

# Converging Factors in the Successful Transfer of Irrigation Management Responsibilities to Water Users Associations in the Dominican Republic

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## INTRODUCTION

MANY FACTORS ARE involved in and must converge to make the transfer of irrigation system management to farmers a successful one. Sociological studies have been done concerning what makes a successful irrigation project, most notably that of Ostrom (1992) and concerning the theories involved in providing incentives for rural development (Parlin and Lusk 1990). However, this paper proposes to discuss what in the experience of the On-Farm Water Management (OFWM) Project made irrigation system transfer to farmers in the Dominican Republic not only feasible but successful. What was achieved by the Project in one of the poorest sections of the Dominican Republic was so successful that the Dominican Government decided to begin a plan for turnover of 100 percent of its irrigation systems to farmers even before the OFWM Project ended.

The purpose of this paper is to discuss some of the success of the OFWM Project but will focus even more on the factors which converged to make this success.

## YSURA Irrigation Project and On-Farm Water Management Project

Located in the Azua Valley in the Dominican Republic is the site of a former Dominican Government Irrigation Project called the Yaque del Sur: Azua (YSURA) Irrigation Project. It had largely failed, particularly after Hurricane David in 1979, resulting in disgruntled farmers whose lands had produced little during the last ten years and had become one of the most economically depressed areas of the country. Nevertheless, this area has been transformed into one of the most promising irrigation districts of the country. This transformation occurred after the intervention of the OFWM Project, an eight-year, US\$20 million loan and grant project implemented by a Utah State University technical assistance team under the sponsorship of the United States Agency for International Development (USAID) and the Government of the Dominican Republic.

YSURA was one of the two key irrigation areas chosen by the OFWM Project in the Dominican Republic with the aim of improving the management of irrigated areas of the country. This goal was expected to be accomplished by increasing land productivity, rehabilitating irrigation districts, reclaiming land, and, most important of all, by the transfer of management of the water resources from the hands of the government to those of organized farmer associations. These objectives were indeed accomplished, far beyond initial expectations.

## Transformation

The rural community of YSURA was one with a long, historical record of dependence upon the government, yet at the same time made callous by lack of hope for any assistance; their area was one of the most depressed economic areas of the country, an area of high poverty, little education, and poor to often no irrigation tradition. Through use of a strategy of escalating incentives based on an empathetic assessment and an initial survey of overall conditions, and through a holistic plan of action based on empathy, meeting farmers' needs, and common sense, the YSURA area was slowly transformed. This rural community was able to emerge from a stage of disarray and disorder to a budding capacity for self-governance. Indeed, the community progressed from initial rejection and reluctant observation to that of best ally in their own process of transformation and rehabilitation, ready to be organized into an institution of self-rule that already competes with the government in technical and organizational capacity to manage the water resources of their irrigation system.

However, the presence of certain factors was essential in causing a reluctant rural community to accept the great changes required for better living conditions and for management of their own irrigation systems, and later, for a government to decide to implement irrigation system turnover at a national level. To determine these factors, it is

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helpful to look at the process of irrigation system transfer itself, the main protagonists involved in the process, the particular situation each faced, and the goals and incentives of each.

### **Specific Data on the OFWM Project and YSURA**

The OFWM Project work took place in two areas of the Dominican Republic. One was the YSURA area in the Azua Valley, in the arid southwest of the country; the other was the Yaque del Norte Project area in the north central Cibao Valley which received considerable rainfall. YSURA farmers were small farmers, working plots of one to 3 ha each. The Yaque del Norte farmers were generally small and medium farmers, but included a few large farmers. The YSURA area, being the neediest, received the most attention, funding and effort-wise. The changes seen in the process of irrigation system transfer were the most dramatic in YSURA, so this paper will focus primarily on the OFWM Project's work in YSURA.

The need for improved on-farm irrigation efficiency was based on conditions in both areas, but much worse in YSURA: high water tables, water logged and saline soils, and clogged irrigation systems, with even trees in canals. Poor irrigation system maintenance resulted in inequitable and uneven irrigation water distribution; inadequate (government) funding and low or often uncollected water fees were at fault. Furthermore, many of the water masters in charge of water delivery and control were political appointees having little dedication, experience, training, and scruples (Utah State University 1991).

The OFWM Project work in the two areas of the Dominican Republic initially included 2,000 ha and resulted in an increase of on-farm irrigation efficiency from 15-20 percent to 45-50 percent. Farmland affected by the Project included 2,300 ha benefiting from new subsurface drainage installation and 1,500 ha benefiting from new open drains. More than 1,200 ha of land out of production due to high water table levels was reclaimed. One hundred sixty km of irrigation canals were rehabilitated, and 400 km of drainage canals were reclaimed. Approximately 7,500 farmers received training. Twelve water users associations (WUAs) were formed in the Project areas itself (7 in YSURA), and by the end of Project, six others elsewhere in the Dominican Republic had already been formed as a result of the Project. The OFWM Project directly involved 14,000 ha of farmland, over 8,000 ha of which were in YSURA. Over 6,400 farmers benefitted from the Project, two-thirds of which were in YSURA (YSURA Water Users Association 1992).

Before the OFWM Project began, the operating cost of irrigation systems in the Dominican Republic was highly subsidized by the government, with less than 12 percent of the farmers contributing through water fees. With the Project, water fees were increased approximately 15 times, with a third of this payable in labor. Despite this drastic increase, over 80 percent of the farmers contributed water fees, and the WUAs gradually assumed responsibility for their collection.

Farmers learned in the process to equate water fee payment and contribution of labor to the irrigation system with a tangible increase in agricultural production and an overall reduction of labor to obtain and apply water. The commitment of the farmers was such that the WUAs, the farmers themselves, summarized it as "no pay, no water" (YSURA Water Users Association 1992).

The non-quantifiable results were privatization of control of irrigation districts (irrigation system transfer), democratic initiatives through the WUAs, security in investment by farmers through perceived decreased risk, social peace and justice through resolution of conflicts through WUAs, halting and reversal of land degradation and of loss/misuse of soil and water resources, decreased health risks to rural populations due to draining of waterlogged lands, decreased risks of loss of homes and critical highways in the Azua Valley in times of heavy rains and hurricanes due to construction of adequate drainage systems.

### **Institutional Changes**

As a result of success of the OFWM Project, the National Institute of Hydraulic Resources of the Dominican Government (INDRHI) decided to begin a plan to turn over 100 percent of the nation's irrigation districts to the farmers. At the close of the project in 1993, INDRHI had already budgeted for the turnover of 29 irrigation systems covering an area of 26,300 ha to 7,261 farmers organized in water user associations. To support these plans, INDRHI had recently inaugurated the National Center for Training in Irrigation and Drainage to disseminate the lessons learned through the OFWM Project.

The WUAs, in their role of representing farmer interests to attain their objectives, had already grown in maturity and initiative. They are recognized by national organizations and donor organizations as the natural means for channeling resources and services to associated farmers. Some examples of this are that the Agricultural Bank of the country extended emergency credit through the YSURA WUA; the Peace Corps Public Health units make community contacts through the WUAs; and technical assistance donors from Germany and Taiwan have discovered that the WUAs make it easier for them to extend their services to farmers.

## **THE ROAD TO SUCCESSFUL IRRIGATION SYSTEM TRANSFER**

In irrigation system transfer, different protagonists may be involved in the process. In the case of the OFWM Project in the Dominican Republic, the protagonists included the farmers (the water users), the host country government (the Dominican Government, particularly INDRHI, a cabinet-level ministry), the donor/loaner agency (USAID), and the contractor-executor (the Utah State University OFWM Project team).

The road to successful transfer of an irrigation system to the farmers it serves is indeed a long one. It is much like growing a strong, flourishing garden. It takes time to assess needs, to develop a holistic approach, to implement plans, to await the first flowering of progress, to fertilize and nurture the tender growth, and to reassess, protect, and redirect that growth. The process has many setbacks. It requires, as in the analogy, great patience and dedication. Great patience is required, not only of the one nurturing the process, the contractor-executor, but also of the other protagonists in the process: the farmer, the host country government, and the donor/loaner agency. The process is a difficult one for the contractor-executor, but often the hardest part, at least in the OFWM Project, is convincing the other protagonists to have patience, to allow time for the process to grow and progress.

### **The Host Country Government and the Donor/Loaner Agency**

Situations for conflict often arise in the process due to the natures of the protagonists. Both the host country government and the donor/loaner agency like quick results from a project. Often, in each there are frequent changes of administration. Thus, there is a tendency in many cases for administrators in each to want a "feather in his cap" of results from projects in his portfolio. They often prefer a project that gives quick results even if the results are superficial and not sustainable; they often have little patience with a project that moves steadily but, in appearance, slowly. Often it is a matter of political survival.

Furthermore, there may exist a certain resistance on the part of the host country government to interact with the donor/loaner agency, since the latter's plans, however officialized by contract, may still be seen as "meddling in our affairs," and showing up their own failure to achieve the same. In the case of the Dominican Republic, WUA organization had been tried unsuccessfully by the government and failed for several reasons (Yap-Salinas 1993b). Pressure for change by the donor/loaner agency must come in a positive manner and be well timed.

### **The Farmers**

Likewise, the farmers want quick results. For them and their families, it is a matter of physical survival. "Flash-in-the-pan" promises and projects have come through before and often failed, so farmers tend to be wary and not readily willing to commit time, effort and their precious land to a new project. This was true of YSURA.

### **The Contractor-Executor**

From the point of view of the contractor-executor, the job is not only to achieve the objectives and goals set, but to convince the farmers, the host country government, and the donor/loaner agency to have patience, to allow time, and to cooperate even though the results are not yet being seen.

How the contractor-executor does this requires certain skills and qualities on his part. In the experience of the OFWM Project, these skills included, first, the ability to "read the signs," both internationally in the field and locally at the host government and donor/loaner agency level. Early in the OFWM Project period, a trend toward privatization in development was taking place in the international environment. The views of a new USAID administration began to stress democratic initiatives and environmental protection. All these trends fit into what the OFWM Project was already doing, although they were not specific objectives at the time. Thus, a second skill came into play: flexibility, the ability to adapt objectives of the Project to the prevalent climate while attaining the same final goals. Another analogy fits here: that of a surfer, who must "catch the wave" and flow with it.

A third quality in the OFWM Project was dedication to the fight for survival of the project, knowing that the hopes being already tenderly offered by farmers to the Project's success lay at stake. This required a willingness to put in extra time to write additional reports to the host country government and donor/loaner agency explaining the progress being made, how the objectives of the host country government and the donor/loaner agency were being met, that indeed results were forthcoming.

A fourth requirement was imagination and innovation, to plan and produce pilot areas and small farmer plots to get quick results on a small scale, to encourage the farmers, the host country government, and the donor/loaner agency.

A fifth requirement was empathy. Empathy has been defined by Webster as "the ability to share in another's emotions, thoughts, or feelings." A native American proverb describes it thus: "Do not judge your neighbor until you

walk two moons in his moccasins" (Zona 1994). Empathy in the OFWM Project meant understanding the needs of the farmers, of the host country government, and of the donor/loaner agency, and working with each.

### **Irrigation System Transfer Process through the OFWM Project**

The process employed by the OFWM Project involved providing the physical infrastructure necessary to allow success in irrigation in the OFWM Project areas (particularly YSURA), and at the same time convincing one or two farmers to allow work to be done in their fields. Results in production, showing that less risk, cost, and effort would be involved, convinced other farmers to let work begin in their fields also. As work progressed, step-by-step turnover of laterals began, the first taking place in 1987, two years after the OFWM Project began. A system of escalating incentives based on the farmers' hierarchy of needs was employed. While not identified as such at the time, upon analyzing the success of the Project, it was found that these terms and the term "empathy" were indeed what described the factors in its success.

The success in YSURA was encouraging, because YSURA was considered the worst agricultural situation in the Dominican Republic. If such dramatic results could be obtained in YSURA, changes could also be practical elsewhere in the country. The host country government began paying attention and getting excited, seeing advantages of irrigation system transfer.

It must be noted that complete transfer of the irrigation systems to the farmers was not the original plan. As originally conceived, the OFWM Project's goal was to build up water users associations as a means to improve agricultural production, but this called for a limited participation of farmers as partners with the government in irrigation system management, with the government maintaining control. The idea of transfer came in later, with the powerful international current of privatization and building up of nongovernment organizations (NGOs) and when structural economic reform became a goal of the donor/loaner agency (USAID). Privatization in irrigation management, i.e., irrigation system transfer, would be the natural extension of this. While commonplace in the U.S., this in a developing country was new to USAID, new to the Dominican Government, and new to the OFWM Project. The OFWM Project was already underway. However, with this catalytic push from USAID, the Project was flexible, "caught the wave," and adapted its plans.

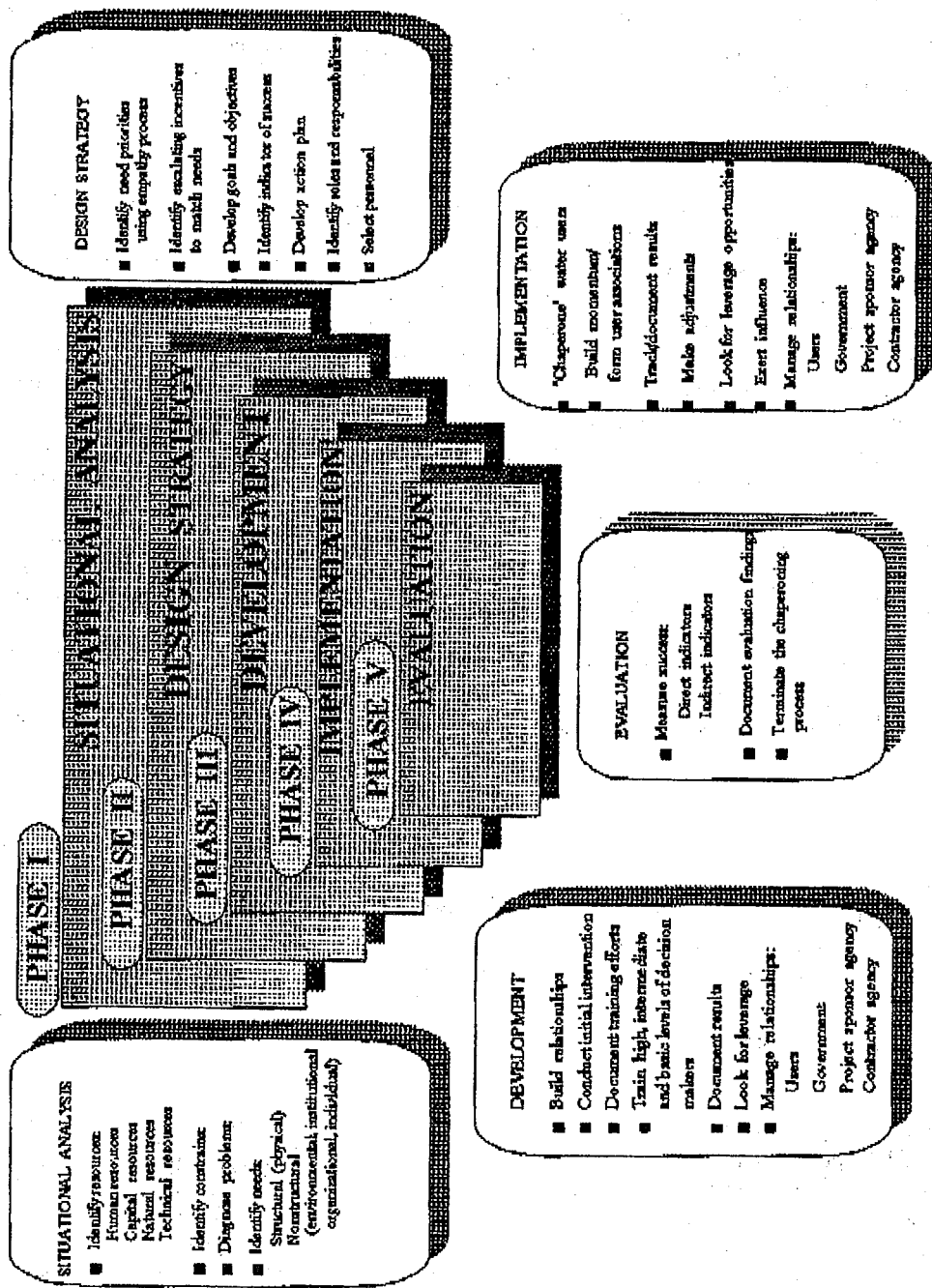
Another helpful factor in all this was obtaining press coverage of significant steps and achievements during the progress of the Project. Press coverage served to gain the attention of the host country government and donor/loaner agency and, even more, helped encourage the host country engineers working with the Project when they saw their work in print and could feel proud of it and of themselves. The phases of activities in the progress of the OFWM Project may be seen in Figure 1.

### **ATTITUDINAL SITUATIONS: STAGES**

Different stages of attitudinal situations were involved in the Project and in the process of irrigation system transfer, beginning with rejection, progressing to acceptance, partnership, leadership, and consolidation.

Escalating incentives based on the needs of the farmers, host country government, and donor/loaner agency were used to help turn the initial situation from rejection to acceptance and then to continue the process. The implementation of engineering works at the beginning and throughout the Project enabled increased production at reduced risk and was essential to farmers' acceptance and interest in learning to care for their own irrigation systems and in organizing into WUAs. It must be stressed that without this initial improvement of the physical infrastructure, farmers would not have been able to be motivated. During the partnership stage, farmers began to teach what they had learned about irrigation and drainage to other farmers. They began to sell the concept of being organized and its benefits to their peers. During the leadership stage, the WUAs took over responsibility for their irrigation systems and became promoters to other rural communities of this approach. In the consolidation stage, two factors have been important. The first was the prospect of the farmers' receiving legal entitlement to their lands as promised by the government. The second is the formal recognition of the WUAs by the government as valid, representational entities. The proof of this is in the new National Water Code being established; WUAs will be recognized institutions with all legal rights. The government's recognition of WUAs has been a necessary element in the transfer of water resource management to farmers and also in the expansion of the concept of WUA organization throughout the country.

Figure 1. Phases in the OFWM Project, Dominican Republic.



Due to the obligatory end of the OFWM Project, the process of transfer was left at the consolidation stage. The final goal is sustainability, which will, in the end, depend upon the Dominicans themselves. The satisfaction came in seeing the necessary bases set and in being able to help nurture growth to young maturity. These stages are shown graphically in Figure 2.

## **ESCALATING INCENTIVES**

An empathetic understanding of the needs and objectives of the farmers, host country government, and the donor/loaner agency helped develop incentives to each as part of attaining the goals of establishing water users associations (WUAs) and increasing agricultural production (Yap-Salinas 1993a, 1993b, 1993c). These different incentives to the protagonists in the transfer process were able to be identified from the point of view of the contractor-executor, who in the end bears the responsibility for making the irrigation system transfer effective.

### **Host Country Government**

Since the Project was contracted with the host country government, it was important to understand their situation. A state of rejection was apparent in their view of the idea of building up WUAs. They themselves had tried previously and failed in the attempt, so they were not very receptive to the idea. However, the Dominican Government, through its water resource agency, INDRHI, provides funding for the operation of irrigation districts in the country. Letting farmers take over management and letting them also handle the necessary raising of water fees would allow the government to decrease its work and monetary input. Furthermore, the problematic process itself of water fee collection was thus also avoided. These economic and management incentives proved important to the government once it was seen by initial successes that WUA control of irrigation districts was feasible.

Furthermore, because of the disastrous condition of management of the irrigation systems and because of the disastrous condition of these systems themselves, there was considerable dissatisfaction of the rural populace directed toward the government. Since the actions of the Project were viewed by the people as an action of the government, every good action and economic result represented increased leverage with the farmers, decreased social turmoil, and thus political gain for the host country government. Thus political incentives were brought into play, since farmers are voters. The success of the Project was also a political incentive to directors of the host country government agency; having a successful situation in their portfolio improved their political and employment futures.

In addition, when host country government engineers worked with the Project, these engineers received training in the Project; this gave them greater local professional leverage. Many of them had the opportunity to study in the U.S. and in other countries through Project funding. Thus, personal incentives were also involved.

### **Donor/Loaner Agency**

Few irrigation projects worldwide have been truly successful (Ostrom 1992). Thus it was a great satisfaction to Project Officers and to the higher levels in USAID to be able to have a successful irrigation project in their portfolio, one that indeed inspired sweeping changes in irrigation management throughout the host country.

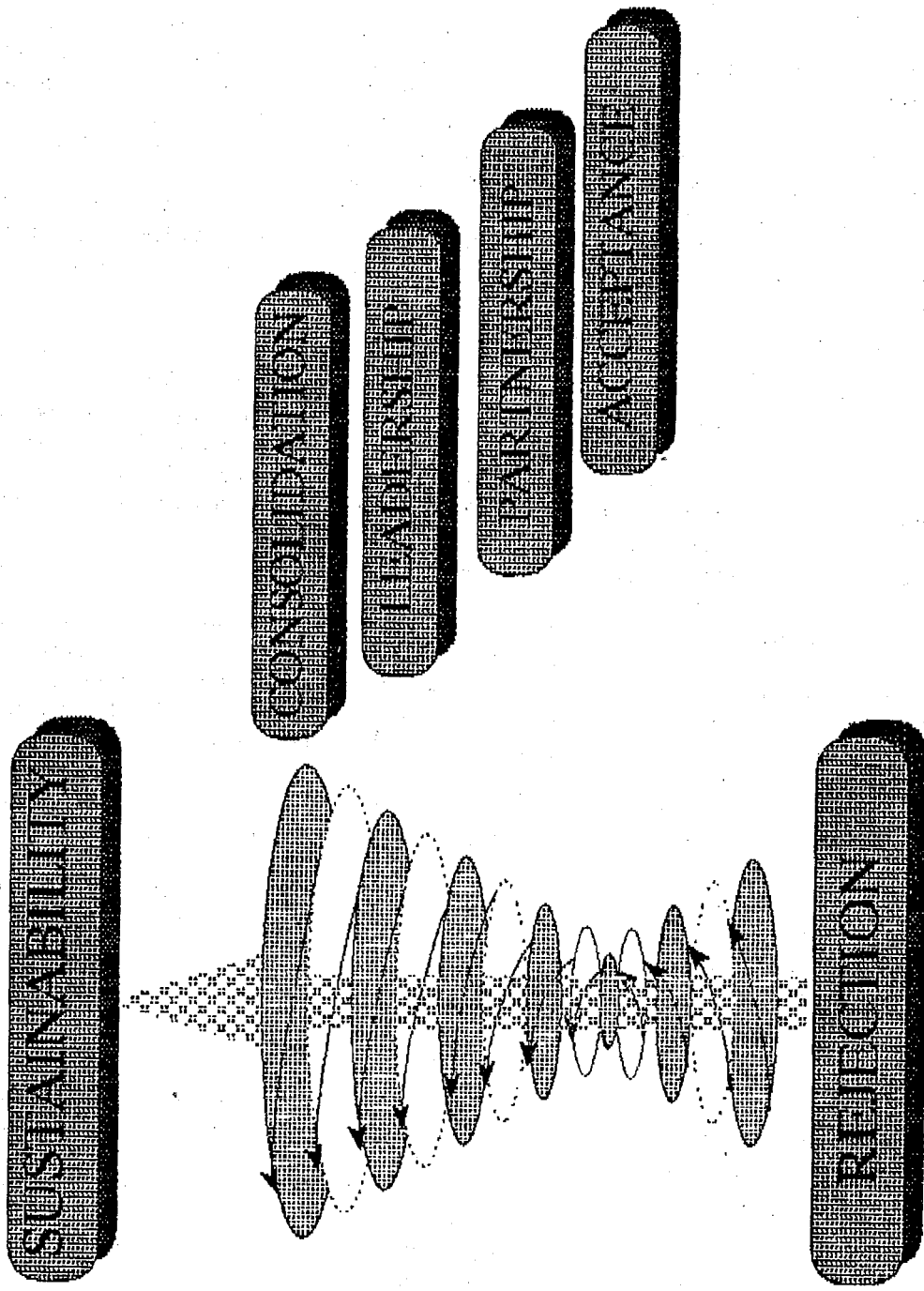
Obtaining leverage with the host country government is also an incentive to the donor/loaner agency in their goal of catalyzing transformation in the host country. As with the OFWM Project, the contractor-executor's success in his project, as part of the donor/loaner agency's portfolio, gives the donor/loaner agency this desired leverage.

### **Farmers**

Farmers have a natural reluctance to change; they are naturally risk avoiders rather than risk-takers. This is because their physical survival and that of their families is at stake. Three initially important incentives provided by the Project were, therefore, risk reduction, increased production, and decreased effort and cost to obtain water and production.

By establishing a pilot area in YSURA and working with key farmers on their lands, the OFWM Project had the opportunity to show farmers that irrigation system rehabilitation, completion, and proper operation and management produces reliability and equity of water supply, not only to the farmers close to the water source, but to those down at the lower part of the water distribution system who previously were not able to get water often except through bribes and conflicts. Imposition of order and discipline were thus necessary to provide this reliability and equity of water distribution.

Figure 2. Attitudinal stages in irrigation system turnover, OFWM Project, Dominican Republic.



Providing a reliable source of irrigation water through changes in the physical infrastructure and management gave the farmers a sense of confidence in their irrigation system and thus a reduced economic risk of investment of their money and effort into the agricultural process. It was necessary at first to convince a few farmers to allow works to begin in their fields. Then as these farmers' fields began to show dramatically improved agricultural production, other previously reluctant farmers became more cooperative and even anxious to have work begun in their fields. They were also willing to allow experimentation in their fields to compare their own management to Project work with improved technology and management. Seeing improved production in their own fields was an even more dramatic demonstration to the farmers at times than seeing it done in the pilot area. Furthermore, by using key farmers with a certain degree of social leverage in the area, this effect was able to be multiplied.

By use of the three initial incentives of reduced risk of investment, improved production, and decreased requirement of effort and cost, situations resulted that in themselves were further incentives for the process to continue and for the farmers to commit themselves to the process. Conflict and vandalism were essentially eliminated because the water supply was reliable and equitable. Respect for the irrigation system itself increased, along with an increased respect for concepts of order and discipline, because they could see firsthand, and in their pockets, the results of order and discipline. Because of the elimination of conflict, cooperation and relationships improved among the farmers, creating an improved social environment. This elimination of conflict and improved environment was critical in getting the farmers interested in organizing and cooperating together to form nuclei and later water user associations at the lateral level. It was seen that the three initial incentives produced a chain reaction producing positive social behaviors while diminishing and eliminating negative ones.

The step of eliminating obstacles--improperly functioning irrigation systems and situations of social conflict--was essential. Once farmers tasted this improved social environment and were happy about outputs, they felt happier toward the government in general (since the Project was viewed as a government program). Then the OFWM Project team started working in the area of leadership, teaching them how to organize and hold meetings (parliamentary order) and how to talk as a community. Farmers learned how to arrive at a consensus and how to make decisions favoring the rural community as a whole, not just certain individuals. This process in turn planted seed for democratic initiatives in the community overall. The WUAs later evolved as a body voicing concerns of the community with leverage in confronting government officials when such situations arose.

News of the success story of the WUAs in the pilot areas spread as wildfire to other areas of the YSURA system in the Azua Valley and to the country as a whole.

Parallel to the development of the WUAs, the Project worked with the government to make the first turnover of a lateral once the farmers were organized into a WUA. As the first fruits of improved production and farmer cooperation were appearing, the Project presented the results of its work and its approach to the government. Seeing the political and economic incentives to be gained, the government found it attractive to respond willingly to the idea of irrigation system transfer. The attitude of the government, however, has had a limit; the government has preferred to allow transfer to farmers at the lateral level while reserving control for security reasons at the top levels of the main system (dams, reservoirs, main conveyance canals that serve present and potential areas). The WUAs have, however, at present powerful leverage and influence in decision making concerning management of these upper levels of the main system.

The establishment of the WUAs has represented a radical change in irrigation system management in the Dominican Republic because now they have a strong voice concerning management of the whole system and are in actuality the main actors in the system. Where previously a paternalistic situation existed, with the government viewed as the only problem-solver, now farmers view themselves as determiners and masters of their fate.

## **THE FARMERS' HIERARCHY OF NEEDS**

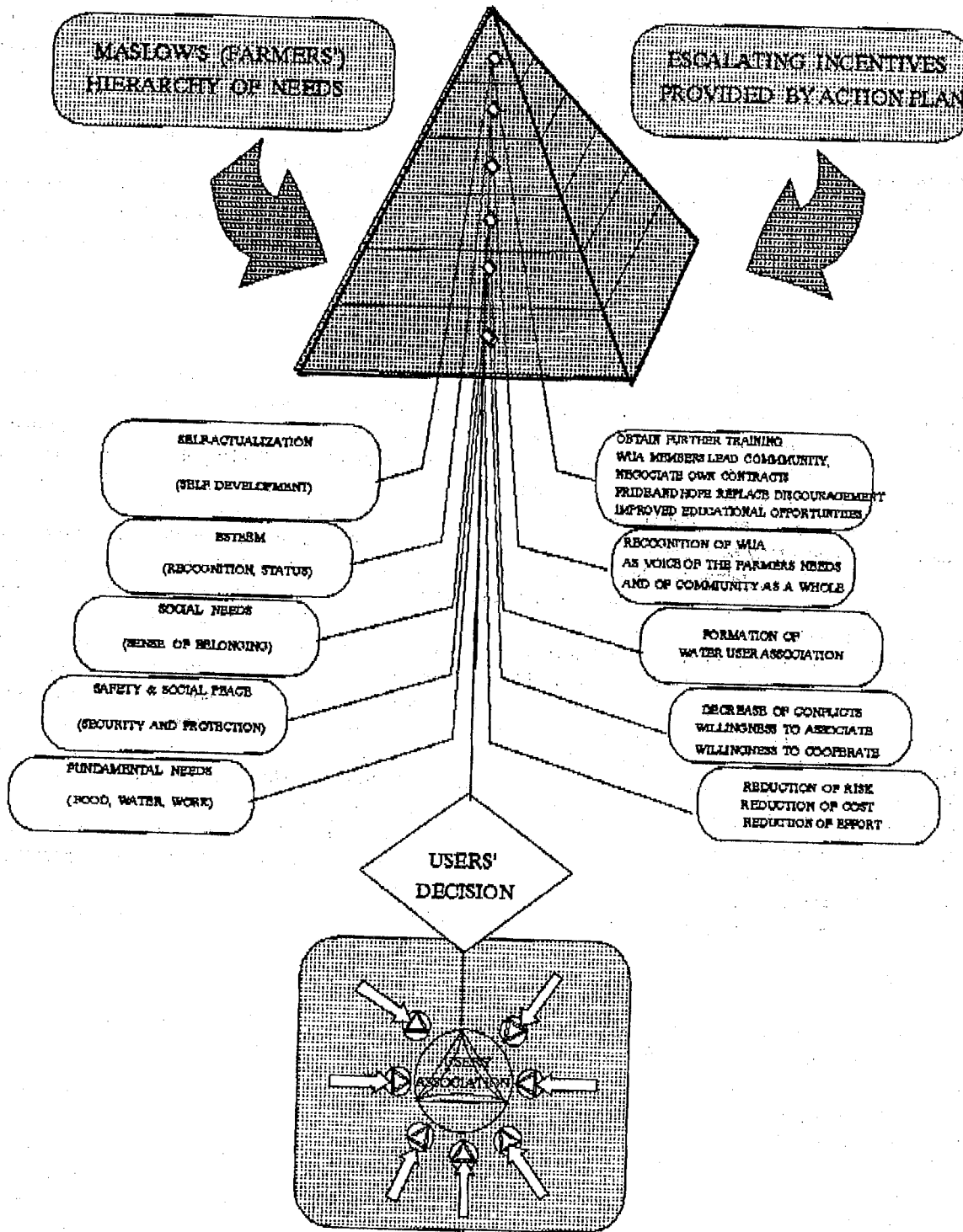
Maslow's hierarchy of needs (Maslow 1970) serves to describe the farmers' basic needs and how the Project employed its system of escalating incentives to meet their needs. Although the Project did not consciously at the time plan the use of such a hierarchy, it nevertheless empirically put it to use. Figure 3 shows this graphically.

Maslow's hierarchy of needs states that basic physical needs must be met before more social and self-actualizing needs can be met. Applied to a rural irrigated area, this means that farmers' needs for water, food, and work (source of income) had to be met first. In the OFWM Project, the three basic elements of reduction of risk, reduction of cost and work effort involved, and improved agricultural production apply here as the first needs to be met. This was accomplished by providing reliability and equity in the water supply through rehabilitation, completion, and proper management of the irrigation system (principles of order and discipline).

The second level of safety (security, protection) occurred in the OFWM Project when, because of the reliability and equity of water supply, farmers' conflicts decreased and the farmers became willing to cooperate with each other.



Figure 3. Maslow's (farmers') hierarchy of needs matched to OFWM Project escalating incentives.



The third level, the social need for a sense of belonging, came about with the formation of the WUAs and the resulting sense of community.

The fourth level, that of esteem (recognition, status) has come about in the OFWM Project area and throughout the Dominican Republic with the recognition of the WUAs as the voice of the farmers' needs and, increasingly, as a voice of the rural community as a whole. The farmers' individual pride in their abilities has grown. Their growth in self-esteem through responsibility has proven a heady incentive toward further growth and sustainability of the WUAs. The farmers enjoy seeing their names as leaders in the newspaper, and they enjoy their independence from the government. One concern here, however, is to help provide diversification in training for leadership so as to avoid formation of a closed rural elite leadership group among the farmers.

The highest level, that of self-actualization, or self-development, is being seen in the Dominican Republic as result of the OFWM Project work as WUA members lead the community, obtain further training, and negotiate their own contracts. Pride and hope are replacing discouragement. Increased educational opportunities for farmers' families arise with their improved agricultural income. One striking example of this was the ability of an YSURA farmer's daughter not only to complete elementary and secondary school, an achievement seldom seen in rural areas, but was able to go on to the university and study English.

## **TIMING AND HUMAN RESOURCES**

The degree and time requirement for WUAs to organize and become effective depends upon the human resources, the farmers themselves. A more uneducated and inexperienced group of farmers requires more time to become trained and proficient in irrigation and drainage techniques and management than a group with more education and experience. In the OFWM Project, the farmers of the Yaque del Norte Project area had more education, greater experience, and a better initial economic level; they also had better lands and resources. WUA organization among these farmers followed the same basic steps as in YSURA but developed much more easily and quickly.

The length of a project may seriously affect the successful arrival of the irrigation system transfer process to the stages of consolidation and sustainability. Indeed, it may be said that the longer the project, the greater its chance for success, much as the length of gestation determines the survivability of an infant. The OFWM Project lasted eight years, a rather unusually long time for a USAID agricultural project. However, it lasted this long because it was meeting needs of the other protagonists in the process and was continuing to provide incentives to each. If the Project had been terminated earlier, say at five years, the transfer process would have been incomplete and unable to survive.

Timing of actions during a project of irrigation system transfer is also important. It was seen in the OFWM Project that pressure of the donor/loaner agency upon the host country to permit trying out of new ideas in the field leading up to irrigation system transfer must be taking place at the same time that the contractor-executor is achieving increased production and farmer cooperation, so that the host country government can see that the irrigation system transfer being proposed by the donor/loaner agency and the contractor-executor is indeed feasible.

It was also found in the OFWM Project that when the sets of needs of the protagonists in the process are met by the contractor-executor by an empathetic approach in a holistic action plan, escalating incentives should be employed in a steady, step-wise doses throughout the length of the Project's duration to maintain the interest and commitment of farmers, host country government, and the donor/loaner agency.

## **CONCLUSION**

It has been observed from the experience of the OFWM Project in the Dominican Republic that certain factors must converge for success in the process of irrigation system management transfer. These can, with dedication and effort, be induced by the contractor-executor.

First of all, the provision of incentives for each of the protagonists in the process is essential, and these incentives must be made to converge throughout the process.

The farmer is the focal point of the process. Scarcity of water, whether real or artificially produced, is of primary concern to the farmer. Since water is key to his survival, engineering works of rehabilitation, completion, and reclamation constitute the base of the pyramid for meeting his needs and providing incentives. The provision of adequate physical infrastructure reduces farmers' risk of investment, increases production, and decreases the effort, cost, and trouble involved in obtaining water for production. From that point on, order and discipline in management and social and institutional changes are made possible.

Factors of timing of actions, and qualities and skills of the contractor-executor, particularly flexibility and dedication, are also important in the irrigation system transfer process and must converge with incentives.

Finally, the host country government's official recognition of farmers and their WUAs is essential in consolidating irrigation system transfer. Fulfillment of the Dominican farmers' long-awaited hope of entitlement to their lands and the institution of a new National Water Code giving WUAs full legal rights are not only incentives but crucially essential elements in building sustainability and permanence in the irrigation system transfer process.

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