IMPACT OF PARTICIPATORY APPROACH ON MANAGEMENT OF COMMUNAL IRRIGATION SYSTEMS IN UPLAND AREAS

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ABSTRACT

This Study was conducted in 2004 at the service area of the Caraballo and Southern Cordillera Development (CASCADE) programme in three provinces in Northern Philippines. It was designed to assess the impact of participatory approach for development and management system employed for communal irrigation system (CIS).

Results show that economic impact was due to increase in productivity and cropping intensity. Across all crops, average productivity per hectare was highest in vegetable producing CIS.

The social impact of the project was determined at three levels: household, community and irrigators association (IA). At the household level, the benefits were more on increases in land productivity and cropping intensity as a result of the assured water availability even during summer, hence food and income of the household.

At the organization level, the following benefits were revealed namely; 1). Change in leadership structure paved the way for recognition of new leaders; 2) Improved leadership skills; 3). Increased participation of members in IA related activities; 4) Improved organization skills; 5) Enhanced cohesiveness among members and 6) Better partnership and mutual existence between the village Local Government Unit (LGU) and the IAs.

The integration of farming activities directly benefited the community. The LGU – IA partnership encouraged maximum utilization of the project as evidenced by increased cropping intensity and crop diversification.

The sustainability of the CIS-IAs are ensured through; (a) the internalized rules in the proper usage and maintenance of the systems ;(b) security of their livelihood against drought and (c) improved leadership capabilities and high level of control in the IAs.

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I. INTRODUCTION

The environment is undeniably playing a critical role, especially in the economy of a developing country, like the Philippines. Economic activity has been the main source of pressure on the country's resource base. This is further compounded by the pressure due to the demand of the increasing population and the need to sustain food security.

In the Philippines, the uplands are among the most vulnerable ecosystem. This can be attributed, in part to the increasing migration of people to these areas in search for livelihood. This in turn has a trade off - environmental degradation that will eventually threaten the very existence of man.

To mitigate this problem, the Caraballo and Southern Cordillera Agricultural Development (CASCADE) Project was launched in 1997. This project through the partnership of the European Union – Philippine government, is an integrated area development program aimed at promoting the agro-based local economy and sustainable development of the indigenous upland and highland communities in 19 municipalities of Benguet, Nueva Vizcaya and Nueva Ecija of northern Philippines (see **Figure 1**).

One of the components of the project is the establishment of irrigation facilities to enhance food security and at the same time protect the environment from further degradation. As of October 2003, there were 39 communal irrigation systems (CIS) completed. Alongside with the development of the irrigation system, financial assistance was also provided to support the social infrastructure of the project areas.

The CIS was implemented through the participatory approach. The beneficiaries were actively involved in the management and development of the CIS in their locality. Thus, the impact of this approach for small-scale irrigation project was determined, hence this study.

II. OBJECTIVE OF THE STUDY

The ultimate goal of the study is for CASCADE and partners to be informed on economic and social impact of the project under the framework of participatory irrigation management approach and document information and experiences for the improvement and sustainability of the CIS projects.

II. METHODOLOGY

The methodology used in this project builds from earlier works done on participatory development for the past years. The methodology was based on the team approach on the assessment of the integration of participatory processes in community based projects. It intensively makes use of a combination of focus group discussion, triangulation supported by actual field visitation with the beneficiaries, interviews and actual physical assessment of fields served by the project. The data gathering and

discussion however did not consider thoroughly issues with bearing on cultural sensitivity. Likewise, due to lack of logistics, not much data was collected to draw conclusions on the effect of the CIS in the environment.

The steps undertaken in the conduct of the study were as follows:

1. REVIEW OF CASCADE'S STRATEGIES FOR IRRIGATION DEVELOPMENT

A thorough review of CASCADE's strategies, thrusts and programs on irrigation development was done from available documents provided by the project. This preparatory work enabled the research team to describe, characterize, and do initial profiling and categorization of existing CIS assisted by CASCADE.

2. ACTUAL FIELD VISITATION, SURVEY AND FOCUS GROUP DISCUSSION

- Physical Data and Service Area of 16 representative CIS operating for at least six months were measured using the most appropriate equipment/method available.
- Socio-Economic, Management and Operations - Data on the management and operations of the Irrigator Association (IAs), social and economic impact of the project was gathered from sampled CIS units. It was done through interview with key informants and beneficiaries. The primary data were gathered with the use of questionnaire, and focus group discussion.

3. DETERMINATION OF SAMPLING SIZE

Out of the 39 CIS completed and operational for at least one cropping, sixteen (16) CIS sample sites or 41% of the total CIS were selected for impact analysis. The criteria for selection were as follows: geographical location, type of system intervention, cropping system, type of irrigation, project cost, number of beneficiaries and declared service area.

4. ASSESSMENT AND ANALYSIS OF DATA

The indicator used in measuring economic impact of the various CIS in the CASCADE area was the increase in production per hectare as evidenced by: expansion in area served, increase in productivity (i.e. increase in production per hectare; and increase in cropping intensity.

The assessment for social impact was done in three levels; household (beneficiary level), Irrigator's Association and the community.

At the management level, the written reports on the participatory strategies employed in the implementation of the project were verified as to how these were implemented by the management and at the beneficiary level. At the beneficiary level, both focus group discussion and interview were used in the collection of data.

The levels of participation of the members of the IAs were rated using the following: 3-high, 2-medium and 1-low. Participation were measured in terms of level of the type of involvement namely; 1- if participation was for attendance to meetings only; 2- for

attendance to meetings and participation to planning and decision making and; 3- for undertaking all of the items including contributing in labor, efforts and funds in the operation and maintenance of the IA and the CIS.

The context of sustainability is measured for the extent of participation, status of the physical structures (relative to vulnerability of the environment of the structure); records on activities undertaken (meetings, consultation, trainings); organizational control; commitment of leadership; availability of trained leaders and commitment of the leadership of both IA and LGU. These were scored by the evaluating team based from results of survey and field visits and later validated with the community. Each organization is scored based on the total value. These were correlated with other variables that will explain the sustainability of each IA.

Organizational control is scored by the beneficiaries based on the following items: 1) group cohesion; 2) attendance to meetings; 3) LGU complementation; 4) effectiveness of leader to enforce rules and discipline and influence members. This criterion was validated using problem identification with the beneficiaries through focus group discussion.

III. RESULTS OF THE STUDY

A. PROJECT PROFILE

The irrigation systems in the CASCADE area are small, low-cost and located in vulnerable areas with slope greater than 20%. Water sources were either creek or Small River and spring water. The CASCADE's development assistance to CIS comes in three forms: a) capability building; b) communal irrigation systems physical structure (new construction, rehabilitation and improvement) and; c) other support services like microfinance and enterprise development. **Table 1** shows the type of infrastructure for the CIS's and the impact on water supply. Also, **Figure 2** shows an example of CIS for rice and vegetable production in the study area.

Table 1. Water acquisition facilities and their impact on water supply

Name of CIS	Infrastructure	Crop	Impact on water supply
Manamtam	River Intake	Rice	water supply is always enough – no impact
Dilan	Reservoir	Vegetable	new irrigation service area
Libawan	1 diversion weir	Rice+Vegetable	increased+more stable supply
Botilao	1 diversion weir	Rice+Vegetable	increased+more stable supply
Proper Pudi	1 diversion weir	Rice	increased+more stable supply
Lower Sisi	1 diversion weir	Rice	increased+more stable supply
Capintalan	1 diversion weir	Rice	increased+more stable supply
Yaway	River Intake	Rice + Vegetable	Stable water supply
Ammococan	1 diversion weir	Rice	increased+more stable supply
Decabacan	1 diversion weir	Rice	increased+more stable supply
Batu	River Intake	Rice-Rice-Onion	water supply is always enough – no impact
Dutac	River Intake	Rice + Vegetable	Stable water supply
Abogan	Spring Intake	Rice + Vegetable	Stable water supply
Balete-Bagtang	2 units Reservoir	Vegetable	new irrigation service area
Batawil-Sabdang	2 units Reservoir	Vegetable	increased+more stable supply
Dapong	3 small diversion weir	Vegetable	increased+more stable supply

The purpose of communal irrigation project is to increase production through increasing water supply, and protect the environment that supports the project with the community as the main actors of the development process. The project studied covers a total of 267 hectares planted into rice, a combination of rice and vegetables and vegetables only.

The Respondents

There were 128 respondents in the study, but only seven of which are women (see **Table 1**). Vast majority of the respondents were members of tribal communities called Ibalois and Kalanguyas - the indigenous people in the northern uplands of the country.

Table 2. Respondents Profile

Number of Respondents	128
Type of Respondents	
IA Officials	69
IA & LGU Officials	21
Members	38
Age bracket	45 – 74
Educational Attainment	At least elementary education
Average Household Size	5.4 heads
Average land area, multiple cropped areas	.48 ha.
Average land area, single cropped (rice)	.96 ha.

System Performance

On the whole, the systems studied had an increased cropping intensity of 21%, a distribution efficiency of 40% (much higher than National Irrigation Admininistration's 10-15%), and a fair satisfaction rating given by the members interviewed.

In terms of the respective roles of the IA's in planning irrigation-related activities, it was observed that in general, there was no uniform practice across the system studied.

There was a poor collection of Irrigation Service Fee (ISF) except from the three project sites. All projects that were visited are believed to be functioning efficiently with minimal conveyance losses because of the use of pipes in the case of vegetable irrigation and lining of canals for rice irrigation.

B. OVER-ALL BENEFITS DERIVED FROM THE PROJECT

1. Economic Impact

Results show that most of the impact was due to increases in productivity and increases in cropping intensity. Only one CIS had an increase in area served. Across all crops, average productivity per hectare was highest in vegetable producing CIS. The average aggregate annual benefit per farm was P116, 274 (2,300 USD)

Considering the total construction cost as the initial investment of the various CIS and the increases in the value of benefits due to increases in productivity, cropping intensity, and area as the project benefits, the payback period computed ranged from 0.05 year to 1.99 years. This payback period for investment projects is quite fast. This result implies that the investment cost in these CIS can be recouped very quickly. Also, this implies that the direct benefits from CIS are high.

2. Social Impact

The project created impact at three levels; community, organization (IA) and households' level. The positive impact at the community level included increased access to resources like the construction of water bridges out of collected service fees and external sources for microfinancing,

At the organizations' level, the IA's generally learned to cope up with maintenance problems especially when their livelihood security was threatened with inadequate irrigation water. These enhanced the cooperation among farmers and ness in others, leadership development, market integration among vegetable growers, and more cohesive relationship of the IAs and the LGUs.

C. STRATEGIES OF PARTICIPATORY DEVELOPMENT AMONG CIS

Participatory development in the communities was legally established through Republic Act 7160 signed in 1992. The law provides decentralized decision making at the lowest local government unit – the barangay or village level. Projects were established based on needs of the community. Through the representation of their officials, the community decides on what type of projects will be established. Each barangay is granted Internal Revenue Allocation (IRA) from the national government based on their population, land area and revenue collections. The IRA is however utilized primarily for infrastructure projects like roads, bridges and buildings. With the assistance of the CASCADE project, the covered communities were able to access other resources for development while making use of indigenous knowledge.

In the implementation of the Communal Irrigation Projects, the participatory development strategies employed are as follows;

1. Involvement of the local government officials from the provincial to the community in the planning, and operation of the projects. This strategy gave the local government a first hand look on the economic and environmental conditions in the project sites;
2. Facilitating the integration of various government services and programs into the community;
3. Formulation of "Rules-in-Use" by the members of the IAs;
4. "Counterparting Scheme" for various stakeholders (i.e. IAs contributing labor in the construction and operation and maintenance of the irrigation projects);
5. Trainings on capability building not only on maintenance and operation of the projects, but also negotiations, decision-making, resource generation and communications strategies.

D. EVIDENCES OF PARTICIPATION

1. Contribution to the Construction of the CIS.

Participation is in itself shown primarily in the construction of the facilities. On the average, the beneficiaries contributed more than 22 % of the total project cost in the form of labor and food.

2. Indicative Increase in Organizational Control

The level of organizational control increased in most of the CIS. Maintenance and operation has become easier to implement in IAs with high to medium level of organizational control. **Table 3** shows the ratings on level of performance on organizational control and the main reasons for the performance ratings.

3. Development of New Leaders

In some IA's, new sets of leaders were regularly elected to manage the projects. This is one of the off-shoots of participatory approach.

Table 3. Levels of organizational control exercised by the various CIS

Name of CIS	Level of Organizational Control	Reasons for the Performance
Dapong	High	• Vigilant leadership • Proper resource sharing • Involvement of women
Manamtam	High	• Effective leadership • Group cohesion
Decabacan	High	• Committed leaders • Visible projects
Batu	High	• Good leaders • Presence of NGO's
Capintalan	Medium	• Infrequent meetings • Little service fee collection
Yaway	Medium	• High dependence to project
Dutac	Medium	• Weak organizational structure
Abogan	Medium	• Few committed leaders
Balete Bagtang	Medium	• Infrequent meetings • Little service fee collection
Batawil Sabtang	Medium	• Organizational problems
Dilan	Medium	• Infrequent meetings • Little service fee collection
Libawan	Medium	• Low level of organiza • tional discipline
Botilao	Low	• Crisis-driven cooperation • Farms are not ideal
Proper Pudi	Low	• No collection of service fees • Highly silted areas
Lower Sisi	Low	• Ineffective leadership • No elections or meetings
Ammococan	Low	• Low level of interest to the project

4. Relationship of Participation to the Sustainability of the CIS**.**

Table 4 presents a result matrix of Pearson R correlation technique to show relationship between participatory measures to various indicators of sustainability of the CIS. It can be noted that the CIS and the IA has a good chance to continue sustainably even after the project ends as it indicated a significant relationship. The main reason is because the project would ensure the availability of water for irrigation to the farms hence the security of food for the family; and supported by higher income due to increased in productivity. The CIS project increased cropping intensity by more than 20% to as high as 100% after the establishment of the project.

The matrix revealed that as long as irrigation water secures the food and livelihood of the members, the farmers will continue to support the project. Given this nature of Livelihood-CIS relationship, the importance of the CIS will subsequently enforce agreed relationships and will shape the behavior of the farmers-members towards the power nexus of the IA.

Table 4. Correlation Matrix of Participation to Other Variables

Variables		Increase in Productivity	Sustainability	Participation	Household Size
Increase in Productivity	Pearson Correlation	1	0.496	0.624 (**)	0.716 (**)
	Sig. (2-tailed)	.	0.051	0.010	0.002
	N	*16*	*16*	*16*	*16*
Sustainability	Pearson Correlation	0.496	1	0.709 (**)	0.397
	Sig. (2-tailed)	0.051	.	0.002	0.128
	N	16	16	16	16
Participation	Pearson Correlation	0.624 (**)	0.709 (**)	1	0.576 (*)
	Sig. (2-tailed)	0.010	0.002	.	0.020
	N	*16*	*16*	*16*	*16*
Household Size	Pearson Correlation	0.716 (**)	0.397	0.576 (*)	1
	Sig. (2-tailed)	0.002	0.128	0.020	.
	N	*16*	*16*	*16*	*16*

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

SUMMARY AND CONCLUSION

1. ECONOMIC AND SOCIAL IMPACT

Important results of the study show that most of the economic impact was due to increases in productivity and cropping intensity. Only one CIS had an increase in area served. Across all crops, average productivity per hectare was highest in vegetable producing CIS. Considering the total construction cost as the initial investment of the various CIS and the increases in the value of benefits due to increases in productivity, cropping intensity, and area as the project benefits, the payback period computed ranged from 0.05 year to 1.99 years. This payback period for investment projects is quite fast. This result implies that the investment cost in these CIS can be recouped very quickly. Also, this implies that the direct benefits from CIS are high.

The project has also created social impact at three levels; community, organization (IA) and household's level. The positive impact at the community level included increased access to resources like the construction of water bridges out of collected service fees and external sources for micro-financing,

At the organizations' level, the IAs generally learned to cope up with maintenance problems especially when their livelihood security is being threatened due to inadequate irrigation water. These factors will enhanced the cooperation and cohesiveness among farmers, promotes leadership development and mutual existence of the IAs and the LGUs.

2. CHARACTERISTICS OF A SUSTAINABLE AND STABLE IRRIGATORS ASSOCIATIONS.

Several characteristics of the Irrigators Association were found to be good measure for their long term sustainability as follows:

1. The members are involved in the planning, operation and maintenance of the irrigation systems.
2. Support Services were broadened and integrated into the project operations.
3. Rules formulated were tied up with water distribution criteria.
4. The members and young leaders are mentored on how to make rational decisions

3. PROSPECTS FOR REGIONAL EXCHANGE OF INFORMATION ON PARTICIPATORY MEASURES

The study has generated a wealth of information on the impact of participatory measures in irrigation management in the community-based projects of upland and mountain environments. A full documentation of the experiences are very good case studies for dissemination in regional forum and publication outfits. Other countries

working on the similar environment and context can benefit on the strategies of participatory process employed in this undertaking.

Likewise, a collaborative research and development work and continuing exchange of information on the regional and international scale is worth pursuing.

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Figure 1. Project Location

Figure 2. A view of a Communal Irrigation System for rice and vegetable farms