

Institutions for Water Management in Mexico

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5.1 Introduction

Water management practices in Mexico have changed in recent years mainly as a response to the varying economic, social and environmental conditions of the country. Generally, the management of water resources has traditionally given priority to infrastructural development, with limited considerations of economic instruments and social and environmental factors. The past few decades have witnessed challenges imposed by increasing demands from the different uses and users, as well as growing water quantity and quality concerns. As a result, decision-makers are being forced to consider not only technical solutions when dealing with water planning, management and development, but also have started to consider issues as appropriate institutional frameworks, implementation of demand management practices, protection of natural resources and the environment, participation from the affected sectors and stakeholders, formulation and implementation of legal frameworks, and improving management capacity.

Unlike in most other countries of the world, institutional arrangements for water resources management at the river basin level were first put in place in Mexico as early as the decade of the 1940s, with the primary objective to foster socio-economic development of the several regions based on water availability. These institutions, known as river basin commissions, operated for almost 40 years. When their importance vanished, new institutional arrangements, policies and instruments were developed according to the then priorities of the country. Later, during the 1990s, institutions were established again at the river basin level with the objective of improving water management practices. River basin councils were expected to work at the river basin level, and river basin commissions, committees, and groundwater technical committees at the sub-basin, micro-basin and aquifer levels, respectively.

This chapter analyses the challenges, achievements and constraints of the institution arrangements for water management in Mexico for the past six decades. It also analyses the reasons as to why, inspite of great efforts at the local levels, the achievements of the several institutions that have been established thus far have been limited in terms of rational and efficient management of water resources at the river basin level.

5.2 River Basin Commissions, 1946-1986

During the twentieth century, the economic and social goals at the national level predetermined what was expected to be the most appropriate policies and institutions “in order to cover the needs of the population and encourage national and local economic growth, taking into consideration the environmental capacities of the several regions of the country.” (CNA 1995).

It was towards the end of the 1940s that Mexico embarked on large-scale water-based integrated development programmes¹ for the arid plains of the north, and the tropical areas in the east and southeast of the country. The then administration (1946-1952) focused on the use of water for the integrated development of the areas, with main emphasis in the tropical areas. There was a feeling that the tropics were backward areas where “everything had to be done”, and there was tremendous optimism in the sense that development of these regions was a real possibility because of the availability of the untapped natural resources, mainly water (Estrada 2003). Water was recognised as an engine to trigger integrated development of the individual regions, through which the quality of life of the local people would be improved over both the short and the long terms, and the economic growth of the country would accelerate.

Specific river basins were selected where agricultural (including agro-industries at the commercial level), forestry and industrial development-related activities could be encouraged. A main objective was also to settle the different regions with population from the central part of the country where enough agricultural land was not available. People were encouraged to migrate to the tropics, and thus provide the labour that would be necessary for the development of the areas. The river basins selected had plentiful natural resources, but with population living in extreme poverty, with acute health problems and with inadequate social and support services in the sectors of health, education, communication or transportation.

In order to implement the water-based development plans, a strong institution responsible for water management at the central level was considered necessary. Hence, the then National Commission for Irrigation² was restructured to become

¹ Estrada (2003) has noted that objective of the integrated development programme for the river basins was to ensure that the different economic and social sectors would benefit from the natural resources available in the several basins.

² The National Irrigation Commission was created in 1926. Its first task was to construct infrastructure to irrigate the areas along the border with the United States to promote their economic and social development. At the national level, small irrigation projects were constructed for a more even geographical distribution of investments and accrued benefits. Irrigation districts and units were established throughout the country. By 1946, irrigation districts covered some 775,000 ha, and small irrigation projects accounted for more than 42,000 ha.

the Ministry of Water Resources. To coordinate the activities that would be carried out in the several basins, the river basin commissions were created as the first semi-autonomous, multi-purpose implementing agencies in the country. These commissions were responsible for the development and coordination of both plans and policies at the local levels to promote the growth of the most backward areas. The plans developed were based mainly on economic considerations, but were designed to take into account the social aspects of the several regions as well as the natural resources available (SRH 1952).

Executing and planning agencies were created at the river basin level. The executing agencies included the Papaloapan and the Tepalcatepec River Basin Commissions (1947), the Fuerte River Basin Commission (1951) and the Grijalva River Basin Commission (1952). In order to include larger areas within the integrated development programmes, the Tepalcatepec Commission was wound up in 1960 and the Balsas River Basin Commission, which covered a much larger area, was created the same year. Under the leadership of the Ministry of Water Resources, the following ministries participated in the development of the river basins: Ministry of the Interior, Ministry of Finance and Public Credit, Naval Ministry, Ministry of Economic Issues, Ministry of Agriculture and Livestock, Ministry of Communications and Public Works, Ministry of Health, and Ministry of National Properties and Administrative Control.

In general, the tasks of the executing commissions included, but were not limited to, planning, design, coordination and construction of irrigation projects, flood control programmes and hydropower generation. The commissions were also responsible for expenditures on urban and rural developments, health and communication services (including navigation, ports, roads, trains, telegraph, telephone services, etc.). Planning agencies included the Lerma-Chapala-Santiago and the Panuco Commissions (Figure 5.1).

When the river basin commissions were established, the prevailing policy emphasized the importance of the integrated social and economic development of the regions based on the natural resources available, water being the main resource. The commissions had full authority to plan and execute programmes for integrated development under their direct supervision. They were also responsible for coordinating the activities of the several ministries within the river basin, for which they had limited authority but on which they were able to make inputs. Because the river basins included more than one state, the power of the commissions was higher than that of the states and municipalities. Thus, even though the river basin commissions had the authority to plan and implement the different tasks in coordination with the specific ministries, the fact that the commissions were above the states created tensions among the institutions over the years.

When the commissions were first established, they had full support from the President, and hence they were practically autonomous with almost no budgetary

limitations. However, this situation changed with time, since the following administrations had their own views as to what should be the role, if any, of the river basin commissions within the overall economic strategy of the country.



Fig. 5.1. River Basin Commissions

It is important to note that the performance of the different river basin commissions varied according to the socio-economic and political conditions of Mexico at specific times. These conditions depended, and still depend, on each six-year presidential mandates, and hence, on the priorities and budgetary allocations of each administration. For example, in 1947, the central government considered that the water resources in several geographical areas could act as “engines” for development of the poorest regions of the country. Accordingly, it provided very significant financial support to the Ministry of Water Resources for the implementation of the projects. However, the subsequent administrations had different approaches, which were reflected in the activities authorized and the budgets allocated. Hence, the achievements of the commissions were not always of their own making, since they depended mostly on the decisions at the federal level on which they had limited or no control.

In fact, the records show that the projects implemented by the commissions generally focused on the development of water projects, without much consideration of the long-term needs of the population, or the rational use of the all the natural resources available which could have contributed to the long-term economic development of the region (Barkin and King 1986).

Following is a brief analysis of the main activities and performance of the Papaloapan, Tepalcatepec/Balsas, Fuerte and Grijalva Commissions. For a review on the Lerma-Chapala-Santiago Study Commission, see Wester et al. (2001).

5.2.1 Papaloapan River Basin Commission

The area of the Papaloapan river basin is 47,000 km², with a run-off of 44,476 million m³, representing nearly 12 percent of the national run-off. Fifty percent of this river basin is in the states of Oaxaca (164 municipalities), Veracruz (71 municipalities) and Puebla (29 municipalities).

The Papaloapan River Basin Commission was created on 26 February 1947 as “a technical and administrative body, with the objectives to construct all works for flood control, irrigation, power generation, communication (water transport, ports, roads, railways, telegraphs and telephones) and urbanization in the area, as well as to decide on industrial, agricultural and settlement-related issues within the integrated development of the region.” (DOF 1947a). The creation of this Commission was partially influenced by the fact that institutions were being created in different parts of the world looking for the integrated management of river basins, especially the Tennessee Valley Authority (TVA). According to Poleman (1964) and Barkin and King (1986), the similarity between the Papaloapan Commission and the TVA was that both of them were conceived as developmental authorities to promote the integrated development of the river basins, with a main focus on flood control activities. The main difference, however, was that the TVA was an autonomous institution, whereas the Papaloapan Commission was under the Ministry of Water Resources.

The background for the creation of the Papaloapan Commission goes back to the frequent floods of the Papaloapan river. The records show that in 1921 and 1944, the flood damages were very high, both in terms of human lives and economic losses in parts of the states of Veracruz and Puebla. Hence, in order to develop appropriate flood control measures, the then President of Mexico commissioned a study with the main objective to propose specific alternatives for the overall development of the Papaloapan river basin. The study explored the possibilities for constructing hydropower projects to produce electricity, which in turn would industrialise the rural areas. The report was finalised in 1945. It concluded that it was necessary to create a technical commission for the study of the overall Papaloapan river basin (SRH 1972; SARH 1990) and for the implementation of the appropriate projects.

When the Papaloapan Commission was established, its first president was the Minister of Water Resources. The board of directors included representatives from the Ministries of Finance and Public Credit, and National Properties and Administrative Control. The funds for the projects and running expenses were provided by the central government through the Ministry of Finance and Public Credit. The

first task of the Commission was to carry out several studies for which specific development projects could be formulated. As a result of these studies, programmes were established in the areas of sanitation, flood control, hydropower generation, communications, and agricultural, industrial and urban development (SARH 1990).

During the 1946-1952 period, some of the projects implemented by the Commission included the construction of the large multipurpose Miguel Alemán dam (flood control, irrigation, hydropower generation, and drinking water supply); the establishment of Alemán city (eventually for 150,000 people), construction of levees, training of the Papaloapan river, irrigation projects, water supply and sanitation works, roads, eradication campaigns for malaria and intestinal diseases, and construction of schools, markets and gardens (Poleman 1964).

However, in December 1952, a new federal administration came into power for another six-year period. While the overall objectives of the Papaloapan Commission remained the same, fewer projects were implemented. During this administration, the Miguel Alemán multi-purpose dam was completed, levees were constructed and new irrigation projects were initiated. Roads were constructed and improved, hydropower generating plants were installed, health-related projects were implemented and schools were constructed. The budget allocated was higher than the previous administration, mainly because of the infrastructure that had to be constructed (Orive 1970).

A main constraint to the success of the projects was the poor implementation of the economic policies, for example, agricultural credits and marketing, to promote the growth of more profitable crops. The problem was that an integrated plan which considered the overall management of the region was missing, the financial institutions did not provide the appropriate support and trained staff was not available. For example, the Commission reported that from 1954 it had to provide credits to the farmers from its own budget, as a result of which the credits available were very limited (SRH 1958).

The political priorities changed with time, and the Papaloapan Commission as an institution was not considered as important to achieve the economic policies of the country, compared to when it was established. Its budget was drastically reduced and it could not perform its functions as the institution responsible for integrated activities in the basin. It also suspended the construction of large projects or its participation on health-related activities, education, agricultural research, construction and maintenance of roads and schools, etc. During the 1958-1964 administration, there were virtually no new funds for investments and most of the limited ones that were available were allocated for operation and maintenance activities and for the construction of few small projects for drinking water supply and flood control. Consequently, the staff was reduced to about one-third of what it was in 1956. Additionally, in 1962, the then administration considered that the several river basin commissions should not be responsible for works that were not strictly water-related. Consequently, the Papaloapan Commission handed over the

responsibility for road construction to the Ministry of Public Works (Orive 1970; SARH 1990).

The budget allocated to the Papaloapan Commission under various six-year presidential administrations, over the period 1947-1961, are shown in Table 5.1.

Table 5.1. Budgets allocated to the Papaloapan Commission, 1947-1950

Periods	Budget (million pesos in 1972 constant prices)
1947-1952	270
1952-1958	592
1958-1964	172
1964-1970	202
Total	1,236

Source: SRH 1972

Of the total 1,236 million pesos (at 1972 constant prices), 41 percent was allocated for water projects, 24 percent for communications, 11 percent for social activities, 10 percent for administration, 4 percent for agricultural development, and 5 percent for equipment (Table 5.2).

Table 5.2. Budget of the Papaloapan Commission for different activities, 1947-1972

Activities	Percentage of Investment funds
Water works	41
Communications	24
Social activities	11
Administration	10
Agricultural and livestock development	4
Equipment	5
Others	5

Source: SRH 1972

The studies that the Commission carried out on hydrology, climate, geology, agriculture and anthropology were very useful. However, irrespective of the overall investments that were made by the Papaloapan Commission, there was no real evaluation of its overall achievements and the lessons that could be learnt from such a development activity. Official reports focused mainly on the descriptions of the implemented projects (SARH 1990), but there was hardly any serious assessment of the experiences resulting from the several development plans, or even specific activities, carried out by the Commission. Some of the few broad impacts noted by the Papaloapan Commission (SARH 1958) were the following:

- Flood control, which during the years 1952, 1956 and 1957 would have resulted in economic losses of more than 800 million pesos, not including human lives;

- Agricultural production in the basin, estimated at 290 million pesos before 1947, increased at a 8.4 percent annual rate;
- Cultivated areas increased from 223,000 ha in 1947 to 394,000 in 1955;
- Hydropower was generated;
- Sugar production increased by 150 percent between 1947 and 1958;
- Approximately 171,000 ha were irrigated.
- More than 2,000 km of roads were constructed; and
- Revenue of the Papaloapan river basin in terms of taxes collected represented 56 percent of the overall public investment in the basin.

Globally, the Papaloapan Commission was one of the first programmes of integrated river basin management. It was also one of the very first development programmes which focused on the tropics. However, in spite of the initial interest to develop the social and environmental potentials of the area, the official concern was almost exclusively on flood-related problems. In fact, the main accomplishments of the Commission were in terms of flood control and communications works, mainly due to the completion of the Alemán dam in the first case, and road construction in the second. The benefits of the Miguel Alemán dam reached many users in the urban centres in terms of electricity, large-scale farmers (mainly sugar cane production), and ranchers (livestock development). In addition, large-scale farmers and ranchers were able to realize better prices for their products because of the road networks constructed. In terms of the expenditures for rural development, most of it was used to build Alemán city. Some parks, streets and recreational facilities were also constructed in other communities (Poleman 1964).

The achievements in terms of education, health and urban improvements were very important for the area. For example, malaria and yellow-fever were eradicated, and schools were constructed and improved, which benefited about 40,000 students. Even then, however, thousands of young people did not have access to education. In fact, the Papaloapan Commission noted (SARH 1990) that there was such an increasing demand for education that it was simply not possible for the Commission and the Ministry of Education to meet this demand. Even by 1987, when the Papaloapan Commission was dissolved, educational level of the area remained 10 percent below the national average.

Additional activities of the Commission included clearing unoccupied land to prepare for the settlements of the farmers to whom the land would be given for cultivation. It is important to remember that one of the objectives of the Papaloapan Commission was to settle “virgin land” with farmers, who were not from the region. The main problem with this policy was that there were already two million people living in the area, and the existence of virgin land was more of a myth than a reality (Diaz-Cisneros 1974).

Some major constraints were that the Alemán dam was designed for irrigation purposes before studies were conducted on the needs and desirability of supplementary irrigation in the area; Miguel Alemán city was laid out even though there were well-established towns near by; and a three-lane paved highway was constructed when there were not even unpaved roads. In addition, most of the settlement projects that were implemented ended in failure because of the lack of services available to the population (Poleman 1964).

While the policies of the 1946-1952 presidential administration focused on the construction of large projects, the 1952-1958 government chose instead more direct forms of assistance to promote development in the basin, such as secondary and feeder road systems and programmes for agricultural credit and settlement schemes. The general objectives of the new Administration were the intensive use of large land areas, both virgin and under use, and the improvements in educational and sanitary conditions. Contrary to what had been planned earlier, the budget for water projects, drainage and road construction was drastically reduced (Poleman 1964).

Overall, the agricultural development activities resulted in a few concrete achievements, partly due to the changing priorities and interests of the different administrations. For example, it was planned to construct a very costly gravity-flow canal from the Miguel Alemán dam to irrigate an area of 160,000 ha. However, this canal was too expensive and was thus never constructed. Two smaller irrigation projects were planned, Los Naranjos and Blanco river. Los Naranjos was supposed to irrigate a maximum of 4,000 ha and the Blanco river project, approximately 35,000 ha. In the case of Los Naranjos, the scheme proved to be uneconomical after two seasons of small-scale operation and was finally abandoned in 1957. The Blanco river scheme was never started because the local ranchers did not want to divide their land into smaller lots and refused to cooperate with the Commission. Orive (1970) has noted that under this project, only 1,800 ha were cultivated from the total that was planned.

In terms of the changes in the region due to the projects implemented by the Commission up to 1962, Poleman (1964, p 99) noted that "...the 16 years of the Papaloapan project have brought about important changes in the Papaloapan basin and its economy... If this suggests that the lower basin at least is now well on the way of sustained economic growth, it does not follow that the project has been completely successful. Nor does it follow that the Commission's activities have been based on the logical unfolding of a preconceived plan of development. Instead, much of the programme has evolved through trial and error, and on several occasions it has undergone major alterations in order to conform with changing national policies. The result has been a number of abandoned schemes, failures and expensive errors."

In general, settlement projects and credit promotion were not very effective. In many cases, they can be considered to be total failures (Wionczik 1982). Loans

were available only to very few farmers, and the settlements were very small, with no more than 550 families. Consequently, in 1957, the funding for the Commission was drastically reduced (Poleman 1964). A very regrettable result was the displacement and improper resettlement of 22,000 mazatecos indigenous people due to the construction of the Alemán dam, where approximately 40 percent of the people spoke only their native languages and 56 percent could not afford any shoes. In this community, where the only economic activity was subsistence agriculture, about half of the families were resettled (McMahon 1989). According to Bartolomé and Barabas (1990), even by 1972, the indigenous people were still suffering from inappropriate housing, lack of water and electricity, and under the best conditions were connected through small roads which soon became unusable due to lack of maintenance. Even worse, most of the population did not receive title deeds to their lands, and thus could not obtain any credit. This indicates that the Papaloapan Commission, while entrusted to implement the objectives of the national policies which focused on agricultural and industrial development for which infrastructure had to be developed, totally failed to realize that more efforts were necessary to properly settle thousands of indigenous people who did not receive adequate compensations, and were mostly ignored by the development activities³.

In relation to the conditions under which the Commission operated during the 1970-1982 period, Estrada (2003) noted that in 1970, with the 1970-1976 administration, regional development activities⁴ were promoted as one of the main economic strategies to reduce the inequalities among the different regions of the country. The programmes implemented were for rural, agricultural and industrial development at the regional levels.

From 1972, the changes in the economic policies of the country, and hence water policies, resulted in radical modifications of the institutional frameworks of the country, including those related to water planning and management. The river basin commissions did not disappear, but were restructured to fit the new national development policies, mainly because these policies encouraged water planning at the regional level (SRH 1975). The programmes to develop the tropical areas were still considered important within the proposed development plans. Accordingly, the commissions found an appropriate niche for their work.

³ More recently, Murillo (2003) carried out an overall assessment of the Papaloapan river basin, including the living conditions of the mazatecos indigenous people who were resettled. The mazatecos said that promises that were made to them when they were resettled have not yet been fulfilled. These included lack of paved roads and no drainage in several towns like Nuevo Ixcatlán, Nuevo Cantón and Las Pochotas.

⁴ When the Papaloapan commission was first established, its objective was to achieve the integrated development of the basin. However, during the 1960s and 1970s, the official policies changed, and the focus changed to "regional development" with the objective to reduce inequality among the various regions. Integrated development was no longer considered to be important.

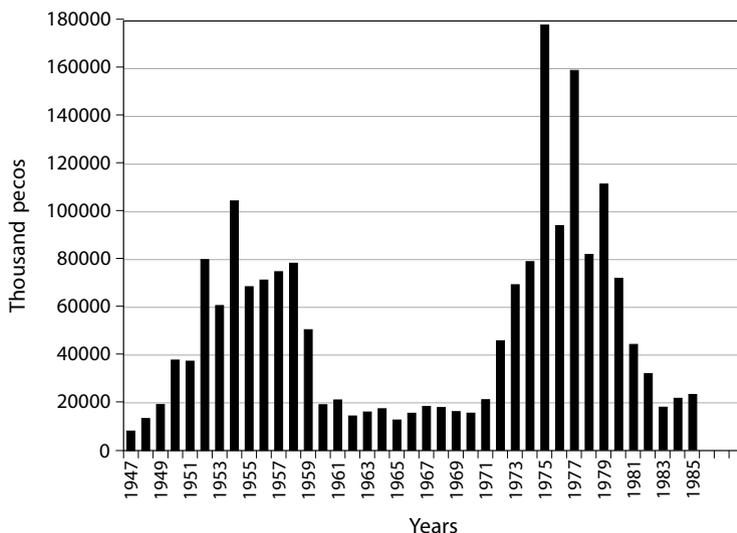
In 1972, a government commission was established to evaluate the economic development of the High Papaloapan river basin, including the demands from the population in terms of infrastructure. The recommendations stressed that the Papaloapan Commission should receive further financial support and become the agency responsible for regional planning as well as for irrigation and livestock-related activities, aquaculture, credit-related issues and construction of all necessary infrastructure (SARH 1988). The Commission became again the coordinating agency for the activities carried out by all the ministries within the basin.

With the beginning of the construction of the Cerro de Oro dam, the budget of the Commission increased by 117 percent. However, approximately 26,000 Chinantecos indigenous people were affected by this dam, and their resettlement process was not only inadequate but was also totally unsatisfactory. A main reason for this sad state of affairs was because the Papaloapan Commission did not pay enough attention to the demography and ethnic characteristics of the population: the emphasis was primarily on the number of persons who had the title deeds (Bartolomé and Barabas 1990)⁵.

In 1974, the Ministry of Water Resources and the Papaloapan Commission prepared jointly a project, the objective of which was the integrated regional development for the overall river basins of the country. The Inter-American Development Bank provided a credit and the Papaloapan Commission, acting as an administrative and not as a coordinating body, engaged in rural development activities to increase agricultural production by organizing the farmers, and providing technical assistance and credit (SRH 1988). The Commission was responsible for planning and development. It also provided funds to other organizations to carry out their projects, which included irrigation works, drinking water supply and sanitation projects, electrification, and construction of roads, schools and clinics.

Figure 5.2 shows the annual budget allocations of the Papaloapan Commission from 1947-1985. It indicates extremely high variations in the budget from one year to another, which made any medium- to long-term planning difficult, if not impossible.

⁵ In his assessment of the Papaloapan river basin, Murillo (2003) has noted that the chinantecos indigenous people are still lacking services which were offered to them such as paved roads, sidewalks and drainage. In addition, for example, in Las Pochotas, people complained that they were not given the 20 ha of land they were promised, but only 8.5 ha; and that in Los Naranjos, there are no irrigation activities or roads.



Source: SARH (1990) in Estrada (2003)

Fig. 5.2. Annual budgets of the Papaloapan River Basin Commission, 1947-1985

In 1982, the economic crisis affected negatively the whole country, including all national and regional level institutions. During this time of economic crisis and changing development policies priorities, the then administration decided to dissolve the river basin commissions. The Papaloapan Commission was officially dissolved on 24 December 1986 (DOF 1986), and projects and activities were handed over to the state offices of the SARH.

5.2.2 Tepalcatepec and Balsas River Basin Commissions

The second river basin commission that was established was the Tepalcatepec Commission, created by a presidential decree on 19 December 1947. It followed the same strategy as the Papaloapan Commission. Its main objectives were “to plan, design and construct the infrastructure necessary to develop the areas within the Tepalcatepec river basin” in an integrated manner. The Tepalcatepec river basin covers some 18,000 km² in the states of Jalisco and Michoacán. Even though this basin was not affected by severe floods, there were acute social, health and communication-related problems that the Commission was expected to address (DOF 1947b).

As in the case of the Papaloapan Commission, the president of the Tepalcatepec Commission was the Minister for Water Resources, and the board of directors included representatives from the Ministries of Finance and Public Credit, and National Properties and Administrative Control. The funds for its operation were channelled through the Ministry of Finance and Public Credit.

The main tasks of the Commission were the construction of irrigation networks within the Tepalcatepec river basin, rehabilitation of irrigation networks to improve their efficiencies, and the construction of the necessary road infrastructure to market the products that would be produced throughout the region (DOF 1947b). Extensive technical studies were carried out on issues such as population, education, health, sanitation, water resources, soils, planning of irrigation and hydropower projects, credits, urban and rural electrification, communication, forests, etc. (SRH 1961). The area originally selected to be under the Tepalcatepec Commission included three sub-regions of the state of Michoacán: cold jagged mountain chains, mild temperature areas, and coastal-tropical areas.

During the 1947-1952 period, some of the projects constructed under the Commission included the Valle de Juárez, San Juanico, Jicalán, Cóbano, Coróndiro, Piedras Blancas and Punta del Agua dams; 90 km of main canals, and 3.6 km of tunnels, in addition to numerous small-scale irrigation works. Other activities included water supply and drainage projects, as well as provision of electricity for urban and rural areas, construction of main and secondary roads, construction of schools and, most importantly, the eradication of malaria, gastro-intestinal diseases and tuberculosis in the region (Orive 1970).

The annual budgets allocated to the Tepalcatepec Commission during the period 1947-1958 are shown in Table 5.3. As indicated, the budget increased from four million pesos in 1947 to 41 million pesos by 1952. It is worth noting that during 1952-1958, the investment for irrigation activities decreased overall in the country for the first time in 27 years.

As it can be observed, the budget for irrigation programmes of the Tepalcatepec Commission was reduced from 7.5 percent in 1953 to 4.9 percent in 1958. Similar to the Papaloapan Commission, the projects implemented during this period were fewer than before. Projects for irrigation and power generation were constructed, which allowed rural areas to receive electricity. By 1958, the main impacts of this Commission were considered to be a significant increase in literacy (a large number of schools were constructed in remote areas through which more than half of the illiterate population learnt to read and to write), and construction of road networks which connected isolated communities to the rest of the country. The economic benefits were calculated to be around 400 million pesos, based mainly on the value of the agricultural production and the electricity generation (Orive 1970), in addition to the commercial and industrial activities that were promoted in the basin.

Table 5.3. Annual budgets of the Tepalcatepec Commission, 1974-1958

Year	Annual budget (Million pesos)	Percentage of total investment funds in irrigation pro- grammes	Budget in 1996 pesos (Millions)
1947	4	1.8	11
1948	10	4.2	25
1949	13	5.2	30
1950	17	4.7	36
1951	21	4.9	35
1952	41	7.5	67
1953	43	7.5	72
1954	34	5.5	52
1955	32	5.0	44
1956	32	5.3	41
1957	32	5.0	39
1958	32	4.9	38
TOTAL	311	5.35	490

Source: Report of the Ministry of Water Resources (1958) in Orive (1970)

One of the major limitations of this project was that the Commission focused mainly on the development of the tropical areas without much concern for the mild- and cold-temperature zones, where most of the local farmers lived. In addition, the small farmers who lived in the tropical areas could not benefit from this development, except for irrigation in some cases. One of the reasons was that the farmers did not have access either to credit or to technical assistance and could not grow profitable cash crops like cotton, cantaloupe, watermelon or lemons. In other words, the development plan of the Tepalcatepec River Basin Commission failed in many cases to provide support to the farmers so that they could have access to credit and technical assistance. The credits available from the agricultural bank were insufficient, and were seldom provided on time. Under these circumstances, and as the years passed, the subsistence farmers did not have any other alternative but to rent their land to large-scale farmers who monopolised both the land and the credits available. In order to make a living, many of the farmers had to work as share-croppers for the big farmers who had rented their land (Díaz-Cisneros 1974).

Geographically, the Tepalcatepec river basin is within the Balsas river basin. Hence, in order to cover a larger geographical area, the Tepalcatepec Commission was dissolved, and the Balsas River Basin Commission was established on 11 November 1960. The action plan for the newly created Balsas Commission included the Federal District and the states of Michoacán, Guerrero, Jalisco, México, Tlaxcala, Puebla, Oaxaca and Morelos. The tasks of the Balsas Commission included the study, planning, design, construction and follow-up of all infrastructural development for flood control and irrigation, hydropower generation, and activities related to water supply, health, communication networks, trains, telegrams, telephones and ports. The Balsas Commission was also responsible for agricultural,

industrial and livestock developments, as well as for human settlements (DOF, 1960). While the Tepalcatepec Commission was responsible for development projects in 17,915 km², the Balsas Commission was responsible for an area of 112,161 km². The investments funds allocated to the Tepalcatepec Commission increased from 21 million pesos in 1959 to 177 million pesos by 1964 (including 120 million of internal financing), after it became the Balsas Commission (Orive 1970).

The Executive Director of the Balsas Commission was a respected past-President, Lázaro Cárdenas, who managed to bring considerable prosperity to the basin. The activities of the Commission included mostly the planning of projects for hydropower generation, agricultural development, water supply, communication networks, etc. Irrigated areas were developed and roads and large dams were constructed. Water supply and drainage projects were implemented; improvement of urban areas included an average of 17 communities per year and the construction of 11 schools per year. The annual value of the agricultural production in the irrigation districts within the basin reached 735 million pesos in 1964 (Orive 1970).

As with the rest of the commissions, the Balsas Commission was dissolved after some 20 years of existence.

According to Barkin and King (1986), the main investment of the Tepalcatepec/Balsas Commission in the area was in terms of irrigation, drainage, roads and pilot-schemes for agricultural developments. Social projects represented only 10 percent of the total budget of the Commission until 1965. However, the Commission had very positive impacts on the people in the region. For example, the construction of schools was fundamental to promote education, even though this investment represented only 3 percent of the total expenditure of the Commission. Water supply, rural electrification and urban improvements also benefited the local populations, who contributed with labour so that as many towns as possible benefited with services at low cost. Access to electricity increased at twice the national rate between 1950 and 1960. In terms of health programmes, the Commission also contributed with limited funds to the eradication of malaria⁶. In addition, hospitals and clinics were constructed by the Commission for many communities. It should be noted that while the social projects were implemented for the entire basin, most of the economic investments were made mainly in the tropical areas. Overall, because the credit facilities were limited, only a few people could benefit from the prosperity brought about by the irrigation projects.

All the activities implemented by the different river basin commissions had beneficial impacts on the overall development of the country. The problem, however, was that the programmes and projects did not seem to have been successful in achieving cumulative effects at the regional levels. In the specific case of the

⁶ This programme was promoted jointly by the governments of United States and Mexico.

Tepalcatepec Commission, perhaps the most important achievement for the development of the area was that it brought to the attention of the government the need for additional investment on a variety of development-related issues. Hence, while the spending on social issues by the commission may be considered to be limited compared to the needs of the region, the investments made by different institutions and communities were very important for the improvement of the quality of life of the population (Barkin and King 1986). This was an important contribution.

5.2.3 Fuerte River Basin Commission

The Fuerte River Basin Commission was created on 27 August 1951, as a “technical and administrative body under the Ministry of Agriculture with the objective of achieving the integrated development of the Fuerte river basin.” As with the previous commissions, its objective was to foster economic development of the area where water could be the engine for development through the construction of infrastructure, agricultural and industrial developments, and hydropower generation. It was expected that agricultural development would result in extensive industrial development which, in turn, would result in the development of new urban areas, ports, airports, roads, trains and communication networks (DOF 1951).

In 1952, the Fuerte Commission took over the activities of the Fuerte irrigation district, which included planning and construction of projects for flood control, irrigation, hydropower, water supply, sanitation, and road networks and also improvement works. During its first year of operation, the budget of the Commission was four million pesos, which represented 0.7 percent of the total expenditure for irrigation at the national level. The budget increased later, especially during the construction of the Miguel Hidalgo y Costilla dam, when the figures represented 5.4 percent of the total investment in irrigation in the country in 1958 (Orive 1970). On 27 May 1958, it was agreed that the Fuerte River Basin Commission would also be responsible for the development works of the Sinaloa river basin, covering a total area of 35,000 km², with very rich land in the states of Sinaloa, Chihuahua, Sonora and Durango (SARH 1986).

During the 1958-1964 period, projects on irrigation, rural development, water supply and sanitation were constructed. Approximately three million pesos were invested per year in schools (55 percent), water supply (30 percent), electricity, roads and urbanization-related activities (15 percent). Overall, some of the projects started by this Commission included maintenance works for irrigation projects, technical assistance, water supply and some financial support for schools, electricity, roads and urbanization projects (Orive 1970).

In 1964, the objectives of the Commission were modified so that they would be compatible with the new regional water plans. The new priorities became planning, construction and operation of water projects, mainly to transfer water resources towards the northern areas where water for agriculture and livestock pro-

duction had become important. Within the Water Plan for the Northwest of Mexico, the Josefa Ortiz de Domínguez dam was constructed during the 1964-1970 administration, and the Ing. Guillermo Blake dam during the 1970-1976 administration (SARH 1986).

The Fuerte River Commission was operational from 1951 to 1985. Following the changes in the national policies of the 1982-1984 period, it was decided that the Commission would become part of the government of the state of Sinaloa. The Commission was dissolved by a presidential decree on 8 May 1985 (DOF 1985).

5.2.4 Grijalva River Basin Commission

The Grijalva River Basin Commission was established in 1952, but it was not until 1959 that the president and its board of directors were appointed. The objective of this Commission was to promote the development of the southeastern regions of the country, including parts of the states of Tabasco and the Yucatán peninsula, incorporating approximately 50,000 km². The specific objectives included flood control, irrigation development, water supply, sanitation, and road construction (DOF 1951).

The first stage of the work of the Commission included a series of technical studies, extensive drainage works and construction of very essential roads. Flood control projects were constructed covering more than 260,000 ha. Since one of the main objectives of the Commission was to implement an extensive programme of settlement, with the support of irrigation and promotion of agricultural practices in tropical areas, the Chontalpa Plan was initiated during the 1952-1958 period (SRH no date). Additionally, the Malpaso dam was constructed between 1960 and 1964, and the Malpaso hydroelectric plant was built during 1964 to 1967.

The Chontalpa, in the coastal plain of Tabasco, was a mixture of forest (43 percent), pastures (24 percent), annual crops (22 percent) and perennial crops (11 percent). There were acute health problems because the only source of water available to the population was contaminated; most of the land was used for subsistence agriculture with very low returns and hardly any commercial value; and there were no roads for the distribution of agricultural or animal products. The Chontalpa Plan was meant to be a model for integrated development, where housing, education, health, irrigation, technical assistance, and communication were expected to be properly planned and implemented (Orive 1970). The Chontalpa Plan included the development of thousands of hectares of land in two phases. The first phase was to be implemented from 1965 to 1974, and included the development of 140,000 ha in the left bed of the Mezcalapa river. The second phase was to be implemented in the areas of Cuduacán, Jalpa and Nacajuca, but depended on the construction of infrastructure in the Samaria-Mecoacán areas (Contreras-Moreno 2002).

On 10 January 1972, the trusteeship for the Chontalpa Plan was established under the Ministry of Finance, and the Southeast Bank was to provide credits for agriculture and livestock development. There was an initial investment of 25 million pesos, out of the 200 million pesos that were to be invested during the first stage of the Chontalpa Plan. The participating institutions were the Ministry of Agriculture and Livestock, Ministry of Health, Administrative Committee for the Construction of Schools, Ministry of Education, Federal Power Commission, National Commission for Popular Subsistence, Southeast Bank for Agricultural and Livestock Development, National Bank for Agricultural Credit, and the government of the state of Tabasco.

In 1971, the Grijalva Commission was requested to plan and implement a second project for agricultural and livestock development in Tabasco, the Balancán-Tenosique Project. It was planned to be an integrated development plan under the same lines of the Chontalpa Plan, with an investment of 400 million pesos. The project covered some 115,000 ha of land, and was to be developed in two stages. The first stage included the development of the northern part of 50 000 ha (10 ejidos, or common lands, of 5,000 ha each). Some 20 parcels were established for agriculture, livestock and forestry development (Díaz-Cisneros 1974).

The Balancán-Tenosique Plan included the construction of main and secondary roads that would connect the communities. Pre-feasibility studies were carried out. It was found that 10 percent of the land was suitable for livestock production and the balance could be used for irrigated agriculture. Some 20 population centres were to be developed, with services such as water supply, sanitation, electricity, hospitals, primary schools, sports centres, etc. Some 250 families were expected to live in each centre. The land, each of 20 ha, would become cooperatives and land owners would work jointly to increase productivity, promote technical development and revenue generation, develop industry and generate employment. It was expected that the small-scale industries would be integrated, both vertically and horizontally, with the economic activities of the region, and that the added values would remain in the area and would benefit the farmers. During the planning stage of this plan, there were about 1,000 families from the state of Tabasco, Michoacán, Guanajuato and Chiapas in the region. About 4,000 families from Tabasco were expected to be settled in the area. The plan identified areas for the development of natural forests or plantations of valuable trees such as cedar and mahogany, as well as orchards of fruit trees. The economic activities would include agriculture, animal husbandry and bee-keeping. In addition, two areas were selected which would be under the control of the government for reforestation and research activities (Contreras-Moreno 2002).

In 1973, the Executive office of the Grijalva Commission assessed the performance of the Commission (Echeagaray 1973). According to this evaluation, up to 1973, the total investments of the Commission was approximately 2,360 million pesos: 118 million pesos during the 1952-1958 period; 1,026 million pesos during 1958-1964; 840 million pesos during 1964-1970; and 376 million pesos during

1972-1973. Out of the total amount, 980 million pesos had been invested in the Chontalpa Plan.

The assessment report concluded that the overall impacts of the Chontalpa Plan were very poor. The objective was to develop 140,000 ha during the first stage of the plan and 135,000 ha during the second stage, for a total of 275,000 ha. The first stage was also divided into two phases: a first phase of 80,320 ha, which was under development during the time of the assessment, and the second phase of 59,680 ha which was to be developed in the near future. In reality, out of the 80,320 ha that were being developed, works and services had been implemented to utilise only 26,700 ha for agriculture and livestock-related activities. The rest was "being wasted" because of lack of credit and absence of viable activities for the local population. The conclusion was that, 20 years after the plan was formulated and had received an investment of about 980 million pesos, it had not resulted in the expected outputs. The population did not benefit from the projects and services mainly because of lack of credits. Due to such poor results, it was recommended that highly profitable crops like banana, cacao and sugar cane would have to be introduced in the area, which might result in short-term profitable returns on the high investments that had already been made (Echeagaray 1973). According to Redcliff (1982) employment generated in the area was very limited and the peasants were ousted from their lands. The main constraint was that the control of the project was in the hands of financial institutions and the project was basically planned and implemented from Mexico City (Barkin and King 1986), with virtually very little local involvement.

The assessment by Echeagaray (1973) also pointed out that the health and education-related activities, which were the responsibility of the Grijalva Commission, were handed over to the Ministry of Health and the Ministry of Education in 1972. In addition, the activities related to trusteeships had also been handed over to the National Bank for Agricultural and Livestock Development. The assessment strongly recommended that the Commission should be restructured in order to become an implementing body for integrated development, since "at present, it has become basically a regional office for water resources for the state of Tabasco, with no decision-making power in the state of Chiapas, where the High Grijalva is located. It is necessary to develop an integrated plan for the development of the entire Grijalva basin" (Echeagaray 1973, p 5).

In his analysis of the Chontalpa Plan, Barkin (1978) noted that the plan was originally conceived as a pilot project for the management of the humid tropical areas of Mexico, which, if successful, could provide solutions to political and economic problems the country was facing. However, inadequately planned and implemented projects resulted in massive deforestation and ecological deterioration. The objectives of the plan could not be achieved because of lack of technical assistance to the farmers, inadequate availability of credits and unstable employment generation.

No records exist at present as to whether the Grijalva Commission was restructured, or if the Chontalpa Plan was modified to suit the interests of the region. The report of activities of the Grijalva Commission 1974-1975 (Grijalva Commission 1975) only notes some activities on drinking water and sanitation in urban and rural areas, irrigation, drainage and aquaculture, with investments of millions of pesos.

The Commission was dissolved in 1985, and its responsibilities were transferred to the state offices of the Ministry of Agriculture and Irrigation.

5.3 Factors which influenced the performance of the river basin commissions

In order to understand the water-based integrated and regional development programmes and institutional arrangements, it is necessary to analyse the forces that provided the context for these programmes and institutions. It is important to note that water and agricultural policies have been intertwined for decades as part of the economic development strategies of the country. Hence, any change in the water policies affected the agricultural policies, and vice versa.

In 1947, when the river basin commissions were established, the economic policies of the country focused primarily upon large-scale agricultural and industrial development projects. Numerous large projects were constructed for different purposes, the most important of which were for irrigation and hydropower generation. The investment in irrigated agriculture was extensive. From 1947 to 1967, irrigation was introduced in more than 1.2 million ha. The expectation was that expansion of irrigated agriculture would bring agro-industrial development, increase exports, and generate employment opportunities.

However, a major constraint for policy implementation for all the sectors, including those in water and agriculture, was that the programmes and projects at both national and local levels had to be planned and implemented only within the six-year presidential administrations. Historically, with the election of a new President, even though he was from the same political party as his predecessors, the new Administration invariably made radical changes in national priorities, policies and programmes. This has meant that the continuity of major development programmes and projects can seldom be assured beyond the six-year Presidential term.

Regarding the development of the rural sector, according to Schumacher (1981), de Janvry (1995), and Diaz-Cisneros (1974), interest and support in irrigated agriculture, and thus in water resources development, have varied dramatically within the different six-year presidential periods. For example, during the 1946-1952 presidential term, the national policies were to invest heavily in the dif-

ferent regions, more with economic than social objectives. The administration that followed during 1952-1958 faced high inflation rates and currency devaluations. Consequently, the total budgets of the different ministries, including the river basin commissions, were reduced in real terms. However, since there were large development projects under construction (mainly for irrigation and hydropower generation), the Ministry of Water Resources still received some priority. In spite of this, its budget was reduced from 13.8 percent of the total national budget in 1953 to 7.8 percent of the total national budget in 1958. The support to the river basin commissions continued, but the projects implemented became fewer. More importantly, the power and authority of the commissions were steadily reduced. The political perception was that the commissions clashed with the other ministries and with the state governments. For example, the Tepalcatepec Commission found itself having no funds for the construction of new development projects, and the Fuerte Commission lost its initial mandate (Orive 1970). The 1952-1958 administration achieved higher agricultural outputs, but it was accompanied by high levels of rural under-employment.

At the beginning of the 1960s, national exports declined, investment plans for the public sector were changed, and the budget allocated to the agricultural sector was drastically reduced, impacting negatively on the performance of the river basin commissions. Less irrigated areas were developed but there was more financial support for the maintenance of the irrigation districts. From 1964, the water policies of the country emphasized not so much the construction of water projects, but the improvement and development of small irrigation projects primarily because the objective was to increase the social benefits. In addition, the concept of integrated development of basins was changed to integrated regional development, which included several basins. For water resources planning, several regions were established and water plans were formulated for the northwest, central and central-gulf regions. A National Plan for Drinking Water was prepared to ensure future availability of water supply for the Mexico City Metropolitan Area (SARH 1988).

In 1972, a new water law was enacted⁷, and a commission was established to develop a national water plan, with national and regional objectives. In 1975, the National Water Plan was finalised, and in 1976, the National Water Planning Commission was established to implement it, and to update it on a regular basis (CNA 1995). The 1975 Water Master Plan stated that the management of water resources would be carried out at the regional level based on the hydrology of the country. The plan also proposed the establishment of water institutions at the regional level, which would include the major river basins. These institutions would have decision-making power and would have the authority to formulate the regional water development plans, prepare and implement actual projects, and decide on the fees and collect them for water users and effluent discharges. The central authority was to be responsible for the policy formulation at the national level, coordination among the different sectors, resolution of conflicts among the re-

⁷ The previous water law was enacted in 1932.

gions, integration of regional plans into a national planning framework, implementation of large-scale and technically complex projects, and management of research and training programmes (SRH 1975).

According to the 1975 Water Master Plan, 13 hydrological regions were established, and regional programmes as well as water development programmes were developed for each one of the regions, with the objective of using more efficiently land and water resources available, and to reduce the prevailing inequalities in water availability to the people. The water development programmes included large-scale irrigation, flood control and drainage for agriculture; water supply for major urban and industrial areas, and multi-purpose hydropower projects (Herrera-Toledo 1997).

In 1976, due to the importance of irrigation at the national level, the Ministry of Agriculture and Livestock and the Ministry of Water Resources were combined to form the Ministry of Agriculture and Water Resources⁸. This new institutional arrangement, under which water planning, management and development activities were placed under different ministries, made coordination and execution of any water policy very difficult. This complicated the implementation of the 1975 Water Master Plan, as well as the performance of the National Water Planning Commission⁹.

By 1982, water scarcity and water pollution had become serious problems at the national level. The new administration (1982-1988) prepared a new water policy by considering these constraints. Among the other problems it addressed were flood control, conflicts between water uses and users, and low efficiency of water use in all the sectors. While the need for construction of infrastructure was acknowledged, the main objectives were appropriate use of water, maintenance of all types of infrastructure, water pollution abatement through better administration of water resources, improved social and economic efficiency, technological improvements, and human resources development.

In an effort to decentralize, the Ministry of Agriculture and Water Resources delegated activities to its offices in the states and established regional coordinating agencies to improve the integrated management of water at the river basin level. Since the new water policy emphasized the management of water resources at the regional level, it was decided that the offices of the Ministry in the states would

⁸ The previous Ministry of Water Resources became one of the five offices of the newly created Ministry.

⁹ Some of the main achievements of the Commission were the formulation of the overall national water policies in collaboration with the agricultural sector, formulation of the 1981 National Water Plan which emphasized regional aspects more than the 1975 version, preparation of the water plans for the states, and the basis for the water-related programmes for the 1976-1982 and 1982-1988 National Development Plans (CNA 1995).

take over the responsibilities of the river basin commissions, including further planning, management and development of water resources, and that the river basin commissions should disappear (SARH 1988). It was decided that “plans for the use of water resources, developed by the authorities at the municipal, state and federal levels, will be based on the hydrologic basin, but taking into consideration the development trends in each region.” (PRI/IEPES 1982, p 152).

During the years the commissions acted as executing agencies, they made determined attempts to use water as a part of the national effort to develop the several basins and regions. However, while the activities carried out by the river basin commissions had beneficial impacts on the overall development of the country, their programmes and projects did not achieve their objectives at the regional levels. This is because increase in irrigated area would not necessarily increase agricultural production, and thus improve the quality of life of the local populations. Investment in social issues, and provision of credit and technical assistance, are equally important factors to ensure the long-term success of any agricultural development project (Barkin and King 1986).

Because infrastructure is long-lasting, the work of the commissions was appreciated mostly in those places where water, sanitation and road projects were constructed. Barkin and King (1986) have noted that the overall expenses of the Tepalcatepec Commission in the implementation of projects (Balsas Commission included), from 1947 to 1964, were 579.9 million pesos at 1960 prices. The corresponding figures for the Papaloapan Commission was 1,360.4 million pesos, for the Grijalva Commission 1030.6 million pesos, and for the Fuerte Commission 838.8 million pesos (Table 5.4).

An important factor to note for the time during which the commissions were functional, as well as at present, is that the river basin commissions, being semi-autonomous institutions, were coordinating entities for the national funds at the regional level. The commissions were active in several states, where they were able to coordinate the efforts of the several ministries to improve the social conditions of the regions. This task was specially challenging, since it depended on the political will of the parties and required considerable commitments from all the parties, which was, and continues to be, a most difficult task.

The idea of managing water at the river basin level reappeared later, and continues until the present day. However, a serious limitation that has remained until now is that the different institutions for water resources management at the river basin level continue to suffer, just like during the 1940s, from a short-term planning horizon of six years which ensures that plans, programmes and activities are not properly and adequately implemented.

Table 5.4. Expenditures of the river basin commissions, 1947-1964 (in 1960 million pesos)

Year	Papaloapan Commission	Grijalva Commission	Tepalcatepec/Balsas Commission ^a	Fuerte Commission
1947	18.6		5.7	
1948	35.8		25.8	
1949	43.5		29.3	
1950	70.9		31.8	
1951	122.3		32.5	
1952	167.4		40.9	3.8
1953	174.9	8.4	42.0	57.8
1954	137.6	13.7	35.5	154.0
1955	117.9	16.6	39.6	175.8
1956	103.1	30.5	35.5	141.4
1957	98.8	31.1	42.5	66.8
1958	110.0	37.2	35.5	38.2
1959	42.8	25.5	20.9	21.0
1960	24.3	57.9	26.6	32.9
1961	29.7	48.9	10.8	23.0
1962	20.5	239.5	21.6	24.5
1963	22.5	391.7	51.2	39.9
1964	19.8	129.6	52.2	59.7
TOTAL	1,360.4	1,030.6	579.9	838.8

Source: Ministry of Water Resources, Mexico, in Barkin and King (1986)

^a It includes expenditures for the overall Balsas basin. Only for the Tepalcatepec basin, the expenditure for 1962 was 13.9 millions; for 1963, 13.8 millions; and for 1964, 10.4 millions.

5.4 Recent regional approach to water policies and institutions

In 1989, it was decided again that the responsibility for overall planning, management and development of water resources in the country would be under one institution, the National Water Commission (CNA by its acronym in Spanish). Initially, the CNA was under the Ministry of Agriculture and Water Resources. In 1994, it was moved to the Ministry of Environment, Natural Resources and Fisheries (Semarnap), which became the Ministry of Environment and Natural Resources from 2000 (Semarnat).

In terms of legislations, the Law on National Waters (CNA 1992; Semarnat 2004) and the Federal Law on Water Excise Taxes, set the regulatory, economic and social frameworks for water management. The Law on National Waters establishes the broad objectives for the development and implementation of the plans and the policies for water resources management. The responsibility for implementing this law has been assigned to the CNA. The Law for Ecological Balance and Environmental Protection (LGEEPA) defines the environmental regulations, and the General Health Act establishes the standards for drinking water.

Modifications to the Law on National Waters were approved on April 2004, and thus it is still too early to evaluate its impacts. One of the main changes to the Law has been the creation of River Basin Organisms, which are expected to be “autonomous units for technical, administrative and legal purposes.” (Semarnat 2004, p 41). Interestingly, and in spite of the very questionable performance of the institutional arrangements at the river basin level so far (Guerrero and García-León 2003), the 2004 National Water Law states that the institutions for water management at the river basin level would continue to be the basin councils (with practically no implementing roles), that the opinions and concerns of the users would still be channelled through the general assemblies of the basin councils (which so far have not proved very useful), and that the river basin councils will be “autonomous bodies, but will be under the federal authorities.”

The river basin councils, which have existed legally from 1992, but have not had perceptible impacts in terms of improving water management practices, are expected to manage water from integrated and regional perspectives, and involve water authorities at the federal, state and municipal levels, as well as the various users. For operational purposes, the river basin councils define four territorial levels: basin, sub-basin, micro-basin and aquifers, where the bodies are respectively known as councils, commissions, committees and groundwater technical committees (Marañón 2004).

The country is divided into regions and sub-regions for water management purposes. There are 13 regions, based on the hydrology of the country, and 102 sub-regions on the basis of political jurisdictions. Each sub-region includes a number of municipalities of the same state, so that regional programmes can be planned at the sub-regional level. At present, there are 314 hydrological basins, 37 hydrological regions and 13 administrative basins. Twenty-five river basin councils, out of the 26 that were planned, have already been established, but the vast majority are not yet functional for all practical purposes (Table 5.5).

By law, the river basin councils have to approve the river basin plans which, once integrated within the national water master plan, become mandatory for the federal government, and indicative for the local and the state governments and water users. Constraints, actions and resource needs are to be identified and evaluated, and unrealistic or infeasible situations are expected to be fed back into the regional planning process (Tortajada 2000).

Vast majority of the river basin councils at present are not operational: they are still in the process of organization. The councils continue to be coordinating units that can only make recommendations to the authorities and to the users. Even though the Law on National Waters (1992 and 2004) stipulates that the river basin councils can develop and implement programmes for the construction of water infrastructure which could be considered to be strategic, the fact remains that because the councils have not yet been functional, not all have say in the planning, design or operation of major water infrastructure of the country. If and when they

become fully operational, it is yet to be seen as to whether the central authorities will allow the councils to use their decision-making powers on important issues, or if the traditional centralised decision-making in the country will continue for more years to come.

Table 5.5. Basin councils established as of November 2002

Name	Date established	Administrative Region
Baja California Sur	3 March, 2000	I Peninsula de Baja California
Baja California	7 December, 1999	I Peninsula de Baja California
Alto Noroeste	19 March, 1999	II Noroeste
Rios Yaqui-Matape	30 August, 2000	II Noroeste
Rio Mayo	30 August, 2000	II Noroeste
Rios Fuerte y Sinaloa	10 December, 1999	III Pacifico Norte
Rios Mocorito al Quelite	10 December, 1999	III Pacifico Norte
Rios Presicio al San Pedro	15 June, 2000	III Pacifico Norte
Rio Balsas	26 March, 1999	IV Balsas
Costa de Guerrero	29 March, 2000	V Pacifico Sur
Costa de Oaxaca	7 April, 1999	V Pacifico Sur
Rio Bravo	21 January, 1999	VI Rio Bravo
Nazas-Aguanaval	1 December, 1998	VII Cuencas Centrales del Norte
Del Altiplano	23 November, 1999	VII Cuencas Centrales del Norte
Jerma Chapala	28 January, 1993	VIII Lerma-Santiago-Pacifico
Rio Santiago	14 July, 1999	VIII Lerma-Santiago-Pacifico
Costas del Pacifico Centro	-----	VIII Lerma-Santiago-Pacifico
Rios San Fernando-Soto La Marina	26 August, 1999	IX Golfo Norte
Rio Panuco	26 August, 1999	IX Golfo Norte
Rios Tuxpan al Jamapa	12 September, 2000	X Golfo Centro
Rio Papaloapan	16 June, 2000	X Golfo Centro
Rio Coatzacoalcos	16 June, 2000	X Golfo Centro
Costa de Chiapas	26 January, 2000	XI Frontera Sur
Grijalva-Usumacinta	11 August, 2000	XI Frontera Sur
Peninsula de Yucatan	14 December, 1999	XII Peninsula de Yucatan
Valle de Mexico	16 August, 1995	XIII Valle de Mexico

Source: Statistics on Water in Mexico (2003)

In theory, the basin councils have representatives from the federal and the state governments from the water and other sectors (Federal Power Commission, Mexican Oil Company, etc.), academia, NGOs, others and regional committees for the users of the different sectors (industrial, agricultural, drinking water providers, services, etc.). Specific commissions and committees can be established within the councils only when there are specific problems, i.e., evaluation, regional considerations, groundwater, etc. Before the amendments of the Law on National Waters, citizens and organized civil society were not part of the discussions at the

river basin level (Tortajada, 2001). Even though legally this is not the case any more, only time will tell the extent of real participation of non-governmental groups, as well as their contributions.

By law, the basin councils are primarily coordinating agencies whose main role is to make recommendations to the federal government and the users on specific issues. Unfortunately, however, their establishment responds more to broader decentralization trends at the national level which still have not been achieved, rather than from the realization that water can be managed more efficiently from a regional perspective. The main problem of river basin management is not that the councils are not entitled to develop any regulations or execute any administrative or legal action, but rather that the overall operational framework to manage water resources at the basin level is still not functional in the country. If the councils are to become operational, they could play an important role as coordinating bodies. It is still not clear what are to be the operational functions of the councils, or how the councils will relate to the administrative structures of the country at the state and municipal government levels, so that they could complement, co-ordinate and support each other. At present, only one out of the 25 river basin councils that have been created is operational. In most cases, other councils do not even have staff or offices, not to mention implementable plans, financial support, or management and technical capacities (Guerrero and García-León 2003).

After more than 70 years of continuous hierarchical and top-down water management and planning practices, experiences show that the country still lacks knowledge and expertise as to how best to structure the institutional arrangements for water management at the river basin level from a decision-making viewpoint. Real participation by stakeholders has been mostly missing. Among many other constraints faced by the river basin councils are their lack of experience (both technical and managerial) as to the processes by which water policies could be formulated; reluctance of the central authorities to disseminate reliable data and information, lack of appreciation by the authorities on the importance of stakeholders' participation, and the absence of use of proper economic instruments like water pricing and demand management, and appreciation of the importance of social and environmental issues (CTMMA 2003). The main institutional challenge for the future is how best to transform the basin councils, which in practice are advisory agencies with very little real authority, into basin councils that govern, plan, organize, run, control and supervise water management at the river basin level (Guerrero and García-León 2003).

5.5 Concluding Remarks

The previous analyses show the relevance, appropriateness and impacts of the efforts made in Mexico on structuring and restructuring of its water management institutions at the river basin and regional levels. The results, unfortunately, have

been mostly disappointing in terms of improving the efficiency of water resources management practices.

In the case of the river basin commissions, the overall objective was to promote economic and social growths of the appropriate regions, which were expected to reduce the prevailing inequalities among and within the regions. This was expected to be achieved through infrastructural development and settlement programmes, which, in turn, were supposed to trigger agricultural development, hydropower generation, industrial investment, employment generation and higher incomes for the local populations.

The establishment of the river basin commissions was a national effort to use water to develop the regions. However, while the programmes implemented by the commissions may have had some beneficial impacts on the overall development of the country, they seem to have basically failed to reduce regional inequalities and alleviate poverty. The decision-making failed to realize that increase in irrigated area per se was not a sufficient condition to alleviate poverty and improve the quality of life of the local people. Important issues, like investments in social services, provision of credit, technical assistance, participation of stakeholders and capacity building, were not adequately considered, even though they are absolutely essential to ensure the long-term success of any development project.

In terms of the performance of the existing institutions for river basin management so far, it has to be concluded that they have basically not achieved efficient management of water resources at the basin level. At best, they have had minor impacts in improving water management practices, which means that fundamental institutional realignments are necessary if the present basin councils are to become successful organizations to manage water regionally.

Regrettably, no comprehensive and objective evaluations have been made by the authorities concerned on the viability of such institutions, the extent to which they have fulfilled their objectives and their overall societal impacts both positive and negative. Absence of such assessments has meant that appropriate lessons have not been learnt from their failures, and/or sub-optimal performance.

While the demands for water for various uses have increased significantly in Mexico in recent decades, management practices have improved only slowly and incrementally. Consequently, the water problems of the country, in terms of quantity, quality and management, have become more serious and complex than ever before in history. The demands from different uses and users are increasing rapidly, but the technical and managerial expertise and financial resources of the concerned institutions are growing only incrementally. Unless these trends are reversed, the water situation of the country is unlikely to get better in the foreseeable future. Not surprisingly, OECD (2004) concludes that “water use in Mexico is on an unsustainable path.” Furthermore, in spite of the efforts at decentralization, the real authority to plan and manage water resources continues to be vested in one

single institution at the central level, which has been unable thus far to respond successfully and sensitively to the escalating needs of the sector and of the different regions of the country. Nor has it been willing to decentralize appropriate decision-making powers, investments funds and technical and managerial resources.

It is now absolutely critical to modernise the water sector of Mexico, not only in terms of institutions and laws, but also in terms of overall management practices. The water problems of the country have deteriorated due to the inadequate management, technical capacity, and the slow, and often inappropriate, responses of the sole central institution responsible for water management in the country.

Fortunately, however, the country as a whole is changing. The regions are asking for greater roles in planning, managing and decision-making not only in the area of water, but also in other sectors as well. There are some positive and encouraging indicators that some states are making good and commendable progress in planning and managing their water resources. States are realizing that water is an important resource, and its timely and proper development and management would affect the lives of the people, and their quality of life, through various pathways.

While there has been much discussion about decentralization in recent years, in practice water management has continued to be hierarchical and top-down. Unless real decentralization takes place, where institutions at regional, state and local levels would have the requisite authority, funds management capacity, and technical expertise, efficient and equitable water development and management, which could improve the social, economic and environmental conditions of the country as a whole within a reasonable timeframe, is likely to remain a distant dream.

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