

Importance of the Social Dimension in the Design of Modern Technology for Hydroagricultural Projects

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ABSTRACT

THIS PAPER PRESENTS the reasons for including the *Social Dimension* in the implementation of modern technology, as well as its importance in the project, "Use of Hydraulic Resources for the Integral Modernization of Irrigation District 085, La Begona."

The starting premise of this work is, there is a need to actively involve the farming sector in any modernization project involving the rural areas. Experiences worldwide have proven that even the most well-designed technological project will not succeed without the participation of the social actors. It is they who will forward or obstruct the implementation of any project.

With this criteria, the paper shows how the government has enforced modernization policies in the farming areas. Among these policies, one of the most important in the hydroagricultural sector is the transfer of the irrigation districts to User Associations organized by farmers. This policy is designed to involve irrigation district users in the administration, operation and conservation of their districts, as well as to achieve the financial self-sufficiency of the districts.

The paper also shows how our interaction with the User Associations and the engineers and technicians from the National Water Commission (*Comisión Nacional del Agua-CNA*) and the Mexican Institute of Water Technology (*Instituto Mexicano de Tecnología del Agua-IMTA*), has from the very beginning led us to *incorporate the social dimension* in this project in conjunction with a technological scheme for modernization, to achieve a consensus among all the water users for an efficient and equitable distribution of this resource in Irrigation District 085, La Begona, where this vital fluid is so scarce.

Finally, this paper shows some of the steps we have taken to include the social dimension in the implementation of this project known as, "Use of Hydraulic Resources for the Integral Modernization of Irrigation District 085, La Begona."

INTRODUCTION

First, we have to bear in mind that the importance of including the social dimension cannot be underestimated in any kind of modernization project. If we include the social dimension, the social actors will be able to maintain and operate their irrigation districts properly. Another important result is that if the project is geared to satisfy the users' needs, they will appropriate the project, participating actively and managing the project as their own, leading the organizational processes involved in the experience.

For example, in rural areas, there has been an infinite number of projects with the best and most modern technological designs. Yet in spite of this, many projects have failed, because from the beginning they did not take into consideration the importance of the participation nor the needs of the farming sector as the social actors that would forward or obstruct the implementation of the projects.

With these criteria in mind, the Mexican Institute of Water Technology (*Instituto Mexicano de Tecnología del Agua - [IMTA]*), saw, the need to incorporate the social dimension in its technological projects. To meet this end, it was necessary to begin by sensitizing the engineers and technicians to the importance of including the social aspects in their projects, and by stimulating awareness among the participating social scientists to the inclusion of technical aspects to theirs.

Therefore, from the outset of the project, "Use of Hydraulic Resources for the Integral Modernization of Irrigation District 085, La Begona," importance was given to a better understanding of what is really meant and what is implied by an integral modernization project, from the technical and social perspectives. For this, a constant exchange of "know-how" and experiences among the professionals involved is required.

For this reason, in this paper, I shall start by pointing out some of the main socioeconomic problems in the Mexican irrigation districts that lead to the enforcement of the transfer policy. We will then offer social data concerning Irrigation District 085, La Begona, to provide a better understanding of its characteristics.

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Finally, we will explain the methodology used for the insertion of the social dimension in the project of integral modernization in Irrigation District 085, La Begona.

THE TRANSFERENCE OF THE MEXICAN IRRIGATION DISTRICTS

In the last decade, all irrigation districts in Mexico have suffered a significant deterioration in their productivity. Some of the main socio-economic problems we can mention include, farm productivity stagnation, shrinkage of harvested areas, constant price decreases of several of the agricultural products, and reduction in available water for the irrigated production areas, caused by poor maintenance of the hydraulic infrastructure.

We can recall some of the reasons that caused these problems, such as, income reduction in the agricultural sector created by the permanent diminishment of profits (lower prices for their products and higher prices for inputs), little or no technological renewal, distancing of farm production with respect to national and international market requirements, inefficient management of water and soil resources, and last but not least, lack of user involvement in operational costs as well as in the maintenance and administration of the irrigation districts.

Consequently, the National Water Commission (*Comisión Nacional de Agua - CNA*) created a program to stimulate farm production in all irrigation districts within the available budget, giving special consideration to the credit shortage and to the deterioration of the infrastructure in the irrigation districts. The need to decentralize the irrigation districts, rehabilitate the infrastructure, and increase the efficient use of water were seen as the means to reaching this goal.

In 1990, the Mexican Government decided to enforce the rural modernization policy,² in which the transference of the irrigation districts is one of the main considerations. The transference of the irrigation districts establishes a new legal system which allows users to operate, maintain and administer the infrastructure through a Users Association, organized by the users in each district, to attain user involvement and district financial self-sufficiency.

The effects of these modernization policies for the rural areas, specially those directed toward the transference of the irrigation districts, implies important transformations in productive economic practices as well as in socio-organizational behavioral patterns of the producers.

These changes can be depicted by the diversity of organizational and productive strategies developed by the producers and their families that live around and within the irrigation districts. Another significant change is the transformation of the usual "paternalistic" role assigned to government institutions at the local, regional and national levels.

The Subcoordination for Participation of the Mexican Institute of Water Technology (IMTA), introduced the social dimension in the project, "Use of Hydraulic Resources for the Integral Modernization of Irrigation District 085, La Begona," not only because it united all the characteristics common to the majority of the irrigation districts in Mexico, but also because this irrigation district is one of the most suitable to apply the necessary actions for an integral modernization of hydraulic resources management, given its infrastructure and its headway in the transference process.

IRRIGATION DISTRICT 085, LA BEGONA

Irrigation District 085, La Begona, is located in the mid-eastern part of the state of Guanajuato (see Maps 1 and 2) and covers an area of 12,390 hectares that are irrigated with an allotment of 124 million cubic meters from superficial streams and 60 million cubic meters from underground streams.³

Irrigation District 085 started operations in 1969. Its main sources of water are, the Ignacio Allende Dam with a storage capacity of 251 million cubic meters provided to the Celaya Valley, and the Isidro Orozco Portugal (Neutla) Dam with a storage capacity of 5 million cubic meters conveyed to the users of Irrigation Module 1.

The district receives the overflow from the Laja River, a yearly average of 182.6 million cubic meters, and 38 million cubic meters from 132 wells (21 wells operated by government agencies and 111 wells owned by the private sector). Furthermore, it has two diversion dams (Soria and Guadalupe), 164 kilometers of main and secondary canals, 155 kilometers of drains, and 1,262 structures.

². Congreso de la Unión, "Políticas de Modernización para el Campo" 1990.

³. Data from the National Water Commission, State Headquarters.

Within the transfer program for the district, four irrigation modules were created: Neutla, Comonfort (with water pumped from Laja River), Left River Bank and Right River Bank (see Map 3). The users of these irrigation districts hold land under one of two kinds of land tenure, the *ejido*.⁴

From Table 1, it may be seen that most of the users are in the "ejido" sector. From a total of 3,288 users in the irrigation district, 2,595 (78.93%) are "ejidatarios," corresponding to an irrigated surface of 9,029 hectares (72.88% of the total surface), and 693 (21.07%) are small land owners, holding an irrigated surface of 3,360.5 hectares (27.12%).

One peculiarity of this irrigation district is that the social stratification of the users is mainly determined by access to the water sources, and secondly by the over exploitation of the phreatic deposits. In other words, the potential of the district farm land is determined by the use and management of the surface water and the extraction of the underground water. Therefore, users farm an average of 4 hectares, irrigated with surface water. Any land above or below this average places them in a higher or lower status.

Another characteristic of this district is that most of the farm surface is used for horticulture and perennial farming (see Table 2). These products require great volumes of water in a state where the scarcity of this vital fluid is a critical factor (see Table 3).

INSERTION OF THE SOCIAL DIMENSION

After acquainting ourselves with the geographic and physical characteristics of the irrigation district, it was extremely important to start identifying the social and institutional actors that would participate in the social process.

First, it was important to acknowledge that there was a clear difference between the "necessary time" for user acceptance of advances in technology and that which entailed in the inclusion of these advances into the social and cultural processes.

Without a doubt, it can be said that the "necessary time" required for the user commitment in the social process is much longer. For this reason, the professional staff in charge of the design of any modernization project must contemplate the need to understand the main cultural and socio-organizational factors that are involved in these projects, if we wish to obtain the full and active participation of the district's users.

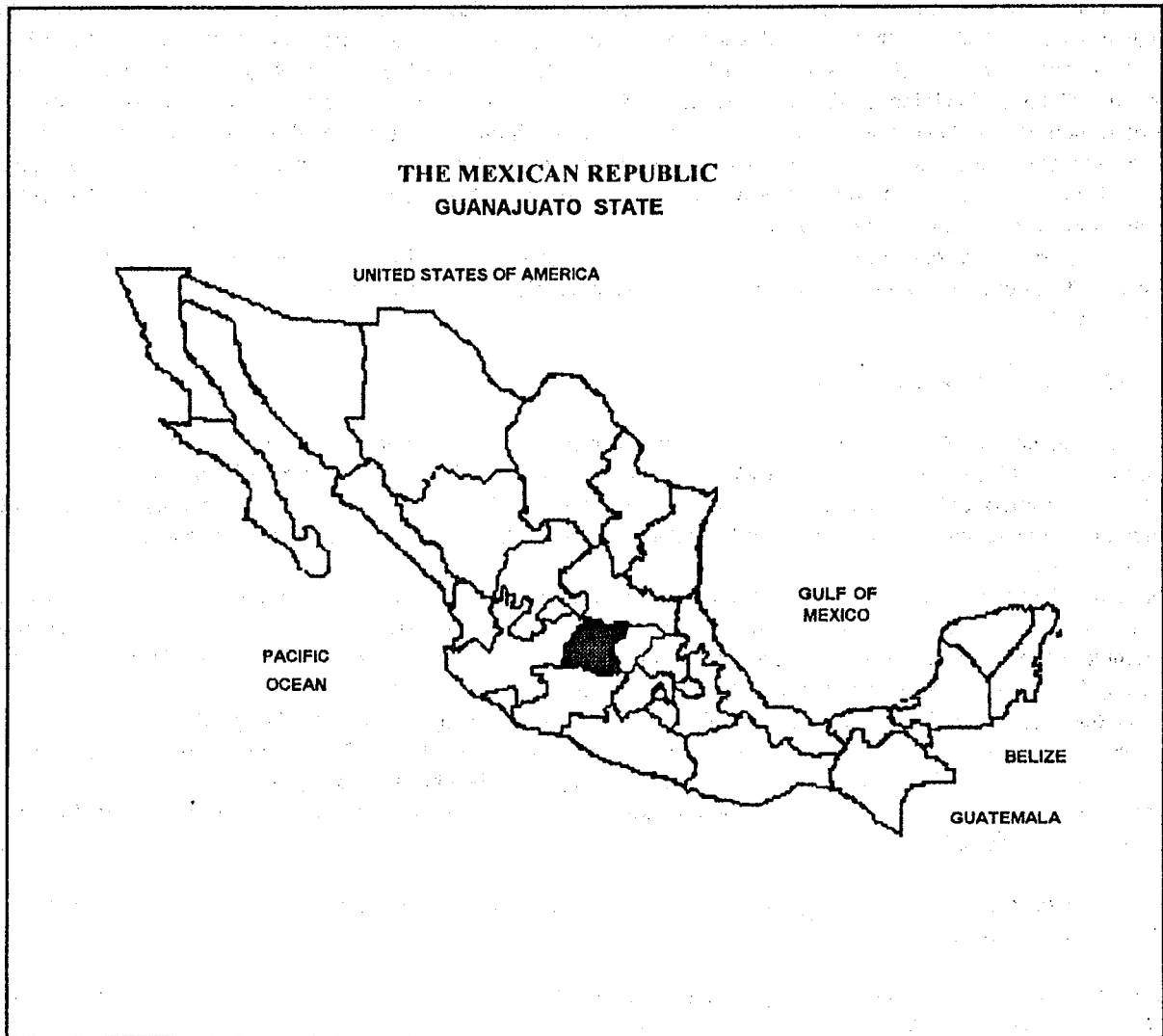
Consequently, we felt it was important to initiate our work with a *diagnosis of situation* (written and filmed), that enabled us to identify how the social actors interacted in Irrigation District 085, La Begoña, the several socioproductive areas, and the variety of problems that might develop during the initial phases of the project.

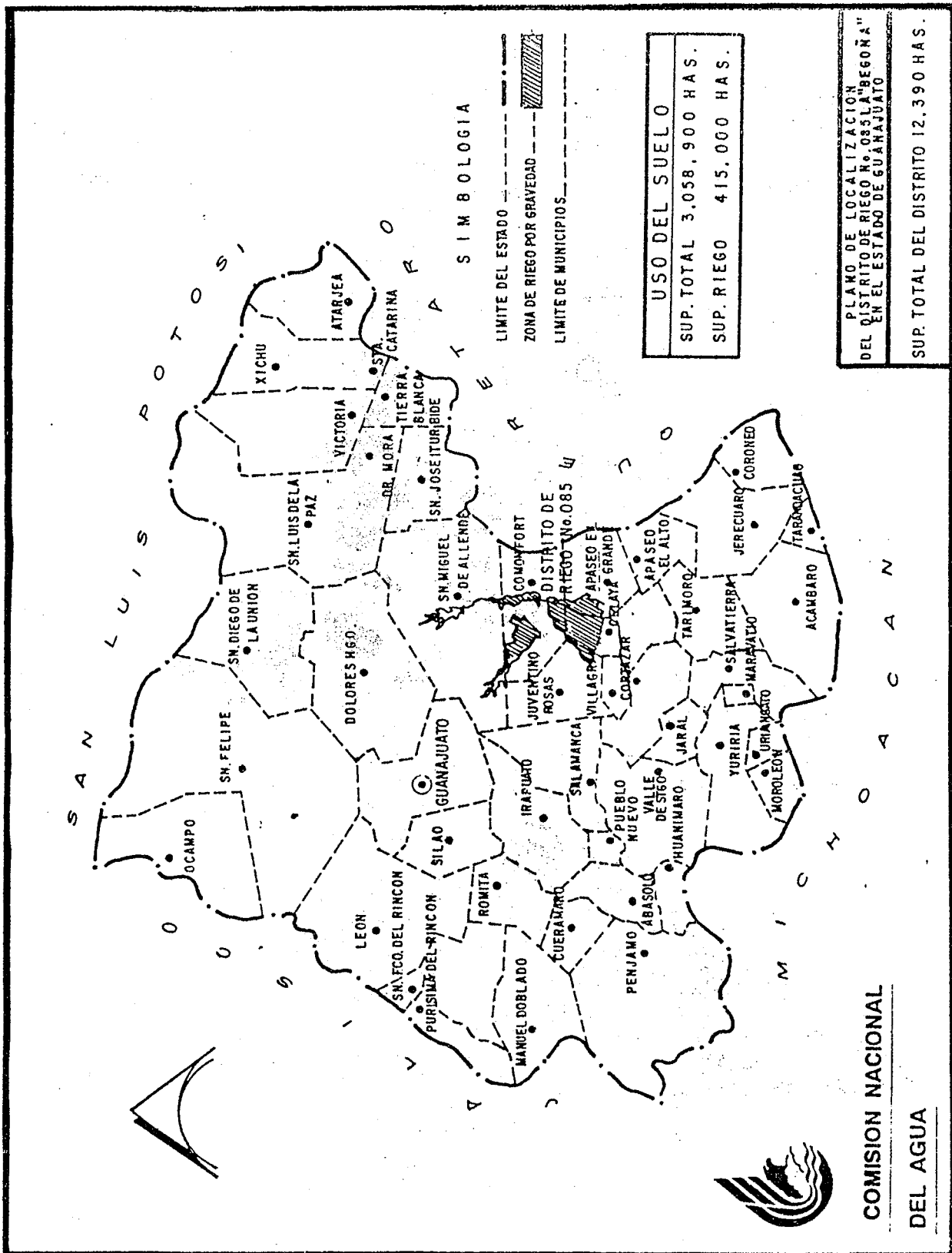
Once we had the *diagnosis of situation*, it was necessary to center our concern on the main activities that allowed us to fulfil the goals of the project:

- * Detect the main economic, productive tendencies and socio-organizational behavioral patterns among the district's user.
- * Identify the main organizational problems caused by the maintenance, administration and distribution of water in the whole district.

⁴The *ejido* is a legal entity established under the Mexican Constitution of 1927, in which land use is assigned to a requesting group, "ejidatarios." This assignment is invariably to a group. However, the land use may be on an individual plot basis or as a community effort. In 1991, Article 27 of the Constitution was amended, with which the possibility of ownership was given to the *ejido*, on an individual basis. This amendment allows an *ejidatario* to sell or rent his plot of land, with the authorization of the members of the *Ejido's* assembly.

Map 1.





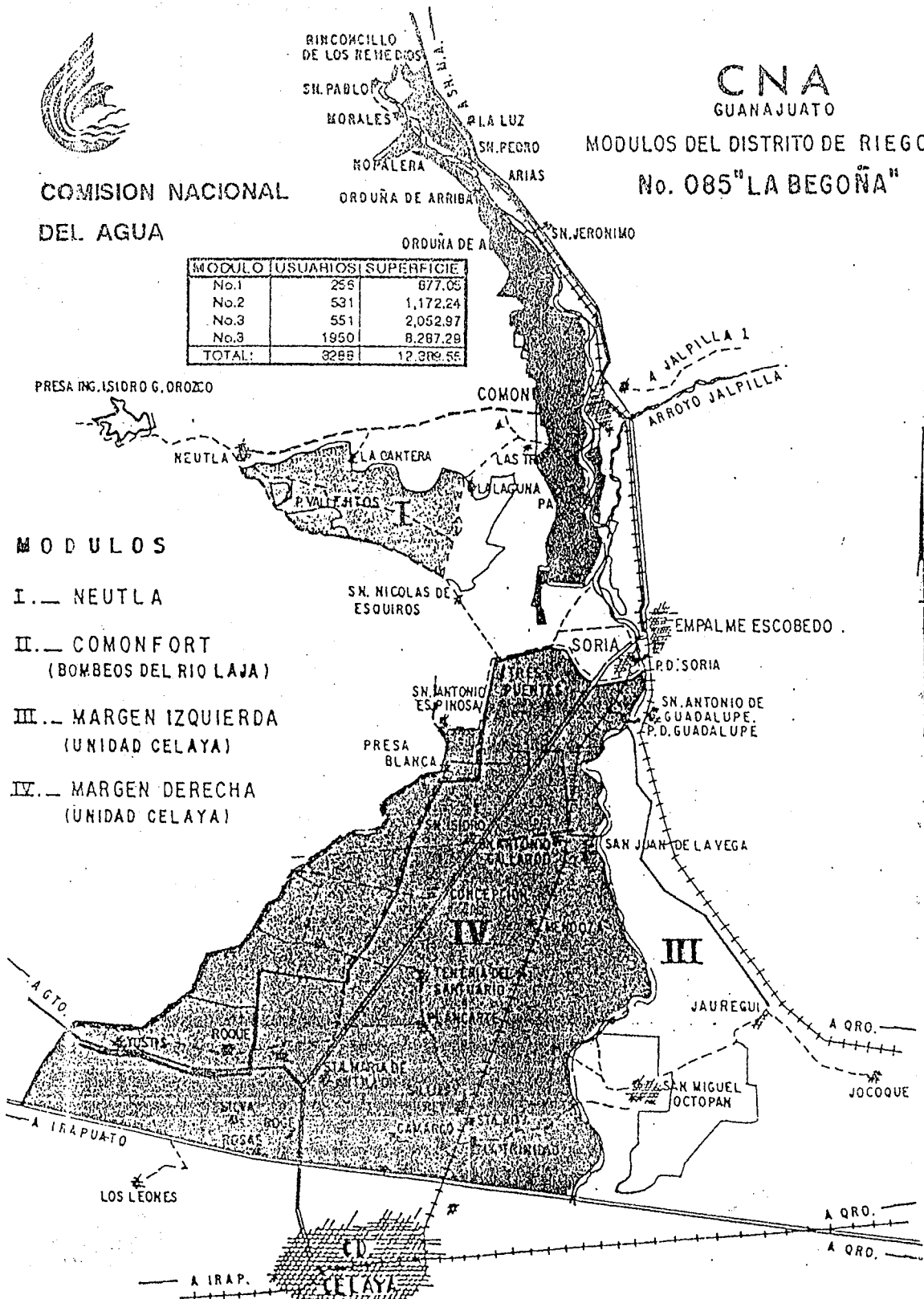


COMISION NACIONAL
DEL AGUA

MODULO	USUARIOS	SUPERFICIE
No.1	255	877.05
No.2	531	1,172.24
No.3	551	2,052.97
No.3	1950	8,287.29
TOTAL:	3288	12,989.55

CNA
GUANAJUATO

MODULOS DEL DISTRITO DE RIEGO
No. 085 "LA BEGOÑA"



- MODULOS**
- I. — NEUTLA
 - II. — COMONFORT
(BOMBEOS DEL RIO LAJA)
 - III. — MARGEN IZQUIERDA
(UNIDAD CELAYA)
 - IV. — MARGEN DERECHA
(UNIDAD CELAYA)

Table 1. User Classification and Irrigated Areas in Irrigation District 085 "La Begoña."

MODULE N° AND NAMES	EJIDATARIOS (°)		SMALL LAND HOLDERS		TOTAL	
	USERS	SURFACE	USERS	SURFACE	USERS	SURFACE
N° 1 NEUTLA	243	831.67	13	45.38	256	877.05
N° 2 COMONFORT	152	338.08	379	834.16	531	1,172.24
N° 3 LEFT RIVER BANK	498	1,760.29	53	292.68	551	2,052.97
N° 4 RIGHT RIVER BANK	1,702	6,098.96	248	2,188.28	1950	8,287.24
TOTAL	2,595	9,029.00	693	3,360.50	3288	1,2389.5

Source: Form C-1. State Headquarters (Gerencia Estatal). Irrigation District 085, Feb. 1994.

⁵The ejido is a legal entity established under the Mexican Constitution of 1927 in which land use is assigned to a requesting group, ejidatarios. This assignment is invariably to a group. However, the land use may be on an individual plot basis or as a community effort. When Article 27 of the Constitution was amended in 1992, the possibility of ownership, and not just land use, was given to the ejido, if the members of the assembly so authorised.

Table 2. Irrigation District 085, La Begona, Cropped Area (ha).

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
HORTICULTURE	657	422	964	915	1,444	1,289	364	971	180	2,186	1,621
FRUITCULTURE	836	506	465	515	596	824	49	755	563	351	729
FORAGE	3,585	2,920	1,854	2,570	2,825	3,143	3,147	3,154	2,821	2,661	3,205
GRAINS	5,470	5,776	5,527	5,625	4,999	5,136	3,526	4,004	3,787	2,667	6,301
TOTAL	10,548	9,624	8,810	9,625	9,864	10,392	7,086	8,884	7,351	7,865	11,856

Source: Irrigation District Headquarters, CNA. Agricultural Statistics System (Sistema de Estadística Agrícola, SEA).

Table 3. Irrigable and Irrigated Areas (1985).

	USERS	IRRIGABLE AREAS	IRRIGATED AREAS
Superficial streams		89,297	103,863
Underground streams		22,597	45,662
Total District 011	22,626	111,894	149,525
Superficial streams		9,110	9,876
Underground stream		1,600	1,370
Total District 085	3,122	10,710	11,246
Superficial streams		11,724	9,635
Underground streams		200	400
Total District 087	2,209	11,924	10,035
Superficial streams		41,238	33,600
Underground streams		196,702	262,576
Total of 511 Small Units	37,912	237,940	296,176
Superficial streams		20,000	14,700
Underground streams		25,024	32,531
Total Private Small Units	13,353	45,124	47,231
TOTAL	79,222	417,592	514,213

Source: Field Study Irrigation Districts 011, Alto Rio y-Lerma & 085, La Begoña. Subcoordination of Participation, IMTA, 1991.

- * Strengthen the user organizations for their active role in the operational, maintenance and administration procedures needed for the equitable and efficient distribution of water in each module of Irrigation District 085, La Begoña.
- * Design an efficient strategy to achieve consensus concerning the procedures to be followed for each aspect, among the engineering personnel of the National Water Commission (Comisión Nacional del Agua-CNA), the technicians, the User Association board and the users in general.

A FIRST APPROACH TO THE METHODOLOGY USED

For a better understanding of how we implemented the social dimension in the project, "*Use of Hydraulic Resources for the Integral Modernization of the Irrigation District 085, La Begoña*," we will explain the different stages included in it.

Based on a first appraisal of the social actors participating in the consolidation of the transference of the irrigation district, and the social, economic, and productive problems detected in the state of Guanajuato, the country and the localities around and within the irrigation district, the following stages were programmed

1. Before the Implementation of the Project. This stage contemplates the following aspects:

- a) The present conditions of the district's infrastructure and the water management procedures handled by the users. For this purpose, all irrigational structures were recorded on film and several district users were interviewed.
- b) A social, economic and productive study was prepared with a target sample which covered the surrounding towns and the localities inside Irrigation District 085, La Begoña. For this purpose, we used the Statistical Package for Social Sciences (SPSS) and the System for Geographic Information (SGI). These computer packages allowed us to include the socio-organizational and economic-productive data by section, by module and for the entire district.
- c) Based on the results of the social, economic and productive study, the social netting and its relation to the water distribution network was identified.
- d) The potential organizational patterns, starting with the primary level, the individual plot of land, or Irrigation Committee, up to the district level were identified.
- e) The existing cultural and socio-organizational diversity within the area was identified.

2. During the Implementation of the Project. The highlights of this stage are:

- a) The design of a research methodology that enabled us to attain participation based on the consensus of all the social actors involved in the process in the short, medium and long term.
- b) The design of this research methodology also allowed us to achieve a "cultural restructuring" within the users' cultural patterns, so that they could appropriate for themselves the technological principles that will impulse the consolidation of the modernization processes.
- c) As part of these activities, a mass media campaign was designed, to promote the involvement and understanding of the social and technical aspects related to the project.
- d) The introduction and transfer of the "know-how" of new technology such as automatic gates and instruments for volumetric water measurement. This equipment will be transferred to users after proper training in workshops.
- e) The identification of the most capable personnel to be trained as liaisons and promoters in each module.

- f) The development of consensus spaces between the social actors and the institutions involved in the project. This may be done using different techniques of group dynamics to find possible alternative solutions to the problems of maintenance, operation and water management. Group dynamics are also geared to strengthen the organizational aspects of the User Association for an equitable and efficient distribution of water to each of the modules of Irrigation District 085, La Begoña.

3. After the Implementation of the Project. This stage is designed for the period after completion of the technical modifications, where the following activities are provided:

- a) Demonstration of the technological changes introduced after the project was applied. For this, a filmed comparison will be used to demonstrate the technological changes in the infrastructure before and after the project's implementation.
- b) Evaluation of the users' perception of the improvements and problems evolved within the project's development.
- c) Readjustments to the overall design of the project: "Use of Hydraulic Resources for the Integral Modernization of Irrigation District 085, La Begoña."

With this methodology, we hope that we will be able to have some insight into the achievement of the User Association's main goal that can be summed up as follows:

The transference of technology for an equitable and efficient use of water in Irrigation District 085, La Begoña, Guanajuato.