CHAPTER IX

Sustainable Development Proposals for Small Family-based Production

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INTRODUCTION

This article presents two experiences with sustainable development projects, in execution in Brazil, where the greater involvement of the family and especially of women throughout the various phases can be observed, as well as a greater awareness of the need to appropriately handle and preserve natural resources, especially water.

The projects are located in Brazilian regions with very different characteristics. The Gloria Project is part of the Itaparica Complex, in north-eastern Brazil, in a semi-arid region with little rainfall, poor soil and all the problems that result from these characteristics. The Programme for the Verticality of Small Family-based Agricultural Production—PROVE—is located in the Cerrado savanna region, in Central Brazil, whose main characteristic are two well-defined seasons: summer, which lasts six months and has a high level of rainfall, and winter, which has the same duration but is extremely dry.

In both projects the efforts undertaken are aimed at allowing the beneficiaries to develop a more productive, technologically advanced and commercially sustainable form of agriculture. In this manner, small farmers, rural workers, their families and organizations have been contributing more to the productive system through greater competitiveness, profitability, job offers, and the appropriate utilization of available resources.

GLORIA—A SELF-SUSTAINED AND SELF-MANAGED FAMILY IRRIGATION PROJECT

Brief history

In the 1970s, a pronounced increase in the demand for electric energy occurred in north-eastern Brazil; an increase that put the region's development at risk, with the possibility of a rationing of power. To meet this challenge, CHESF—the São Francisco Hydroelectric Company—the company responsible for the generation and transmission of electric energy in the north-east, carried out detailed studies which led to the construction of the Itaparica Hydroelectric Plant, as a means to allow the region to develop. This was a daring step, but a correct one. Itaparica resulted in a 34 per cent expansion of CHESF's energy generation capacity, benefiting more than 40 million Brazilians.

The Itaparica Resettlement, therefore, is the result of an indemnification process carried out by CHESF, compensating the rural and urban communities displaced by the construction of the dam of the same name. It is located in the north-east region of Brazil, more specifically in the 'Polygon of Droughts', a region with a semi-arid climate, characterized by high evaporation, an average annual rainfall of 400 mm and an average annual temperature of around 26°C.

The water source for the Itaparica Hydroelectric Plant and also for the Gloria Project is the São Francisco river. Of the reservoir's total area, 16,500 ha (165 km^2) of productive lands were submerged. The implementation of the reservoir, flooding such a vast expanse of land, caused an impact on the population and economy of the São Francisco Valley region. CHESF pledged to provide new ways of making a living and to compensate for the socio-economic impact felt by the 105,000 families affected, distributed in the following manner: 4,600 in the urban zone and 5,900 in the rural area, among which 200 were Indian families. Three cities with populations of 18,000, 6,000 and 5,000 inhabitants, respectively, were flooded to form the dam.

The irrigation works for the resettlement encompass approximately 20,000 hectares, complemented by another 100,000 hectares that could be utilized without irrigation or in a collective manner. The resettled families live in 126 agro-villages built by CHESF, with an average of 50 families per village.

Since the beginning of this endeavour, basically three institutions have been involved in the various processes for the agro-socio-economic development of the region: CHESF itself, that built all the constructions, the Development Company of the São Francisco Valley (CODEVASF), and the Syndicate of Workers of the Sub-Medium São Francisco, which represents the majority of the communities of resettled farmers. The World Bank financed approximately US $ 230 million of the money spent on irrigation projects, of a total of US $ 1.2 billion spent up to now, not including the costs to build the plant. In this spending are included the construction works for rural and urban infrastructure and the purchase of the 80,000 hectares of land flooded by the dam.

GLORIA PROJECT

The Gloria Project is part of the Itaparica Resettlement Project and is located near the Itaparica Dam (right margin), in the municipality of Gloria, in the state of Bahia. Due to the irregular and scattered distribution of the spots of soil for irrigation, the project was conceived as a series of four mini-projects, where 122 families reside in a total of 590 people. It disposes of 385 ha of irrigable lands, distributed into 139 plots that vary from 1.5 to 6.0 ha of useful lands, according to the number of family members able to work, using the irrigation system of conventional aspersion, with the Itaparica Lake being the source of the water (COOPAG/ATER, 1998).

Water, despite being considered an abundant resource, in relation to the project's current uses and demands, is a resource of extreme importance, due to the climatic characteristics of the region where the project is located, as previously mentioned. It is very important to be aware of the fact that at the end of this decade, this century and this millennium, the inappropriate use of water—a shortage in some areas and a growing demand for it—are revealing water to be one of the most serious problems for man-kind in the twenty-first century. A new way to deal with the environment must therefore be found soon. In terms of basic services, the population involved with Project Gloria can count on four schools with nearly 150 students, one health clinic, equipped with an ambulance and specialized personnel and one bus, contracted through a CHESF/CODEVASF agreement.

Agricultural production

Due to the characteristics of the soil and market factors, the short-cycle crops for which the Gloria Project was planned yield low profits, not enough to totally cover the expenses with the operation and maintenance. The project's soils are, predominantly, quartziferous sands with a organic matter content below 0.6 per cent, planted with watermelon, *Phaseolus* beans, onions, *Vigna* beans, and tomatoes.

With these characteristics, export from the irrigated plots has not allowed settlers to make enough income on a regular basis from farming—to multiply the capital invested there and to improve the living conditions of their families, as well as guaranteeing capital for the production unit. It is probable that, within the current context of agricultural exploitation, the payment capacity of resettled farmers does not permit them to break out of the vicious cycle of low income to the point of reaching the self-sufficiency of plots and the project as a whole. Therefore, a need exists to change the model of agricultural exploitation, and financing a technology that increases the productivity of crops, and organizing the programme for production/sale in order to create the necessary conditions to allow for the programme's emancipation.

In view of the limitations of the original exploitation model in providing the minimum conditions for the emancipation of farmers, it has become necessary to make changes to reduce restrictions and to offer alternatives to get the enough income to support their families, to multiply the capital invested and also to generate extra income for the 'capitalization' of the productive unit.

Self-sustainability of the project

In light of the inability of the original agricultural model to provide the minimum conditions for the sustainability of the project, the re-settled farmers of the Gloria Project have been developing activities for the implementation of a new production model. This is a production technology called Green Factory.' It attempts to provide settlers with a more productive and technologically advanced form of agriculture which is commercially sustainable. The Green Factory is a tool that allows for a reorganization of small-scale agricultural and livestock production through the maximum utilization of the production

factors, aimed at improving the living conditions of small rural property owners organized into co-operatives, providing adequate family income. It takes into account the natural vocation of the soil and of the family, taking into consideration especially the important role carried out by the woman not only in the family organization but in the entire productive process. It is a flexible programme for the training and professional qualification that takes into consideration the socio-cultural characteristics and technical-economic vocations of the context in which it is implemented. Far from being an assistance-intended proposal, the Green Factory tries to transform communities into self-sufficient production units, highly integrated to the market economy. The basic principle of the Green Factory Project is to make farmers aware that increase in production and profits is not the direct result of an increase of investments, but mainly of the total elimination of waste and loss of energy, labour, raw materials, technology and capital.

For this purpose it is fundamentally important that the small farmer and his family become themselves subject to a process of change, actively participating in the implementation of new labour techniques and procedures and, in this manner, modifying a process that is structured according to tactically established and barely efficient standards.

PARTICIPATION OF WOMEN IN PROJECT GLORIA

Brief history

The participation of women in Project Gloria and in other projects of the Itaparica Resettlement developed in a manner and along a time frame that reflected the building of the dam. Against this background, two periods should be considered. In the initial period, when the projects were not yet producing, the active participation of women was aimed at ensuring that their rights and those of their families as re-settlers be respected. During this period, involvement with labour unions in the pursuit of this goal was strong. In the second phase, when some projects began to produce results, women diminished their level of involvement in the struggle to get their demands met in order to help their husbands with farming chores in their plots of land.

However, they did not feel stimulated by this since they received no money for their labour and were financially dependent on their spouses. These setbacks did not discourage the women. They continued to struggle, but increasingly become aware of the fact that they must find their own space where they would be valued and receive wages for their labour.

The struggle continued and, thanks to some assistance, there are women groups today, well organized or in the process of organization, in almost all projects of the Itaparica Resettlement. These women are trying to find ways to generate income, especially through family-based agro industries, in order to help their families. According to various testimonies, the most gratifying aspect of the entire process is the awareness that the women have good prospects of becoming financially independent.

Naturally, the challenges continue. However, they pursue onward with the understanding that participation is an expression of freedom and depends essentially on the view each of them has of their responsibility and capacity to bring about changes in their day-to-day lives and build for the future.

Planning of family agriculture

The women of the Gloria Project lived quite complacently as housewives. Sometimes they would help their husbands with farm chores, but that did not count. The first time they got together was at the urging of a team from the Technical Assistance and Rural Extension (ATER) to discuss alternatives for the purpose of utilizing the remains left over from production. Initially the women would only meet during harvest time and exclusively for the reason just mentioned. The women did not think they could organize themselves and search for their own space, living contentedly and eternally dependent upon their husbands. The husbands enjoyed this condition of dependency because of their machismo, and were glad not have to deal with 'another problem'.

The beginning of the Technical Co-operation Project (TCP) between the Inter-American Institute for Cooperation on Agriculture (IICA) and the São Francisco Hydroelectric Company (CHESF), in

May 1996, marked a new moment for the Gloria Project. This new moment was the beginning of efforts aimed at the self-management of the projects. One of the main objectives of TCP CHESF/IICA is to support agricultural and social development programmes of the Itaparica Resettlement. With this focus in mind, the CHESF/IICA Technical Co-operation Project is working arduously, encouraging small farmers to advance in the organizational process in order to attain the self-management of their projects.

With the discussions regarding self-management in the Gloria Project, women began to have their own expectations and asked themselves: What is my space? What is my role within the self-management process? Can I develop an activity that can increase the family income? Should I seek out other women to think of these possibilities together? And it was in this manner that they reached the conclusion that there is room for them and that they should start pursuing alternatives in order to get there.

With all these doubts, a group of five women initiated a crusade to mobilize the other women of the Gloria Project. They wanted to share with their peers the doubts they had, and find ways to become less dependent on their husbands. The mobilization was successful. At first, around 80 women showed up for the meetings. But the macho attitude of many husbands resulted in many women giving up the fight, opting for continuing dependence on their husbands. However, 23 women remained: they have chosen to form the 'Movement of Pro-Co-operative Women'—MMPC.

The group that was thus formed continued fighting for its goals, holding meetings, trying to obtain IICA's support to advance in their efforts to get organized. On this path to self-management they reached the conclusion that the most viable way to obtain the space they desire is to associate to the Project's Self-Management Association, the Co-operative of Agricultural and Livestock Producers of the Gloria Project Ltd. (COOPAG), constituted in August 1997.

Together with this revelation came the first difficulty of the MMPC, which was: how to buy the shares and become associated with COOPAG, with their own funds. That was when they were able to find a location to hold a festival for Our Lady of Conception, the

project's patron saint, and with the money they made with the event and some sponsorships obtained, they purchased COOPAG shares. As a result, MMPC managed, in January 1998, to pay in full 80 per cent of the underwritten capital. The incorporation of 23 women to COOPAG's membership roster was the result of the group's organization, of its great effort, and of the hosting of various activities aimed at raising money for this purpose. The group is concerned with finding alternatives for producing and generating income. For this purpose, they are already manufacturing home-made sweets in the agro-villages, with sales doing well. Moreover, the group keeps active by searching for technical improvements, participating in training courses. Among these is participation in a course on co-operatives taught by IICA technicians.

The participation of women in the Gloria Project, even though incipient, is of great significance when considering the environment in which they live, where they are usually excluded from productive activities. The women are betting on the new model of production, especially because they see it as a starting point—namely the participation of the entire family in the productive chain in a pursuit for a better quality of life.

PROVE—PROGRAMME

Brief history

The Programme for the Verticality of Production (*Programa de Verticalização de Produção*—PROVE) was created by the government of the federal district through its agriculture department, conceived in January 1995, and implemented in October the same year. PROVE's main objective is the generation of jobs and income aimed at reducing social inequality by means of sustainable development. In the specific case of the federal district—FD—this intent gains even greater significance considering the great migratory influx of the rural population from other states.

The programme, an unprecedented initiative in this country, attempts to rescue small farmers from the margins of the economic process by giving greater value and providing greater income for their activity, through mechanisms for the verticality of the productive

process. By processing their products *in natura*, be it of vegetable or animal origin, the producer has been able to sell them at competitive market prices. In this manner, small farmers, rural workers, their families and organizations, have profited from a greater participation in the productive system through greater competitiveness, profitability, job offer, and the appropriate utilization of available resources.

PROVE's target public are the family-based producing units selected according to the following criteria (Brasil, 1997):

- At least 80 per cent of the net income of Family-based Productive Units must originate from a rural environment, and the sum of all incomes divided by the number of family members cannot exceed half a monthly minimum wage.
- The Family-based Productive Units may hire seasonal labourers, as long as they do not exceed in number the sum of the available family manpower.
- The Family-based Productive Unit should have, in the maximum, 20 hectares (4 fiscal modules) of cultivatable lands.
- The producer should live on the property or in a nearby town.

PROVE's operationalizing has been possible through an integrated effort of the department of agriculture, and its interdependent organizations, and joint activities with the other agencies of the FD government directly responsible for the execution of the program. They are:

- *Government-run Wholesale Market (Central de Abastecimento—CEASA/DF)*—Responsible for commercialization, market assessment, sale negotiations and direct sales (wholesale markets).
- *Technical Assistance and Rural Extension Agency (Empresa de Assistência Técnica e Extensão Rural—EMATER/DF)*—Responsible for the public selection, preparation, monitoring and technical assistance of projects. This assistance includes not only technology on the production of raw material and its processing, but also for the legal paperwork for the standardization and normalization of products.
- *Zoobothanic Foundation of the FD (Fundação Zoobotânica do DF—FZDF)*—Responsible for the architectural, water-sanitation and electricity projects of the 'agro industry kits' composed of pre-fabricated walls and support beams adapted to various types of construction, depending on the type of agro industry.

- *Food Supply Agency (Sociedade de Abastecimento de Brasília—SAB)*—Responsible for the construction and maintenance of the 'Producer Stands', where products are sold.
- *Water and Sewage Company of Brasilia (Companhia de Água e Esgoto de Brasília—CAESB)*—has collaborated with the programme by rendering assistance in the construction of water filters in agro industries and for performing water analyses.
- *Brasília State Bank (Banco de Brasília—BRB)*—To carry out his project, the farmer can count on a line of rural credit at the *Banco de Brasília* through an agreement signed with the *Ministry of Agriculture* through the *National Programme of Family Agriculture (Programa Nacional de Agricultura Familiar—PRONAF).*
- *The Department for the Sanitary Control and Inspection of Products of Vegetable and Animal Origin (Departamento de Defesa e Inspeção de Produtos de Origem Animal e Vegetal—DIPOVA)*—is the inspection agency responsible for inspections aimed at the issuing of a certificate that authorizes the agro industry to operate. DIPOVA makes two official inspections during the building of the agro industry for the purpose of adapting it to the correct hygienic and sanitary norms. Later, when the agro industry is in operation, at least two visits a month are made to ensure quality products for the consumer.

A partnership established with the state departments of health, of finances, and of the environment facilitates the legal processing of the licenses necessary for the operation of agro industries, according to legislation—such as a business license, formal bills of sale, bar codes, and others.

The agriculture department and the others involved, mentioned previously, do not have enough human and financial resources to meet the programme's current demands. Therefore, partnerships have been developed with other institutions that share the programme's basic objectives, rendering assistance according to their possibilities. Thus, currently collaborating with PROVE are:

- *National Research Council (Conselho Nacional de Pesquisa—CNPq)*—With the establishment of an agreement with the FD agriculture department and through the Support Programme for Appropriate Technologies, CNPq has provided specialized professionals and intern students through work scholarships. This hiring occurs in the following

areas: sales, chemical engineering of food, marketing and design, civil engineering, agronomy/animal husbandry, computer science, rural sociology and rural organization. The scholarship recipients, professionals or students in these different areas, work in a participatory manner in the process of transferral and adaptation of the technological know how vital for reaching the programme's goals.

- *Inter-American Institute for Cooperation on Agriculture (Instituto Interamericano de Cooperação para a Agricultura—IICA)*—will subsidize training courses for technicians and rural producers.
- *Brazilian Agricultural Research Institute—(Empresa Brasileira de Pesquisa Agropecuária—EMBRAPA)*—will provide, as a basic line of co-operation, orientation and technical assistance in the area of food technology.
- *University of Brasilia (UnB)—Nucleus of Scientific and Technological Research (NPCT)*—with studies and research on the programme's socio-economic and environmental impact for the purpose of assessment and necessary adaptations.

The implementation of an agro industry

When a PROVE product reaches the market, it has undergone a series of procedures and steps carried out for the purpose of assuring the product's competitiveness and of ensuring consumers that the best quality and safety standards were used. The product is submitted to various procedures, with the most important being: disclosure of the programme, purchase of materials, equipment, and construction of agro industry, establishment of norms, standardization of products, quality control, managerial training of producer, product placed on the market, routine follow-up of the business by the rural extension agent, and finally, commercialization of the product. When reaching this last stage, the producer will be on his way to economic independence.

One of the strategies employed by the agriculture department to consolidate PROVE was the preparation of a bill to ensure funding and the continuity of the programme. When voted on at the district house of representatives, the law was approved in January 1998.

According to data from EMATER-DF, in February 1998 there were 73 agro industries in operation, benefiting approximately 120 families involved in the following branches of activity: poultry raising (42 per cent), vegetable processing (14 per cent), dairy products (11 per cent), breads and cakes (11 per cent), sweets and preserves (8 per

cent), processed meats (3 per cent), fruit pulp (3 per cent), others (8 per cent).

Organization has proven to be an important tool for PROVE's success, which has convinced rural producers to unite and elect their regional representatives, who together with the technicians from various areas and institutions, are resolving problems involving the purchase of inputs, transportation and the sale of their products. Meetings are periodically held where all the producers of the agro industries assess and decide together the actions to be taken for the programme's success.

In July 1997, through NPCT/UNB and in a partnership with the department of agriculture, a preliminary study of an exploratory nature was carried out for the purpose of analysing the socio-economic and environmental impact of PROVE. Using a sociological approach and focusing on the opinions of the families who have gone through all phases of the programme, that is, motivation, financing, establishment of infrastructure, standardized processing and commercialization, 35 benefited families, who are already in the market selling their products with the PROVE label, were interviewed.

An initial analysis of the data showed that PROVE has brought about important changes in the lives of these families by allowing them to develop the ability to manage their own businesses, to have a notion of the cost/benefit of their work by keeping accounting records of the agro industry and to see beyond the current moment by planning for the future, assuredly forcing them to break away from the more traditional behaviour and popular beliefs.

Through these interviews it was possible to detect that, in general terms, 50 per cent of producers have a quite positive opinion about PROVE, observing still, according to Duarte *et al.* (1997), that the programme, besides altering practices used by producers, resulted also in a gradual change in mentality and the perception they have of the world and of themselves: *'They stopped being, in their majority, housewives, farm hands and employees in order to become and feel like rural entrepreneurs, that is, individuals or groups of individuals who manage to grasp, with greater clarity, the logic of the context they were excluded from up to now.'*

THE ROLE OF WOMEN IN THE AGRO INDUSTRY CONTEXT

One of the surprising results of the survey carried out in 1997 involves the division of labour among the sexes. A closer analysis of the survey, which encompassed 26 families, revealed that in 69 per cent of the cases women were actively involved in running the agro industry, being that in 46 per cent of the cases they are managing the agro industrial activities on their own or with the help of a family member.

According to Duarte *et al.* (1997):

> It can be observed, relative to the division of labour between the sexes, that, in most cases, it is women who are behind the management of agro industries and area responsible for the tasks. By dividing her time between the agro industry and domestic chores and/or activities carried out up to then, with success and recognition (be it material or not), a margin for domestic conflicts has emerged, in which husbands try to maintain their authority by exerting pressure on their wives to abandon the agro industry. If, on one hand this factor of discord can have negative reflexes, it can also, on the other, reinforce the process of economic independence of these women in the direction of what we call 'full citizenship'.

This citizenship refers not only to an increase of the family income but, above all, points to general changes in the woman's life in regard to her relationship with her family/community, allowing her to become more forceful and aware of problems around her, in pursuit of financial and professional autonomy.

One can speak of 'redeeming' the value of traditional housework because by using the experience and knowledge women have acquired through chores they carry out, such as the handling of food, their ability can be enhanced through technical knowhow in order to become a source of growth on a higher social and economic level.

However, the family conflicts resulting from the decreased time spent by women on domestic chores and farm work, and their own limitations in managing an agro industry, usually turns the more successful woman into the most overworked. The agro industry becomes an extra job for the woman and since she no longer has enough time for her home and cannot count on her family for support, she finds herself forced to hire outside help to do the housework,

since the hiring of employees for the agro industry requires greater legal commitments and greater spending. It was possible to verify, on the other hand, that family backing is an important factor in allowing women to successfully carry out their productive duties. In some cases, the involvement of the entire family in the agro industry becomes the predominant factor for its success and any disturbance of this set-up can jeopardize the continuity of the business.

The woman, therefore, is responsible for the agro industry as well as for overseeing domestic duties. The fact that she is no longer working with the husband on farm chores sometimes leads to domestic conflicts. Even in view of all this, the women stressed the changes achieved in terms of a greater sense of citizenship, for they are now more aware of problems and more prepared to face challenges in their day-to-day running of the agro industry, and even in special occasions like giving interviews to newspapers and receiving outside visitors.

It's important to note that, though the families involved have not yet obtained great economic prosperity, the underlying transformations have been significant, especially in what refers to a greater sense of citizenship and personal satisfaction on the part of the women involved with the programme. In this area, in fact, PROVE goes beyond its initial goals by helping families, and especially women, escape social exclusion. They now have access to credit, information, training, technical assistance and a market for the sale of their products. Moreover, their hard work is recognized not only by the family but by the community as well.

MANAGEMENT AND UTILIZATION OF WATER IN AGRO INDUSTRIES

Water, as a part of the ecosystem, is a natural resource and a social and economic asset whose current utilization in Brazil has been requiring the establishment of policies to prioritize its preservation, improved public health, and the safety of food and environmental protection. For the success of these policies, not only the capable performance of the entities that provide water services should be taken into consideration, but also the most efficient utilization of water by the various consuming sectors.

The utilization of water in agro industry is important in both phases of its operation, that is, in the production of raw material (agricultural or livestock) and in the processing phase. For the agricultural–livestock production phase, the agriculture Department, through EMATER, has instituted the 'Drop of Water Programme' aimed at the development of 'localized irrigation' in the FD, as one of the alternatives for the sustained development of agriculture, allowing small family producers to enter the market through the rational use of water resources. It is a programme whose technology, appropriate for this new clientele, is simple and cheap, with productivity gains that allow the product to be competitive in the market and technically justifiable because of its sustainability characteristics. It has been an important tool of support for the other programmes developed by the department of agriculture, especially for PROVE.

Among all the traditional known systems, localized irrigation—dripping or microaspersion—is the most appropriate for the environmental particularities of the federal district. Besides saving power and water, it has less impact on the environment, generates greater productivity gains than other irrigation systems, and can be considered socially equitable, because it can be used by a wide segment of farmers.

Due to the low hydro potential of the cultivatable lands of the FD, this type of irrigation provides the best possible utilization of the water and an increase of the profitability of agricultural undertakings by allowing for less spending with water and energy and reduced manpower. Up to now, the PROVE participants who use this type of irrigation are mainly vegetable growers who process their production in their agro industries, either as preserves, or as pre-processed (sliced and packaged). Therefore, the use of the water resource concerns not only its quantity and availability for the production of the raw material, but also its quality, an important factor for the quality of the final product of the agro industries.

The limited availability of water per inhabitant in the federal district raises concerns not only about its offer, but also the efficiency of its use. The notion that water is an inexhaustible resource no longer exists, because we know today it is limited. With this in mind, the Water and Sewage Company of Brasília—CAESB, the government agency responsible for water supply in the federal district, elaborated

a Rural Sanitation Programme with the purpose of improving the quality of life of this population through the introduction of sanitation and sewage technologies. To reach its objectives, CAESB bases itself on a joint solution for water and sewage, appropriate disposal of solid residues, drainage, control of vectors, sanitary and environmental education (CAESB, 1998).

CAESB's participation in the development of this programme is concentrated in four areas: selection of the water source; analysis and inspection of water quality; impounding and treatment; reserves and distribution. In the PROVE programme, due to the great dispersion of the population involved, CAESB has been asked to improve water supply by using the appropriate system according to the available water sources, as well as to provide sewage systems and treatment for water. For this purpose several works were executed to construct cisterns, wells and gutters to meet the hygienic-sanitary demands of the programme.

In the agro industries, this is a fundamental factor when considering the importance of water quality for the correct sanitary conditions and handling of the foods they process. With this focus in mind, CAESB checks and controls the quality of the water before it reaches the agroindustry's reservoir by means of physical, chemical and bacteriological analyses of the water, aimed at determining the most convenient treatment (chlorine or bleach). This control is maintained through regular inspections carried out in all agro industries every two months by CAESB technicians in conjunction with the family, who, after trained, can do the task themselves.

In a recent survey with PROVE families previously mentioned, matters related to the environmental impact of the implementation of the programme and, especially, the water issue were analysed. According to the results, it was possible to verify that of the total of 22 agro industries observed, 73 per cent have cisterns, 14 per cent have a spring or streams and 9 per cent count on artesian or semi-artesian wells as their main source of water (Table 1). By summing the share of wells and cisterns, the percentage of those who remove water directly from the water table rises to 82 per cent, which could become a problem in the future. It is interesting to observe also that almost all agro industries use the same source of water for domestic and agro industrial purposes.

The monthly consumption of water in an agro industry was hard to measure since most of those interviewed are not sure how much water they use. This unawareness results from the type of source (cisterns in their majority), from the way the water is used and from the fact that they are not charged for using it by the government. An estimate based on the data obtained shows that among the 22 agro industries mentioned in the survey 60 per cent of owners use from 1,000 to 75,000 l/month of water (Table 2). The remaining 40 per cent do not know how much they consume or did not answer. This last result draws attention. When asked the question, many of those interviewed seemed not even to understand it, which shows that this type of issue is not part of their universe. Another interesting aspect is the great disparity in the amount of water used by different agro industries. It was not possible to establish whether there is a direct correlation of this data with the type of agro industry, or if it only reflects the producer's inability to make more realistic estimates.

Currently, the most visible concern in relation to PROVE's environmental precautions has to do with the hygienic-sanitary conditions of the agro industries, since the final product will be consumed and can affect human well-being. Sanitary hygiene, including in this concept the environment and especially water, was the channel through which rural extension agents were able to orient those responsible for the agro industries. When considering the survey mentioned previously, in which it was verified that women participate of agro industrial activities in 69 per cent of the cases, she becomes the main user and therefore the person chiefly responsible for the utilization and management of water in these undertakings. Testimonies given by EMATER technicians confirm this tendency. They say that, according to their observations, the task of using and controlling the water, both at home as well as in the agro industry, belongs to the woman, who is concerned not only with its quality but also with its appropriate utilization. Men, in general, are given the job of locating and obtaining water for the family—in other words the more operational and more practical function. The technicians also revealed that though the entire family receives training on the treatment and appropriate use of water in an agro industry, it is always the women who give more value to the information received and who try to put it into

practice. On the other hand, when employing hygienic-sanitary procedures in their agro industry, they end up using these same procedures in their domestic chores, influencing the entire family to adopt good habits for personal hygiene.

But both men and women are now beginning to worry about a shortage of water. The rural population, in a general manner, is becoming aware of the fact that water is finite by seeing the water levels of their own wells dropping during the dry season. In regions in which before only perforations of 2 to 3 metres deep were necessary to reach the water table, it has now become necessary to perforate up to 25 metres to reach water. This problem is already seen by farmers as an indication of the deterioration of the environment, that is, the poor use of water in agriculture, waste, deforestation and, principally, the emergence of new urban settlements that are demanding the opening of new artesian wells and cisterns to meet the ever-growing needs of the population. In this context, to educate this population, especially women, on the need for the rational utilization of water and its preservation for future generations becomes an urgent requirement.

CONCLUSIONS

The Project Gloria as well as the Programme for the Verticality of Small Family-based Agricultural Production—PROVE, are based on agricultural and environmental preservation policies that try to meet the expectations of the participants. In these projects, water is an important resource, but more than this, it is a 'vital element', being therefore necessary to ensure its availability on all rational levels of consumption. By the same token, rural communities have realized that they can no longer accept the role of expectant user, waiting for proposals from the government sphere, but are endeavouring in a new way of thinking which is that of pursuing alternatives for solving their own problems, including those related to water. In this context, women are conquering more space in order to participate more actively in the control of production factors, giving value to their own priorities as human beings, and are beginning to understand the importance of the role they can undertake in the management and preservation of agro-ecological resources, especially, water resources.

Today, in Project Gloria, women represent 22 per cent of the

membership roster of the Co-operative, which is the project's administrator, which reveals an even greater potential for women to get involved in productive activities within an organization, confirming their willingness to help increase the family income. As a productive being, the woman in Project Gloria feels she has the right to participate of all the activities undertaken in the community—among them the process of managing water, a fundamental element for the success of an irrigation project. Furthermore, she understands that in Itaparica, water, before being a 'hydro resource' in the utilitarian sense, is, as mentioned earlier, a 'vital element' for the success of the project and its management and preservation should be established by the community of which she feels she is an integral and fundamental part. Moreover, she wants equal participation in the development of Project Gloria, in the pursuit of a greater sense of citizenship.

In the Programme for the Verticality of Production—PROVE, it was verified, through a survey carried out in 1997, that in 69 per cent of the cases, women are actively involved in running an agro industry, being that in 46 per cent of these they are responsible for the management or operation. These circumstances are giving women the opportunity to improve their standard of living by means of an inclusive, non-discriminatory policy that offers the diversification of production and greater access to the job market, and that counts on institutional support, which has become a fundamental factor of importance in the programme's development. By participating in PROVE, the woman becomes eligible to receive all the benefits, including an appropriate infrastructure which leads to better living conditions and more efficiency at work because she has access to services like running and treated water, sewage installations, appropriate equipment and other facilities that help improve and give order to her activities within an agro industry.

The fact that women are responsible for a productive endeavour that generates jobs and income has implied a reorganization of relationship patterns within the family nucleus, leading to changes that have caused conflicts not only for the man of the house but the entire family. Future studies should take this aspect into consideration, analysing it from a gender point of view, proposing it as an issue that is present in all the activities of the programme (credit, technical

assistance, technology, etc.) that should be viewed as such. It is important to consider also that besides raising these conflicts, mechanisms should be made available to women who participate in PROVE and their families to solve their problems in a positive manner.

As to the availability of water for the programme, the government of the Federal District has been ensuring its offer in quantity and quality, in step with the needs of agro industries, which has been an important incentive for its operation. The predominance of cisterns and wells has not resulted in poor quality of the water used, thanks to the services rendered by the inspection and control agencies that enforce all the hygienic-sanitary norms established by PROVE.

Finally, it can be observed that due to the greater experience and responsibility of women in the management of water in their daily routines in the family context, and now in an economic one as well, the institutions involved with these projects have been providing important technical information in respect to this matter. As a consequence, important changes have been observed, not only in relation to the incorporation of new technologies in the management of the resource 'water', but also in the introduction of new hygiene habits fundamentally important for the successful operation of an agro industry, These are now becoming part of the day-to-day routine of the entire family as well.

REFERENCES

BRASIL, I.C.P., 1997. *Prove—Relatório Institucional,* Período set. 1995 a julho 1997, Brasília, DF, Secretaria de Agricultura, mimeo.

CAESB—Companhia de Água e Esgotos de Brasília, Assessoria de Saneamento Rural, 1998. *'Programa de Saneamento Rural—Documento Síntese'.* Governo do Distrito Federal, Brasília—DF.

COOPAG/ATER, 1998. *Projeto Glória; Plano Agrícola para* 1998, Itaparica, mímeo.

DUARTE, L.M.G., BRAZIL, I.C.P., SALVIANO, O.M.M.F., BEZERRA, R.S., 1997, *Avaliação Sócio-Econômica do PROVE—Relatório de Pesquisa, Considerações Preliminares. Brasília,* DF, NPCT/CNPq, mimeo, 18 pp.

TABLE 1. Sources of water in the agro industries

Types of Sources	No.	%
Cisterns	16	73
Springs/Streams	3	14
Deep Wells	2	9
Others	1	4
Left Blank	1	4
Total	22	100

Source: Field Research. Study: *'Citizenship and the Environment: A Proposal of Environmental Management for the Cerrado, the Federal District and Outlying Region'*, Sub. Project PROVE, Nucleus of Scientific and Technological Research, UnB/CNPq. Unpublished.

TABLE 2. Monthly consumption of water per type of agro industry

Type of agro industry	Monthly consumption of water (L)	No.	%
Sweets and preserves	from 1,000 to 21,000	3	14
Poultry raising	from 6,000 to 15,000	3	14
Dairy Products	from 6,000 to 30,000	3	14
Breads and Cakes	from 4,000 to 6,000	3	14
Semi-Processed Vegetables	75,000	1	4
Do not know	–	8	36
Left Blank	–	1	4
Total	–	22	100

Source: Field Research. Study: *'Citizenship and the Environment: A Proposal of Environmental Management for the Cerrado, the Federal District and Outlying Region'*, Sub. Project PROVE, Nucleus of Scientific and Technological Research, UnB/CNPq. Unpublished.

CHAPTER X

Water Conservation in El Salvador—Case Study of a Small Community

Rita Sorto de Parker and *Gilma Rico de Calvío*

INTRODUCTION

Treatment and conservation of water are a priority items in El Salvador and in other countries throughout the world. This is because of the environmental degradation threatening the future development of the nation, which in turn has been caused by accelerated population growth and socioeconomic conditions which necessitate the search for new means of survival. These are causes which can be observed in the indiscriminate deforestation in upper catchments to clear land for agriculture, and in the accelerated growth of urbanization and illegal settlements both which have adverse impacts on water resources.

The present chapter is a case study of the rehabilitation of an impoverished zone which sprang up on the fringes of the city in 1910, where the struggle for survival had led to environmental contamination and degradation. This made it difficult for the inhabitants to face their responsibilities, especially the women, in their daily duties of taking care of the family. The main goal for the rehabilitation of the Las Palmas community was to completely change the living conditions of the inhabitants by integrating it to municipal services, especially those linked to running water and waste treatment. A final goal was to contribute towards the protection of water resources.

Community participation, with women playing an important part,

was the central point around which the project development took place, from the planning stage to the implementation and management of community services.

EL SALVADOR

The Republic of El Salvador is the smallest and most densely populated country of Central America, with an area of 21,041km^2. To the south it is the Pacific Ocean, with a total coastline of 296 kms. According to the national census of 1992, El Salvador had a population of 5,118,599 inhabitants (DIGESTIC, 1992). The difficult demographic situation is characterized by a population growth rate of slightly over 2 per cent per year, with an estimated population of approximately 6 million in 1998, and a density of 286 inhabitants/km^2. On an average, the family structure for heads of household is 69 per cent men and 31 per cent women.

In 1996, the GDP: reached 92.6 million (equivalent to 10.6 million USD, according to data supplied by the Central Reserve Bank of El Salvador (1997).[1] The GDP per capita for the same year was 16,000: (1,830 USD), thus placing the country among the poorest in Latin America. By 1995, 48 per cent of the population lived in poverty, and 18 per cent in extreme poverty. The armed conflict which devastated the country during the previous decade affected productive activities very significantly. With the arrival of peace in 1992, and the implementation of a sweeping structural adjustment programme, the country's economy has been reactivated but is highly dependent on foreign resources, such as money sent by expatriates living abroad, and the aid supplied by international organizations.

In 1992 there were 1,236,866 housing units, of which 673,677 were in urban areas and 563,089 in rural areas. Regarding water management in the urban areas, 74.1 per cent of the households had access to potable water and 65.9 per cent could discharge wastewater into sanitary sewage systems. In the rural areas, 13.4 per cent of homes had access to potable water and 63.8 per cent to adequate waste disposal systems. In summary, of all urban and rural dwellings, approximately 600,000 had no potable water and 435,000 did not have access to suitable wastewater discharge systems.

The majority of the country has a water management system to catch, channel and store rainwater: These river basins, with large degrees of deforestation, undergo high rates of erosion, and are continually degraded further by three types of activity: (1) poor techniques used in the growing of basic grains; (2) use of firewood which surpasses regeneration capacities; and (3) accelerated growth of urbanization (Barry, 1994). All this is in addition to illegal settlements which appear along the fringes of the large cities. Among the environmental consequences caused by the proliferation of unplanned urbanization is the cutting of trees, paving of long stretches by asphalt roads, the need to supply potable water, and the accumulation and improper management of solid and liquid wastes.

FOUNDATION FOR DEVELOPMENT AND BASIC HOUSING (FUNDASAL)

FUNDASAL is a public, non-profit institution, with the main objective of raising of social awareness to promote the social development and transformations required to benefit the poorer sectors of El Salvador: It was founded in 1968 because of a natural catastrophe. Among its primary objectives are:

- Integration of persons, family and communities among the poorest and neediest sectors of the country.
- Active, responsible and informed participation of these sectors in the processes for local development, and in the broader transformations on a national level; and
- Generation of alternative development models that can benefit as many families as possible, with a minimum and rational use of resources.

The model for institutional activities stems from the premise that it is possible to eradicate significantly the direct manifestations of poverty and marginality, and adjust certain structural causes and conditions that lead to this unfortunate situation. As part of the housing programme, the different projects developed by FUNDASAL through the Mutual Assistance system can be classified into three types: popular urbanization; urban renovation of impoverished areas (*tugurios*);[2] and resettling of 'ex-conflict' rural zones.

Despite the fact that one of the causes of environmental degradation is precisely the proliferation of unplanned urbanization, significant efforts are made to conserve water where the settlements are located. These efforts include fostering rationalization in the supply of water for consumption, use of sanitary devices for reduced consumption; construction of wastewater discharge systems to be incorporated into existing services, and further co-ordination with institutions that regulate services and educational programmes geared towards the user populations. Included in these efforts are solid wastes treatment, and protection of banks of watercourses bordering the settlements.

The institution has 161 employees, 64 professional (38 per cent) and 104 non-professionals (62 per cent). Of the total employees, 60 per cent are men and 40 per cent women. Positions are filled according to professional capacities and the types of work to be done.

Decisions are made at top and middle-management levels, constituting 8 head offices, 17 co-ordinators, in addition to the Executive Director and General Manager. Top management positions are filled by 80 per cent men and 20 per cent women: The breakdown for middle management positions are 53 per cent men and 47 per cent women.

INSTITUTIONAL CONTRIBUTIONS TO GENDER ISSUES

FUNDASAL has incorporated into its policies certain aspects of gender issues, among which are:

- Membership in the national network 'Women and Habitat'
- Initiative Center of El Salvador for the Women and Habitat Network for Latin America, or HIC (Habitat International Coalition)
- International workshop-encounter on Women and Habitat, entitled 'Paths from Beijing and Istanbul, in Central America and the Caribbean', in May 1997, in San Salvador
- Documentation on urban aspects of gender issues have been documented (Nos. 23/1994; 24/1994; 40/1995; 49/1996; 51/1997; 56/1997; and 64/1998)
- Publication of 'Women and Habitat' in 1997
- Formulation of an operational plan incorporating 'Gender Policy', whose

purpose is to disseminate information on gender issues to FUNDASAL personnel

- Incorporation of training/sensitization policy within the programme for applied research

LAS PALMAS COMMUNITY

Located in western San Salvador, the community is one of the largest slums in the metropolitan area of San Salvador (AMSS).[4] The community dates back to 1919, when the land was found on the outskirts of the city. By the late 1940s, there was a massive settling of the land, and by 1960 the settlement had consolidated to its current dimensions, with the city growing around it. Thus, the following limits were established: (1) to the north and west is the exclusive area known as San Benito, one of the wealthiest residential areas with the lowest population density of 50 inhabitants per hectare; (2) to the east is the Pan-American Highway; and (3) to the south is the International Fair grounds, and the Ministry of Public Works, with the Lechuza Falls lying in middle of both. Currently the community has to means of access. The first connects it with the Pan-American Highway, and the second is east, through San Benito, which is the only vehicular accessway.

The community has been established on the central government property and covers 9.6 hectares, equivalent to 96,000 m^2. The inhabitants do not have property deeds for the lots they occupy. Some 1,342 families constitute a population of 5,267 inhabitants, living in 1,021 dwellings, distributed among 15 plots, within a gross density of almost 550 inhabitants per hectare. A survey conducted with 1,059 dwellings determined that 63.4 per cent of heads of household are men, and 36.6 per cent are women. The average monthly income per family is $1,14: (national currency), equivalent to 131.00 USD[5] (FUNDASAL, 1992). The majority of this income is used for food.

Communal representation meant to seek a solution to potable water services in 1970 constituted the first organizational structure in the community. In 1972, the first board of directors meeting was held, which operated eleven years outside the legal institutional framework of the country. In 1984, the communal organization

became the Communal Development Association (ADESCO) upon obtaining its legal identity. From that point on the community is formally given the name Comunidad en Desarrollo Adesco Las Palmas.

During its growth, the formal city clearly established its conditions for physical and social exclusion from Las Palmas. On the border of San Benito a, 6-metre high wall was built to impede all communication between the two settlements, a true reflection of the profound economic and social differences of its inhabitants. The Lechuza Falls served as a natural barrier, which, together with the other conditions, helped to give the community the feeling of being a 'ghetto'[6]. There is no transportation regulation which would ease its incorporation into the city. The community has only one vehicular access. Internal movements can be done solely on foot along narrow and disorderly corridors.

Potable water supply within the community is collective. There is no indoor plumbing, people have to haul water from several designated points to their homes, in several containers for their daily use. There is no sanitary sewage system. Waste treatment for the housing units is accomplished with dry-ditch latrines: There are 3,000 latrines at the last count, active and plugged up. The community lacks a rainwater drainage system, thus endangering certain parts of the community during the rainy season due to flooding and unsanitary conditions.

In the Lechuza Falls sector there are differing levels between the settlement and the flow of the falls, varying between 6 and 25 metres. This makes this sector highly unstable and susceptible to landslides which endanger those living close to the falls.

The lack of municipal service for solid wastes disposal, together with ignorance in the community regarding health and environments issues, has led to the creation of outdoor garbage dumps, a veritable source of vectors for communicable diseases of all types, and contamination of the Lechuza Falls, downstream, which crosses the entire city. The flow of this waterfall is highly polluted due to discharge of domestic and industrial wastes located in the upper part of the basin.

The settlements present different degrees of consolidation in terms of their sizes because there was no proportional distribution of land. Approximately 63 per cent of the dwelling have walls made of

permanent material, but nonetheless there are all types of structural deficiencies.

HEALTH OF THE POPULATION

The current physical situation of the community serves as an obstacle to receive services from the city, prolongs travel times and the receiving of goods and services, and instills a feeling of insecurity among the inhabitants. The difficulties encountered in obtaining potable water and the poor quality of waste treatment increases the effort needed to perform household chores the traditional responsibility of women. It aggravates the health of family members, especially children, because they are more susceptible to diseases caused by lack of clean water. Children are also home for longer periods of time, and young girls are forced to remain home from school more often than boys, because they are saddled with helping women around the home a true reflection of the culture in developing nations such as El Salvador.

It is essential to consider the health and well-being of the community when thinking of projects, because they equally affect men and women. However, the physical deficiencies are experienced differently by both, when one considers the roles each has in society. It stems from their roles in the community, without overlooking the triple role played by women in reproduction, productivity, and communal activities.

The planning of the project began by identifying practical needs and problems encountered through operational diagnoses and specialized studies carried out to determine the complexity of the intervention necessary. This clearly defines the needs of men and women *vis-à-vis* (1) social structure; (2) the role of men and women in grassroots organizations; (3) types of economic activities is being performed in or around the home; (4) hygiene deficiencies; and (5) cultural restraints in project participation.

PROJECT COMPONENTS

The project included a rehabilitation process which implied the physical integration of the community to the municipal services, respecting the existing infrastructure, and family ties to housing units

already built. All the project components contained an educational process for implementation as well as for future maintenance, and hopes to achieve community consolidation.

The following description of the project components represents a solution to the problems and needs felt by the community.

- Implementation of a transportation system which allows for vehicular movement within the community, thus enabling the supply of goods and services.
- Realignment of corridors for enhanced travel, respecting topographical conditions and existing dwellings
- Implementation of a running water system and a sanitary sewage system for wastes disposal, including channelling of rainwater the gully, also improving the electric power system
- Construction of protection structures bordering on the Lechuza Falls, recover land, plan reforestation and protection for replanted areas, legalization of land for each family and for community areas
- Implementation of solid wastes collection, clean-up of garbage dumps along the banks of the Lechuza Falls, and treatment for dry-ditch latrines
- Granting of credit for materials to improve housing, building of new dwellings in safe areas for families located in risk areas and for those which would be affected by the transportation realignment.

REHABILITATION OF LAS PALMAS FOR WATER CONSERVATION

The supply of water services in the community and its conservation would be possible through co-ordinated actions with the community, FUNDASAL, and institutions with specific responsibilities such as the National Administration for Water Supply and Sewage Systems (ANDA), the institution in charge of managing and regulating services for potable water and wastewater disposal, the Ministry of Housing and Urban Development (VMVDU) which regulates plots and the rainwater system, and the municipality of the region. The project hopes to provide an opportunity for the community to be aware of the potential offered by various organization in order to improve the existing living conditions. This would be similar to the work done by the community in approving the water supply and sewage project with the responsible authorities.

The introduction of water services required installation of indoor plumbing in homes, schools, community centre, workshops and public laundry areas. In order to meet all these demands, ANDA authorized a minimum supply of 125 l/p/d (litres per person per day), from the existing public network located at the entrance to the community on the Pan-American Highway.

The uneven topography as well as the irregularity of pedestrian walkways (narrow corridors) did not allow introduction of a household wastewater system in keeping with the technical standards set forth by ANDA. The requirements were a minimum diameter of 8", joined by boxes with a minimum height of 1.0 metres and/or wells with a minimum height of 1.50 metres. Thus an alternative technology known as Small Diameter, Shallow Sanitary Sewage (APD/PP) was selected.

In order to identify the APD/PP system, several institutions were consulted. Among them were the Pan-American Health Organization (PAHO), and the Company for Ecology and Appropriate Technology of Guatemala (ECOTEC). The APD/PP was one of the main contributions of the project. It generated alternative and economical models for sanitary infrastructure, and the treatment of subsoil in similar settlements. It consisted of the installation of a pipeline network with small diameters, from 4 to 6 inches, installed with positive slopes at depths as shallow as 0.50 metres at each change in direction (horizontal and vertical). In household connections a small meter is installed so as to facilitate system maintenance. Once the APD/PP pipe capacity was surpassed, the next step was to connect the last stretch to the conventional system. This was an internal discharge sewer. Which was to be connected later to primary collector No. 3 of the ANDA intercepting sewers, located to the east of the community. There will be 5,590 meters of small diameter, shallow sanitary sewage installed, which represents 75 per cent of the total system.

For the implementation and later maintenance of this component, it was necessary to train men and women, including boys, girls and senior citizens, so that the system could be managed by the community during the first five years, with the technical and social assistance of FUNDASAL. During this period, its proper operation can be tested.

The system would then later transferred to ANDA for management.

The realignment of pedestrian traffic through the creation of corridors with a proper slope would allow surface runoff to be better channelled through the gutters to the downstream sewers. At the joints of several corridors, the runoff would be channelled by proper size pipelines, which may be variable to the point of final discharge into the Lechuza Falls. The final works for Lechuza Falls include protection projects in the area of landslides caused by inadequate runoff. These projects consisted of containment wall with proper slopes, land recovery and clean up of the banks, and reforestation.

There was an agreement with the mayor's office for garbage collection trucks to go to the community; for the building of a container prototype adaptable to the conditions of the community and the type of collection machinery that would be used by the municipality; for establishing the collection points; and for a major educational campaign (FUNDASAL, 1997a).

ROLES OF WOMEN

Contributions to the conservation of water resources included: a minimum supply of water in litres/person/day, which resulted in reduced extraction of water at the source upon ANDA delivery; reduction in the contamination of the aquifer by plugging up dry-ditch latrines, and incorporation of sewer effluents at established points; conservation of part of the Lechuza Falls sub-basin through the stabilization, reforestation and treatment of its banks, which also reduced sediment discharge to the river.

Women played an important role in this process, as they generally worked in the home and ensured the family's health and hygiene. The relationship between the workload endured by women, the time and effort invested in performing chores related to their roles in the home—such as supporting families and ensuring better hygiene and health conditions for their children—would be reduced upon the delivery of appropriate water and sanitation services. In addition this would favour health and education for the family by allowing women more time for income generating activities.

PROJECT IMPLEMENTATION AND EXECUTION

In order to implement the components described above, funding was obtained within the framework of bilateral between the Federal co-operation Republic of Germany and the Government of El Salvador. The funds were channelled directly to FUNDASAL by the Kreditanstalt Fur Wiederaufbau (KFW).

It was during the community meetings that the scope of the construction work was defined. During the educational process developed with the community organization, women represented 55 per cent, and men 45 per cent, levels which were maintained during the subsequent meetings (FUNDASAL, 1997b). Even though 63 per cent of heads of the household were men, and 37 per cent were women, were nonetheless responsible for ensuring the well-being of the family. It consolidated the community structures, and eventually women would benefit from all these efforts since they would perform chores in less time. This could open up additional possibilities in terms of income generation.

CONCLUSIONS

The Las Palmas project broke the tradition of the country, thus posing a challenge for FUNDASAL and the community. However, it was approved by all state regulatory agencies because of special conditions. If this development process works, which it is likely to, the process could be duplicated in the future.

By rehabilitating Las Palmas, a major contribution was made towards improving the living conditions of the community and also the conservation of water resources through protection of the banks of Lechuza Falls, treatment of dry-ditch latrines, and proper disposal and collection of solid wastes.

The involvement of women during the project development from the identification stage stemmed from their awareness of being the building blocks for a change that would improve the lifestyles of their families. Once the Las Palmas community is properly rehabilitated, women who currently invest the majority of their time performing household chores would have more time to engage in activities geared

towards generating income that would improve the family budget. Women, as the main users of water resources, would also be better trained for its rational use as well as for the operation and maintenance of the APD/PP system, which in turn shall improve family hygiene and reduce the incidence of disease.

The physical aspects of the rehabilitation project clearly indicated the roles played by women living in the community. Even more important is the enhancement of their position within the community social structure. When educational programmes are implemented, their self esteem would increase further. This is likely to increase their participation in decision-making processes as well as management and control of projects.

NOTES

1 Value in 1996 prices. Exchange rate: 8.75 per dollar. Source: Central Reserve Bank of El Salvador.

2 *Tugurio* is an irregular settlement generated by invasion, without transit planning, lacking basic services and infrastructure, located on uneven topography and/or landfills, and generally bordering on contaminated water sources. The dwellings are made of waste materials and highly dangerous.

3 A FUNDASAL publication whose objective is to expose to the national and international community, the position of the Institution (opinions, critiques, proposals, etc.) on the most pressing issues concerning habitats of the country's poor.

4 Metropolitan area of San Salvador or greater San Salvador, which is a grouping of 13 municipalities covering 543.3 km^2, including the capital city of San Salvador; current estimated population is approximately 1.7 million inhabitants.

5 Data from the socio-economical Community Las Palmas, Dec. 1992.

6 A place where impoverished people live separated from the rest of society.

REFERENCES

Banco Central de Reserva de El Salvador, January–March 1997, p. 90.

Barry. D. 1994. El Agua Limite Ambiental para el Desarrollo Futuro de El Salvador. Boletín Número 5, January–March.

DIGESTIC, Dirección General de Estadísticas y Censos. 1992. Censo Nacional. San Salvador, El Salvador, CA.

FUNDASAL, 1992. Fundación Salvadoreña de Desarrollo y Vivienda Mínima, Presentación e Interpretación de los Datos de la Encuesta Socioeconómica. Comunidad Las Palmas. San Salvador, El Salvador, CA.

FUNDASAL, 1997a. Fundación Salvadoreña de Desarrollo y Vivienda Mínima, Informe Trimestral Comunidad las Palmas, June–September. Ciudad Delgado, San Salvador, El Salvador, CA.

FUNDASAL, 1997b. Documentos de Estudio No.24, La Recolección de Residuos Sólidos en Asentamientos Populares. Ciudad Delgado San Salvador, El Salvador, C.A.

CHAPTER XI

Women and Agenda 21 in Mexico

Sonia Dávila-Poblete

INTRODUCTION[1]

This article analyses, from a gender perspective, some of the Mexican social policies that are in the amendment to the Agrarian Reform (better known as Article 27), as well as in Agenda 21, the Strategic Action Plan, in order to better understand how these policies intervene in the social action and participation of women in the hydro-agricultural sector.

The main goal of the current Mexican economic model is to reduce the state's role in all economic activities and, in its place, stimulate the participation of private enterprise to attain national economic growth through reduced public expenditure. To successfully reach this goal, the government had to modify several programmes and projects already under way, amend the existing legislation, and propose new decrees or laws. For example, in the agricultural sector (one of the key sectors) we find the National Programme for Modernization of the Rural Area: 1990–1994 (Programa Nacional de Modernización del Campo); the National Plan for Development: 1989–1994 (Plan Nacional de Desarrollo); the Amendment of Article 27 of the National Constitution (Artículo 27 Constitucional) and the National Water Law (Ley de Aguas Nacionales).

These programmes and projects reduced financing for all agricultural projects, suspended almost all rural loans, privatized or closed several state enterprises, and cancelled government-financed technical assistance in the management and administration of modern technological projects. The structural, social, economic and political

consequences of these programmes were profound because, as Gonzalez and Salles said: 'The diminishment of the State's participation in the rural areas broke up—with unprecedented haste—an important range of key institutions that were in charge of the agricultural economy, which had been developed over several decades.'[2] (González y Salles, 1995). Another aspect of the current Mexican economic model is to encourage private investors to participate in or to take over some of the programmes and projects that are geared to the rural sector. Although this seems to be an open invitation, the small farmers, *ejidatarios*,[3] peasants and indigenous communities are excluded for economic reasons. Since the 1994 Mexican economic crisis, many peasants have been drawn from a market economy to a subsistence economy, where they are often forced to rent or sell their land and work as field hands on their own property or in the surrounding areas; or to migrate to the cities, to other rural areas within the country, or to the neighbouring United States, leaving their spouses and families behind.

These modifications in economic policies were linked to the sustainable development model introduced in Mexico and many other countries. Since the 1992 United Nations' Conference on Environment and Development, held in Rio de Janeiro, many government representatives have signed the Rio Declaration in favour of 'the creation of a new and equitable global partnership through innovative levels of cooperation among States, key sectors of society and people' (UNCED, 1992).

This adherence to the Rio Declaration resulted in a clear shift in all government policies. For example, nearly all countries elaborated countless studies, reports, publications, international meetings and events of all types for projects and programmes concerned with the conservation and preservation of natural resources. Many secretariats or ministries were created to administer sustainable development policies based on various documents, including the Rio and Dublin Summit Declarations, the Bio-Diversity Agreement, the United Nations' Convention on Climatic Change, the Principles for the Sustainable Management of Forests and many more.

After the Rio Declaration, the majority of governments,

development agencies, United Nations organizations, and independent sector groups of the international community adopted the action programme 'Agenda 21', to be implemented from now into the twenty-first century in every area where human activity affects the environment. In the midst of this turmoil, women, without doubt, are the most affected. Therefore this article, which is geared to analyse women's situation from a gender perspective, acknowledges the importance of bearing in mind all these surrounding events. And so it will take into consideration some aspects of rural women's rights in relation to land tenure and inheritance, the National Water Law in the amendment of Article 27 of the Mexican constitution, and the Strategic Action Plan of Agenda 21, to see how these decrees and resolutions affect women's participation within the current Mexican social and economical context.

THE LOWER LAJA RIVER BASIN

For a better understanding of the inheritance pattern specified in Article 27 of the Mexican Constitution, as well as the local traditions followed by the *ejidatarios*, and finally the National Water Law, I will use some data of the Lower Laja River Basin in the state of Guanajuato. The Laja River Basin begins in the north-eastern part of state of Guanajuato and runs through the south-eastern part, covering a small part of the state of Queretaro. The Laja joins the Lerma River in the southern part of the state of Guanajuato. The Laja has a total length of 25 km^2 and provides water to eighteen municipalities: fourteen in the state of Guanajuato and four more in the state of Queretaro.

Due to great social diversity, the population density and other socio-economic factors among the water users of this river basin, as well as the rivers' water course, our research team[4] divided the basin into four main areas: the Upper Laja River Basin, the Dried Lake River Basin, the Lower Laja River Basin, and the Huimilpan and Queretaro River Basin. The Lower Laja River Basin has been selected for this study because it best represents the entire river basin. It has a high population density; concentrates a variety of economic activities; and supplies different types of water users—urban users, the industrial and agricultural sectors—with its small irrigation units and Irrigation

District 085, La Begoña. It services the municipalities[5] of Celaya, Apaseo El Alto, Comonfort, Apaseo El Grande and Juventino Rosas de Santa Cruz.[6]

The Lower Laja River Basin has a total population of 61,905 of which 30,423 (49.15 per cent) are men and 31,482 (50.85 per cent) are women. Of the 11,130 *ejido* population in the basin 5,489 (49.32 per cent) are men and 5,641 (50.68 per cent) women (see Table 1).

Although the percentile difference in the total number of men and women living in the River Basin as well as among the *ejidatarios* is less than two per cent in favour of women, when it comes to the Irrigation District 085, La Begoña, a quite remarkable difference can be seen. Only 708 (22.33 per cent) women appear in the registry as water users of a total of 3,171 (see Table 2). This data shows a gender differentiation; the *ejidatario* women in the irrigation district are at a disadvantage from the very beginning. I will use this data to demonstrate the relation between these women's situation and the policies of land tenure and water rights included in the Amendment of Article 27.

AMENDMENT TO THE CONSTITUTIONAL ARTICLE 27

On 6 January, 1915, after several peasant uprisings, Mexico was the first Latin American country to institute an agrarian reform under the slogan: 'the land belongs to those who work it'. Through the creation of Article 27 of the Mexican constitution, the state declared itself the owner of the land, while the *ejidos* held the usufruct of government land.

The *ejido* is a type of land-tenure pattern in Mexico, under which peasant groups in the agricultural sector are given a legal identity. These 'legal entities' have the mandate to integrate productive, social and cultural aspects, and to provide for the economic growth of their families, through the use of a plot of land that belongs to the federal government. This type of land possession allowed this social sector to inherit and use the land but not to mortgage or sell it. From 1915 to 1983, 25,589 *ejidos* were legally constituted throughout Mexico (Arizpe & Botey, 1986). Since then, in the traditional inheritance pattern for the productive land observed by most *ejidos*, the first heir was the wife, then the oldest son, and only if there were no males in

the family could the eldest daughter inherit the land. This pattern allowed women to be *ejidatarians*, as shown in Table 1.

When women inherited the land, usually as widows, they decided when and what was going to be sown, determined who was going to work the land, as well as who should inherit their land. When a daughter inherited the land, all young men saw the heiress as the most eligible fiancée, because marriage would give them a chance to improve their position within the *ejido*, be they *ejidatarios* or peasants without land. In either case, the husband took care of the plot and decided when and what was going to be planted, but the women, as legal *ejidatarias* retained the right to decide who was going to inherit the land.

This land-inheritance pattern gave women the possibility of gaining prestige and a chance of empowering themselves within their families and among the *ejido* members, because it placed them on equal terms with men in the community at the general meetings, where decisions were made about the administration and political participation of the *ejido*. At the same time, they bore the responsibility of deciding all the administrative aspects concerning their plot of land. This turned out to be a kind guarantee for the women, since all the possible heirs took care of them, even if it was only for the purpose of being named in their will.

On 14 November, 1991 President Carlos Salinas de Gortari, in a speech to the Permanent Agrarian Congress, mentioned ten reasons for introducing an amendment to Article 27 of the constitution. The core of his speech was geared to show that with these changes the rural sector would have greater justice and liberty. He said that the plot used for agricultural production could be sold if two-thirds of the qualified people from the *ejido* or community approved the sale of their plot of land. To support this argument, he said: 'the purpose of amending this Article is to give the *ejidatarios* the freedom to decide on the best uses of his or her plot of land' (*La Jornada*, 15 November 1991). At the same time, he said that the ejidos would have greater protection under this amendment, because the village area, where the people live, could not be sold. To support this, he argued that if this area were sold, the community's identity as well as its traditions would

be jeopardized. To strengthen his commitment he went on to say: 'we will give our support with health and educational services, with loans for productive projects, with financial resources to all equitable associations with answers for peasant women' (*La Jornada,* 15 November 1991).

This statement shows us, once more, that the private or domestic sphere is still considered the woman's sphere of action, and that's why Salinas' speech ends with the phrase that his government will give 'answers' to peasant women—without specifying what their needs are. Furthermore, he takes for granted that women are responsible for the identity of their communities and their traditions. Therefore, he assumes that by protecting the piece of land where the village is settled, his government would be responding to women's needs.

On the other hand, the fact that the agricultural plot of land, which is the profitable area, can be sold, gives us an idea of how the land-tenure inheritance pattern, previously described, could leave *ejidatarios* completely unprotected. The legal and mercantile sphere of action is little known among the men and even less so among women, who for the first time have the opportunity of selling their land. To this we must add the economic issues resulting from the changing government policies mentioned above.

Therefore, on 6 January 1992, exactly seventy-seven years after the implementation of the agrarian reform, former President Carlos Salinas de Gortari finally obtained Congressional approval for his proposed amendment of Constitutional Article 27. When this amendment was made public, most of the young male *ejidatarios* considered selling their plot, while older men and women were against it. As one *ejidatario* said: 'our forefathers had to fight many years to obtain this plot. How can I sell it and leave my family without the only dowry I can give them?'.[7]

Now, six years after the passage of the amendment of Article 27, it is clear that more *ejidatarios* have decided to rent their land rather than sell it. The leaders of the Independent Agrarian Workers and Peasants Trade Union (Central Independiente de Obreros Agrícolas y Campesinos, CIOAC) said that within the irrigation districts there was an increase in land rentals, which from 1992 to 1995, has gone

from 7.1 to 14.2 per cent. They also found that 86.7 per cent of the *ejidatarios* were against selling their land.

The same can be seen in irrigation district La Begoña (see Table 3), where of 11,276 irrigated hectares assigned to the Right Bank Module in 1992, only 4,895 hectares (43.41 per cent) were harvested and of this land 1,152 hectares (24 per cent) were rented.

What seems to be happening is that although there are more people interested in selling their land, the economic crisis as well as the unequal competition in the production and marketing of agricultural goods seems to have discouraged many investors from buying land. Instead, they prefer to guarantee their income by renting land that has water for irrigation. Although to date only a few *ejidatarios* have sold their land, our main concern is related to the possibility that, under continued unfavourable conditions, they will sell, rent or mortgage the land and leave women destitute or with fewer possibilities of retaining control over the land. For a more precise understanding of these aspects, it is necessary to look more closely at some of the policies related to irrigation water management in the National Water Law.

NATIONAL WATER LAW

Mexico's first Irrigation Law, promulgated in 1926, remained in effect until 1972, when the government replaced it with the Federal Water Law. Twenty years later, on 1 December 1992, the National Water Law took effect. The new law had two goals: first, to provide for 'administrative modernisation, planning and programming', and second to reinforce a more 'efficient and rational use of the natural resources'. (Ley de Aguas Nacionales y su Reglamentación, 1992). The National Water Law has ten titles, or sections, that specify the general legislative aspects of the different chapters and articles. Here, I will only consider Title Six that deals with the transfer of the irrigation districts.

While the implementation of the irrigation districts transferred to water users—as a result of the application of policies that came with the current economic model mentioned earlier—the hydro-agricultural sector was suffering from a significant deterioration in its productivity and profitability, through the shrinkage of harvested areas,

constant price decreases of several agricultural products, farm productivity stagnation, and reduction of water available to irrigated production areas resulting from poor maintenance of the hydraulic infrastructure (FAO, 1994: Research Documents NE8, NE9, NE3, NE2 & NE10; Marsh and Runsten:1996; INEGI: Agricultural Census 1990 and others).

Under these circumstances, the federal government assigned the National Water Commission (*Comisión Nacional del Agua CNA*) the task of creating a programme to stimulate farm production with special consideration to the decentralization of the irrigation district administration, rehabilitation of the infrastructure, increasing water users' participation in administrative procedures, and water-use efficiency programmes to ensure the districts' financial self sufficiency.

Bearing these in mind, a new legal system for the transfer of the irrigation districts was established on 1 December 1992. The decree allowed users to operate, maintain and administer the infrastructure through a users' association, organized in each irrigation district. Initially, the transfer was viewed with scepticism not only by the water users, but also by some of the personnel of the National Water Commission, who believed that their functions would be duplicated by the staff in charge of the irrigation districts. At the same time, the water users knew that once the government transferred the irrigation districts, the repairs of the deteriorated infrastructure would be their responsibility.

Once the transfer of Irrigation District 085, La Begoña, was legally established, the Users' Association had to take into consideration the fact that the water scarcity and the over-exploitation of underground water deposits, meant that the users' social stratification was determined mainly by their access to water sources. In other words, the potential of the farm land within the district is determined by the use and management of surface water and the extraction of underground water. As a result, users farm an average of 4 hectares, irrigated with surface water. Any amount of irrigated land above or below this average places them in a higher or lower status.

Another characteristic of the district that had to be taken into consideration was that most of the farm surface is used for horticulture

and perennial farming. These products require great volumes of water in a state where scarcity of this vital fluid is a critical factor.

With this Begoña's irrigation district users' association began its activities by updating its lists of irrigation water users. In the process, they asked themselves who had the water rights and, therefore, who was going to pay the quota: the people who held the property rights or those that worked the land? These questions were raised because, as noted earlier, women and the elderly had the right to decide what they were going to plant and to whom they were going to give their land, but for reasons of gender and age they did not work directly on their plots. This situation was more noticeable in the irrigation districts than in places with no irrigation. Furthermore, with the amendment to Article 27, this question had greater significance due to the fact that now the *ejidatarios* and the small land holders could rent or sell their land and the renter or new owner decided what to plant, and therefore they had to pay the irrigation water quota assigned, instead of the legal owners.

The second task that the user's association had was to continue enforcing the assigned volume of water according to the type of product permitted for the plot of land. This task was made more difficult because of the need to implement more water restrictions in response to the ongoing water scarcity. For example, they had to keep a close control on the staff in charge of the water distribution, to ensure that they were delivering the volume of water that was assigned to each plot in accordance with the type of crop that the owner had permission to cultivate. In addition, only long standing plots of alfalfa[8] and other crops with high water demand could continue to receive large volumes of water to cultivate these products.

Therefore, because of the water restrictions, new and established owners and renters had to abide by the permits given to the plot of land, which brought a new dimension to the land question. In places where there is water scarcity, the rental or sale price has to be coupled, not only to access to the resource, but also to the type of permit assigned to land. All of this is complicated by the fact that today nobody working a plot of land in an irrigation district has to prove ownership to request water. The only requirement is to present a letter

of agreement signed by the registered owner of the plot to enrol with the users association and specify the periods when the water should be delivered.

Even though there are rules and regulations that explain the procedures to be followed to obtain permits and requests to deliver water on time, there have been cases in which the users that needed more water or a modification in the delivery programme solved their problems through what we will call informal negotiations, namely bribing the staff in charge of water distribution, or negotiating quotas in a local bar. This type of informal negotiation takes place among men, leaving women at a complete disadvantage.

This leads us to state an issue that has to be underscored: women are at a disadvantage from the very beginning, therefore laws and programmes have to be made to support their participation. In spite of the data presented, which has shown that when it comes to access to water—and therefore productive soil[9]—women represent only the 22 per cent of the water users, when in the *ejidos* and the River Basin they represent more than 50 per cent of the population. Furthermore, there is a whole world that is culturally forbidden to them where through informal negotiations many decisions are made. How can this situation be changed?

This question forced us to look into the strategic action plan put forward by Agenda 21, with the hope of finding in it some concrete proposals to encourage women's participation.

AGENDA 21 STRATEGIC ACTION PLAN

As stated at the beginning, the United Nations Conference on Environment and Development, held in Rio de Janeiro, began its sessions searching for international agreements that would allow the implementation of a sustainable development model. The Rio Declaration and Agenda 21 were the main documents produced at this meeting. In the preamble of this last document, Maurice Strong, Secretary-General of the Conference, said:

> Underlying Agenda 21 is the notion that humanity has reached a defining moment in its history. We can continue our present policies which serve to

> deepen the economic divisions within and between countries; which increase poverty, hunger, sickness and illiteracy world wide; and which are causing the continued deterioration of the ecosystem on which we depend for life on Earth. Or we can change course. We can improve the living standards of those who are in need. We can better manage and protect the ecosystem and bring about a more prosperous future for us all. No nation can achieve this on its own. Together we can, in a global partnership for sustainable development (United Nations' web page).

This preamble, as well as the discussions and results that came out of the several meetings held by the participants, compelled the governments to commit themselves to the implementation of a broad strategic plan with policies geared to allow sustainable development in their countries. To achieve real and lasting sustainable development they had to arrive at an equilibrium between environmental sustainability, economic growth and social equity (Dourojeanni, 1994) Another claim from this Declaration and its Action Plan, or Agenda 21, is that the harmful effects of environmental degradation not only threaten the economic growth and social welfare of third world countries, but also of the so-called developed countries, and for this reason all of them must participate and share the responsibility.

Bearing this in mind, the Agenda 21 proposal gives concrete and specific guidelines that must be considered in the Strategic Action Plan of each country in accordance with its own characteristics and culture. The Agenda 21 proposals cover three main issues: development, sustainable resource management, and poverty eradication. For each of these issues, there are concrete action strategies to be considered in policy-making to achieve sustainable living standards. The proposals give different approaches to population policies, health care and education, women's rights, and the role of young people, indigenous people and local communities.

Since our main interest lies in the social aspects of women's participation, I will only bring forward the struggle against poverty, which according to Agenda 21 is the social policy that has a major impact on sustainable development and is more closely linked to women's participation. It reads: 'Poverty is a complex multidimensional problem with both national and international origins. No one solution

will apply globally; country specific programmes are crucial. The eradication of poverty and hunger, greater equity in income distribution and human resources development remain major challenges everywhere. All countries must co-operate'(UNCED, 1992)

This strategic action plan was supported by Principle 20 of the Rio Declaration, which states: 'Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development' (UN, 1992).

This principle leads us to believe that there is a clear understanding regarding the need for women's participation in the process of implementing sustainable development. Yet when we see the strategic action plan proposed in Agenda 21, we find that after the first line, the plan only refers to reproductive and health issues, because it says: 'Women should have full participation in decision-making. Women and men should have the same right to decide freely and responsibly on the number and spacing of their children. Health facilities should include women-centred, women-managed reproductive health care services, including pre-natal care. Women should be able to fully breastfeed at least during the first four months after birth'.

Further down in this same section, the plan suggests guidelines to be used in the struggle against poverty. Its main concern is the access to natural and economic resources: 'Food security should be promoted as part of sustainable agriculture. The urban poor should be given credit; and the landless poor provided with access to land and natural resources and the means of production. The poor should have access to fresh water and sanitation.'

Even though the strategic action plan of Agenda 21 has made a difference in the economic and productive activities of some peasant families, as well as in their daily life, it still has to consider the plan's effect on existing policies to widen and enable women's true participation. This can only be done if we start understanding women's perceptions of themselves and their participation and involvement in the process of design and implementation of organizational forms from the very beginning. Without doubt, women's situation has been taken into consideration in many studies, most of which focus on these issues from different perspectives, but there is still a great need

for more such studies to find ways of increasing women's participation from a gender perspective.

CONCLUSIONS

In this work, the means used in Mexico to systematically restrict women's access to irrigated land, the most profitable land, have been described. During the initial distribution of land under the agrarian reform, men were the primary beneficiaries. Traditional inheritance patterns also favoured male descendants. The discrimination women suffer when negotiating access to water for a plot of land was demonstrated. Unequal distribution continues with the changed legislation and other cultural barriers. These limitations will continue to make an equal distribution of land, water and therefore wealth difficult to attain for women, unless there are changes in the law to support them.

With the implementation of new hydro-agricultural policies, important transformations in the legal, productive and economic sectors resulted. At the same time, it is clear that these represent a serious disruption of traditional and organizational patterns of the producers' families as well as of the lives of the *ejidatario* women, broadening the gap between on the one hand those who have access to modern technology, irrigation systems and loans with low and long term interest rates, and on the other those who are far from having access to some or any of these.

Another significant change is the transformation of the traditional inheritance pattern and the productive activities developed at the local, regional and national levels, which does not bode well for women and small producers. These changes have resulted in a diversity of strategies developed by the producers and their families, all of whom live around and within the irrigation districts.

I shall mention only three of the most noticeable changes for women. First, they had to face and immediately adapt themselves to these structural changes that have shifted (in some cases) or done away (in others) with many traditions, such as villages customs and traditions regarding inheritance, cultural values, and roles assigned to women. Second, although in the past 'nature and women have

historically been the primary food providers in natural farming' (Shiva, 1990) the use of sophisticated machinery and technology has displaced women from many agricultural activities. Recent economic changes have forced their husbands to migrate to find jobs and consequently women have had to resume their position as providers and administrators of their plots of land, while remaining in situations that demand informal negotiations outside their control. Third, in the absence of their spouses, they have been forced to deal with economic issues beyond their households, including commercial transactions involved in the sale of their products.

These changes have led to a greater participation of women in the productive lives of their communities. Their presence at public meetings and assemblies, and their absence in managerial positions would seem to affirm the contrary, however the recently opened spaces promoting women's participation, especially those proposed by the strategic action plan of Agenda 21, must be exploited.

I would like to conclude this article by stressing that the only way to find social equity, for men and women, rich and poor, young and old, is by acknowledging the critical problems, identifying them, then seeking solutions for them with a view to removing impediments to economic growth and environmental sustainability. This tremendous task will require the participation and representation of all members of society. Women have to complement and strengthen with their own experience and vision initiatives in the search for solutions in the decision-making process for sustainable development.

NOTES

1 I would like to thank Dianne Hayward and Laurana Moreno for their comments to this paper.

2 Translation of the author.

3 *Ejidatario* is a legal term given to a group of farmers, for more details refer to: THE AMENDMENT OF CONSTITUTIONAL ARTICLE 27 in this article.

4 The research team, consisting of Ana Helena Treviño, Ph.D., Sergio Vargas M. of S. and myself, has done a study called: Social Organization and Overall Management in the Laja River Basin. This study was funded by the Ford Foundation.

5 Municipality is equivalent to county in the United States.

6 It also includes a small part of Villagran, which has not been included because it does not represent a substantial part of the municipality.

7 Interview to an *ejidatario* from the state of Guanajuato, 20 November, 1994.

8 Alfalfa needs to be irrigated at least seven times a year, while corn is irrigated only twice.

9 According to the 1991 census of the National Institute of Statistics, Geography and Computer Information (INEGI) of the total harvested land, 81.9 per cent does not have irrigation systems and 18.1 per cent is irrigated. Yet, the last one produces more than 50 per cent of the overall agricultural production of the country.

REFERENCES

Arizpe, and Botey, C. 1986. 'Las Políticas de Desarrollo Agrario y su Impacto sobre la Mujer Campesina en México'. In *La mujer y la política agraria en América Latina.* Magdalena León y Carmen Diana Deere (eds.). Bogotá: Siglo XXI de Colombia, ACEP.

CNA 1994. *Ley de Aguas Nacionales y su Reglamento.* México.

Dourojeanni, A. 1994. 'Políticas Públicas para el Desarrollo Sustentable: La Gestión Integrada de Cuencas.' Documento presentado en el Segundo Congreso Latinoamericano de Manejo de Cuencas Hidrográficas. Mérida, Venezuela: 6 al 10 de noviembre de 1994.

FAO. 1994. *La agricultura en el contexto del desarrollo nacional.* México: Proyecto UTF/MEX/030/MEX, Documento Técnico NE 2.

FAO. 1994. *Mercados nacionales e integración económica.* México: Proyecto UTF/MEX/030/MEX, Documento técnico NE 3.

FAO. 1994. *La agricultura de riego en México.* México: Proyecto UTF/MEX/030/MEX, Documento técnico NE8.

FAO. 1994. *Análisis cuantitativos sobre las perspectivas de la agricultura.* México: Proyecto UTF/MEX/030/MEX, Documento técnico NE 9.

FAO. 1994. *Competitividad internacional de la agricultura mexicana.* México: Proyecto UTF/MEX/030/MEX, Documento técnico NE 10.

La Jornada, 15 November 1991.

Plan Nacional de Desarrollo 1989–1994. 1989. Talleres Gráficos de la Nación, México.

Programa Nacional de Modernización del Campo (1990–1994). 1990. Talleres Gráficos de la Nación, México.

UNCED. 1992. *Report of the United Nations Conference on Environment and Development. The Rio Declaration.* A/CONF.151/26 (Vol.I) 12 August 1992.

Shiva, Vandana. 1990. *Staying Alive: Women, Ecology and Development.* London: Zed Books.

United Nations Press Summary of Agenda 21. (1992). *International Co-operation to Accelerate Sustainable Development in Developing Countries.* A/CONF.151/26, Vols. I III: UN Publications.

TABLE 1. Population by municipalities

Municipalities	Population						Ejido's Population					
	Men	%	Women	%	Total	%	Men	%	Women	%	Total	%
Apaseao el alto	26456	48.8	27734	51.2	54190	100	6874	49	7143	51	14017	100
Apaseo el grande	30270	48.7	31955	51.3	62225	100	10800	49	11225	51	22025	100
Celaya	171265	48.4	182820	51.6	354085	100	12703	49.4	12985	50.6	25688	100
Comonfort	29756	48	32239	52	61995	100	7877	47.7	8622	52.3	15999	100
Santa Cruz de Juventino Rosas	30423	49.1	31482	50.9	61905	100	5489	49.3	5641	50.7	11130	100
Totals	288170	48.5	306230	51.5	594400	100	43743	49	45616	51	89359	100

Source : INEGI. *Anuario estadistico del estado de Guanajuato. 1996*, and INEGI. *Datos por ejido y comunidad agraria: VII censo agropecuario, 1991.*

TABLE 2. User classification and irrigated areas in irrigation district 085 'La Begõna'

Module N°	Ejidatarios				Small Land Holders				Total			
And Names	Users		Surface		Users		Surface		Users		Surface	
	Men	Women	Total	Total	Men	Women	Total	Total	Men	Women	Total	Total
N°1	203	38	241	831.67	8	1	9	45.38	211	39	250	877.05
Neutla	84%	16%	100%		89%	11%	100%		84%	16%	100%	
N°2	106	17	123	338.08	296	107	403	834.16	402	124	526	1172.24
Comonfort	86%	14%	100%		73%	27%	100%		76%	24%	100%	
N°3	372	113	485	1760.29	36	12	48	292.68	408	125	533	2052.97
Left River Bank	77%	23%	100%		75%	25%	100%		77%	23%	100%	
N°4	1349	385	1734	6098.96	93	35	128	2188.28	1442	420	1862	8287.24
Right River Bank	78%	22%	100%		73%	27%	100%		77%	23%	100%	
Total	2030	553	2583	9029.00	433	155	588	3360.50	2463	708	3171	12389.5
	79%	21%	100%		74%	26%	100%		78%	22%	100%	

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

TABLE 3. Total and rented surface in irrigation district 085

Section	Total Hectars	Total Irrigated Hectars	Cropped Area		Rented Area	
			Hectars	%	Hectars	%
1	1178	1176	554	47	168	30
2	804	804	404	50	226	56
3	1730	1730	380	22	138	36
4	1704	1704	495	29	78	16
5	892	892	511	57	3	1
6	889	889	373	42	114	31
7	1183	1183	435	37	25	6
8	2952	2898	1743	60	400	23
Total	11332	11276	4895	43	1152	24

Source: Data From *Users Association of the Irrigation District 085.*

CHAPTER XII

Gender Issues in Irrigation

Rhodante Ahlers

INTRODUCTION

Studying gender issues relating to irrigation policies, decision-making and practices is perceived as a novel activity in Latin America. Gender issues are frequently related to land rights, domestic water use, credit, health, or educational services, but rarely to irrigation practices and decision-making (Carmona and Monsalvo 1998, Deere and Leon 1997). This topic has had far more publicity in the Asian and African contexts (Carney 1988, Dey 1981, Zwarteveen 1994, amongst others). However, over the past ten years studies relating to irrigation have been carried out in several countries across the region, most notably in Peru, Bolivia, Ecuador and Mexico, documenting women's participation in irrigated agriculture and analysing the extent to which gender relations shape their access to water. Although the subject is regarded as incongruent, the findings suggest that gender is a crucial issue of importance to understand and improve irrigation water management.

Dramatic changes in agricultural and economic policies have been introduced throughout the world during the last decade, with a focus on reducing the role of the state and privatization of natural resources to encourage the market mechanism in all sectors of the economy. Whereas previous reforms in Latin America were directed toward redistributing land and defining water as the property of the state, the reverse is now taking place (Deere and Leon, 1997, Johnson 1997). Farmers are confronted with reduced government subsidies, a privatized credit system, and ownership of resources over which they previously

had usufructory rights. Water in particular has provided ample discussion on how a natural resource, which is on the one hand such a basic human necessity, and on the other so fluid, could be tailored into a comfortable commodity (Ahlers *et al.* 1998, Bauer 1997, Moore 1989, Rosegrant and Binswanger 1994, Perry *et al.* 1997, Zwarteveen 1997b). Irrigated science entered this discussion, searching for the means to improve water management with concepts such as promoting a sense of ownership, decentralizing management, irrigation management transfer.[1] The objective of transfer is to improve the efficiency of water use and financial resources by encouraging the users to manage the system themselves, and enter the market in order to commercialize the agricultural production process.

Chile leads the region in introducing privatization into the water sector during the 1980s, with Mexico and Peru following in the early 1990s. Ecuador is in the process of allowing water to become private property (Gazmuri 1994, Deer and Leon 1997). Mexico implemented an extensive irrigation management transfer programme, ambitious in terms of size and timing, while Ecuador is undergoing a similar process at the moment. When weighing the ups and downs of neoliberalism in irrigated agriculture, perhaps insight into the dynamics of gender related to property rights and self management may give a picture beyond winners and losers. This paper delves into the issues of property rights and organization within the context of irrigated agriculture in several countries across Latin America. It provides an overview of gender differences in access to such an essential resource as water as well as a discussion of its management.

Neoliberal policies require individual versus collective property, thereby influencing the organization of the agricultural production process. Formal decision-making institutions are encouraged to manage resources overriding the existing informal networks. Although this has had a dramatic impact on rural gender and class relations, the focus of this paper will be on the gender dimensions. It is argued that the falling away of the collective could increase the responsibility, labour, and insecurity of rural women through diminishing control by the community. But it could also break the neutral household concept, allowing each member to have potential access to property

rights. The introduction of Water Users Associations has formalized decision-making in particular confined settings but has also slowly led to women entering arenas that have been, and in many cases still are, particularly male dominated. The challenge for these women is not only how to enlarge but also redefine their room for manoeuvre in these new settings under different rules; the challenge for policy-makers is to consider irrigated agriculture in a social as well as technical context in which normative frameworks shape the restrictions—but also possibilities in optimizing the use of these resources.

IRRIGATION AND GENDER RELATIONS

Several issues shape the precarious relation between women and irrigated agriculture. The most pertinent of these concern 1) property rights, 2) farming, but especially irrigation activities, perceived as an exclusively male domain, and 3) the institutional set-up within which irrigation takes place. To understand the dynamics one needs to take a closer look at the dynamics of gender relations within the context of irrigated agriculture.

Property rights

Throughout Latin America, as is the case in many countries throughout the world, farming is perceived as an activity practised and developed by male heads of households. It is assumed that the family has common interests and equally benefit from the enterprise. The participation of women in irrigated agriculture is regarded uncommon but field research reveals that women are very much involved, ranging from helping out to completely managing the farm. One should also take into consideration the importance of rural women sustaining irrigated agriculture by their off-farm income. In the studies from Mexico, women are primarily involved in providing labour on the farm with a minority taking on the overall management, evolving either from personal interest, from widowhood, or due to economic hardship (Carmona and Monsalvo 1998, Ahlers 1997, Brunt 1992, Villareal 1994). Elsewhere, especially in Ecuador and Peru, women play a far greater role and are far more visible in irrigated agriculture as title holders and irrigators (Ahlers and Smits 1991, Bastidas 1998,

Deere 1987, Lynch 1991, Krol 1994). In both countries male migration out of agriculture seems to have stimulated this development. In all cases, women's access to land titles and water rights is through their male relatives and only in exceptional cases have they obtained titles directly. Throughout the region, land is titled to heads of households. A woman farmer exclaimed: 'It would be easier if I were a widow, [they] would have to treat me as a head of the family' (cited in Brunt 1992). Water rights may be obtained by investing labour in the construction of a system, holding property in the command area, or having land allocated in the system. In Ecuador, participation in construction is of primary importance while in the other countries rights were directly linked to land. In both Chile and Mexico, water rights are now legally divorced from land rights.

In Mexico rights to water before 1992 were exclusively linked to rights to land. With the land reform of the early 1930s, two different forms of land holding emerged called the *pequeña propiedad* and the *ejido*,[2] with the crucial difference that the *pequeños* held property titles and the *ejido* usufructory rights. With the land reform, land was granted to male household heads. The law drawn up in 1927 specifically mentions right holders to be 'Mexican nationals, males over 18 or, single women or widows supporting a family', implying that for women only supporting families justifies their claim. In 1971 this law was reworded: 'Mexican by birth, male or female over 16 years of age and or of any age with dependants, couples can both be right holders if both husband and wife are entitled *ejido* members, and women are allowed to let out their land to be cropped by others—unlike men—because their domestic duties and children might hinder farming activities.' This change in law does portray gender sensitivity but the actual approval remains with the *ejido* council.

In the case of the *pequeña propiedad,* sons are culturally favoured to inherit the property, although widows will inherit from their deceased husbands. In both cases, a normative framework shapes a gender access to land:

1. Men are farmers—thus land is inherited by sons
2. Women can access land only through inheritance while men have other options, such as original gift in 1936, redistribution of communal land, and purchased rights.

With the new water law and amendments to Art 27 of the constitution, land and water have become private property, and are thus direct individual assets which can be sold and bought. Obviously, the head-of-household concept will have serious consequences in terms of capital assets now that land and water are becoming commodities and no longer a use right belonging to the state and managed by the *ejido*. Access to land, and in this case water, before 1992 can be constructed through formal rights as specified in the law, through social relations and political networks within the local municipal and *ejido* structure. After the change in law—only relatively little time has passed—it seems that in terms of gender very little has changed except that the relatively uninformed rural population is not completely aware of the implications and possibilities of the new law leading to uninformed decisions by both men and women where social relations and political connections play an even greater role. In a survey done in the Comarca Lagunera, we see that the same number of men and women rent and sell their rights but that the form is different and that women are generally paid lower prices. Women enter the arena of marketing their rights and do not seem more prone to relinquishing their rights than men, but the negotiation power is limited; they cannot optimize the arena.

Women's access to land and water is through their male relatives, whether they are farm managers, co-workers, or not involved in agriculture at all. Their indirect access is argued by the following reasons:

- the woman's place is in the home (throughout LA)
- she might seduce men while working in the fields (Ecuador, Mexico)
- it is shameful and embarrassing for the men if their women have to work in the fields (Mexico, Peru)
- irrigating is physically too strenuous and too complicated for women (everywhere)[3]

While these reasons portray strong ideological constructs and very little sense of daily reality, they are mentioned here to demonstrate the functioning of normative frameworks. They not only hinder women's access to property rights but define their room for manoeuvre in decision-making processes. Confronting these barriers might have a high social price and lead to stigmatization (Villareal 1994). Women have to justify their claim to property by proving to be responsible mothers, victimised widows, or worthwhile members of the community. They have to argue for a right that is unquestioned for their male counterparts. By claiming this right they jeopardize their own position and status, and possibly that of their husband, with the result that women are discouraged to do so.

Institutional context

A property right will not ensure that water will actually reach your parcel. Irrigation systems are characterized by their collective use of water and thus can be conceptualized as a common pool of resources with decisions made on allocation and the distribution of volumes of water. This volume then needs to be delivered at the farm gate. Farmers would want their interests to be optimally represented in order to receive the maximum volume possible at the time it would be most productive. Thus, influential participants at each level of decision-making, down to the ditch rider delivering water at the field level, are generally grateful beneficiaries of considerations in exchange for timely and sufficient water.

With IMT, water users associations (WUAs) were formed to self manage (part of) the irrigation system, allowing the state to reduce costs (personal and material) and responsibility by handing both over to the users. Users choose their own management team which would, theoretically, better defend the interests of their fellow users.

Research in two irrigation districts (011 and 017) in Mexico found no female presidents of WAUs, a handful in the assembly representing their communities (2 per cent DR.017), and again no female ditch riders. The question arises as to why these women are not participating or elected, and whether their absence hinders their interests from being well represented.

To understand the lack of women in decision-making positions, one should realize that irrigation agencies and institutions are strongly male dominated, as are the public sphere of discussion, politics and decision-making. Krol 1994 quotes users giving reasons for women participating only marginally:

- not having direct access to titles means not having direct access to the organization as membership criteria are based on entitlement
- women have no time, or meetings are at inconvenient hours for women
- the husband will not take over activities if the wife joins the organization
- the men do not listen to the women who participate
- women endanger their social status by joining groups of men
- the women cannot leave the house, so how can they have the knowledge or experience to deal with outsiders

Interestingly enough, these reasons do not only argue the case for Ecuador or for Latin America, they are encountered throughout the irrigation world, illustrating the structural character of gender relations in this respect (Ahlers and Vlaar 1995, Kome 97, Zwarteveen and Neupane 1995, Bruins and Heijmans 1993, Brismar, 1997).

In Ecuador meetings were held on the weekends because the irrigation agency knew that the men were engaged in migratory labour elsewhere during the week. It did not occur to them that during that week somebody else would be irrigating and cultivating land, in this case their wives and daughters, who were far more updated on the state of the irrigation system and the needs and problems farmers were facing in irrigating their fields (Phillips 1987, Ahlers and Smits 1991).

The position that women do hold in local level organizations—with evidence from Ecuador, Peru and Mexico—is that of treasurer. Unfortunately, evidence from the Comarca Lagunera in Mexico reveals that these women have very little influence. One of them could not read or write, another was told to sign the papers and mind her own business, after which she resigned, while a third confided that even though she was only allowed to sign the papers, at least she had formal and direct access to the board members when she needed them (Ahlers 1997).

The representation of women in the WUAs might be very slow in coming, but before enforcing their participation it may be worthwhile to consider its importance in actual water management. Bastides states that most of the problems are either solved directly in the fields or inside the households, Krol describes the importance of family relations, and in Mexico the cantina seems to be the central point of negotiation. WUAs are strongly promoted as part and parcel of IMT, but their creation denied the existing social and political networks. Therefore, an analysis of gender access to decision-making should include these networks alongside the formal institutionalized organization.

While women have little or no access to institutional and formal organizations, the foci of decision-making often take place outside these meetings. Brunt (1992) describes the different access men and women have to land and water, emphasizing their differential access to social networks. While men can take the relevant actors to cantinas, offer them drinks, food and even women, these practices are of course unavailable to their female counterparts. Others bring alcohol or offer money in the field (Ahlers, 1997, Van de Zaag, 1992). Decisions are formalized in the meetings but made in other more informal and daily encounters. Community and WUA meetings are arenas of oration instead of discussion or decision-making. Women therefore, often perceive it as a waste of time.

As a political arena, irrigation has several features that make it less accessible to women than others—such as food and health policy. Because irrigation institutions are male dominated, irrigation is not a sector where the state has encouraged movement of women into a political sphere beyond the community. If men constitute the overwhelming majority of irrigation leaders, it is at least in part because agencies are more willing to recognize men as spokespersons (Lynch 1991).

Thus women, facing barriers to the right institutions, the right contacts, and in general the political discourse , seek other informal ways of representing their interests and securing their water. In the studies reviewed, networks are defined by:

- family relations

- irrigation and exchange relations
- patron—client relationships
- joint economic activities
- *compadrazgo*
- political connections
- gender

In the study from Ecuador, women established water exchange networks in which they will be flexible in giving away their turn as an investment, which they can cash in on when they need water in the future. In district 017 in Mexico, the UAIMs [4] are not particularly productive, but their formation has allowed women farmers to bond, and even though the UAIM no longer functions the members can approach each other for help (Ahlers 1997). In general, though, the emphasis lies on building relations with the leaders of the community and the representatives of organizations. Both Brunt 1992 and Villareal 1994 give extensive examples of the investments women make to foster relationships with the right people through feeding them, politically supporting them in public, asking them as *compadres,* and using male relatives to rally support in the community or beyond.

Doing this they have to continuously balance the limit to which they can go before being accused of immoral behaviour. Women with sons will choose to employ their sons as negotiators and promote them as the beneficiaries instead of themselves.

In order to maintain legitimization within her networks, she has to comply with such social rules and standards or negotiate her way out of them. She chooses to conform, but in doing so she also reproduces and legitimizes these forms of behaviour (Villareal 1994).

Indirect Access and Informal Organization: A Discussion

Given the dynamics of policy changes throughout the continent, one could argue, as does Zwarteveen (1997a), that this could open up possibilities for gender concerns to be incorporated and for women to increase their room for manoeuvre. Newly introduced policies effect a reshaping of relations between agencies and users, implying a potential for improving access to water and decision-making over water

for all stakeholders, including women. However, explicit policies and additional measures to allow for this potential to materialize are a requisite. Privatizing rights might give women the possibility to translate usufructs rights into capital, but this must be analysed within the context through which the negotiation is shaped. Privatized rights are not free from political and social manipulation.

The move from collective to individual through privatized and thus individual rights infers a diminished community responsibility for and control over the distribution of benefits. As women have only indirect access, they are highly dependent on the community overseeing the distribution of benefits resulting from their household titles. Now that these titles can be bought and sold, they may well be marketed without the approval of all who are dependent on them. Nevertheless, individual property rights might serve to undermine the family unit as a neutral entity. Joint or individual titles would not prejudice household heads but allow both men and women to have legal access to land and water rights. It would also provide women security of assets for which they have provided both agricultural as well as domestic labour. Entitlement, as *the* ticket to membership organizations would serve a second purpose: the formal access to decision-making organs.

Carmona and Monsalvo (1998) propose that WUAs rotate their boards of directors not on the basis of elections but on the basis of membership, allowing each member to take on a position in the management structure. This would secure the participation of all members and minimize political and financial motives for entering the elections, while ensuring the participation of both men and women in decision-making processes.

These measures might give women the justification to participate and even influence the normative frameworks and ideological barriers they face. Nonetheless, this means a drastic redefinition of norms and values by both men and women. Women will need the necessary courage and confidence to take on management positions which they have been discouraged to take on before, with the danger of losing respect and status in the community. It may even be in complete disagreement with their private interest, in which their informal

networks have been shaped so as to incorporate their restriction in movement and access to resources, and from which strategies have been designed to achieve a level of success within the boundaries.

The dynamic times of current policy changes and post-modern influences cannot leave us yearning for the past. If women are to optimize their access and use of resources, they will need to expand their room for manoeuvre and surpass normatively defined boundaries with their male counterparts. At the same time, policy-makers are urged to approach irrigation issues in both its technical and social context, moving beyond naive harmonious concepts, such as 'sense of ownership' and 'community participation', to recognizing and incorporating heterogeneity and gender in their analysis and policies. Policy should place stronger emphasis on allowing the involvement of all stakeholders, implying state regulation of natural resource titling and marketing, sensitive and sensible credit and subsidy schemes, and more sophisticated extensions incorporating a diversity in users.

NOTES

1 In the 1980s a shift took place in irrigation development from new construction or rehabilitating systems to an approach in which management became the central focus with the objective of reducing the relatively high costs of irrigation systems and devolved management from state agencies to user groups. Central to this process was an effort to instil a sense of ownership to encourage farmers to assume the responsibility of both water management and financial management of the system. The process of transferring state-run systems to users organized in water-users organizations was captured by the term Irrigation Management Transfer or IMT (Vermillion 1997; Yoder 1994).

2 As a result of the Mexican revolution, the state confiscated property from the large landholders and granted usufructory rights to the landless during the 1930s, creating the so-called *ejido* sector characterized by collective farming enterprises. The large land holdings were reduced to holdings of 100 to 800 hectares, depending on the type of crop and land use.

3 This is something heard throughout the world. In Mexico this is the main reason given for excluding women, while actually the majority of households hire professional irrigators (*regadores*) (Ahlers 1997).

4 The UAIMs (Unidad Agricola e Industrial de la Mujer Campesina) were created by allotting groups of women a plot of land to stimulate them to participate in economic activities. The programme was initiated in 1979. For a more detailed discussion, see Zapata 1996.

REFERENCES

Ahlers R. 1997. 'Field notes: Gender dimensions of watermarkets' (February–July 1997). Torreon: IIMI Mexico.

Ahlers, R., W. Kloezen and E. Rymshaw. 1998. 'Diversity under stress; Water Trading in Mexico'. Forthcoming. In *Review*.

Ahlers, R. and A. Smits 1991. 'Ya mismo: Verschillende aspecten van waterproblematiek voor Boerinnen en Boeren. Deel 1.' MSc. thesis, Wageningen Agricultural University.

Ahlers, R. and S. Vlaar 1995. *Up To The Sky: A study on Gender Issues in Irrigation in Combodia in the Provinces of Takeo and Prey Veng.* Phnom Penh: SAWA.

Bauer, C. 1997. 'Bringing Water Markets Down to Earth: The Political Economy of Water Rights in Chile, 1976–95.' *World Development*, Vol. 25, No. 5, pp. 639–56.

Brismar, A. 1997. 'Comprehensive Assessment of the Freshwater Resources of the World: Freshwater and Gender, a Policy Assessment.' Stockholm: Stockholm Environmental Institute.

Bruins, B and A. Heijmans 1993. 'Gender Biases in Irrigation Projects: Gender Considerations in the Rehabilitation of Bauraha Irrigation System in the District of Dang. Kathmandu, SNV Nepal.

Brunt, D. 1992. 'Mastering the Struggle: Gender, Actors and Agrarian Change in a Mexican Ejido.' Ph.D. thesis. Amsterdam: CEDLA.

Carmona E. and G. Monsalvo 1998. 'Las Mujeres y el Riego; Dos Experiencias Pioneras en la Investigación.' Paper presented at the Workshop: Resultados de los Estudios Realizados en el Distrito 011 Alto Rio Lerma, 31 March and 1 April 1998. Salamanca: IIMI Mexico.

Carney, J. A. 1988. 'Struggles Over Crop Rights and Labor Within Contract Farming Household in a Gambian Irrigated Rice Project.' *Journal of Peasant Studies*, No. 15, pp. 334–48.

Dey, J. 1981. 'Gambian Women: Unequal partners in Rice Development Projects?' *Journal of Development Studies*, Vol. 7, no 3, pp. 109–22.

Deere C.D. 1987. 'The Division of Labor by Sex in Agriculture: A Peruvian

Case Study.' In *Latin America. Sociology of Developing Societies*, Archetti *et al.* (eds.), pp. 196–212. London: Macmillan Education Ltd.

Deere C.D. and M. Leon. 1997. 'Gender, Land and Water: From Reform to Counter Reform in Latin America.' Paper presented at the Workshop on Women and Water, International Irrigation Management Institute, 15–19 September, Sri Lanka.

Gaznuri, R. 1994. 'Chilean Water Policy.' Short Report Series on Locally managed Irrigation, No. 3. Colombo: IIMI.

Johnson, S. 1997. 'Irrigation Management Transfer in Mexico: A Strategy to Achieve Irrigation District Sustainability.' Research Report, No 16. Colombo: IIMI.

Kome, A. 1997. 'Gender and Irrigation Management Transfer in Sri Lanka.' MSc. thesis. Wageningen Agricultural University.

Krol, M. 1994. 'Irrigatie is Mannenwerk. Genderverhoudingen in een Kleinschalig Irrigatieprojekt in de Ecuadoriaanse Andes.' MSc. thesis, Wageningen Agricultural University.

Lynch Deutz, B. 1991. 'Women and Irrigation in Highland Peru.' *Society and Natural Resources*, Vol. 4, pp. 37–52.

Moore, M. 1989. 'The Fruits and Fallacies of Neoliberalism: The Case of Irrigation Policy.' *World Development,* Vol.17, No.11, pp.1733 –50.

Philips L. 1987. 'Women, Development, and the State in Rural Ecuador.' In *Rural Women and State Policy: Feminist Perspectives on Latin American Agricultural Development,* C.D. Deere and M. Leon (eds.), pp. 105–23. Colorado: Westview Press Inc..

Rosegrant, M and H. Binswanger, 1994. 'Markets in Tradable Rights: Potential for Efficiency Gains in Developing Country Water Resource Allocation.' *World Development,* Vol. No.22, 1613–25.

Yoder, R. 1994. 'Locally managed irrigation Systems: Essential Tasks and Implications for Assistance, Management Transfer and Turnover Programs.' Colombo: IIMI.

Vermillion, D. 1997. 'Impacts of Irrigation Management Transfer.' Research Report, No.11, Colombo: IIMI.

Villareal, M. 1994. 'Wielding and Yielding: Power, Subordination and gender Identity in the Context of a Mexican Development Project.' Ph.D. Thesis. Wageningen: Wageningen Agricultural University.

Zaag, Van de, P. 1992. 'Chicanery at the Canal: Changing Practices in Irrigation Management in Western Mexico.' Ph.D. thesis. Amsterdam: CEDLA.

Zapata E. 1996. 'Modernization, Adjustment, and peasant production; a Gender Analysis.' *Latin American Perspectives,* Issue 88, Vol. 23 No.1, Winter 1996, pp. 118–30.

Zwarteveen, M. 1994. 'Gender Issues, Water Issues. A Gender Perspective to Irrigation Management.' Working Document, No.32. Colombo: International Irrigation Management Institute.

Zwarteveen, M. 1997a. 'Identifying Gender Aspects of New Irrigation Management Policies.' Paper presented at the Workshop on Women and Water, International Irrigation Management Institute, 15–19 September, Sri Lanka.

Zwarteveen, M. 1997b. 'Water: From Basic Need to Commodity: A Discussion on Gender and Water Rights in the Context of Irrigation.' *World Development,* Vol. 25, No. 8, pp. 1335–49.

Zwarteveen, M. and N. Neupane 1995. 'Gender Aspects of Irrigation Management: The Chhattis Mauja Irrigation System in Nepal.' *Asia Pacific Journal of Rural Development,* No. 5, pp. 1–26.

CHAPTER XIII

Roles of Women in Irrigation Districts of Mexico

Myriam Fracchia-Figueiredo

INTRODUCTION

This study looks at some of the contributions of women to Mexico's irrigation districts. To this purpose, we describe women living in one irrigation district in relation to the resources and the *ejido* family of which they are part, the effects that the agricultural crises have had on both, and from that perspective the main contribution of this family structure and of women in the districts.

One of the main bases of this work refers to the analytical and methodological axes produced by the research coordinated by Maria Luisa Torregrosa, in consultation with Juan Carlos Marin, in relation to 'The characterization of the productive units in ten irrigation districts' (La characterization de las unidades productivas de diez distritos de riego).[1] This was carried out under an agreement between the Mexican Institute of Water Technology (Instituto Mexicano de Technología del Agua, IMTA) and the Latin American Faculty for Social Sciences (Facultad Latinoamericana de Ciencias Sociales (FLASCO)) in 1994. That study started with the design of a socio-productive survey, as applied to 6000 users. Sergio Villena and Maria del Carmen Anaya, members of the research team, carried out the statistical analysis of the results. The gender aspect refers to the results of group interviews of women in El Carrizo irrigation district, Sinaloa, carried out from 1991 to 1997 within the research project that I have

been leading in relation to 'The participation of the woman in irrigation districts' (La participación de la mujer in los distritos de riego), sponsored jointly by IMTA and UNDP from 1993 to 1997. This was part of the wider interdisciplinary project, Technological Reconversion of Family Plots for Sustainable Production, in the same district, with a group of women.[2]

WOMEN IN THE IRRIGATION DISTRICTS

To appreciate the main contribution of women's participation in the irrigation districts, we must meet the women to whom we refer. When we studied the social identity of the women in the irrigation districts, we found that, first, 16.3 per cent of the water users were women, although they were not present in the water users' organizations that decide on local water administration policies.

By studying the women's relationship with water and land, we found that there are several groups: water users and producers; water users and non-producers, usually renting out the land; producers and non water users, also renting out the land; and finally, non-producers and non-users, often family members of those living in the area.[3] Several other differences between men and women water users also became apparent.[4]

Considering the groups of women producers and non-producers, we did not find large differences.[5] from the socio-demographic perspective. However, when we considered the women in relation to their families, we found important differences in terms of their position as head of household and their ability to keep their children at home. Most of the women producers—86 per cent—were heads of household, while most of the non-producers were not.[6] Women producers were responsible not only for administering the production of the plot, but also for maintaining their families as head of household.

It would seem, then, that there is a relationship between being head of household and the administration of production in the case of women producers. Did this process evolve 'naturally' in the families of these women? Stated in other terms, was there a relationship between the position of head of the family nucleus, the life cycle of the family, and production?

An important fact is that one of the main functions of the family of women producers and non-producers is raising children. On average, there were five children in each nucleus and most families were in the consolidation and dispersion phase. We noticed that when families were in the formation phase, the tendency was to retain the children, but during the consolidation and dispersion phase, as the children reached the age to form part of the economically active population, they chose to leave the family nucleus. Thus, the expulsion of adolescents followed a normal trend in the family life cycle. However, the dimension of the dispersion process in the families of both groups was 45 per cent of the total population of offspring (Table 1) for 1991, much greater than expected.

As stated earlier, there is a marked difference in the expulsion rate from the two types of families. Women producers had a much lower capacity to retain their children than non-producers.[7] This situation indicated the possibility of a difference between women producers and non-producers with respect to their family that was more closely related to the social process in the area and within the district's population (such as the effect of the socio-productive crisis), than to the socio-demographic characteristics of the family nucleus. A study of these social processes allowed us to learn more of the contributions of women in the irrigation district.

The irrigation districts were created by a political decision to open the north-west and to stimulate the region's settlement. This decision was not based solely on the need to decompress the demographic pressure in the central region, but also to free the labour needed,[8] to increase agricultural productivity, and stimulate exports. The final purpose was to increase the commercial and financial exchange between the US and Mexico. The main goal of the irrigation districts was to create a competitive agricultural industry.[9]

The settlement of these regions intensified during the Cardenist era (1934–40) and during and 50s, 60s and 70s with the creation of 'new *ejido* population centres' where those requesting land, mainly migrant, rural salaried workers, were sent. The land was ceded to these individuals under the *ejido* possession regimen. As *ejidatarios,* the users were assigned agricultural plots and lots in new towns defined

within the irrigation districts. The other grower groups did not receive urban lots for their housing.

According to the socio-productive survey, most users in ten irrigation districts continue to hold land under the *ejido* possession system (Table 2). There were also more women than men in this group (Table 3).

In general, the *ejidatrios* continue to reside with their families within the irrigation district. This is true for both men and women producers and non-producers. This system results in a peculiar family structure where the members are part of the domestic unit and the productive unit. This explains why even if the title holder of the land is a single person—*ejidatario* male or female—the production of the plot depends basically on the landholder's family.

This family form of *ejido* agricultural production partially explains why we did not find an initially postulated difference that the women producers were in charge of all agricultural activities and decisions, while non-producers had no participation in farming. Women are not entirely absent from the field as long as the *ejido* plot belongs to some member of the family. In fact, the difference between the women producers and non-producers lies in the degree of responsibility for the co-ordination of the agricultural activities: non-producers help with the production while producers are in charge of all aspect of production.

There are other differences between the families of the women producers and non-producers. Women producers are usually heads of household and tend to keep fewer of the children at home. To understand these differences, we must study the social processes that affect these family nuclei.

THE EFFECTS OF THE AGRICULTURAL CRISIS

Crisis on the *Ejido*

Starting in the 1970s, the irrigation districts began to feel the effects of the crisis at a time when their consolidation as the producers of grain for export[10] resulted in marked changes in the territorial and population structure, with the transformation of nearby small cities into service centres for the development of modern irrigated agriculture. The main result of the crisis was a loss of profitability in agriculture[11] that gave birth to an impoverishment of most landholders

and the population residing in these areas, in juxtaposition with the growing accumulation of land in the hands of one-third of the producers. According to the same survey, in 1992–3 one-third of the water users and producers who were not *ejidatarios* held slightly more than two-thirds of the land in the irrigation districts, while the other two-thirds of the water users and producers, who are *ejidatarios,* had possession of just under one-third of the land.[12]

The *ejidatarios* are not only the largest single block of water users in the irrigation districts, but they also hold the smallest extension of land and their conditions are the least favourable for production, forcing them to create a series of social conditions to keep open the access to the farmers' loans from the national banking system and to use in greater measure personal funds,[13] as we will see later. They also form the water user group that, with respect to the other producers, are most often forced to rent out their land,[14] and in this sector there are proportionally more women than men. This shift in land possession, caused by the low profitability in agriculture, has generated the dissociation between water users and producers.

This situation is in addition to the narrowing of the agricultural labour market in the irrigation districts and the consequent transformation of the labour markets from predominantly agricultural to predominantly service-oriented.[15]

Crisis on *ejiditario families*

The *ejiditario* families have responded to the social processes resulting from the low profitability in agriculture and the narrowing agricultural labour market not by disappearing but by restructuring the family nucleus and the basic social identity.

The families have adopted new functions through this process, in addition to the two that gave rise to their migration to the region—the production of children and agricultural commodities. These new functions are also of great importance: the formation of a labour reserve for the region's irrigation districts and for other sectors of the economy in the districts, throughout the nation and in the USA. These new functions have forced a new structure on the family nucleus. The family members no longer remain together within the irrigation districts. Their territorial base is still the district, with approximately

one-half remaining, while the other half can be found spread over Mexico and into the northern part of the continent.[16] We found that the *ejidatario* families are now dispersed and international.

This situation has forced the members of the family nucleus to devise a series of strategies to guarantee the survival of the family. When the territorial base of the family nucleus is within an irrigation district, plot production is maintained at any cost. This implies not only using a greater portion of the joint cash resources but also intensifying the use of manual labour on the family plot.[17]

A second strategy involves complementing the labour on the family plot with other work that provides a cash income. According to the socio-productive survey (1992), three-fourths of the users had other jobs off the farm (Table 4).

Women residing in the El Carrizo irrigation district, Sinaloa, reported that the activities providing the greatest income locally were for day workers, welders, mechanics, electricians, fishermen, common labourers, employees and schoolteachers. Individuals remaining in the district prepare and sell food, clothing, and other objects. They also offer services in their home, such as barber shops, midwife activities and nursing, day care for children—and as domestics in the district.

Finally, the women heads of household are forced to push the members of the base nucleus out into the migrant labour circuits that cover the states along the both sides of the US–Mexico border. These migrants work by day as common labourers, mechanics, electricians, seamstresses and tailors, jewellers, subcontractors, masons, ceramists, schoolteachers, accountants, vendors, as employees in the service sector and, in some cases the women remain at home as housewives.

The impoverishment of the *ejido* families has made both the migrating and non-migrating family members part of the reserve labour force for the secondary and service sectors of the North American hemisphere. The population movement is an expression of the impoverishment of the irrigation districts and the widening of the economic horizon northward.[18]

If we examine the effects of the crisis on the families of the women producers and non-producers, it is in the first one that the widest variety of strategies have been created to guarantee the continuance of the family nucleus and plot production.

Crisis on *ejidaratio* women

Just as the reduced profitability from agriculture and the corresponding impoverishment of the agricultural workers have forced a restructuring of the *ejido* family to prevent the disappearance of the family nucleus, the restructuring process has brought on a change in the social identity of each of the family members. We will study the changes that affect the women, the subject of this work.

We pointed out earlier that some social process might explain why the *ejido* women producers were almost always heads of household. That brought us to a closer study of the relationship between the women producers and non-producers and their families, and the identification of one of the outstanding effects of the crisis on them: the migration of a large part of their family nucleus, especially in the case of women producers.

Let us suppose that the social process that has pushed especially the male members of the *ejido* from the family plot to other economic sectors, and even to other states and countries, is the same process that has forced the women to assume the role abandoned by the men—both within the family nucleus as head of household and within the productive sector as administrator of the family plot.[19] Under this strategy, the women in all cases[20] continue with their responsibilities as housewives, and in addition 75 per cent have some other activity. Often these activities are a combination of housework and agricultural tasks; housework and the preparation and sale of goods or provision of services in the community, the district or nearby cities, especially preparation of food, clothing or activities related to education or health; and working as domestics for others. The general result is that, as a group, the workload of the women producers is much greater. Although they continue with the agricultural tasks, new opportunities are substituting these activities and the plot is in greater measure rented out, resulting finally in migration.

How is it possible that we propose that this is a process of social restructuring and not that of the disintegration of *ejido* families, and a change in the social identity of the members, including the *ejido* women? This question brings us to the central theme of this work—the contributions of women in the irrigation districts. These

contributions would be difficult to understand without considering their family nucleus.

The *ejido* family is reappearing in the form of two nuclei: one centred at the territorial base in the irrigation district, and second dispersed over the northern hemisphere, with the formation of new and original means of exchange between the two. The resident nucleus in the district is a safe base for the migrants for periods between employment, and allows for a subsistence living through cultivation of the plot, if nothing else. It is also an affective centre where the grandchildren may be left while they receive a basic education that will prepare them to seek jobs outside the district. The second nucleus, that of the migrant members of the family, provides income to support the base, a starting point outside the district from which family members can begin their preparation for inclusion in the migrant job market and a labour reserve for the unprofitable family plot, to the point that the migrant will abandon their place in the job market to return to the base and teach their children to do the same—the basic glue of this family structure.[21] It is this income and support, received from the migrant nucleus working in other sectors or abroad, that allows us to speak of a restructuring rather than a disintegration of the *ejido* nucleus. This exchange also allows us to explain the new functions performed by the families residing in the irrigation districts: development of a labour force with a view to entering other activities in the labour market, concentration of income from abroad, and the channelling of this income into the resident nucleus and agriculture. Although the profit from the plot is low, possession of the land is assured by investment of the income from abroad in seed and fertilisers, and payment of overdue agricultural loans. This outside income also subsidizes the families' effort to manufacture and sell good or provide and obtain services locally at lower prices to obtain an income locally.

The experience accumulated by the families in this aspect deserves independent research.

The role that women play in the combination of new functions within the *ejido* family and its reformation is germane. Women have not only acquired the identity of a producer in the sense of being responsible for the administration of production but also that of a

head of household. They have become the most stable and permanent member of the *ejido* family, the strategic reserve for both nuclei, the rallying point and the guarantee for family subsistence. In addition, they are the link between the family nucleus concentrated within the district and that dispersed to other points. They receive and administer the hard won earning of the migrant nucleus, and among their household and agricultural responsibilities they create goods and services within the community and sell them.

Their contribution to the irrigation district as a strategic reserve, especially in the case of the women producers, is to detain the deterioration of the families and the loss of the productive culture in the districts. These women can, and do, simultaneously enter a number of different economic sectors while the labour market is forming new ties with the countries to the north for the migrant nucleus.

The social identity of these women is changing with the remodelling process occurring in the irrigation districts and with the demands of the labour market in the North American hemisphere. From this perspective, their skills within the districts should be studied.

CONCLUSIONS

The low profitability in the agricultural sector and the narrowing of the agricultural labour market have provoked more than the disintegration of the *ejido* families residing in the irrigation districts of Mexico. They have resulted in families becoming dispersed international units and base groups. In addition to the functions that the families, especially the women, traditionally fulfilled—that of producing children and agricultural commodities—there are new ones including serving as a labour reservoir for the local and international markets, and the administration of money earned in other sectors and sent for investment in the family plot and in the creation of goods and services for the community, the district and the nearby cities.

In this context, women, as the most stable members of the *ejido* family in the irrigation district, are the strategic and moral reserve of the family. They tend to become producers and heads of household as these positions are vacated by the men forced, by poverty, to seek work along the US–Mexico border. The women are then the link

between the family in the district and the dispersed family. They administer the labour, land and income, conserve the *ejido* agricultural tradition,[22] and stop the deterioration of the family unit.

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NOTES AND REFERENCES

1 Six thousand water users in ten irrigation districts were surveyed. The districts were Humaya, Sinaloa; El Carrizo, Sinaloa; El Fuerte, Sinaloa; Yaqui, Sonora; Río May, Sonora; S.L. Río Colorado, Sonora; Delicias, Chihuahua; Bajo Río S. Juan, Tamaulipas; Río Lerma, Guanajuato; and Pabellón, Aguascalientes.

2 The interdisciplinary project, co-ordinated by Maria Luisa Torregrosa, included the subproject mentioned earlier, Identification of Technological Needs and Demands, under the direction of Salvador Avila and Esther Padilla, and Technological Innovation, directed by M.L. Torregrosa, in the Participation Area of the IMTA.

3 To identify a women with respect to the agricultural production in the district, we have considered the 'nominal user', that is, women who have the legal right to accede to the land and water and the 'women producers', who administer the production from the plot. For example, in ID 076, El Valle de El Carrizo, Sinaloa, of the 45 women in the study, 60 per cent were producers and 40 per cent non-producers, with the following distribution:

Group	Total	
	Participants	%
Users & producers	19	42
Users & non-producers	10	22
Non-users & producers	8	18
Non-users & non-producers	8	18
Total Number of Women	45	100

Source: IMTA. 1992, 1994. *'The Participation of Women in Irrigation Districts.' Mexico.*

4 Some of the main differences between men and women users refer to the proportion of land left fallow (greater in the case of women), and the size of the plot (smallest in the case of women) regardless of the conditions of possession. Simultaneously, there are fewer women who seek to enlarge their plot. Fracchia, M. & Anaya, C. 1994 Elements of Social Characterisation of Users by Sex in Irrigation Districts (Elementos de Characterizacion Social de los Usuarios por Sexo de los Distritos de Riego). *Memorias Seminario Internacional: Transferencia de Sistemas de Reigo,* pp. 115–16; and Fracchia, M. & Pereyra, A. 1994. Women and the Family Productive Structure Operating in Irrigation Districts' (La Mujer y la Estructura Productiva Familiar Operante en los Distritos de Riego). Mexico: UNAM-ENAH. *La Sociedad Rural ante el Nuevo Milenio.*

5 In the El Carrizo ID, Sinaloa, the main sociodemographic differences between the producers and the non-producers were age, number of children, and education. The non-producers were generally younger, from 19 to 35, not heads of households, and some did not have children. Those non-producers who had children, usually had fewer than had the women over 35, who were mostly producers. The non-producers usually had a higher level of studies, including secondary or high school and in some cases college. Women producers were generally over 35, with an average of 50. Women of both groups in this age bracket (the minority) shared many more characteristics: all had an average of 5 children per family, slightly more in the case of producers; education varied from none to partial completion of secondary school.

6 Of the group of women interviewed at El Carrizo ID, Sinaloa, slightly more than half (53 per cent) were married and shared the responsibility of maintaining the family nucleus with their husband. The remainder were heads of household.

7 That is in the case of non-producer women living in the El Carrizo ID, Sinaloa, the expulsion of offspring varied between 0 per cent and 36 per cent, while for producers the rate was between 66 per cent and 80 per cent of the children in the family nucleus.

8 At that time, the main crops were cotton and sugar cane, both labour-intense.

9 In fact, during the population growth in the irrigation districts, the region did increase its production. For example, 64.6 per cent of the economically active population in the state of Sinaloa, in 1960, was employed in agriculture. Fracchia, M. 1997. 'Formation process of a new social identity in irrigation districts: women as producers and

multientreprenurial heads of international families', Master's degree thesis. Mexico: Universidad Autonoma de Mexico.

10 According to the same survey, 79 per cent of those interviewed claimed to produce grain.

11 According to the women surveyed in the El Carrizo ID, Sinaloa, from 1991 to 1997, the poor profitability in agriculture is due to the negative balance between the crops and the rising production costs, the instability and uncertainty of the sale price of the product. These factors are in addition to a series of mechanisms that affect the low productivity: the falling quality of the input, the decapitalization that does not allow for access to modern technology, the financial mechanisms imposed by banks that provide credit for production, and the corruption within the agricultural insurance institutions.

12 This is one of the most important results of the aforementioned survey. Fracchia, ibid., pp. 92–6.

13 According to the socio-productive survey, for 1992–93, 30 per cent of all producers in ten irrigation districts used their personal funds to cover the production costs.

14 In fact, based on the above mentioned survey, almost 20 per cent of the users do not crop their land. Of these, 80 per cent are *ejidatatios.* Fracchia, ibid., pp. 89–90.

15 For example, in the state of Sinaloa, in 1960, 64 per cent of the economically active population was involved in agricultural activities. In 1990 only 36.7 per cent of this population worked in the same area, while the service sector grew from 23.1 per cent of the labour force in 1960 to 42.4 per cent in 1990. The economy was moving toward service oriented activities.

16 The Survey of Demographic Dynamics of 1992 indicated that at least one individual from almost one out of every five households had migrated to the USA. Conapo 1997. *La Situación Demográfica de México* (The Demographic Condition in Mexico). Mexico.

17 According to the above mentioned survey, in all ten irrigation districts, one-fourth of all producers used only family members for production; slightly more than one-half of the producers combined family members and salaried non-family members for this purpose. Fracchia, op. cit., pp. 106–7.

18 Fracchia, ibid., p. 125.

19 This aspect is interesting because in generally accepted legal terms, women do not enter into possession of the family plot except as heirs. Here

we find that women have access to the land in response to a social process—migration—with the corresponding responsibility as administrator of the land.

20 A list of the activities commonly performed by the women can be found in Fracchia, ibid., pp. 131–74.

21 Money sent from the USA is one of the main sources of income in Mexico. In 1992, an estimated 3.5 to 4 billion dollars were sent, although the approximation may underestimate the total because often currency is brought back. By 1990, the money received by the family was the equivalent minimum wage of 1.7 million Mexican workers, according to the annual report presented by the Bank of Mexico. During that same year, in the state of Sinaloa an estimated 64 million dollars were received by the families in residence. Conapo, op cit., p. 30; Fracchia, op. cit., pp. 112–13.

22 The productivity in the *ejido* compared with that obtained under other land possession regimens, and the changes in social identities that have resulted, are topics that could well provide interesting material.

TABLE 1: Dispersion of family nucleus

Children residing in family nucleus	Number of families
Yes	1,631 (55%)
No	1,334 (45%)
Total	2,965 (100%)

Source: Participation Area, IMTA. Survey to estimate the potential participation of users in irrigation districts. El Carrizo ID, Sinaloa, May 1991. A. Pereyra & M. Fracchia.

TABLE 2: Classification of land holding regimen in 10 irrigation districts

Classification	Per cent of all landholders
Ejidatario	63.6
Small land owner	23.0
Coloniser	4.8
Family administrator	3.8
Renter	3.0
Administrator	1.3
Heir	0.5
Total	100.0

Source: IMTA-FLACSO. 1992. Results of a socio-productive survey of ten irrigation districts.

TABLE 3: Land holding regimen in ten irrigation districts, by sex

Classification	Men (%)	Women (%)
Ejidatario	65.9	71.1
Small land owner	21.3	20.7
Coloniser	3.9	5.4
Family Administrator	3.9	1.6
Renter	3.2	0.3
Administrator	1.4	0.2
Inheritance	.5	.6
Total	100.0	100.0

Source: IMTA-FLACSO. 1992. Results of a socioporoductive survey of ten irrigation districts. Mexico.

TABLE 4: Complementary jobs of district users, by sex, in ten irrigation districts.

Economic Sector	Men (%)	Women (%)
Agriculture	29.9	18.6
Common labourer	28.9	26.4
Workers	25.5	21.9
Independent contractor.	15.7	33.1
Total	100.0	100.0

Source: IMTA-FLACSO. Results of the socio-productive survey in ten irrigation districts, 1992. Mexico.