

Social Impact in Small Irrigation Projects Transferred to Farmers

A Case Study in Andean Semiarid Agrosystems, Peru

Fransh Medina Durand

INTRODUCTION

For the operation and maintenance (O & M) of irrigation systems in an efficient and sustained way an evaluation is required before and after its transfer.

An impact evaluation should be identified to determine a) if the objectives formulated before the IMT process have been reached in economic and social-benefit terms to farmers, and b) if the transfer process has deteriorated the O & M of the project which had not been foreseen.

The researched project has taken into account a process of training and education to farmers before the transfer, focusing on the technological transfer and women's participation in this process. This research considers the measurement of efficacy and efficiency of water delivery, effective organization, training and production systems once the project is transferred.

Normally, in irrigation projects an impact evaluation is neither made nor made completely. But, there is a great interest in impact evaluation because it fulfills those benefits that can be greater than costs.

The studies of Social Impact (SSI) point their attention to the social aspect, which has objective and subjective factors which contribute in a positive or negative way to the people's well-being, and to the kind of life of the communities. The [avantitative] indicators serve to describe the social context, from which we measure the economic change, demographic, political, social and environmental processes.

The (SSI) let us, in a nutshell, foresee effects in other projects in order to increase the positive consequences and decrease the negative ones, incorporating in the decisions process the indicators which represent the wishes and aspirations of people, communities, organizations and regions which could have affected, or directly affect the later IMT process.

THE CONTEXT: AGRICULTURE IN THE REGION OF AREQUIPA, PERU

The Region of Arequipa, which is in the south of Peru has about 88,000 hectares of cultivated land. Seventy-five percent of this land is cultivated. The 75% is located in the coastal zone with commercial cultivations directed to the regional, national and international market. The Andean zone which is located between 2,500 and 4,500 above msl has a few suitable lands for agriculture [and specially for the scarcity of irrigation water]. The production is guided mainly to the family feeding, having just one harvest a year.

In Arequipa (1990), agriculture represented about 17.3% of the regional PIB. One of the most important problems which stops the development of regional agriculture occurs because of the scanty availability of hydric resources. There are in the region approximately 1,415,250 hectares of useful land of which just 6.6% is for cultivation and 40.70% for natural pastures of low [and resistant] efficiency. The rest is characterized for its aridity.

In the region there are about 38,200 farming units which, in comparison with the total hectareage of cultivated land demonstrate a [deep] small-holding which has little productivity, showing that the raw worth of production is less than the proportion of lands which belongs to that region. The small property including the small-holding has 94.4% of farming units and represents 62.5% of the agricultural area.

The levels of technological development are relatively low. In general terms it can be shown that the regional industry is very little articulated to the raw production.

The most important social organizations in the farm are those about distribution and the use of water. These organizations are legally recognized.

The Watering Systems

In the South Andean zone, there are, according to the intensity of use of systems of watering, three kinds of watering: intensive, semi-intensive and limit. Each kind of watering asks for eventual alternative requirements of infrastructure.

With intensive watering, the most considerable difficulties presented in Arequipa's Andean zone are:

- 1) The dispute of many farmers for the little distribution of water.
- 2) The absence of rationality in many watering systems in the distribution of schedules.
- 3) Carelessness in the maintenance and operation of the system.
- 4) Deficient application.
- 5) Deficient infrastructures.

Colca Valley

Colca Valley (3,000 above msl), situated in the province of Caylloma has an 8,000 ha of agricultural land with water and about 4,000 ha of abandoned lands due to scarcity of water. The most important traditional cultivations are beans, corn, wheat, potato, and barley.

Some of the problems are the scarce availability of water in 95% of cultivated land with 0.50 l/s/ha/year.

[Besides low efficiency in the use and manage smallholding level and infrastructure deterioration of watering.] In addition there is a systematic abandonment of the farming lands due to the scarce availability of hydric resources, with smallholding preferences (1.2 hectares approximately) and a marketable dispersion of smallholding.

The commercialization production process is done in an individual way so an absence of added worth in products gives low prices to the producer. The productive problem is worse because of productivity in traditional cultivation and Andean camel breeding, because of wrong management of blight and sicknesses, service lack to farming production, and low availability seed, etc. In addition to these, an insufficient energetic exploitation resource is presented which stops the development of rural zone agroindustry.

The valley has a population of 19,823 inhabitants formed by farmers who speak Quechua and whose economics depends directly or indirectly on farming activity.

The main problem which stops and limits the development of the Colca Valley is the lack of water and its distribution management. About 70% of the valley's production is used for consumption and 30% for the market.

In a general way, the valley's towns share, at least, four main characteristics:

- a. Agriculture is practiced in platforms under watering, and there is no *secano* (agriculture depending on rains).
- b. The weather is irregular and dry. Rains are not frequent or very low to provide a good *secano* agriculture. Yearly rain in the low zone is 300 mm and in the high zone it is 500 mm. The watering [molutator] is of 0.2 lt/hec.
- c. The watering infrastructure dating back to the pre-Inca epoch is used even now, with some improvements in the past few decades.
- d. The relationship between farming surface and population is 0.8 hectare/inhabitant. Land tenancy is a little concentrated.

The quantity of water given to each smallholding depends on its surface, independently of cultivation. The frequency of distribution will depend on the cultivation. The example is the same for the rest.

WATER: NECESSITY OF AN EFFICIENT USE

To sustain development is the international objective for the 21st Century. Even with varied definitions there is a consensus on the necessary requirements:

1. Absolute elimination of poverty
2. Fair access to education, health, potable water and drainage system.
3. Respect to juridical and political rights and equal opportunities without class or race discrimination.

These aspirations change according to the moment and place. In Peru, demographic pressure and poverty are problems which contribute to soil erosion, high disafforestation, extinction of species and chemical pollution.

In 1940 (6,200, inhabitants) 77.7% was rural population, while in 1993, (22,600, inhabitants) 70.4% was urban population. The consumption of food per inhabitant in 1970 was 421.4 g; in 1993 it was 329 g.

To satisfy Peruvians food requirements, 300,000 ha will be increased in the present decade. In the last decade the increase rhythm was just 6,000 ha yearly. Our goal till 1989 was to increase 832,025 ha, but we could increase only 208,700 ha [No irrigational national project has fulfilled with the area goal neither satisfied the put spectatives. 90% of the inversion in enlarging the farming frontier has been led to the coastal zone (less than 2,000 m.a.s.l.)]

The aridization process goes from south to north and from west to east (Medina, 1993). That is why the rains decrease approximately 70% per [century]. To this loss of water in rivers is added the less defrosting of mountains. From 2872 m²/sec. of provided water in 1532, now a day provides just 350 m²/sec.

Sooner or later the availability of land and water will be achieved. If we foresee this limit it is better to concentrate in small projects and leave the big ones for the future. The small projects can be [achieved] with the participation of the local community.

The New Conditions in Peru

The political context shows that we go to a liberal economy: [the farmer must leave being farmer to become.] There is a competitive tendency to sell what there is [not neither what they have nor what they produce in the markets".]

There is atomization of prices: the highest is the manpower and water. There ought to be less consumption and improvement in the quality of water. [About gravity watering to pressure watering the efficiency will be higher than 70% per gravity and 80% in spraying and 90% in dripping.]

The Peruvian reality is also changing and there are more demands in the middle of [lack.] Nowadays there is a national debate on the Proposal Law of Water presented by the Agriculture Minister, whose positive aspects are:

1. Faced with lack of water we have to be more efficient in its use [through the real property of water].
2. Administrative organization based in the hydric bowl.
3. The watering organizations are the only ones in charge of the O & M system.

Proposal of an IMT Program

According to the previous problem what the Government and the Private Development Organizations (PDO) do first is to define the central goal, which is summed in:

Increase the provision of water to a determinated number of hectares, which will improve the life conditions.

The Government has concentrated its actions in big irrigations in the Coast; the PDO with the help of Technique International Cooperation, develops actions in the Andean zones. Taking into account the characteristics of each system and its goal, some actions take priority:

1. Improve and power the watering organizations which guarantee the fulfilling of such functioning norms of the system including its maintenance, and administrating the conflicts.
2. Capture more water.
3. Provide equality in the distribution of water among the people who use it.
4. Decrease the loss of water when channeled.
5. Suitable share of water with an efficient scheduled system.
6. Optimize the use of water in the smallholding.

The Center of Help and Agrarian Promotion Development, (CHAPD), is a nongovernmental organization in charge of the promotion of development which has been working in the high provinces of Arequipa Region since 1987. This is working together with the Colca Valley Watering Commission in the implementation and fulfillment of projects to improve the infrastructure of watering which increase efficient conduction, improve the warehousing capacity, and rehabilitate the abandoned agrarian area.

In parallel we work in the organized aspect in order to power the capacity of communications of irrigators and approve the control over their use, management, and distribution of water through programs of education to leaders and users.

CHAPD has signed agreements with 17 irrigator commissions.

CHAPD, considered it necessary to evaluate the impact of these projects to validate the methodologic, objective and sustained proposals once the projects are transferred to farmers. To make this possible we took a project of the Colca Valley (District of Lari) as an example.

IMPLEMENTATION OF PROJECTS IN FARMING CONGESTION

In the fulfillment of projects according to the previous characteristics a rapid transfer of the improved system is considered. The organization of irrigators take the initiative [to priority] so they take part in all the project stages, and [with a suitable education] the O & M system is in charge of this organization.

In the district of Lari 3,330 above m.s.l. with 350 families and 1,255 inhabitants, farmers have not had a good organization on watering but have controlled the construction of the use of platforms or agricultural terraces.

CHAPD's objective was to contribute to fortify the economic-productive base of Lari, through the design of an option in the watering problem and agro-feeding production. The project, at the first stage, consisted in the damming of Ticllacocha Lake (4,200 above m.s.l.) and at the second stage the damming of Lequempa and Quehuisha lakes. Of late, the main canals have improved the [guide] of water significantly.

THE IMPACT AND THE SUPERVISION IN WATERING SYSTEMS IN THE ANDEAN SOUTH

To make the analysis of impact as external agents of [prived] development we started from 8 hypotheses or orientation reflections:

1. To fulfill watering projects in the south Andean zone to reduce the risk and vulnerability of [agropecuarian] activity.
2. To reduce risk let there be a more intensive agropecuarian practice.
3. This practice increases the production and productivity of the farm family.
4. The more production and productivity the more incomes for the farm family.

5. A more intensive [agropuecuarian] activity is articulated to the valid communal organization.
6. At the same time, that intensive [agropeucuarian] activity is compatible with the social and cultural time of the community.
7. The general result of the fulfillment of projects of watering generates conditions to its own development.
8. [Finally, which abitual and historial procedures sustain the use of water for the farmers and how is the relationship with the valid legislation.]

Discussing the previous hypotheses, we thought about the validity of watering projects, analysing the efficacy and efficiency in four aspects: conduction efficacy and efficiency, organizational efficacy, educational efficacy and productive system efficacy. In the last we refer to organizational efficacy for O & M and determine if the previous situation improved to compare them with the project results, and investigate the unforeseen desirable and nondesirable results.

The Impact of Watering Programmes

Usually, in the evaluation of watering projects the impact evaluation is studied either superficially [or not fulfilled.] On the contrary, the beneficiary shows interest in this theme. When the population takes part in the programme, it is usually believed that the management by the community is fair; this is not necessarily the case and a good management does not always require fair distribution.

The main objective of the study of Impact is to evaluate the contribution of this program and the development process of a specific zone; this objective has two important points:

- a. In the strategy sense the development is a continuous process related to a global context which goes farther than the specific actions of CHAPD. So it requires evaluating the continuity and it is self-sustaining [in the time.]
- b. Evaluate the contribution to the development process in terms of physical results and identify other benefits generated by the program.

Description of the Variables

The content of the variables of the model has a detailed description of economic, social, demographic, and organizer [raw acts or] components produced direct or indirect for the proposed program for the impact period in the community during six years (Appendix 1).

[Although it can happen, and in fact it happens, such raw acts with the other variable proper of socio-demographic and economic-social structure of the affected community.] The main interest of this analysis is based on its effects over the organization to O&M once the project is transferred.

IMPACT IDENTIFICATION

The detection of the impacts was done through the use of Leopold's mould correctly adapted. This mould favours the produced impacts in the natural environment and for such reason it was complemented with other methodologies, questionnaires and interviews.

Impact in the Dams

The construction of damming walls meant a major accumulation of sediments in the area of the reservoir. This makes the operation and maintenance difficult. The infrastructure in its construction did not consider some cracks and filters which limited the capacity of the duct. These cracks could not be fixed because the filters originate fountains which are well-spent to give water to natural pastures.

The reservoir zone is characterized for its extreme aridity with clayey and alluvium formations. Its soils lack almost completely of nutriment and have much saltpeter which makes it difficult for the generation of biomass. There is no typical vegetation of aquatic ecosystem at all. Sometimes when there are rains over the reservoir the water gets muddy. However, it does not impede the seaweed and microseaweed proliferation and secondary consumer (zooplankton) which feed from them forming a feeding chain.

Impacts in Low Waters

In a short time the regulation of water has produced positive impacts to agriculture so that 437 of a total of 497 ha registered hectares, of which just 180 were cultivated in the drought epoch in 1992, were directly benefited.

However the production of solid and nutriment material can in a short or long time affect the productivity of soil now in production.

Nevertheless, the watering system cannot reach optimum levels of function without an appropriate development of complementary work such as the impermeabilization of watering canal, the development of distribution or distributor of water and a suitable application in the farm.

The reservoir and major infrastructure projects have contributed specially to decrease the frequency of watering, and also to support the droughts (Table 1).

Impact in the Social Environment

To analyze the social impacts to farm level, and to determine which behavior provokes added consequences in the global ecosystem level, we programmed the application of a survey in the majority of users taking special care in including small owners for considering them as the most [disprotege] community sector which consequently needs the most help in any environmental action project. (By the way, this will be an aspect which has relations with the investigator valor).

Perception of Changes in the Quality of Lands

Farmers say that there had been changes in the quality of lands, 61% saying that such changes have been good for the agriculture. People who say they are bad, explain that the lack of rains degrade them, and that they are either "tired" or chemical fertilizers drive them "addict".

The positive changes have as the main result the terrace reparation and major water availability product, which not only improve the soils but also recuperate the cultivation area.

The farmers, without exception, show a great pleasure for the quality of its lands and the correct kind of cultivation they have, which reveals the existence of a certain resistance to the change of the uses of soil. Eighty six percent of producers say that their lands are suitable for agriculture. The Index of Quality Land (IQL) was built [asking about] the water retention capacity and soil facility for watering. Fifty one percent say that filter and retention of water are regular and 47.3% say it is good for watering. We exclude the quantity of organic material for being of easier evaluation.

Access Grade to Get Information about Management of Water

The grade of information about management of water is very important to the development of agriculture in Colca Valley. The majority gives a low information level about technical management of water [who consult technics, in its majority medium owners of the zone.] Sixty three percent does not attend trainings and the concentration of training themes reveals that the priority item has been about seeds and watering. The major training demand is shown in agriculture and cattle, mentioning 33.4% about watering clearly (Table 2).

Inhabitants' Satisfaction with the Place They Live in and Main Preoccupations

In general, the 55% of farmers express a grade of regular satisfaction with the place they live in, but they would like the main works to be done, specially with electric power and more water.

Let us consider one of the most important questions about their present situation compared with that of 1985; 57% said that their situation was better in 1985. Investigating the causes, the collective answer was that "there was more to eat". On the other hand, they mentioned that structural adjustment to correct the inflation given by the government had affected their purchasing power so that they can buy less and less. The answer for this question seems to distort the impact so that it is difficult to mention what is the most important to the project and what is important to the State politics. The conclusion is that it is important take into account the macroeconomic context for mediation of an impact.

Women's Role

The majority of the people said there is the same quantity of men and women in the assemblies (55.6%). In 1986, CHAPD found that women attended assemblies in the same proportion but they had never had charge in the directive of Commission of Waterers. In the communal works, the work of women has been recognized as that of half of men. In the case of widows and single mothers they had to ask their relatives to help fulfill their "duty". That is to say, women were outcast severely.

CHAPD, through the projects made it a condition to make women's day-journeys and her vote in the assemblies to be recognized. [Nowadays 62% of interviewed people said that in the directive of the Commission of Waterers.] Those who disagree with this say that women's main difficulty is their lack of studies or little experience. In impact terms this is one important contribution to the project of Lari because nowadays women respect the agreement taken at Ticllacochoa project.

Impact in the Organization

The Commission of Waterers has [potencied] and there is a recognition that water councilman are just men (83.6%). The mechanism control [us] the most suitable and 47% says this is more organized and in pursuing minute books we found 27 annual average registered meetings until 1985.

From 1986 they have increased to 48 annual meetings. The attendance at meetings and assemblies increased in the number of users and this has decreased the quantity of conflicts. The activities to the O&M are made in a more organized form through communal obligatory work. The water [distributors] are designed for annual schedules having no price for the Commission of Waterers.

Way to Resolve the Conflicts

The watering, by its social component, supposes some conflicts because of water disputes. Thirty three and point nine percent of users have had conflicts in Lari. The majority of cases are resolved by the Commission of Waterers, trusting in this institution for its solution. The applied punishments are fines (42.7) and the water failure (32.2). This attributes to the program a mechanism of control and a function regulation of the Commission of Waterers through the use of personal cards in which are established the obligations and rights of users.

PERSPECTIVE: POLITICS OF MANAGEMENT

The politics of management to reduce the impacts of soil degradation in agroecologic semiarid areas must be the result of more careful studies than those which we can formulate. After having seen the programme of Lari, [the deficit continues being the treatment of soil where use factor and management of water are determined.] Taking into account the limits in economic and financial resource material at hand [of these who decide politically because of the crisis,] we believe that all political management ought to notice these aspects:

1. Push the users to a more efficient use of water for watering.
2. Realization of an interesting campaign through communication means and the organisms of agricultural change extension in patterns of watering and uses of soil.

Anyway, the proposals of IMT must achieve harmonic integration of government organism in the administrative and legal aspects, along with the cultural norms through which them the farmer acts with the environment.

CONCLUSION

In the transference of irrigation projects, there is interest by the government to avoid subsidies as well as by many organized farmers who know the projects must be transferred because once they have operated and managed, [irrigation systems] it makes them more efficient and therefore they can improve their social well-being.

In a concrete experience, validated with an impact evaluation let us make this affirmation in IMT. The disadvantage is that the mediation is done after the transference, but in similar cases let us detect problems which should be considered in IMT.

An impact evaluation ought to consider all the projects and fulfilled programs realized by external agents in a determined zone. [After the impact program ought to be [desingrated] and its program validity have as objective the IMT.]

Finally, in face of the evidence of Peru's crisis in the organization system in the use of administration of water with farming objectives, the urgency to provide new institutional mechanism for the establishment of different roles of state and for a wider and more efficient participation by the users is underscored. In the impact evaluations let us clarify their positive validity in the programs of O&M management by users especially in small systems.

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Appendix

Indicator of Impact Measuring

VARIABLES	BASIC INDICATORS
A. <u>Economic-Productive:</u> * Rational use of water	<ul style="list-style-type: none"> - Hydric balance - Decrease of water loss - Infrastructure of watering existent
* Migration, employment, incomes, (decrease the tendency to disfarming)	<ul style="list-style-type: none"> - Capacity of absorption of local man power - Salaries and income levels and acquisitive capacity
* Production stability productivity per production unit (familiar and communal)	<ul style="list-style-type: none"> - Productive structure - Destiny of the product - Volume and quantity of production - Productive area - Productivity per surface unit
* Environment	<ul style="list-style-type: none"> - Management of river basin - Conservation of RR.NN - Use of agrochemist - Organic agriculture
B. <u>Socio-organizatives:</u>	
* Participation of the population in the decisions to a communal level	<ul style="list-style-type: none"> - Mechanisms and participation grades in a project - Woman's role - Influency of power groups in the communal decisions
* Cohesion of organization	<ul style="list-style-type: none"> - Relationship and reciprocate - Experiences transmittion - Development of charges - Leadership, equity and justice - Management of conflicts - Training
* Democratization of the society and development politics	<ul style="list-style-type: none"> - Organizational, social, horizontal and democratic forms - Interlocution and negotiation capacity - Planification and proposal capacity

Table 1. Moment of major utility.

MOMENT OF MAJOR UTILITY	USERS	PERCENTAGE
From the moment it finished	52	26.1
During the drought	66	33.2
Now	19	9.5
During the work	25	12.6
When there are rains	13	6.5
Others	24	12.1
Total	199	100.0

Table 2. Means to be informed about watering.

MEANS TO BE INFORMED ABOUT WATERING	USERS	PERCENTAGE
He talked with neighbors who know	47	23.3
He asked the technician	44	21.8
He saw wholesaler neighbors	7	3.5
He listened to radio programs	14	6.9
Training courses	37	18.3
He knows his farms	5	2.5
The command advices	8	4.0
Others/nothing	40	19.9
Total	202	100.0