

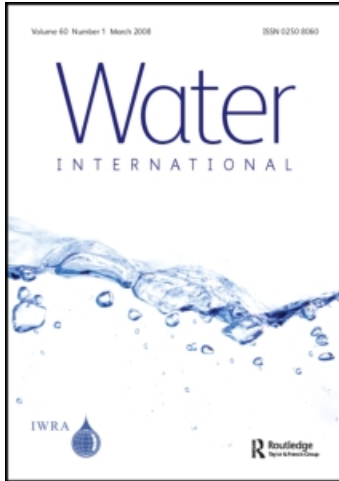
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Institutions for River Basin Development in Mexico, 1947-1986

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Abstract: *Institutional arrangements for water resources development at the river basin level were attempted in Mexico as early as 1947. The establishment of the river basin commissions represented a national effort to promote integrated development of different regions of the country based on the water resources available. The programs implemented by the commissions had many beneficial impacts, primarily in terms of infrastructure development, but much less on long-term improvements in social conditions. Development programs, in spite of very large investments, did not make any meaningful impact in reducing regional inequalities and alleviating poverty due to the lack of knowledge of the environmental conditions of the regions and the basic understanding of the socio-cultural conditions of the local populations.*

Keywords: *Mexico, water institutions, river basin organizations, water resources management, performance assessment*

Introduction

During the 20th century, economic and social goals at the national level in Mexico predetermined the most appropriate institutional arrangements for policy implementation at the local and regional levels in the country.

Towards the end of the 1940s Mexico focused on the use of water for the integrated development of several regions, with main emphasis in the tropics. The then Administration (1946-1952) embarked on large-scale water-based integrated development programs so the different economic and social sectors would benefit from the natural resources available in the different basins of the arid plains of the north, and the tropical areas in the east and southeast regions. It was realized that development of the tropical regions, considered the backward areas of the country, was possible because of the availability of untapped natural resources, mainly water (Estrada, 2003). Water resources were recognised as an engine to trigger integrated development of the individual regions, through which the quality of life of

the local people could be improved over both the short- and long-terms, and the economic growth of the country could accelerate.

In order to implement the water-based development plans, a strong institution responsible for water management at the central level was established. The then National Commission for Irrigation was restructured to become the Ministry of Water Resources and coordinate the activities that would be carried out in the several basins. The river basin commissions were then created as the first semi-autonomous, multi-purpose implementing agencies in the country.

Specific river basins were selected where agricultural (including commercial agro-industries), forestry and industrial development-related activities could be encouraged. Equally important would be to colonize specific regions with population from the central part of the country where agricultural land was a constraint. The people who would migrate to these areas would provide the labour that would be necessary for the development of the areas. The river basins selected had plentiful natural resources, but the populations



Figure 1. River Basin Commissions

lived in extreme poverty, with acute health problems and inadequate social services, including a lack of support services in the sectors of health, education, communication and transportation.

The River Basin Commissions established were the Papaloapan and Tepalcatepec Commissions in 1947, and subsequently, Fuerte and Grijalva Commissions in 1951. In order to include larger areas within the integrated development programmes, the Tepalcatepec River Basin Commission was transformed into the Balsas River Basin Commission in 1960, covering a much larger area (Figure 1). Some other river basin commissions were established later, like the Lerma-Chapala-Santiago and the Panuco Commissions.

Under the leadership of the Ministry of Water Resources, several other 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.

The river basin commissions had full authority to plan and execute programs for integrated development under their own direct supervision within the river basins. In general, their tasks included, but

were not limited to, planning, design, coordination and construction of flood control, irrigation and hydropower generation projects. They were also responsible for expenditures on urban and rural development, health, education, transportation and communication services, including navigation, ports, roads, trains, telegraph, telephone services, etc. River basin commissions were also the coordinating agencies for the activities of the several ministries within the river basin, on which they had limited authority but were able to make inputs.

Following is an analysis of the main activities and performance of the Papaloapan and Grijalva River Basin Commissions from the time of their establishment to their dissolution. Among the several river basin commissions, these two were specifically selected because they represented the largest attempts to implement socio-economic development programs based on water resources in tropical areas. The analysis considers the performance of the commissions during each presidential period of six years as institutional development in Mexico depends on six-year presidential mandates with almost no continuity between one government and the other. The performance of the commissions is thus considered within the context of the changing economic and policy priorities of each Presidential administration.

Papaloapan River Basin Commission

The area of the Papaloapan River Basin is 47 000 km² with an annual 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 state of Oaxaca (163 municipalities), 37 percent in Veracruz (64 municipalities) and 12 percent in Puebla (11 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, transportation and communications (water transport, ports, roads, railways, and telegraph and telephone services) and urbanization of the area, as well as to decide on industrial, agricultural and settlement-related issues within the integrated development programmes of the region.” (DOF, 1947). The creation of this commission was partially influenced by the institutions being created in different parts of the world for the integrated management of river basins, especially the Tennessee Valley Authority (TVA). The similarity between the Papaloapan Commission and the TVA was both of them were conceived as developmental authorities to promote the integrated development of river basins, with a main focus on flood-control activities. The main difference was that the TVA was an autonomous institution, whereas the Papaloapan Commission was under the Ministry of Water Resources (Poleman, 1964; Barkin and King, 1986).

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 several states. In order to develop appropriate flood control measures, the then President of Mexico commissioned a study with the objective to propose alternatives to develop the whole Papaloapan River Basin. An important issue was hydropower generation, which in turn was expected to promote industrial development in the rural areas. The study was finalised in 1945. It recommended the establishment of a technical commission to carry out a comprehensive analysis of

the overall Papaloapan River Basin, and then implement the resulting suggested programs and projects (SRH, 1972; SARH, 1990).

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 from which specific development projects could be formulated. As a result of these studies, programs were initiated in the areas of water supply and sanitation, flood control, hydropower generation, agricultural, industrial and urban development, transportation and communications (SARH, 1990).

1946-1964 period

During the 1946-1952 period some of the projects implemented by the commission included the construction of the large multipurpose Miguel Alemán Dam (for 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).

In December 1952, when the new federal administration came into power for another six-year period (1952-1958), the overall objectives of the Papaloapan Commission remained the same, but 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 more schools were constructed (Orive, 1970).

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 developments within the basin. During the first years of the 1952-1958 administration, emphasis was given to programs for agricultural credit and settlement schemes, as well as to the construction of secondary roads. 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).

In 1955, the idea of the government was that the Papaloapan Commission would develop thousands of hectares in a coordinated manner, build new roads, start colonies and bring settlers, and provide credits and technical support to the local residents. New lands were expected to be under development by 1970 when the commission would be dissolved. The ongoing activities would then be handed to the interested federal ministries and the private initiatives (Poleman, 1964). As noted earlier, this tentative plan would change with time.

By the end of the 1950s, it was already clear that even though the task of the Papaloapan River Basin Commission was to implement integrated development programs, there was no such plan which could consider the overall management of the river basin. Some problems had already surfaced. Among these problems were that financial institutions were not disbursing funds on time, agricultural credits were inadequate to support the farmers and promote the growth of more profitable crops, and trained staff was not available. In 1954, the commission reported that it had to provide credits to the farmers from its own budget, and as a result the credits available were very limited (SRH, 1958).

During the period from 1958-1964 the political and economic priorities of the Mexican government changed with the new administration. The role of the Papaloapan Commission was not considered important in the promotion the regional economy of the country any more, compared to when it was first established. Its budget was drastically reduced and the commission could not perform its functions as the institution responsible for integrated activities in the basin. Figure 2 shows the budget of the commission during the time it was functional. It indicates very high variations in

the budget from one year to another, which made any medium- to long-term planning very difficult, if not impossible. During this period, there were years when there were virtually no funds available for investments in the basin. Most of the limited funds that were available in this period were not used for new development projects, but for operation and maintenance activities and construction of few small projects for drinking water supply and flood control. Hence, the staff was reduced to about one-third of what it was in 1956.

The pressure from the different states within the basins was mounting because the river basin commissions had become too powerful, even more than the states and municipalities. The fact that the commissions had more authority than the states created tensions among the institutions over the years. At the end of the 1950s, the then administration decided that the several river basin commissions should not be responsible for works that were not strictly water-related. Consequently, the Papaloapan Commission suspended its interventions on health-related activities, education, agricultural research, construction and maintenance of roads and schools, etc.

It is important to note that the achievements of the commission in terms of education, health and urban improvements up to this point were very important to the region. Malaria and yellow-fever were eradicated, and hundreds of schools were constructed and improved, benefiting about 40 000 students. Even then, thousands of young people still did not have access to education. In fact, the Papaloapan Commission noted 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 and more support was necessary (SARH, 1990).

By 1961, the overall expenditure of the Papaloapan Commission starting from 1947 was 1236 million pesos (1972 constant prices, SRH, 1972). Undoubtedly, the most important 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 extensive 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)

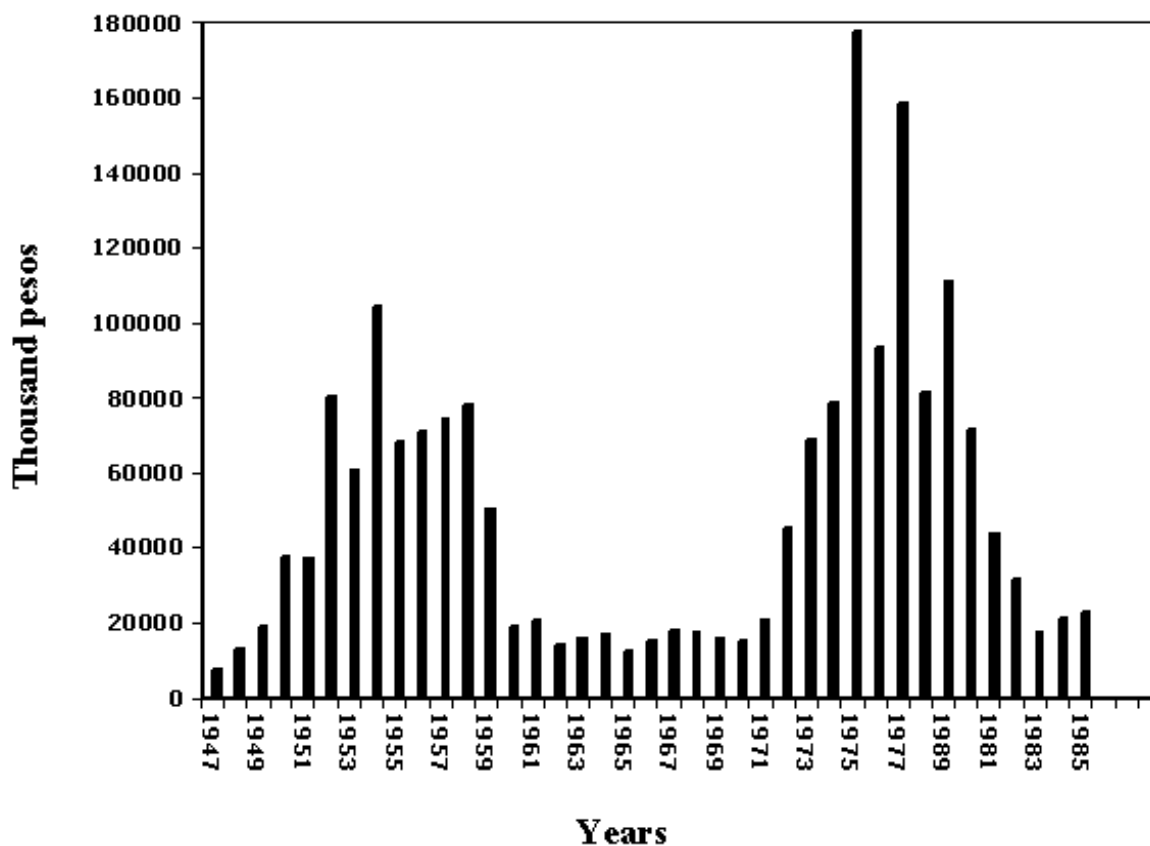


Figure 2. Annual budgets of the Papaloapan river basin commission, 1947-1985

(SRH, 1958; Poleman, 1964).

In spite of the very high investments and the massive construction of infrastructure, the commission did not carry out any evaluation of its activities or achievements, or any analysis of the lessons that could be learnt from such a large development activity. Official reports focused mainly on the description of the implemented projects (SARH, 1990), but there was hardly any attempt to assess the experiences resulting from the several development plans, or even specific activities, carried out by the commission.

As to be expected, there were many positive results, but also many negative impacts. Some major constraints were: 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, where most of the rural development expenditures were used, was laid out even though there were well-established towns near by; and a three-lane paved highway was constructed when there were not yet even unpaved roads. Irrigation schemes were abandoned because they were too expensive or

because of lack of cooperation of the local population, and many of the implemented colonization projects ended in failure because of the lack of services available to the population (Poleman, 1964; Orive, 1970).

The main weakness of the commission was in terms of agricultural development activities. This was partly due to the changing priorities, interests, and the extent of financial support provided by the different administrations. However, it was also due to the lack of knowledge of the commission on how to implement agricultural activities in tropical areas. The agricultural potential of the basin was taken for granted. It was assumed that the coastal plain was suitable for agriculture and livestock production, and the commission knew how to do it. Most of the staff working for the commission were civil engineers with experience in the arid areas of the northern part of Mexico, but with no knowledge or expertise in tropical areas. Accordingly, their decisions were based on knowledge of completely different environments. It was assumed that practices which had been suitable in one environment could be transposed into another without modifications or further

considerations. Instead of introducing a combination of crops and cultural practices suitable for the local conditions, the commission attempted to introduce a new system of semi-mechanized production into the colonies. The resulting mistakes in terms of selecting inappropriate crops and unsuitable machinery, kept the income of the people at much lower levels than had been anticipated. The commission was thus unable to offer the populations the opportunity to achieve a better life than one they had before. As the commission learnt, abundance of capital could not make up for the inadequate knowledge and a shortage of skilled personnel (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 even shoes. In this community, where the only economic activity was subsistence agriculture, only about half of the families were resettled. The rest of them were resentful of the commission, left the area and moved to the highlands to continue with their own lives (McMahon, 1989).

A balance by 1962 of the changes in the region due to the projects implemented by the commission could be synthesised as follows: "...the 16 years of the Papaloapan Project have brought about important changes in the Papaloapan Basin and its economy. These have been particularly pronounced in the lower basin. The fertile lands along the Papaloapan have been largely freed of the danger of flooding, and, thanks to a new system of roads, substantial new tracts have been opened to the agriculture. In the uplands, too, a noteworthy beginning has been made. Several new roads have been constructed into the hinterland of the upper basin, and for the first time, the people there are learning of the world beyond their own villages. (However,) 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." (Poleman, 1964, p. 99).

In spite of the good intentions of the engineers leading and working in the commission, their lack of knowledge and experience on agricultural development in the tropics did have negative impacts in the quality of the life of the populations.

1964-1988 period

During the period from 1964-1970, the commission initiated surface water and groundwater studies, hydrological stations were established, and the national inventory for groundwater was started. Regional water plans were also underway for the northwest, centre, and Gulf regions of the country. The National Plan for Small-scale Irrigation proposed to irrigate 306 000 ha until 1976 (131 000 ha during the 1967-1970 period and 175 000 ha during the 1971-1976 period) and the plan to improve efficiency of water in the irrigated areas proposed to recover 25-40 percent of water. The National Policy for Irrigation had the objective to finalise the irrigation areas that were under construction, focus on projects with maximum economic and social benefits, and implement technologies to reuse water, and optimise the use of water.

The Papaloapan Commission, in addition to operating the infrastructure already constructed, initiated the feasibility studies of the Cerro de Oro Dam. It also continued with small-scale irrigation projects and constructed water supply project benefiting almost 45 000 people.

In 1970, with the 1970-1976 administration, regional development activities continued as an important economic strategy to reduce the inequalities among the different regions of the country. These overall objectives were not different from the previous ones. However, the idea of implementing them in an integrated manner was not important any more. Thus, regional programs for industrial decentralization, colonization of "virgin" areas, modernization of agriculture, and direct support to the people living in the poorest areas, were conceived, and implemented, from a purely sectoral viewpoint (Estrada, 2003). Since public expenditure was higher, the new administration created new institutions and developed new programs.

In 1972, a new water law was enacted, 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 projects, and decide on the fees and collect them from water users and for 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 regions, integration of regional plans into a national planning framework, implementation of large-scale and technically complex projects, and management of research and training programs (SRH, 1975).

Based on the 1975 Water Master Plan, 13 hydrological regions were established. Regional and water development programs were developed for each one of the regions, with the objective of using more efficiently available land and water resources, and to reduce the prevailing inequalities in water availability to the people. The water development programs 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 Resources. This new institutional arrangement placed planning, management and development activities under different ministries, making coordination and execution of any water policy very difficult. As a result, the 1975 Water Master Plan was never fully implemented (CNA, 1995).

In 1981, the Programme for Integrated Rural Development of the Humid Tropics was created to

foster development of marginalized areas in the Gulf of Mexico and the Southeast regions of the country. One of the priority areas of this program was the Papaloapan River Basin, and so the construction of infrastructure and irrigation projects continued there. With the beginning of the construction of the long-delayed Cerro de Oro Dam, the budget of the commission increased by 117 percent. Unfortunately, however, lessons were not learnt from the negative resettlement experiences of the previously constructed Aleman Dam. The resettlement process of the approximately 26,000 *chinantecos* (indigenous people) who were affected by this dam was not only inadequate but was also totally unsatisfactory. This resettlement operation was carried out mainly by the National Indigenous Institute, but the Commission was also responsible for the unsuccessful outcomes. 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, 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 as part of the development process of the region.

In 1982, an unprecedented economic crisis affected the country with very negative impacts in all sectors. Development plans were thus modified and institutions were restructured at the national and regional level. As part of a decentralization strategy, the Ministry of Agriculture and Water Resources delegated activities to its offices in the states and established regional coordinating agencies (PRI-IEPES, 1982).

Based on the then water policy, which again emphasized the management of water resources at the regional level, it was decided that the offices of the Ministry of Agriculture and Water Resources in the states would take over the responsibilities of the river basin commissions, and that the river basin commissions

would disappear (SARH, 1988a).

This decision ended nearly 40 years of efforts to manage water resources at the river basin level. The Papaloapan Commission was intended to be the implementing agency of the government for water-based regional development programs. However, while years passed, it became increasingly evident that the commission was not achieving the expected regional outputs and that its mandate did not fit any more with the changing policy and institutional environments of the country. The Papaloapan Commission was officially dissolved on 24 December 1986 (DOF, 1986), the remaining projects and activities were handed over to the state offices of the Ministry of Agriculture and Water Resources.

Grijalva River Basin Commission

The Grijalva River Basin Commission was established on 27 June 1951, 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 region of the country, including the states of Tabasco, Chiapas, and part of the state of Campeche: 129 municipalities covering an area of more than 100 000 km². The development projects would be for flood control, industrial and irrigation development, water supply and sanitation, health, education, communication and road construction (DOF, 1951).

The first stage of the commission's work included a series of technical studies, extensive drainage works and construction of essential roads. The main objectives of the commission were to construct infrastructure for flood control, and implement extensive settlement programs with the support of irrigation and promotion of agricultural practices in tropical areas. Flood control projects were constructed covering more than 260 000 ha. The Malpas Dam, the largest in the country, was fully constructed between 1959 and 1973, but was operational. Water and sanitation projects, and health and education programs benefited thousands of people living in the region.

The first agricultural development project planned in the basin was a small-scale pilot-project known as "El Limon." Contrary to what was planned,

the pilot project was not implemented on a small-scale, but instead it was decided that it would become a large development plan, the most important one in the basin: the Chontalpa Plan.

The following analysis shows the situations faced by both the commission and the thousands of people that were settled during the implementation of this plan, mainly because development activities were not tailored to the specific conditions of the regions, nor did they consider the socio-cultural conditions of the majority of the population.

Chontalpa Plan

The area known as "Chontalpa" is in the coastal plain of Tabasco. It was a mixture of rainforest (43 percent), pastures (24 percent), annual crops (22 percent) and perennial crops (11 percent). With a population density of 26 persons/km² in 1960 and 41 persons/km² in 1970, it was the most densely populated area of Tabasco. 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 of any commercial value, and there were no roads for transportation of the population, or the distribution of agricultural or animal products (SARH, 1988b).

The Chontalpa Plan was meant to be a model for integrated development where housing, education, health, irrigation, technical assistance, and communication would be properly planned and implemented (Orive, 1970). The plan included the development of 300 000 ha of land in two phases. The first phase would be implemented from 1966 to 1982, and included the development of 140 000 ha in the left bed of the Mezcalapa River. The second phase would include the development of 160 000 ha, but depended on the construction of flood-control infrastructure, since 60 000 ha were affected by frequent floods.

The Chontalpa Plan was conceived in the early 1950s, and was initiated in 1966. The Grijalva commission had the logistical support of the different ministries, and the financial support of the Inter-American Development Bank, which provided a loan, and direct investments by the Federal government.

Infrastructure for water, irrigation, electricity, roads and communication development works were initiated.

Between 1963 and 1968, 150 000 ha of land were expropriated. The main innovation, which was never accepted by the population and created continuous problems, was the restructuring of land tenure with private property becoming common property. Each land owner received a title deed for 15 ha from which 2 ha would be for their own private use and 13 ha would be to produce commercial crops collectively. The commission faced strong resistance from the farmers to common land tenure from the very beginning of the project. Few land owners had large extensions of land they were not willing to share, and poor people with small holdings were reluctant to leave their own land and living place, and face the unknown (SARH, 1988b; SRH, 1974). In spite of the strong opposition, the official policy to encourage joint community work was not modified, and no consideration was given to their resistance. After several confrontations, the farmers who did not accept the conditions decided to leave the project area. Many other people stayed behind, but common land tenure was very much a problem.

The commission established 22 agrarian communities with approximately 200 families living in each community. There was tap water, sewerage, electricity, paved streets, sidewalks and common areas in each community, in addition to one school, a health centre and a church. With the support of the commission, the farmers constructed their own houses (for which they were paid) as a strategy to engage them in community work. A research centre on agriculture was also established with the purpose of developing the most appropriate agricultural practices in the area.

There were health centres and pharmacies in the communities. Primary education, in schools with morning and evening shifts, had a very positive impact on the young people, since it allowed those working in the fields to have access to education. Social workers also provided support to the families on hygiene and home-economics. There were training centres for women for literacy, and for children on agricultural-related activities.

In 1971, the first stage of the Chontala Plan was over and, with it, the agreements between the Grijalva Commission and the several ministries. The commission

thus had to hand over all its non-water related activities. It was then only responsible for maintenance of infrastructure and support of the irrigation districts. In 1972, the Ministry of Education became responsible for education in the area and cancelled the evening shift in the primary schools, eliminating the opportunity of education for children working in the field. Training centres were closed, and the teams composed of teachers and health and social workers that promoted social integration in the communities were dissolved. The Ministry of Health became responsible for the health centres. However, lack of funds forced it to cancel the programs on preventive medicine. Doctors left the area and finally the centres were handed over to the National System for Social Security which decided to restructure the health service in the region. The Ministry of Agriculture and Livestock, without the economic support of the commission, decided to withdraw the support to the agricultural research centre which later on became part of the school for agriculture. The research centre did not provide support any more to the Plan (Arrieta-Fernandez, 1994).

One of the issues that created more constraints and limitations for the proper implementation of most agricultural and livestock activities was the insufficient credits available. Therefore, in 1972, a trusteeship for the Chontalpa Plan was established under the Ministry of Finance and the Southeast Bank, with an initial investment of 25 million pesos, to be increased with time. A technical committee was established with the participation of the Governor of the state of Tabasco, Ministry of Water Resources, Ministry of Agriculture and Livestock, Department of Colonization, Southeast Bank for Agricultural and Livestock Development, and Union for Agrarian Communities in the state of Tabasco (SARH, 1988b; SRH, 1974).

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 2360 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. Of the total, 42 percent had been invested in the Chontalpa Plan.

The assessment report concluded that, in spite of the large investments, the overall impacts of the Chontalpa Plan were very poor. Out of the 80 320 ha that were under development by the time of the assessment, only 30 percent of them were used for agriculture and livestock-related activities. The rest were not productive because of lack of credit and absence of viable activities for the local population. In spite of the trusteeship, credits were not been given on time, and clearly not all land was under cultivation, seeds, fertilizers and machinery were not available, and cattle was not being raised. Without such activities, employment opportunities available were very limited, as was the income of the farmers.

After more than a decade of work, and investment of about 980 million pesos, the Chontalpa Plan was not producing the expected outputs and only few people were benefiting from the project. An overall development plan for the region was still lacking even 20 years after its inception. As noted by Echeagaray (1973, p. 5): "Irrespective of the decisions on the first stage of the Chontalpa Plan, it is necessary to formulate as soon as possible a plan for the development of the Grijalva River Basin."

All activities carried out in the Chontalpa were new for the population (house construction, selection of crops, agricultural techniques, use of fertilizers and pesticides, use of machinery, administration of credits, etc.) and hence they were not able to make any decision but to follow the orders from the Grijalva River Basin Commission. This lack of participation alienated them from the overall process and the people did not develop a sense of ownership for the projects, which they considered imposed on them. With time the population lost interest in the activities and simply waited for the commission to solve all the problems. While the commission was trying to introduce the rural populations to new technical, cultural and political conditions, the farmers felt that they had been ousted from their lands and "forced" into activities that were not giving them better quality of life compared to the one they had before the Plan. The methods used by the commission to interest the farmers in the projects are said to have included everything from ideological aspects and financial incentives to coercion and paternalistic attitudes. Even though these methods

managed to reduce the tension among the farmers, they did not manage to make the people part of the project (Arrieta-Fernandez, 1994; Barkin, 1978).

The poor performance of the Trusteeship made things worse. Its increasing lack of interest and continuous planning and implementing of mistakes resulted in higher expenses for the farmers and increased dissatisfaction and mistrust towards the government and the Plan. In 1976, the Ministry of Finance and Public Credit decided to dissolve the Trusteeship, and the National Bank for Rural Credit was given the responsibility of handling the credits.

The Chontalpa 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 the economic, social and political problems the region was facing. However, the plan failed to achieve its objectives. The many reasons include lack of technical assistance for the farmers, use of inappropriate technology, insufficient availability of credits, and unreliable employment generation. However, the roots of the problems are considered to have been lack of overall planning from the institutions concerned from the very beginning of the Plan, insufficient knowledge of the local environmental and social conditions, and almost no experience on irrigation-related activities in tropical areas. The Plan had negative social impacts, but also very negative environmental results, since the commission desiccated marshlands and deforested large areas of the tropical forest to establish the settlements and carry out agricultural activities (Arrieta-Fernandez, 1994; Tudela, 1989).

The Chontalpa Plan had very limited local involvement and was basically planned and implemented from Mexico City, where interest of the Federal Government was decreasing. In addition, from 1973 (Echeagaray, 1973), the Grijalva River Basin Commission was not functioning as an institution at the river basin level. It had become instead 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 was located.

The difficulties of implementing agricultural development projects in the tropics in other parts of the world, and the reasons for numerous failures, were acknowledged in the literature during the 1960s.

Regrettably, the Grijalva Commission either was not aware of these experiences from other parts of the world, or decided to ignore the lessons learnt. The result was the same. Their plan simply did not produce the expected results. A main drawback was not only the lack of implementation of long-term agricultural development projects, but also the lack of industrial development in the basin. It was expected that electricity generation would trigger industrial development. However, even with electricity, there was no any major industrial development project in the region (Tudela, 1989).

The commission was de facto dissolved in 1985, even though this was not made official until 1987. Its responsibilities were transferred to the offices of the Ministry of Agriculture and Water Resources in the states of Chiapas and Tabasco (SARH, 1988b).

An analysis of the present status of the people living in the 22 communities established under the Chontalpa Plan by the Grijalva River Basin Commission was carried out in 2003 (Alvarez-Rivero et al., 2003). The investigation included an analysis of 39 social, economic and environmental indicators in the 22 communities established during the Plan and also in 44 communities which did not receive any support from the government, for the sake of comparison. The study concluded that the 22 communities are better off in terms of health services (36 percent of population have access in the 22 communities compared to 18 percent in the 44 communities) sewage services (17 percent against 14 percent) and water and electricity in their houses (14 percent against 5.5 percent). Level of education is very similar (middle school), and infrastructure for education seems to have benefited people living in all the communities. The study also noted that the environmental deterioration has increased with time in this area, mainly because of oil exploitation by the national petroleum company, but also because of increased deforestation.

Even though this study noted that the people in the communities established within the Chontalpa Plan by the Grijalva River Basin Commission, have “better” living conditions than their neighbours, the truth is that these “improved” living conditions leave much to be desired. Only 14 percent people having access to water and electricity, 17 percent to sewerage services and 36 percent to health services, clearly, by

no stretch of the imagination, an indication of good development and quality of life. Such overall living conditions are disgraceful in a region where so many resources were invested for some two decades. If this is the best example of a regional development program, the country still has a long way to go.

Lessons Learnt: The gap between planning and implementation

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

The life of the commissions went hand in hand with the developments in the country for 40 years. 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, 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. 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, negatively impacting 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 (Contreras-Moreno, 2002). 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 the 1970s, the ministries of agriculture and water resources were merged into one ministry, complicating the implementation of the National Water Master Plan, which was never properly implemented. The 1981 National Water Plan emphasized regional aspects more than the 1975 plan; it also laid the basis for the water programs for the 1987-1982 and 1982-1988 National Development Plans (CNA, 1995), but it was also not properly implemented.

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 addressing 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. It was in this year that the river basin commissions were officially dissolved, since they were not part of the institutional framework of the country any more.

The programs implemented by the commissions had many beneficial impacts mainly in terms of infrastructure, but much less in long-term social conditions. Development programs, in spite of very large investments, did not manage to reduce regional inequalities or alleviate poverty. The reasons were partially due to changing national social and economic policies between one administration and the other but also within the same administration the budgets available and political considerations hindered the effort. However, the failure of the development projects and programs implemented by the commissions was also their own responsibility for not recognising their own lack of knowledge and experience on the tropics, and for ignoring the elementary socio-cultural conditions of the local population when planning and implementing their programs.

The main achievements of the commissions were primarily in terms of infrastructure. Flood problems eliminated threats in agricultural and population centres in the basins, and electricity generation, health and

education, roads and communication projects changed the lives of thousands of people.

However, the most disappointing performance of the commissions was in the implementation of agricultural development programs, which in most cases did not benefit the population over the long-term. The roots of the problems are considered to have been lack of overall planning from the institutional and financial viewpoints, lack of knowledge of the environmental conditions, no experience on irrigation-related activities in tropical areas, and lack of appreciation of the socio-cultural conditions of the local populations.

The programs implemented by the commissions, mainly the ones on agricultural development, basically failed to reduce regional inequalities and alleviate poverty. Decision-making during four decades failed to realize that construction of infrastructure, as important as it is, and increase in irrigated area per se, were not sufficient conditions to alleviate poverty and to improve the quality of life of the local people. Fundamental issues like coordination, 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.

The agricultural potential of the basins were taken for granted. It was also assumed that the coastal plain would be able to support crop agriculture and intensive livestock production the way the engineers knew how to do them. Agricultural development in the tropics was planned and implemented by means of supplemental irrigation and drainage, but based on knowledge and experience from the arid areas of the northern part of Mexico, and not from tropical areas. Not surprisingly, the agricultural development projects failed.

Instead of initiating pilot projects with less people and investment, large areas were opened to irrigation. Colonies were settled with farmers who had very little or no technical knowledge or capital resources and in many cases saw all these efforts as foreign and even imposed on them. The initial very limited accomplishments of the agricultural projects implemented by the commission should have been considered as a warning of the difficulties of agricultural development in the tropics,

but this does not seem to have been the case. The two commissions were unable to offer to the populations a better way of life than the one they had before.

As Poleman (1964) has noted, it seems that the activities of the commissions were not based on the logical unfolding of a preconceived plan of development. Instead, much of the programs seemed to have evolved through trial and error and ad-hoc decisions, and the process most surprisingly, did not improve with time. The unfortunate results were a number of schemes were abandoned, failures, expensive errors and deterioration of the quality of life of the local population and the environment.

Sadly, the results of these attempts were never evaluated by the water authorities, and consequently, important lessons that should have been learnt are unknown at present. Examination of the present institutional arrangements for water management at the river basin level indicate that there is a high probability that the current approaches may turn out to be another expensive failure, with concomitant high social and environmental costs (see Tortajada and Contreras-Moreno, 2006; Sánchez-Meza, 2006; Tortajada et al., 2004; Wester et al., 2003; Guerrero-Reynoso and García-León, 2003).

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