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Secondary Adoption of Soil Management Practices in Haiti

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Abstract

A secondary adoption study of Soil Conservation (SC) practices, principally rock walls, alley cropping, contour terraces, crop bands, and contour canals was conducted in Haiti during the months of August and September 1998. A total of 101 farm heads of households who had not been included in a recent SC project were interviewed to determine their source of information on the adoption of soil conservation practices. The sample of heads of household included 91 males and 10 females within the ages of 17 to 75 years. It was found that land tenure system affected the adoption of SC practices and soil fertility positively affected the installation of SC practices (p>.05). Most farmers indicated that their information for the adoption of SC practices come from the following: 17.1% from their own experience, 12.0% from other, and 5.7% from friends. Only 1.3% revealed that they obtained the information from the on-going project, while 9.5% said they received it from another contemporary project.

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Introduction

Resources for extending technologies to farmers in Haiti are limited, therefore, organizations that are involved in outreach programs have used various techniques for information diffusion. Included among the methods used for information diffusion are the use of trained farmer leaders, local non-governmental organizations, and local village groups. Even with such methods, the diffusion of information to farmers has been slow. It is believed that farmers often learn from other farmers. Hence, there may be indirect benefits emanating from the project in terms of farmers influencing others. In developing countries where rural communication is limited, and where the elite class communicates using a different language from the masses, informal communication by farmers is the most popular form of information diffusion (Khan and Paracha, 1994). A number of studies on extension communication have shown that informal farmer-to-farmer interaction is still an important process, resulting in effective diffusion of innovation (Rogers, 1983; Antholt, 1991; Alder et al., 1993; Subedi and Garforth,1996). In Thailand, the most frequently cited source of technical information exchange in the villages is local farmers (Reintjes et al, 1992). Farmer-to-farmer diffusion of innovations is important for extension effectiveness.

Among the numerous methods of communicating information to farmers and rural people, the informal network in developing economies remains the most popular due to its peculiar socio-cultural and economic conditions (Khan and Paracha 1994). Interpersonal behavior varies with individuals. The various causes attributed to these individual differences include, among others, the size of land holdings of farmers and their socio-economic and psychological characteristics (Khan and Parcha, 1996). Farmers usually communicate with farmers who share the same problems and situations. In this study we investigated the source of information on soil conservation for farmers who were not participants in the project but had constructed soil conservation barriers. We tried to determine the spread effect of the project through farmer communication and informal networking.

METHODS

We interviewed 101 farm households. The households were within the area of the project implemented by the Pan American Development Foundation (PADF) and Productive Land Use Systems Project (PLUS Project), which was sponsored by the Agency for International Development. We used 3 interviewers and 32 extension agents. The selected farm households were not directly involved with the project, but they demonstrated the interest, ability, and intuition to learn the techniques of soil conservation from others who were directly involved with the PADF/PLUS project. The survey was conducted during August and September of 1998, with 29% and 71% in the months of August and September, respectively. Since a previous survey on the impact of the soil conservation technologies adopted by Haitian farmers on their farm structure was already conducted by the PADF/PLUS project, it was felt that the farmers should be spared another full-blown adoption study.

Once a project was established in a village it was assumed that all villagers participated in the project, and it would have been difficult to receive unbiased responses from individuals interviewed on their sources of information. Hence we interviewed farmers from adjoining villages to determine whether they had been influenced by farmers who had received information on soil conservation practices from PADF/PLUS. We used the Statistical Analytical System (SAS) to analyze the data.

RESULTS

Farmer Characteristics

There were 91 male and 10 female interviewees, within the age range of 17-75 years. Eighty percent of all interviewees were 30-65 years old, while 60% were 35-60 years old (Table 1).

Table 1. Number of farmers in each specified age category, and their corresponding percentages

Age range (years)	No. of farmers in this category	% of Total farmers
17 - 30	15	10
31 - 40	18	18
41 - 50	36	36
51 - 60	19	17
61 - 75	12	10

This level of education was categorized into seven different groups (Table 2). Approximately 54% of all participants either had no formal schooling or had attended infant/preparatory school. Only 5% had attended secondary school. The level of education of individuals had no effect on their awareness of soil conservation (p=0.826). Regardless of their level of education, 98% of all interviewees had heard of soil conservation measures

Table 2. The level of education of participants, their frequencies, and the corresponding percentages of each category to the total number of participants.

Level of Education	No. of participants	% of total farmers
None	22	21.8
Illiterate	23	22.8
Infant	13	12.9
Preparatory	19	18.8
Middle school	8	7.9
Elementary	10	9.9
Secondary	5	5.0

Size and Distribution of Parcels

Households participating in this survey generally owned or operated 1-5 parcels of land (also referred to in this article as a garden-plot). Sixty percent of all households each owned or operated only one plot. The other 40% controlled two to five plots per household. All participants together owned or operated 161 parcels of land, but all were obviously not located in the survey area.

Parcels of land were categorized into three groups (yard, close to home, and far from home), based on the distance between farms or parcels and the participants' homes. In the entire region, the time period between home and farm ranged from zero minutes to two hours. Seventy percent of all parcels could be accessed within 5 minutes. Approximately 25% of all plots were one minute away, and therefore classified as "Yard". An additional 38.5% could be regarded as "Close to Home"

since they were located 2-10 minutes away from home. The other 37% of parcels were considered "Far from Home" since they could be accessed from 20-120 minutes. No time period was recorded for four parcels of land (approximately 4%). A summary is included (Table 3).

Table 3. Classification of participants' fields based on time period from home to plot.

Class of garden-plot	Minutes from home to plot	Frequency	% of total
1. Yard	0	7	7.2
	1	17	17.5
2. Close to home	2.5	21	21.7
	6-10	16	15.5
3. Far from home	11-15	7	6.9
	16-25	8	7.9
	26-45	9	8.9
	46-60	9	8.9
	120	2	2.0

Land Ownership Status

The system of land ownership was classified into six groups, the most common ones being "land purchased" and "inherited" (separated and common). "Land purchased" accounted for 37%, while both "inherited" groups combined accounted for 39% of the total number of land parcels included in the survey (Table 4). The level of education had a significant effect on the system of land ownership (p=0.038*). Approximately 75% of those who purchased or inherited land, or were engaged in joint farming ventures, had some level of formal education.

Table 4. Land ownership status, their frequencies, and corresponding percentages for all fields included in the survey area.

System of land ownership	No. of plots	% of total plots
Purchased land	37	37
Inherited, separated	22	22
Inherited, in common	17	17
Half-lease holder	12	12
Joint farming	8	8
Manager of farm	4	4

**significant at the α=0.01 level of significance*

Table 5. Size distribution of garden plots/ parcels*, and corresponding frequencies and percentages of the total number of plots.

Size of plots of land (ha)	No. of plots	% of total plots
Land than 0.25	37	45.2
0,25 – .50	19	23.2
0,50 - .75	13	15.8
0.75 and greater	13	15.8
Total	82	100

**a garden plot is a parcel of land.*

Field Characteristics

The areas of all fields under survey ranged from 0.02 to 20.0 hectares. he most common parcel size was 0.5 ha, but 52% of all fields were less than 0.25 ha in area. Thirteen percent were 1.00-20.0 ha (Table 5). Parcels were situated on lands with variable slopes (7.0–80°). Fourty percent of all parcels surveyed were established on reasonable slopes of 7-20° or steep slopes of 31-40°. However, 31 plots were located on extreme slopes of 41-80° (Table 6). Soil conservation

measures are definitely required on these hillsides if the lands is to be cultivated productively.

Table 6. Average slopes of land, and the frequencies and percentages of garden plots located on these slopes.

Slope of land (%)	% of total plots
7-10	16
12-20	24
22-30	29
32-40	17
42-50	6
53-60	4
68-80	4

Table 7. Frequency and percentage of parcel positioned as each class of elevation in the survey area.

Elevation range (meters)	Frequency	% of parcels
35-100	6	8.9
150-200	15	22.1
205-300	15	22.0
350-400	3	4.5
450=500	7	10.2
>500	22	32.4

Elevation

Of the 68 fields for which elevations were estimated, 8 were located at elevations of 800 meters above sea-level, and 7 at less than 180 meters. Four parcels each were positioned at elevations of 220 and 475 meters, 1 at 2210 meters, and all others were dispersed within the range of 35-840 meters (Table 7).

Soil Classification

Twenty-two different soil categories were identified for the 90 parcels. The soils of 26 parcels (the maximum number of plots with any one soil category in this survey) were identified as "poor, dry" while 12 were identified as "black/brown". Soil categories for all plots are summarized in Table 8. The soil categories of the other garden plots were each identified as chalk, coarse, rock, red, poor sandy/dry, wet, cool rich, mixed, white, heavy, basalt, and light. Each of these categories was identified in one garden plot only (each representing 1.1% of the total number of gardens).

Table 8. Number of plots and their corresponding soil categories as recorded in the survey area..

Soil category	No. of plots with soil	% of all plots
Poor, dry soil	26	28.9
Black/brown	12	13.3
Heavy soil	8	8.9
Sandy loam	7	7.8
Clay loam/ Sandy soil	6 ea.	13.4
Mud	5	5.6
Rocky soil	4	4.4
Rich soil	3	3.3

Two specific types of parent material were recorded for the soils in plots. Others not readily identifiable were classified as "other". Approximately 60% of all plots were established on soils overlying chalk/limestone parent material, 36% on basalt, and 4% on "other" parent material.

Soil fertility status was grouped into five classes ranging from "poor" to "fertile". A combined 77% of all plots contained moderate

to fairly fertile soil, which is a great advantage considering the very steep nature of the slopes on which these plots were established.

Evidence of Erosion

The varying degrees of erosion of soils on the parcels surveyed were grouped into five categories, with 58% of all parcels exhibiting no/or slight erosion, and the remaining 42% experiencing moderate to fairly extensive erosion (Table 9). Given that nearly half of all parcels experienced some degree of soil erosion exemplifies the need for soil conservation control measures. Even though no erosion was reported for 58% of the plots, it does not mean that erosion was not occurring.

Table 9. Degree of erosion of soils of the surveyed plots, frequency, and percentage of total number of plots.

Degree of erosion	No. of garden soil	% of total plots
None	23	23
Slight	35	35
Moderate	31	31
A lot	11	11

The degree of erosion significantly influenced the choice of soil conservation structures installed in field plots (p=0.001). Such structures could be used as corrective or prophylactic measures. Statistical evidence indicated that 11 rockwalls, 4 hedgerows, and 1 gully plug were installed on land with no evidence of soil erosion. On land exhibiting slight soil erosion, 14 rockwalls, 15 hedgerows, 2 gully plugs, and 3 crop bands were constructed. Twenty-one rockwalls, 7 hedgerows, 2 gully plugs, and 1 crop band were located on land with moderate soil erosion. Nine rockwalls, and one each of hedgerow and gully plug were installed on highly eroded soil. It would seem obvious that more structures were needed on highly eroded soil, and fewer on less eroded land. Many other factors were probably considered in the decision-making process.

SOIL CONSERVATION

Awareness of Soil Conservation Techniques

The survey indicated that, of the 101 participants interviewed, 99 (98%) had knowledge of soil conservation techniques, while 2 had no knowledge of such practices. Those who were exposed to soil conservation cited several benefits derived from the application of these techniques (Table 10). Regardless of their level of education, participants agreed on the same major benefits of soil conservation. The most beneficial aspects of soil conservation were cited as "structures hold the soil together" and "nutrients retained in the soil" by 54% of the farmers interviewed. Sixty-seven percent of the sample of secondary adopters had no negative comments about the soil conservation. In general, the disadvantages expressed by individuals were independent of their level of education (p=0.313).

Disadvantages of soil conservation cited to a lesser extent by participants included: "rockwalls break", and "activities are dangerous", cited on two field plots each, and "wild leucaena spoils the ground", "I do not like hedgerows" and "hedgerows harbor pests" on one parcel each.

Table 10. Advantages of soil conservation experienced by farmers in the survey area, and the frequencies and corresponding percentages of such benefits.

Benefits of soil conservation	No. of plots involved	% of all plots
Structure hold soil together	77	36.0
Soil nutrients retained	38	18.0
Erosion prevented	36	17.0
Good yields obtained	31	14.3
Soil productivity increased	21	10.0
Retained soil moisture	5	2.0
Reforestation promoted	3	1.4
Better crop growth	2	1.0
More tree planted	1	0.5

Soil Conservation Structures Installed

The rockwall was the most common structure adopted by survey participants (Table 11). A total of 10 parcels utilized a combination of two structures for protecting the soil - 5 plots each had a rockwall-gully plug combination, 3 each had a hedgerow plus crop band combo, 1 a (rockwall plus gully plug, and 1 a gully plug plus hedgerow. This combination of principles may be more effective in controlling soil erosion.

INFORMATION SOURCE AND TRAINING

Soil Conservation and Grafting

The surveyed individuals who have had prior exposure to soil conservation techniques received their information for construction of SC measures from several resources. Survey results indicated that a large number of them (approximately 58%) stated that they were self-taught because they took the initiative to adop t what was beneficial to them. Others received their training as indicated in Table 11. Twelve percent copied from others, 5.7% received information from friends, 4.4% from agents, 3.8% from trainers, 1.3% from PADF/PLUS, 1.3% from parents, and 0.6% from a brother. Therefore, a total of 28.7% of all secondary adopters can be said to have received information directly or indirectly from

Table 11. Soil conservation structures built by secondary adopters, frequencies, and corresponding percentages of the total number of parcels with each structure.

Structure	No. of plots with structure	% of total no. of plots
Misek (rockwall)	23	53.4
Ramp vivan (hedgerow)	35	26.2
Baraj (gully plug)	13	12.6
Bann manje (crop band)	8	7.8
Total no. of structures for all 101 land parcels	103	

Table 12. Information source for building rockwalls.

Training resource	No. of plots involved	% of all parcels
Self	64	40.6
Own experience	27	17.7
Copied from others	19	12.0
World Food Program	15	9.5
Friends	9	5.7
Copied from agents	7	4.4
Copied from trainer of farmers	6	3.8
God	3	1.9
Parents	2	1.3
Christian Development Community	2	1.3
PAADF	2	1.3
Brother	1	0.6
Paid to have it done	1	0.6

PADF/PLUS, and may perceive this project as beneficial to themselves as well as to the communities at large.

Within the group, 97 of the 101 farmers had never practiced soil conservation with another project.

DISCUSSION

Age, Gender, and Education

The level of education, gender, and age of participants were all independent of their awareness of soil conservation (p=0.893, 0.297, and 0.912, respectively). Regardless of their level of education, from no formal education to the secondary level, most of them were aware, to some extent, of soil conservation and its principles and practices. The 46-, 50-, and 60-year-old secondary adopters were the most prominent soil conservation practitioners, even though individuals of all ages were involved. The very young and the very old participated to a lesser extent. Male participation was10 times greater than that of females, both sexes demonstrated the same level of awareness of soil conservation.

Location

Statistical analysis for secondary adopters indicated that the location of field plots in terms of elevation or slope orientation did not in any way affect the farmers' perceptions of soil conservation (p=0.183). Wherever field plots were located throughout the surveyed area, 98% of all owners or operators had some knowledge about soil conservation practices. To some extent, the more widespread the fields, the greater the number of individuals who seemed to be aware of soil conservation (r=0.134).

System of Land Ownership

The system of land ownership had a significant effect on whether or not soil conservation structures were installed in the fields ($p<0.05$). On purchased land, where the farmers experienced a higher level of security, 37 structures/soil conservation techniques were in place, including 21 rockwalls and 10 hedgerows. On inherited land that has been divided among heirs, there were 13 rockwalls and 6 hedgerows, as opposed to 6 rockwalls and 6 hedgerows on inherited, non-separated land. On land that was cultivated under a "joint farming" or "farm manager" agreement, the installation of such techniques decreased significantly to 2-5 rockwalls and 1 hedgerow (r=-0.057).

Soil Fertility Status

The soil fertility status of 89 field plots ranged from fertile to fairly fertile to moderate, and all but two farmers had some knowledge of soil conservation techniques. Statistics also showed that soil fertility positively influenced the desire to install soil conservation. This is expected since sustained soil fertility may result in increased crop yields and increased land value and, hence, better cash returns.

Benefits and Disadvantages of Soil Conservation

In general, the benefits derived from soil conservation practices had no effect on the level of perception of soil conservation (p=0.336). This may be due to a lack of information to and/or comprehension by participants of the long-term benefits of soil

conservation. However, there were a few among them who seemed to grasp the concepts of soil conservation and, for reasons known only to them, preferred not to take advantage of such benefits (r=-0.097). One reason could be the significant time, labor, and other resources required for the installation and maintenance of these structures. In addition, some fields are positioned on very steep slopes (up to 80°), and some may have considered it a wise choice to leave them as they are, since disturbance of the soil could inevitably lead to further erosion.

Awareness of PADF/PLUS

The awareness of PADF/PLUS had a positive and very significant effect (p=0.007) on the awareness of soil conservation practices. Because of the existence and activities of PADF/PLUS, approximately 27% more individuals are at present aware of the need to practice soil conservation, especially on steep slopes. Secondary adopters have emerged because PADF/PLUS has emphasized and demonstrated the benefits that can be derived from controlling soil loss.

Help received from the project PADF/PLUS was negatively correlated with cited disadvantages of PADF/PLUS (r=0.739).This may suggest that less help from the project may be available to participants in difficult and impossible situations (e.g. on slopes that are too steep for the cultivation of crops). In this way, development projects may be able to invest resources for the best possible returns. On the other hand, regulated amounts of cash and food incentives were provided to individuals with limited disadvantages that could be overcome (r=0.154).

Source of Information

A large portion of the farmers stated that they were self-inspired to build the soil conservation structure. From this statement one could surmise that the individual could have been inspired by the presence of the project, or previous project, but failed to give credence to the project (PADF/PLUS), or the farmers from whom he/she copied the idea (if then it is copied from the project, a large percent of farmers who indicated that the idea came from their inspiration could have been credited to the project). The percentage of farmers who received inspiration from their family members, friends, and extension agents may also be credited to the project since these family members can be considered agents of change, and they, too, may have been receiving the information from the project. This interpersonal form of communication can be considered a weak link, but is common and effective in transmitting extension information (Hossain et al., 1993). Farmers tend to receive information from others who are in the same situation as they (Khan and Paracha, 1994). A significant number of farmers received information from past projects and though the information was latent, they may have been spurred to act at this given time from the project; thus, the project can be responsible in some way for the spread of the information.

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