 300-400 mm and further north, it further reduces to 150-200 mm. There is very little irrigation either by surface or by groundwater. Groundwater levels are low and few deep tubewells are reserved for community drinking water supply. Over 70 per cent of the population is still rural and over 50 per cent depend upon subsistence agriculture and animal husbandry. There is little industrial activity and the entire economy is on two legs: migration and livestock-keeping. Almost every household with some farm lands keeps some heads of cattle, the scale of cattle holding varies from 3 to 300. Close to the US border, export of calves to the US for fattening is an important economic activity.

Bordos and presas are important elements in the strategy of upland people to sustain and improve their lot. With growing population, expanded livestock keeping has induced intensive management of ranches that require dispersed water sources for stock. Bordos are an integral element of this intensification. Their numbers have grown partly because they cost little to build and partly because, for long, the government subsidised 75 per cent of the cost. Apart from such private bordos, there are also ‘common pool’ bordos built by ejidos [Scott and Silva-Ochoa, 2001].

In interaction with over a hundred farmers in Ocampo, we found that the new Water Law created enormous anxiety among bordo owners and confusion for CNA on three counts: first, the administrative burden involved in processing concessions for such a large number of tiny structures is huge; second, the even greater burden of implementing the concessions; and third, equity issues arising from the new law.

Most bordos can store 5,000 to 50,000 m³ of rainwater, which farmers consider too small to require a concession. However, the Water Law requires concessions for every water body larger than 1080 m³. Farmers’ greatest worry is about the hassle and ‘transaction cost’ of getting a concession for such small storages. On paper, the CNA is committed to process the application for a concession within 60 working days. However, by its own admission, it takes more than a year. Likewise, all concession holders have to pay a water fee to the CNA but the collection of these fees is in huge arrears. These delays would multiply manifold if farmers began en masse to apply for concessions for thousands of small bordos and presas. The CNA insists that getting a concession is in the interest of the user since it formalises her secure right. But farmers think that this right, which cannot be defended in practical terms, is only on paper. Many farmers asked if getting a concession would help defend their water right by preventing new bordos from being built upstream. The CNA’s stock response was that every concession applicant must establish that his proposed use of water will not affect other user; and if it does, the injured party is entitled to invoke CNA inspection. Most farmers were not convinced this would work; moreover, the cost in terms of hassle and money - of defending one’s right through the CNA route seemed out of proportion to the value of the right itself.

Yet, many farmers were worried that the Water Law may hurt the weak and the poor, especially in remote areas, who have no information, some times for months, about the ordinances and new time limits the CNA keeps announcing. In the meantime, the smart and aggressive use these proactively to entrenched and strengthen their positions by legalising them. More aggressive, smart and resourceful farmers have figured that getting concessions under the Water Law is an easy way of establishing private rights over what was so far open access run off. In the race to privatise the run off, some applied for concessions for new bordos designed to catch the run off from roads and highways in roadside structures; others went upstream in watersheds, bought land exclusively for constructing bordos, and would now like to get a formal legal sanction for a practice that other farmers considered clearly unjust. Instead of dealing with the complex reality of the Water Law, the CNA’s stance is bureaucratic: the law requires that applicants for concessions establish the absence of third party damage beforehand by producing a certificate from the municipal authorities. But it is common knowledge that anyone with some influence can buy such a certificate for a few pesos.

V

Aquifer Management Councils (COTAS)

Manipulation of the Water Law by tubewell owners has been a rule rather than an exception in the ‘bajo’ areas, the low lands of south-central Guanajuato, for intensive groundwater use in agriculture. Here, groundwater depletion is a 50 year old problem and since 1948, 14 bans have been issued on new tubewells. However, every announcement of an imminent ban stimulated a flurry of tubewell making activity in the hope that if made before the deadline, they would get regularised. Indeed, intended bans have been the chief reason for the run away rise in tubewell density in central Guanajuato. Farmers also used other ways to manipulate the concession-grants. Many made new wells in the name of ‘repositioning’. Fransisco García, a senior CNA official, told us that in 2001 against 250 applications for repositioning wells, 1,000 new wells were made commonly with power connections drawn from a concessioned transformer.

COTAS (Aquifer Management Councils) were born out of the recognition that concessions by themselves would be of little help in getting water users in the ‘informal sector’ to participate in sustainable water management, and that new mechanisms and structures were needed to engage this vital sector in implementing the spirit of the Water Law. To their protagonists, COTAS were government promoted NGOs fashioned as user organisations; and Guanajuato, where these early experiments first began under the leadership of governor (now president) Fox, continues to lead Mexico’s COTAS experiment to date. Of the 47 COTAS in Mexico, 14 are in Guanajuato, one for each of the 14 aquifers delineated in the state. Now COTAS have been adopted as a national model and the CNA is promoting them in the rest of the country. However, federal COTAS (Technical Committees for Groundwater Management) differ from Guanajuato COTAS (Technical Councils for Water Management) in several respects. Guanajuato COTAS concern themselves with managing all water resources and are also supported
more liberally with state financial support. Each is provided a rented office, a car and salaries for a manager, a technician and an administrative assistant. COTAS in other states focus squarely on groundwater and have far meager support from the CNA. Everywhere, however, COTAS have key design features that are common: their operational domain is defined by an aquifer boundary, which clearly gives primacy to their groundwater management role. They are all designed as representation non-profits. Registered as a civil association, each has a general assembly, an elected board and a small hired staff. Recently, all the Guanajuato COTAS were federated in to a State Water Management Council with a representational structure akin to an COTAS. The Office of the Guanajuato Water Resources Council (CEH) is the organisation that represents all water users in the state. In its evolutionary process, the State Council first brought the 14 COTAS together in this representational structures but its ultimate goal is to bring all water users/stakeholders into the forum. They already have six representatives of surface irrigators now, four from two important irrigation districts of the state and two more to represent the 200 odd Unidades de Riego.

The idea of COTAS is bold; and the expectations from these structures is high. A COTAS is expected to "be a promoter of Integrated Water Resource Management in the state bringing together different actors and stakeholders to protect the water resources in quantity and quality". The State Water Commission of Guanajuato (CEAG) expects that a COTAS should become a local water management organisation, that will mature to a stage where it becomes a rallying point for all water users, that as they get formally recognised by the Water Law (which for the present they are not), they will come up with and implement practical water management and conservation actions and policies, mediate water conflicts and enforce or implement national water policy on the ground level [Sandoval 2002]. A common expectation is also that the COTAS - particularly, their state-level federation - will become a powerful instrument of implementing the law of the nation's waters, that they will interact with authorities and water regulatory agencies and provide decisive inputs on the creation, establishment, control and changes in water management plans. Above all, COTAS are expected to mediate between the state and the federal water authority and the water users they represent. This is why COTAS were designed as representational organisations. The sub-text in all this is that with their closer grass roots presence, COTAS will do what the CNA cannot: restrict groundwater extraction by enforcing the Water Law.

Will Mexico's COTAS fulfill these multifarious, often conflicting expectations? It is early to say so and COTAS even in Guanajuato, the state that pioneered them, four years old. According to Francisco García, of CNA, Guanajuato, "After all, Texas took 16 years to constitute its first aquifer management organisation through a state assembly decree, and five more years to actually put it on the ground. Mexico’s COTAS need to be given time to congeal and find their feet." Guanajuato's COTAS have until 2004 to find their feet, after that, the financial support from the State's Water Commission will cease and COTAS left without alternative sources of funds will have to liquidate their operating systems, and will in effect cease to exist.

Stuck in such a situation, a member organisation would normally turn to its members for sustenance by providing services that members value. This is what Guanajuato's módulos do for instance, as a member organisation, the Irapuato módulo offers its members better irrigation services and has hiked it water fees five times in five years, partly for its own growth and partly to improve the services. A fundamental design flaw in COTAS may well be in its concept itself: it is not allowed to provide what a majority of its members value most, viz, unrestrained access to groundwater; and its members are reluctant to pay its membership fees for enforcing the Water Law on them, which its creators think is the mandate of the COTAS. It is not surprising then that industrial players - whose water use was closely regulated even before the new law - have been quick to take to the COTAS and even dominate them but farmers, the prime target of the Water Law's groundwater provisions, have been staying away from the COTAS. This has been the case even in Texas and California, from where Mexico has borrowed the concept of COTAS. Miguel Solanes (2002) writes.

The experience seems to be common to California and Texas, where state legislatures appear to have given authority to institutions and groups which are not largely willing or empowered to accept responsibility for groundwater management. According to some authorities, barring exceptions, Texas's local groundwater districts have not been very successful. Special interests, limited territorial jurisdiction vis-à-vis aquifer extension, limited powers, and ignorance of technical questions by users and stakeholders are often mentioned as causes for the relative lack of success of local arrangements and special interests representations.

As a result, COTAS are struggling along without a strong sense of direction. Most have no notion of formal membership. With its 20,000 concession holders, Guanajuato's 14 COTAS should each have 700 or in some cases up to 2,000-3,000 members with full user participation but their general assembly meetings often have a few dozen participants. COTAS are little known amongst common people and their presence on the ground is thin or non-existent. Some 45 farmers we interviewed in various parts of Guanajuato - these included all types, small holders as well as large farmers, men and women, a few young and mostly old farmers - were uniformly blank on COTAS. Most COTAS boards were elected by a general assembly attended by a small fraction (often 5-10 per cent) of total concession holders. Partly for that reason, the office-bearers of COTAS enjoy little regard and allegiance from the wider public and citizenry, neither do they seem under pressure to respond to aggregate of member priorities from COTAS. Many elected office-bearers of COTAS seek to pursue their own agendas and drive their COTAS in that direction rather than working on aggregated priorities of members, as would be the vogue in a member organisation. For instance, the president of a predominantly agricultural COTAS has been able to focus all its work on issues related to industrial water use an issue that he feels strongly about, although most concession holders in the COTAS domain are farmers.

A major reason for member apathy is that the high-ground assumed by the COTAS leadership often fails to connect with the here-and-now priorities of its members. In Jaral de Berrios, one of the best performing COTAS according to Guanajuato Water Commission, only a couple of dozen farmers, all above 70 years of age participated in its annual meeting to strategise for groundwater management. Concerned about the bleak agricultural future of the region, the COTAS president, a large private landholder, delivered an impassioned speech advocating the need to regulate the area under tube well irrigation, using an elegant formula linking groundwater draft to the previous year's rain fall. The priorities of the audience were different; one 75-year old ejidatario got up and said, "My farming is already down to two hectares; how much more do you expect me to cut?" Another rose and said, "It took me six years after making an application to get my concession and by then, my well needed to be deepened and I was ready for a new concession. Can't the COTAS help us cut through this maze?" Yet another farmer described how
he put his life’s savings in an expensive drip irrigation system, which failed and irrevocably damaged his well and pump, due to lack of technical support.

Many people we met thought COTAS have done well as “talking shops”. During the first half of 2001, all 14 COTAS together organised some 30 meetings. But the participation often tends to be thin. In response, the State Water Commission (CEAG) uses attendance in COTAS meetings to judge the success of a COTAS. COTAS pursue a range of activities but hardly any has engaged with the difficult issue of groundwater demand management. The Ocampo COTAS has served well as a public platform for raising and debating water issues and running publicity campaigns besides trying to develop an inventory of water resources, carry out hydrologic studies, monitoring and modeling. It has also been taking monthly water level records and piezometer readings in all the wells. In Silao-Romita, the COTAS has helped mobilise the community to protest the transport of groundwater from its aquifer to Leon, the largest industrial city of Guanajuato. This transaction is wholly valid within the law of the nation’s waters because people fear that Leon cannot be effectively prevented from drawing much more water than concessioned. Many COTAS are deeply into research, training and capacity building as a core activity, somewhat unusual for a member organisation which exists to provide services that members would pay for. Laguna Seca, one of the better rated COTAS of Guanajuato has completed an aquifer study, got all its wells geo-referenced and has developed a plan for agrometeorological monitoring and information systems.

Valuable as these service may generally be, it is doubtful if COTAS members will be willing to pay for them, and at a rate that would enable the COTAS to survive. As a result, managers and staff of the Guanajuato COTAS – arguably the stakeholder group most concerned about the future survival of the COTAS – are exploring strategies of resource generation from sources other than their members. Many will continue to look up to the CNA and state governments for continued support. Laguna Seca has been planning research collaboration with the Ecology Institute and State Department of Agriculture, which the CNA will probably support. But the Silao-Romita COTAS hopes that a research collaboration with Guanajuato University’s Agricultural Research Station on water saving irrigation technology will help it to generate resources. The Ocampo COTAS has planned a range of services and activities to generate resources from members, such as registering bordos, tanks, wells, etc., with the CNA so that members have secure rights; training and technical support in irrigation, and bordo construction; helping members deal with the CNA’s titling process and concessions and helping in installation small treatment plants at the community level. However, with its current human resource base, it is open to question whether the Ocampo COTAS can fruitify this plan, or even a fraction of it.

In sum, the present role and future direction of the COTAS are unclear to say the least. The CNA expects them to implement the Water Law, in particular, it help in containing groundwater extractions to concessioned limits, and help in curbing illegal well-drilling. Doing this is the best way for a COTAS to drive away its members. For a member organisation to police and spy over its own members would be a curious role indeed. This is what Laguna Seca has been doing and it has already declared to the CAN that several farmers are making illegal wells clandestinely. CNA can never find these out on its own but being closer to the field of action, COTAS can. In fact, Laguna Seca COTAS tipped off the CNA while the clandestine wells were being made so the CNA could catch them in the act. Farmers would hardly support a COTAS that would do this to them.

Ambitious COTAS presidents, such as in Jaral de Berrios, want to transform the COTAS into a strong water user organisation that can mediate between the users and the authorities. Many COTAS managers view their role as one of promoting IWRM. There is no indication yet that COTAS are ready to play any of these roles. However, what they have been doing may not be without value. Many COTAS have been monitoring water levels while most have been carrying out water education campaigns. They have served as forums in which users can participate in discussing their water problems, and others have been trying to promote technification. At least in one COTAS, farmers shifted wholesale from cultivation of wheat to barley, which uses less water, though this had more to do with a Corona beer plant offering a remunerative market for barley. In any case, regulating agricultural use of water, especially of groundwater, is a challenge that has nowhere been met fully. Perhaps the CNA will be well placed to support COTAS for a long time with the recognition that the ulterior goal behind CNA support, viz., to implement the provisions of the Water Law in the informal water sector, will not be achieved otherwise. Considering that the 14 Guanajuato COTAS have cost the state Water Commission (CEAG) less than US $2.5 million to support for five years, one can easily argue that the capacity building and attitudinal impact COTAS can produce through targeted research and public education activity may justify such investment in view of the growing importance of water in Mexico’s evolution. An early vision of the COTAS was that they would foster self-policing by users themselves taking the responsibility of self-monitoring against the extraction to the agreed volume. Even though idealised, some believe that such a scheme can still work in Mexico aided by European style ‘water notaries’ that might be used to certify the actual extraction. We believe many conditions will need to be fulfilled before such a schema might work reasonably well, one of these is high quality public education on groundwater issues. And COTAS are certainly equipped to deliver this.

VI
Assessment and Lessons for India’s Water Policy 2002

The water sector reform agenda Mexico has pursued during the 1990s is uncommonly aggressive and proactive and has produced wide-ranging changes in the way the nation’s water resources are managed. Many of the interventions made have achieved some, if not all, of the reform objectives. The constitution of the CNA as the core agency responsible for promoting integrated water resources management has been on target: the formation of the CNA has separated water resources management from irrigation management by taking the powers away from the erstwhile ministry of agriculture and hydraulics. Locating the CNA within the ministry of environment has highlighted the declining role of irrigation and heightened the pre-eminence of ecological issues in IWRM. While excessive concentration of authority in the federal CNA, and the marginalisation of state level water resources institutions is a cause for much concern and heart burn, some decentralisation has already begun. Moreover, arguably, the drastic policy and institutional reforms Mexico has carried out would not have been possible but for unified and aggressive steering to the reform agenda the federal CNA has provided. In 2000, Mexico’s 70 years of one party rule was ended:
Vicente Fox, the then governor of Guanajuato State who had been an avid supporter of decentralised management including COTAS in the water sector, was catapulted to power. The PAN (National Action Party) replaced the PRI (Institutional Revolutionary Party) that had ruled since the revolution, however, politics have become more fractious, suggesting that strong-handed steering of reforms, too, will change to a more open debate form of policy decision-making.

The law of the nation’s waters of 1992 has produced mixed results. On the positive side, decentralisation of irrigation management can be considered a significant success, even though irrigation management transfer to water user associations is not as complete and effective in some southern states as in central and north central states. In virtually all of the canal irrigated areas, however, operation and management of irrigation systems are largely undertaken by user organisations. Federal or state subsidies are also not sufficient although there are apprehensions that many WUAs may not be investing enough in the maintenance of irrigation infrastructure. Likewise, decentralisation of urban water supply and sanitation to local water boards has also met with notable success. Here too, while water fee collection has improved rapidly, water boards are still unable to generate enough resources from fees to maintain and improve urban water supply and sanitation infrastructure.

The water rights reform initiated by the 1992 law of the nation’s waters is the boldest and most controversial of the Mexican water sector interventions. It would be fair to say that it has succeeded in driving home the notion that water is national property, and that users have the right only for pre-specified volumes and periods, providing they obtain a proper title through a concession and pay the stipulated water charges to the CNA. It would be also fair to say that water rights reform has worked in the formal water sector, consisting of industrial and commercial users, and to a lesser extent, in the urban water sector where most Water Boards still abstain from paying water fees to the CNA. It is working well even in the formal irrigation sector where water user associations at the modulo level hold the concessions. However, its achievement in the informal water economy – dominated by groundwater structures, bordos and presas – remains open to question. Here, the sheer numbers of users involved and the logistical complexity of processing their requests for concessions is proving to be a great challenge. To its credit, the CNA has been able to cover a fairly sizeable proportion of groundwater irrigators in states like Guanajuato. However, monitoring the actual extractions by concession holders is extremely difficult and restricting the withdrawals to agreed levels is, of course, out of the question.

This raises a whole range of questions about the ultimate value of Mexican water rights reform. The system of operationalising use rights through concessions so laboriously implemented seems to work in those segments of the water sector – namely, large-scale, formal players in the agricultural, municipal and other sectors – whose water use behaviour can be influenced by more direct regulatory action. However, it is proving impossible to enforce on the informal sector players – 90,000 odd tube well irrigators and countless owners of bordos and presas in the uplands of Mexico, who need to be brought within the regulatory framework.

What lessons does Mexico’s experience offer for India and other Asian countries? Obviously, one must be cautious and circumspect in directly transposing the Mexican experience to India. The two countries have several similarities but important differences, too. Like India, Mexico is a large country but while it has two-thirds of India’s geographic area, it has only 10 per cent of India’s population. Agriculture is still an important sector for the Mexican economy; but its contribution to the national GDP is barely 5 per cent compared to 30 per cent for India. Mexico has done well in terms of overall economic growth but it is still at least a good 20 years behind Mexico. Compared to India’s US $ 800 per capita per year, Mexico’s per capita income of US $ 5,900 per year makes it possible for its policy-makers to view agriculture differently. President Fox’s idea of removing rural poverty is to shift small holders out of agriculture; in India, agriculture will have to be the parking place for the poor for decades to come. Mexico’s agriculture is a big groundwater guzzler by the standards of the Americas but its annual use of 12 km$^3$ of groundwater is trifling compared to India’s annual groundwater draft of well over 150 km$^3$. The most important difference is in the numbers: Mexico is finding it difficult to regulate its 70,000 tube well owners; on the last count, India had 20 million private pump owners, and this number has been growing at a rate of 1 million a year in recent years. Clearly, the system of private water rights through issue of concessions that is proving so difficult to work on tube well owners in Mexico, will prove nearly impossible to implement in India.

Nevertheless, Mexico’s experience does offer interesting ideas for water policy-makers in many Asian countries. The most important and precious of these is the tenacious and proactive steering the Mexican leadership provided to water sector reform. Between 1989 when the CNA was created and 1992 when the law of the nation’s waters, as well as the amendment to Article 27 of the Constitution were approved, Mexico rewrote the basic rules of the game by which its water resources were managed. India enunciated a National Water Policy in 1987 and another one in April 2002 and little changed in the interim. As vacuous statements devoid of an operational roadmap for implementation, Indian attempts to steer water reform at the national level can amount to little.

Since water is a state subject, Mexico’s experience will be more relevant and illuminating to many states – such as Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu – which are doing well in terms of economic growth but are bewitched by growing water, especially groundwater scarcity. States like Andhra Pradesh and Maharashtra have already been implementing their own models of irrigation management transfer, however, they are doing precious little to rein in groundwater depletion on which their agricultural growth precariously rests. However, Mexico’s experience offers little of value to the Indian states in dealing with the complex problem of regulating ground water depletion. If anything, it dispels the notion that establishing and enforcing private water rights can be an important part of a feasible solution Mexico’s experience thus far only suggests that creating private rights without being sure about its enforcement can result in mayhem, or worse, unmitigated disaster in a state like Andhra Pradesh, where over 2 million private pump owners will queue up for concessions if the full provisions of the Andhra Pradesh Land, Water and Trees Act 2002 are put into effect. Even more limited groundwater legislation such as the Maharashtra Groundwater (Regulation for Drinking Water Purposes) Act 1993, which merely tried to ensure a distance of 500 metres between irrigation wells and public drinking water wells has proved a resounding failure, if anything, because of “the complete absence of social support for the legislation” [Phansalkar and Kher 2003].

The idea of COTAS – with suitable adaptation – seems worth experimenting with, not because it has much chance to work even
in Mexico but because someone needs to get groundwater users together to talk about the resource and about their common futures tied to it. Many NGOs working on groundwater depletion in states like Gujarat—such as IWMI’s North Gujarat Sustainable Groundwater Initiative, Andhra Pradesh’s AP Well Programme, the Aga Khan Rural Support Programme in Gujarat—are trying to do what better COTAS in Guanajuato are doing: bringing stakeholder groups together to talk about managing their shared resource. But with government support and legitimacy of the kind that Mexico’s COTAS have, chances are that such NGOs would be able to create better, more representative coalitions of stakeholders. Needless to say that expecting these to arrest groundwater depletion would be unrealistic; an appropriate objective for such organisations should be to promote stakeholder dialogue to start with, followed by planning and research to understand the resource better. Making and enforcing rules for resource appropriation and use must come last, if at all.

Finally, there are interesting comparisons in the role of central and state agencies. For the new water policy to be effective, the central-state arrangement in India—with significant user activity on the ground in disregard of stated policy prescriptions—would require greater ‘vertical articulation’ of policy and institutional arrangement. It will be essential to get the states on board on key issues of policy, and far more so, on mega-projects such as the river interlinking project that the prime minister announced a few months ago. This process has not been going terribly well, if we are to go by reactions to the policy in the chief ministers’ conference in April 2002. Punjab, particularly, held out on the issue of interstate river allocation possibly due to its special interest in the Sutlej. Thus, while it is essential that community and users’ concerns get registered as the new water policy becomes operational, there is still a vacuum at the state level. This is a distinct similarity to Mexico, which too has not been able to find an effective balance between the role of central and provincial agencies. The Mexican ‘national water policy’ is encoded in the Plan Nacional Hidráulico (National Water Plan), which started as India’s Central Water Commission type organisation with the mandate of national level planning and monitoring but soon evolved into IMTA (Mexican Institute for Water Technology). It became largely sidelined from operational responsibility by those very infrastructure interests that drove the CNA to what some observers call ‘hydraulic despotism’. The national water plan, which is updated more frequently than the Indian Water Policy is, nevertheless as prescriptive in its tone and as devoid of an ‘operational agenda’, as is the Indian Water Policy.

Address for correspondence: iwmii-tata@cgiar.org

Notes

1 US $1 = Mex $9.50.
2 Recent studies show annual recharge for the state as 1970 Mm$\textsuperscript{3}$ and extraction at 2818 Mm$\textsuperscript{3}$, leaving an annual deficit of 839 Mm$\textsuperscript{3}$ (Wester et al 1999).
3 IWMI estimated their number at 29,000 in late 1980s (Scott and Flores-López, submitted). The State Water Commission believed that although bordos are traditional structures, a large majority of these came up during the past 10 years as a popular response to growing water scarcity. Local farmers we interviewed supported the view that a majority of bordos found today are less than 8-10 years old.
4 These are used by rain-fed farmers essentially to get one irrigation to establish the rain-fed sorghum crop.
5 As a matter of fact, the State Water Commission (CEAG) has tried to break out of the norm that only concession holders can be COTAS members; it has been trying to broaden participation into COTAS affairs from wider cross-section of the citizenry.
6 For instance, the four-year old Silao and Romita COTAS which also covers the town of Guanajuato has a general assembly which includes 2,049 well owners, 93 percent of them agricultural, and should reflect farmer concerns. However, a general assembly attended by some 100 members, mostly from industry, elected a manager of General Motors as the president and a manager of the Leon airport as the treasurer.
7 As Barker et al (2000) suggest, “With a rapidly growing urban population and increasing industrial share of overall economic growth, it may seem to appear that agriculture will be the ‘sacrificial lamb’.

References


