Soil Conservation in the Philippine Uplands: Experiences from Eight Upland Projects

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Abstract: Soil erosion in the Philippine uplands is widely regarded as the country's most serious environmental problem which affect about 63—76 percent of the country's total land area (Paningbatan 1990).

This paper summarizes the experiences gained from eight upland development projects regarding promotion and adoption of recommended soil conservation practices at these study sites. The paper aims to analyze the major factors which affected technology adoption and the consequences of these technologies on the farming system. Policy implications and recommendations were drawn based from the above analysis.

This study covered eight (8) upland sites distributed throughout the major islands in the Philippine archipelago. Three of the project sites were implemented by non-government organizations while the other five were government-initiated projects. Formal household surveys were conducted in the first five sites; case study analysis was done in the next two; while a reconnaissance survey was adopted in the eighth study site.

In the final analysis, the study concluded that the diffusion of erosion control measures on the farm level has been limited in most upland development projects. Adoption usually peaks during project implementation and rapidly declines after its termination. Extent of adoption was usually limited within the project area with little evidence of spontaneity. Successful and sustained adoption of erosion control technologies has occurred where farmers are assured of the short-term economic returns thereby compensating for labor costs and loss of production area and where farmers clearly understand the basic concepts and principles of the technologies.

In areas where adoption has occurred, erosion control technologies were significantly modified by farmers to suit specific biophysical and socioeconomic circumstance and farming systems. Hence, farmers' understanding of the purpose and the basic concept of the soil conservation farming technologies should be promoted to ensure that farmers' adaptations do not nullify the contribution of technology to resource conservation.

Keywords: erosion control, soil conservation, uplands, Philippines

1 Introduction

Soil erosion in the Philippine uplands is widely regarded as the country's most serious environmental problem which affect about 63—76 percent of the country's total land area (Paningbatan 1990). The Environmental Management Bureau (1994 as cited from Miran 1998) reports that about 8.25 million hectares of cultivable lands in the country were considered severely eroded. In this regard, formulation and implementation of upland development projects have been seriously undertaken by government, non-government organizations and other concerned for more than two decades now. All this projects have/had significant component to promote farming technologies that minimize the occurrence of soil erosion on sloping land (e.g., Sloping Agricultural Land Technology). A number of government and NGO projects undertaken were likewise aimed at extending soil erosion control technologies to upland farming communities. Despite these serious efforts, it is still widely felt that the adoption of such technologies has been minimal and that the problem of soil erosion remains serious.

The Southeast Asian Regional Center for Graduate Study and Research in Agriculture, headquartered at Los Banos, Philippines, in collaboration with the University of Queensland in Brisbane, Australia conducted both socioeconomic case studies of eight locations where farming had been promoted and (at least for a time) adopted (Figure 1). Upland household respondents were categorized into adopters, non-adopters and control groups to facilitate comparative analysis. While the soil erosion control technologies being promoted were extensively adopted in some sites, it did not diffuse well in other survey areas. We now arrive at the question “What were the major factors affecting such diffusion, and the consequences of the technologies being promoted?”. Answers to this question are believed to help in the formulation of more appropriate policies for the development of communities inhabiting the fragile upland ecosystems.

This paper summarizes the experiences gained from eight upland development projects focusing on the promotion and adoption of recommended soil conservation practices at these study sites (Table 1). The paper attempts to analyze the major factors which affected technology adoption and the consequences of these technologies on the farming system. Policy implications and recommendations were drawn based from the above analysis.

Table 1 Upland study sites, projects and main erosion control technologies promoted

Village	Municipality, Province	Project/Organization	Main Technologies	Project Status
1. Tabayag, Argao Cebu	Argao, Cebu	Soil and Water Conservation Project,Mag-uugmad Foundation, Inc. (MFI)	Bench terraces, rock walls, contour hedgerows	Phasing out
2. Pananag, Bansalan, Davao del Sur	Bansalan, Davao del Sur	Mindanao Baptist Rural Life Centre (MBRLC)	Contour hedgerows (Sloping Agricultural Land Technology (SALT))	Completed
3. Managok	Malaybalay, Bukidnon	MUSUAN Project, Central Mindanao University	Contour hedgerows	Completed
4. Salogon	Brooke’s Point Palawan	Upland Stabilization Program (USP), Department of Environment and Natural Resources (DENR)	Bench terraces, Contour hedgerows	Completed
5. Magdungao	Passi, Iloilo	Magdungao Agroforestry Project (Map), DENR	Contour hedgerows, bunds and canals	Completed
6. Domang	Kasibu, Nueva Vizcaya	Integrated Social Forestry Project (ISFP), DENR	Contour hedgerows	Completed
7. Ned	Lake Sebu, South Cotabato	Ned Agro-industrial Development Program (NAIDP), SEARCA	Contour hedgerows	Completed
8. Guba	Cebu City, Cebu	Mag-uugmad Foundation, Inc. (MFI)	Contour hedgerows, bunds and canals	On-going

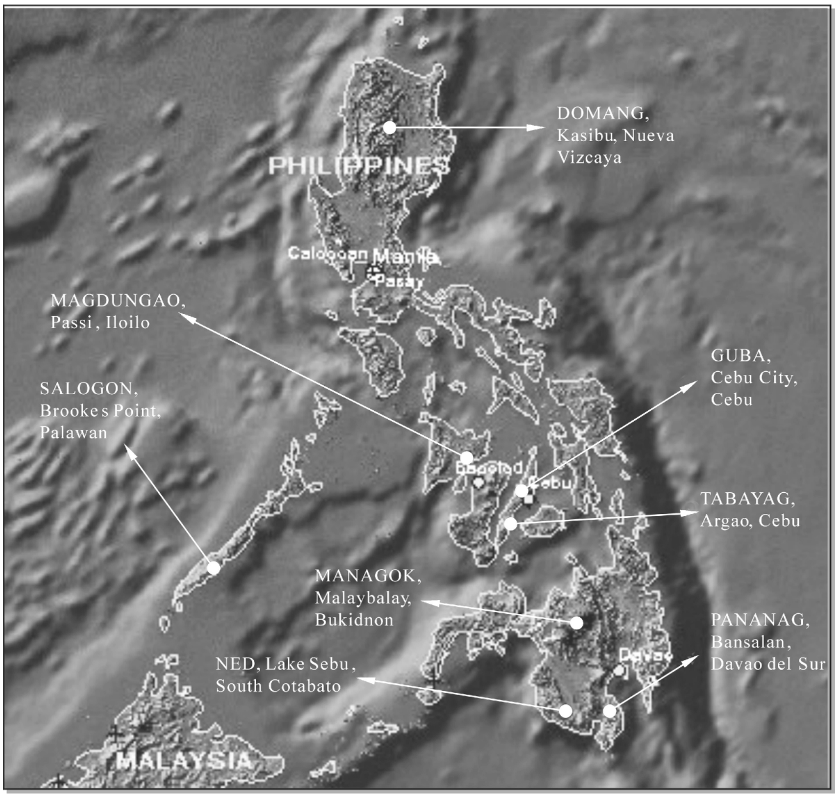

Fig.1 Map of the philippines showing the location of the eight upland project study sites

2 Impacts of technology adoption

2.1 Increase in farm labor requirements

Because of the presence of soil erosion control structures and other recommended activities in the maintenance, farmers who adopted the technologies experienced significant increase in labor requirements. Technology adoption required a high investment of labor which, particularly in the case of hedgerows, created an early-season labor peak. Labor redistribution (from land preparation to hedgerow maintenance) and a net increase in between cropping labor requirements were reported. However, the corresponding increase varied accordingly from site to site depending mainly on the type of soil erosion control technology/technologies adopted.

2.2 Increase in effectiveness of farm inputs

Upland farmers' inputs mainly comprised of fertilizer and seeds. With proper establishment of soil erosion control measures, soils on sloping farms stabilized. As a result, newly applied basal fertilizer and seeds planted were not anymore washed away by rain as compared to without control measure. Because of this, several adopters were encouraged to apply more fertilizer (while some applied less) and plant more seeds. In general, the nutrient cycling aspects of the hedgerow technology were overshadowed buy the used of purchased fertilizer. Other adopters managed to increased yields significantly mainly because they willingly invested in the purchased of improved seed varieties and higher amount of fertilizer. On the other hand, the increase in output was a general effect of the upland development projects, such that non-adopters of the technology in the project village nevertheless produced more food than farmers in neighboring villages mainly due to the increased use of improved farming technologies.

2.3 Increase in cash income?

The effects of technology adoption on cash income of upland farm households were found to be indirect and not significant. This holds true, except in some cases where hedgerows became productive in their own right (i.e., hedgerow plant leaves used as fodder for livestock or harvesting and selling of hedgerow seeds). These gains could have been achieved more efficiently in other ways. Usually, differences in income between adopters and non-adopters were not related to the use of conservation measures but to differences in farm resources and management ability. The main direction of causation was thus in reverse: better-off, more commercial farmers were more likely to adopt conservation measure. As a result, farmers who already acquired sufficient knowledge and resources have the higher tendency to establish the erosion control structures on his farm. The balance of farming activities was changing, but not as a direct consequence of adoption. Some farmers (e.g., Guba and Tabayag) were expanding commercial vegetable production on conservation plots and in some sites hedgerow was tied to intensive goat rearing. While several farmers who remained more under subsistence level opted to continue their conventional farming system. Several studies have shown that farmers' goal to maximize yield and cash income are not necessarily those of the subsistence farmer since he is more likely to be more inclined in improving food security by decreasing the risk of failure (Hudson 1991).

3 Major considerations in adoption

3.1 Adaptation of soil conservation measures

In the eight upland sites, households who adopted the technology usually modified or adapted the soil erosion control technologies according to their particular biophysical and socioeconomic conditions, specifically farming systems. For instance, modification done with contour hedgerows considerably varied in different sites. Examples of adaptations done were: (a) low hedgerow density (i.e., lesser number of plants within the row and wider distance between rows; (b) low trimming frequency (only once a year instead of 3 to 4 times a year); (c) lesser mulching activities (e.g., incidents of crop residues and trimmings burned); (d) use of locally available hedgerow species instead of the introduced or recommended (e.g., hibiscus instead of *Gliricidia*); (e) additional component or other use of hedgerow (e.g., selling of hedgerow seeds, hedgerow branches cut and sold as firewood); (f) change in cropping pattern (from *corn-corn* to *corn-mungbean-rice-vegetable* rotation).

What made upland farmers modify the promoted technologies? Upland farmers are affected by several factors or concerns which include the following: (a) reduced cultivable area; (b) lack of labor for establishment and maintenance; (c) low availability or absence of planting materials; (d) income opportunities from hedgerows; (e) preference to hedgerow characteristics; and (f) suitability to existing farming system. It is in both the biophysical and socioeconomic aspects where technology adoption and adaptation are heavily dependent.

3.2 Sustainability of adoption

The main goal for the establishment of erosion control structures is to sustain the productivity of the upland farms. For this reason, these structures should also be maintained for them to perform their functions better. However, a number of farmers in the study sites were unable to sustain the established structures. Cases of abandonment of soil erosion structures were observed in Salogon, Guba and Magdungao. The major reasons for abandonment include inadequate labor for maintenance, ineffectiveness of the technology, incompatibility with the existing farming system, and out-migration.

The Guba site is characterized by an extensive adoption of contour hedgerows. However, looking closer at several hedgerow plots, some were observed to be poorly maintained. Hedgerow quality decreased, some rows disappeared, hedgerows did not contribute anymore to livestock raising, mulching of cropped alleys, and nutrient cycling in general. Unfavorable climatic condition, such as drought, accounted for some of the losses as did socioeconomic factors, which include uncontrolled grazing of livestock animals on hedgerow plots.

In the case of Salogon, indigenous upland households were used to swidden-type farming system, which involve the practice of burning trees prior to cultivation. With this condition, most of the established *Gliricidia* and *Leucaena* hedgerows were destroyed primarily due to burning.

Considering farmers' concern, their decision to adopt soil erosion technologies was to form terraces on their fields and establishment of flat, cultivable alleys. On the other hand, farmers' failure to maintain their established hedgerows imply that the technology has not been felt to yield sufficient benefits relative to the cost and efforts associated with the establishment and maintenance.

4 Policy implications and recommendations

A. There is a strong need to shift emphasis from focusing mainly on environmental protection to encouraging the care and the sustainable management of land resources for economically productive purposes. This is premised on the belief that soil erosion could be minimize, and prevented through appropriate soil management practices that can achieve on-site production benefits while preserving and increasing soil productivity. Upland development projects should clearly explain the on-site benefits which offer short-term benefits with large increments. According to Hudson (1991), the technology to be promoted must offer an increase of 50—100 percent, since a 10 percent improvement is oftentimes insufficient to convince upland farmers to adopt the new technology. Although this could seem an aggressive improvement, this actually implies that technologies which can achieve greater economic benefits in a shorter period of time are expected to attain better adoption rate in the long-run.

B. Participatory technology development is suggested to be promoted by providing extension and research workers the skills and resources to work with upland farmers in developing more appropriate farm conservation practices that match the local biophysical and socioeconomic conditions of the upland farmers. This would encourage farmer participants to explain their ideas and develop soil erosion technologies suited for their specific conditions without sacrificing the technologies' ability to conserve soil (Garcia *et al.,* 1999). For instance, farmers can actually be encouraged for their purpose by informing them about other plant species which can be used as hedgerows.

C. It is essential to employ people-centered learning process and develop new innovative methods for farmer-to-farmer training and dissemination of information on more adaptable soil conservation technologies. Technology promotion should put highest regard on the human resources development with environmental concern as the second priority. Identification and development of technology adopters who could be capable of becoming farmer instructors themselves are advisable for upland development projects. These adopters have already gained good experiences about the technology and are already convinced about the benefits accompanying technology adoption. Unlike traditional extension methods, the more innovative farmer-to-farmer approach to extension is less bureaucratic, fosters immediate and direct interaction with farmers, and was found to be easily acceptable by peers (Garcia *et al.,* 1999). Farmer-to-farmer approach to extension was employed in Argao and Guba where farmers' experiences and project technical staffs' ideas were combined together to come up with more widespread promotion and adoption of soil erosion control technologies.

D. It is recommended that a major program of local adaptive research and extension in the uplands which better accommodates the range of farmers' goals and circumstances be developed and pursued. A wider range of more profitable and less demanding conservation technologies should be developed for farmers to select from. One important task for this purpose is the more comprehensive reorientation of project implementors and concerned researchers to gain a better understanding of farmers' circumstances through regular farm visits, informal interviews, farmers' meetings and consultations and through the conduct of relevant fora.

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