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SOCIO-ECONOMIC STATUS AND LAND TENURE EFFECTS ON IRRIGATION SYSTEM PARTICIPATION IN HAITI

A report submitted to USAID/Haiti

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ABSTRACT

Irrigation agriculture is a primary means of socio-economic development in Third World countries. While institutional, ecological, and technological factors operate to enhance or detract from the success of such irrigation projects, the link between the types of land tenure arrangements governing plots within the irrigation system area and the ability of the farmers to successfully organize the maintenance and effective use of the system is less clear. This aspect of irrigation system development is a crucial one with regards to long-term operation and success.

Given the complexity of tenure arrangements of plots in rural Haiti, an examination of the influence of land tenure is important to discern and anticipate peasant farmer action and involvement with the irrigation system. The results indicate that most of the farmers have approximately the same socioeconomic status, most are owners of their own land, and that most farmers have favorable attitudes towards irrigation system development. There is evidence however that owners of purchased land and those who rent land have higher socio-economic status. While having more fundamental interests in participating in organizational activities, they may have more negative attitudes towards irrigation development.

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I. Introduction

Irrigation system development is not generally thought to be within the domain of the social sciences. Calculations of crop water requirements, analyses of soil type and content, the identification of water source availability, the technical aspects of water transmission, the design of infrastructure, etc., seem to have little to do with social theory and its applications. Upon closer analysis, however, it becomes apparent that the agricultural, technical, and engineering aspects of irrigation development are merely the fixed, static components of a very dynamic process — that of controlling a much needed natural resource and channeling that resource to meet the nutritional needs of a human population. At the very heart of this process is the very dynamic component of irrigation development — the farmers and the organizations who continually keep this process alive.

Much like the "miracle seeds" of the Green Revolution, the development of irrigation agriculture has had an enormous impact on agricultural productivity. But no matter how extraordinary technological advances are made in increasing agricultural productivity, very little is achieved unless farmers can actively and effectively use the product. In irrigation development, the concern is the efficient use and maintenance of the irrigation system.

In order for the physical elements of an irrigation system to function effectively, that is, the main water gate, watercourse

canals, lateral turnouts, water measuring devices, water distribution devices, etc., operational human forces must also be at work — the ditch rider, the gate tender, the water tax collector, etc. Just as there is a hierarchy of function from head to tail of an irrigation system, there is a hierarchy of function in the organization of the irrigation system.

The Dubreuil irrigation system draws water from the Acul River in the southern region of Haiti. The original system dates from the mid-18th century during the French colonial period. Since the late 1950's, the physical reconstruction, rehabilitation and extension of the system has been initiated by several national and international organizations. 300 hectares of the total planned 1,100 hectares have been completed with installation of secondary canals and in some cases tertiary canals. The completed Phase I of the project includes 9 secondary canals. The objective is to provide rural farmers with an adequate and regular supply of water to irrigate their plots in order to increase the agricultural productivity of the area.

The most recent attempts at organizing water user associations have revolved around the physical delineations of the system, with one water user group per secondary canal. These water user groups are destined to assume responsibilities for maintenance and upkeep of the secondary and tertiary canals. Two employees, the gatekeeper and syndic, regulate general irrigation activity. The irrigation system is planned and designed to operate with as much local control of

day-to-day operations as possible.

The dilemma which has presented itself is that there is little evidence that these water user groups are actively functioning as organized groups of farmers with the common goal of exploiting the water resources. In addition to institutional and technical impediments to successful project implementation on the part of government and donor agencies, the ability of these farmers to successfully manage and operate the irrigation system is of great concern.

In this study, it is hypothesized that participation by local farmers in the organization, maintenance, and use of an irrigation system is in part determined by the tenure status of the farmer. Farmers of different tenure classifications can be expected to respond differently when presented with choices of action with regards to the irrigation system. Tenure status is itself a manifestation of the social structure present in the society and reflects differential resource access and ownership and differential farmer response to irrigation. In order to understand, and subsequently attempt to modify participation of farmers in the irrigation system, it is necessary to identify the linkages between resource distribution, land tenure, and irrigation participation.

First, rural farmers have differential access to social and economic resources. This is demonstrated with the use of a socio-economic cross-cultural level of living scale, a constructed

socioeconomic status index, and the identification of use of credit and chemical inputs for agriculture. Secondly, land tenure patterns in Dubreuil are outlined, including land ownership, parcel size, and whether a source of canal irrigation is present which would increase the value of the land. Thirdly, it is proposed that access to or participation in irrigation is in reality a form of access to an unevenly distributed economic resource, and as such will reflect differential participation by farmers in the irrigation system. Farmers will have different levels of involvement depending on their perceptions of individual benefit and return on their investments. The nature of this participation is discussed in terms of organizational involvement and attitudes toward farmer participation irrigation as well as perceptions of the irrigation system itself.

Assuming then that both access to land and access to irrigation reflect a greater ability on the part of a farmer to exploit these resources, the issues involved in land tenure and irrigation can only be properly understood in the context of the social structure governing differential access to resources. While it is demonstrated that there is unequal distribution of resources, the dynamic nature of the process which generates an unequal social structure remains obscure.

II. Methodology

Primary data was collected from June to August, 1984, and included:

1. Unstructured interviews with agronomists, engineers, and local extension agents involved with the Dubreuil irrigation project.
2. Structured open-ended interviews with the presidents of the water user associations.
3. Structured closed-ended interviews with farmers designated to have access to the irrigation system within the geographical area of the already-completed Phase I of the project.

The first and second data sources cited above were used to discern the organizational and institutional nature of the Dubreuil project, and in particular the structure of the water user groups and how they were formed. While there were nine water user associations, only eight had elected presidents, therefore eight interviews were conducted.

The third source of data is a questionnaire survey administered to a random sampling of households located in the geographical vicinity of the completed Phase I of the irrigation system and technically designed to draw water from the system. The random sampling of the water user population over the 9 laterals of phase-I allowed for structured interviews with 100 individuals.

The questionnaire was pretested with selected members of the community, non-randomly sampled in order to provide a gamut of individuals with variations in the parameters of interest, namely 1) previous versus recent access to irrigation, 2) large versus small land ownership, 3) high versus low commercial activity, and 4) high versus low participation in the water user associations. These were to have served as case studies representative of the entire population. It was discovered, however, that the individuals chosen were not representative of the population, and actually were friends of the local government extension agents through whom contact was made. This hampered our ability to use them as case studies, but nevertheless allowed for revising and restructuring of the questionnaire instrument.

The sampling frame used was a complete census of the land parcels within the Phase I completed irrigation project area. This was executed in 1982 by the water application engineer associated with the project. Parcels were mapped in relation to the nine secondary canals of the system, numbered, and farmers working the parcels were identified. Parcels were randomly numbered and sampled using random sampling procedures without replacement.

100 interviews were conducted by four upperclass students from the School of Agriculture, University of the State — Haiti in Port-au-Prince. There were 84 male and 16 female respondents in ages ranging from 27 to 90, with 71 percent between 35 and 75 years old.

The mean age of respondents is 55.

Evaluation of the data

1. Sampling frame

The technical nature of irrigation system design necessitates accurate knowledge of land characteristics, slopes, land levels, drainage areas, etc. The planning of canal location also requires a determination of parcel postions with respect to different ownership, in order to avoid excessive restructuring of local land boundaries. The sampling frame used was the result of the land survey executed by the water application engineer, who accomplished this through the use of aerial photo maps as well as on the ground plot-by-plot layout. This was done in 1982. While there may have been several changes in this layout by 1984, the use of the 1982 survey for sampling frame purposes was justified by acknowledging that while the land market in rural Haiti tends to be active, it also tends to be confined to local peasants (Murray, 1978a). Therefore while specific parcels sampled may have changed hands, the owners and farmers remained the same, and those interviewed are representative of the Dubreuil irrigation farmer population. The only other problem which was posed was the inadequate documentation of parcels which are located along the older canals of the system, as opposed to the more recently rennovated canals. This was avoided through random sampling from a list of water users within that particular area.

2. Questionnaire design

The questionnaire was constructed and administered in Creole. After pretesting, revisions were made in the phrasing and structure of question items. Three points need to be mentioned. First, the questionnaire was excessively long, which may have had an effect on the irrigation system responses which were last in the interview schedule. Second, there was some difficulty in determining precise land tenure modes, given the intricate detail required to obtain precise information. Murray advocates the use of a "branching yes/no format, in which the farmer is asked first if he is renting or sharecropping. If so, the appropriate follow up questions are asked; if no the questioning branches to the appropriate ownership questions." (Murray, 1978b) Even with the use of such a procedure, however, it is apparent that the eliciting of land tenure responses needs to be systematized in order to assure accurate information as well as consistent data collection techniques. Third, the closed ended nature of the questionnaire did not permit elaboration by respondents upon subjects which may have provided useful insight. This most likely is true for responses about the irrigation system.

In general, however, the questionnaire was evaluated as being well-constructed, and allowed for accurate and consistent responses.

3. Data collection methods

The interviewers, four well-qualified upperclass students at the School of Agriculture, University of the State-Haiti, were well

trained in data collection techniques, all of them having had a substantial amount of experience in rural areas of Haiti. This insured the high quality of the data.

III. Socio-Economic Status

Fundamental to the understanding of rural society, and in this particular case Dubreuil, is the nature of variation in resource ownership and access. Of primary concern is the question of distribution of resources, and with reference to an irrigation development project, do benefits accrue to the entire community or are resources monopolized by particular segments or individuals within the community? Conversely, does hierarchical access and ownership of resources determine the levels at which farmers will take action in order to ensure greater individual access to resources, and collectively maintain differential resource distribution? Furthermore, differential ownership and access to resources implies unequal development, as well as creating impediments to economic growth. In Dubreuil, it must first be determined whether such differential access does exist, and under what forms.

While differences among the urban population in Haiti have been explained with regards to political phenomena, for example the 1946 movement, the Duvalier ascent to the presidency in 1959, and migratory movements (Wingfield and Parenton, 1965, Bourguignon, 1952, Casimir, 1965, and Comhaire-Sylvain, 1959), the factors relating to stratification within the Haitian peasantry have to a large extent been ignored. Differentiation among the peasantry was made only with respect to those who own greater amounts of land, the "gros

habitants", and portrayed in 1965 as:

traditional bourgeoisie			2%
emerging middle class			4%
lower class			94%
urban proletariat		(6%)	
peasantry		(88%)	
gros habitants	(5%)		
habitants	(83%)		

(Wingfield and Parenton, 1965)

The peasantry is divided between those who exert some political influence in the rural areas at the local level, largely as a result of their larger landownings, the "gros habitants", and those who have the least landownings and the lowest standard of living, the "habitants", which comprised 83% of the population.

Casimir finds that small subsistence farmers on average do not own more than 5 karos of land (1 karo=1.29 hectares), and incomes are difficult to measure because of other unreported income producing activities. He also states that the upper rural social class is also the most highly mobile with the total Haitian stratification system. Using the 1950 census to distinguish between the landless, paid labourers, those who employ labor, independent farmers, agricultural businessmen, and intermediaries. Casimir presents a three-class rural society, from lower to upper strata: 1) the landless, 2) the small subsistence farmer and semi-skilled labourers, and 3) larger landowners (gros habitants) and intermediaries. Zuvekas (1978) has

rejected this interpretation arguing that the 1950 census does not provide accurate data on landless labour, and in reality that there are no estimates available whatsoever on landless labor.

It is apparent that differentiation among rural Haitian peasants is obscure, and the theoretical framework for the analysis of social structure has not been clearly defined nor operationalized. Therefore, some measure of socio-economic status is needed as a functional gauge to indicate variations in access to resources. This is especially important given the extreme difficulty in measuring income and wealth of rural people.

In attempting to discern variations in socio-economic status among the Dubreuil farmers, several indicators were used, including Level of Living, Commercial Activity, Livestock Wealth, Access to Credit, Use of Chemical Inputs, Access to Equipment, and Overall Socio-Economic Assessment.

Two level of living scales were initially used to code level of living items: a cross-cultural fourteen item level of living scale which was found valid for use in Puerto Rico and the Dominican Republic (Belcher, 1972), and an eight item level of living scale modified for use in rural Brazil (Saraiva, 1969). Eighteen items from the Saraiva and Belcher scales were used plus one item (grain dryer) determined to be of importance in rural Haiti were initially used. Eight items were elimited for no variance with any one item response greater than 85% and/or for missing data greater than 10%. Three

scale items, source of drinking water, means of transportation, and the number of chairs in the living room were removed for reasons of lack of substantive meaning. The following eight items were used to construct the scale:

1. Exterior wall construction
2. Construction of floor
3. Construction of roof
4. Total number of rooms
5. Grain dryer
6. Cooking equipment
7. Lighting facilities
8. Radio

The frequency distribution and means of the level of living scale items are found below:

Level of living item	Mean	Final Code	N/%
Exterior wall construction	1.75	0 straw, none	0
		1 dirt/wood strips	30
		2 masonry	64
		3 brick/cement	5
		9 missing	1
Construction of floor	1.93	1 dirt	12
		2 cement	82
		3 wood	1
		4 tile/cerramic	2
		9 missing	3
Construction of roof	2.40	1 none, leaves, straw	1
		2 thatch	57
		3 sheet metal	40
		4 cement	0
		9 missing	2

Level of living item	Mean	Final Code	N/%
Total number of rooms	3.82	2	9
		3	45
		4	21
		5	11
		6	8
		7	3
		8	1
		9	1
		99 missing	1
Grain dryer	.60	0 no	40
		1 yes	59
		9 missing	1
Cooking fuel	1.58	1 wood	44
		2 charcoal	55
		3 kerosene/oil	0
		4 gas/electricity	1
		9 missing	0
Lighting	1.86	1 local lamp	19
		2 kerosene/glass lamp	76
		3 Coleman/gas lamp	3
		4 electricity	1
		9 missing	1
Radio	.70	0 no	30
		1 yes	69
		9 missing	1

The total scaled values for level of living are the following:

Value	Frequency/Percent
8	2
9	1
10	5
11	5
12	9
13	16
14	15
15	10
16	13
17	6
18	9
19	5
20	1
21	1
22	1
23	0
24	0
25	0
26	0
27	1

Mean = 14.62
Standard Deviation = 3.09

The range in level of living scores is from 8 to 26, with a mean of 14.62 and a standard deviation of 3.09. The correlations between individual scale items and the total scale scores are the following:

	Wall	Floor	Roof	# Rooms	Dryer	Fuel	Light	Radio
Floor	.376							
Roof	.198	.251						
# Rooms	.669	.246	.513					
Dryer	.034	.277	.321	.279				
Fuel	.259	.443	.335	.390	.165			
Light	.222	.318	.333	.264	.154	.489		
Radio	.241	.284	.332	.222	.334	.301	.300	
LevLil	.461	.581	.679	.787	.487	.669	.575	.542

While the scale is not standardized, and very little interpretation is possible in terms of actual scores, the importance lies in the variation in scores. The interpretation of this distribution indicates different levels of consumption and it can be inferred that there is differential access to economic resources, since access to economic resources is a precursor to economic consumption.

Commercial Activity is a variable indicating approximate level of marketing activity. This variable was constructed through first eliciting what items were being marketed, the profit from those items, and the amount of time taken to sell those items. 53% reported no commercial activity, 32% had low commercial activity, for example less than $5.00 per month, 11% had middle level activity from $5.00 - $20.00 per month, and 3% had high commercial activity greater than $20.00 per month. Level of commercial activity had almost no correlation with level of living (.061). Marketing is usually done by women and since most respondents were men, it is probable that commercial activity was underreported.

Livestock Wealth indicates both ownership of animals and the caring of animals for others. 26% reported no livestock, 32% owned livestock worth less than $200 or were caring for other's animals, 28% reported ownership worth between $200 and $700, and 14% reported ownership worth more than $700. The correlation between level of living and livestock is .335. Livestock, in addition to land, is a

major source of wealth for Haitian peasants. Typically in times of need livestock is sold to meet other cash requirements such as a family member being ill or putting a child in school.

Access to Credit was reported by only 13% of the farmers, as either accepting or refusing credit offered to them. 79% reported no credit at all being available. Typically credit as offered through the local government agricultural agency is in the form of seeds, fertilizer or insecticide. This type of credit is probably not represented in these figures. Correlation between access to credit and level of living is .172.

Use of chemical inputs, either fertilizer or insecticides, was reported by 54% of the population, usually bought from the local market or the government agricultural agency. 34% reported no use of fertilizer or insecticide. Correlation between use of chemical inputs and level of living is .368.

Access to equipment indicates access to a plow or tractor. No access or use was reported by 33% of the farmers. 48% borrowed or rented a plow, 2% owned a plow, and 2% reported access to a tractor. Correlation between access to equipment and level of living is .334.

The difficulty in measuring socio-economic status for these farmers is seen in problems posed by abstract interpretations of the level of living scale, and through difficulties in obtaining accurate information on sources of wealth and income. To solve for these difficulties an assessment is made of the individual's socio-economic

status based on level of commercial activity, amount of livestock wealth, amount of land to which the farmer has access, in addition to other income from other occupations. The distribution of socio-economic level is:

low	53%
medium	30%
high	17%

Low socio-economic level indicates little or no land ownership, livestock wealth, commercial activity, and/or other income. The medium category would indicate for example a farmer with 4 or 5 parcels of land and/or livestock worth $200-$700. The high category would indicate for example a farmer with more than 6 or 7 parcels of land amounting to more than 2.5 hectares of land, with livestock worth more than $700 and/or a high level of commercial activity, in addition to other income sources.

This variable is found to be the best indicator of socio-economic status, as indicated in the correlation matrix below.

	LevLil	ComAct	LivWealth	Credit	Chemicals	Equipment
Com Act	.061					
LivWealth	.335	.191				
Credit	.172	.090	.238			
Chemicals	.368	.083	.277	.344		
Equipment	.334	-.006	.112	.396	.557	
SES	.595	.176	.617	.343	.453	.387

Socio-Economic status has higher correlations with the other indicators than does level of living. However, level of living correlates well with SES (.595), indicating that it is also a valid indicator. While the level of living scores demonstrate variation in the rural popuation, it does little to enhance our knowledge of the nature by which differential access to resources takes place. This dimension operates primarily through land access and ownership.

IV. Land Tenure

Land tenure patterns are of a complex nature in rural Haiti. While several classifications of tenure modes are available (Larose, cited in Lauwerysen, 1983, Groupe de Recherche Pour le Developpement 1979) the most comprehensive work in this area has been done by Murray, who has examined land tenure patterns in particular as they relate to the implementation of erosion control techniques by peasant farmers (Murray 1977, 1978c, 1980). Murray describes two forms of access to agricultural land. Proprietorship, which may or may not entail actual ownership and possession of legal title, is acquired either through cash purchase or inheritance. Tenancy is either through land rental, where cash is payed in advance for a specified number of years or more rarely cash is payed on a yearly basis, or sharecropping, which takes the form of the farmer providing half (or some percentage) of the harvested crop to the owner.

In the coding of land tenure status, two problems were presented: 1) the level of detail used in the definition of land tenure status, and 2) there is the question of mixed tenure patterns and the problem posed in determining which tenure class to categorize a farmer. In order to avoid difficulties in interpretations of land tenure status, the following land tenure status classes were used:

1. Landowner through inheritance
2. Landowner through purchase
3. Member of the owner's family where the land is to be inherited
4. Renter
5. Sharecropper
6. Guardian

Furthermore, the farmer is classified according to the tenure mode of the parcel which was randomly sampled from the sampling frame, i.e. the parcel within the confines of the irrigation system. This type of classification was justified in terms of the objectives of the study, to determine the significance of land tenure status for irrigation system participation. Thus while irrigation system participation is measured through activities associated with the parcel within the irrigation system, so is land tenure status coded to determine farmer actions with respect to land within the irrigation system. The following is the distribution of land status of respondents:

Respondent status	Frequency/Percent
Owner - inherited land	36
Owner - purchased land	32
Owner's family - to be inherited	12
Renter	12
Sharecropper	7
Guardian	1

The respondents were primarily owners (80%). This is expected as the sampling frame was a census of owners of land parcels in the area.

While the most addressed question with regards to tenure modes has been that of land security and the implications of that security for investment in land and development inputs, it is important to emphasize that the elaboration of typologies of land tenure modes calls attention to the internal mechanisms by which rural Haitian peasants actively maintain control over their most valued resource — land. Murray discusses a very active land market — purchasing and selling — which takes place internally among local farmers:

> "The peasant holding ... is by no means the product of passive acquiescense to historical and demographic forces. The entire land tenure scheme is permeated rather by patterns of active maneuvers, maneuvers in which the Haitian peasants themselves have been the major protagonists." (Murray, 1978(a):7)

The different forms of access to agricultural land through extraordinary inheritance practices, as well as different modes of tenancy, indicates an inherent community mechanism by which <u>some</u> access to land is provided to all members of the community. At least this is the picture that is painted — that access to agricultural land is egalitarian, as opposed to ownership of agricultural land, which is less so.

The evolution of these types of mechanisms as manifested in the variety of land tenure modes is the backbone of rural social and economic structure. Alex Dupuy describes the historical evolution of

such locally rooted land dynamics:

> "The peasantry, for its part, did not accept the consolidation of landed property by the dominant class passively. For twenty years, following the presidency of Boyer (1820–40), the peasants waged a relentless struggle against the large landowners to gain their independence, to achieve effective ownership over the land, and to control the process of production and appropriation of the surplus product." (Dupuy, 19__:21)

In Dubreuil, land is farmed primarily by owners, either directly by the owners (50%) or indirectly by family members (13%). The distribution of tenure modes of plots sampled is the following:

Tenure status	Frequency/Percent
Owner farms the plot	50
Owner's family farms the plot	13
Rented	14
Sharecropped	20
Guardian farms the land	1
Not in use	1
Missing	1

The above classifications do not include mixed tenure patterns, where further parcelling occurs and plots may be rented out or sharecropped. It does provide evidence however that ownership among farmers is widespread.

Similar results were found in a 1976 socio-economic survey of the Dubreuil area:

Plots owned	77%
Plots rented	6%
Plots sharecropped	17%

(Charite, 1976)

These figures indicate that perhaps renting and sharecropping of land may have increased. The number of plots rented went from 6% to 14%, and the number of plots sharecropped rose from 17% to 20%. These changes may be due to sampling procedures or to different procedures for land tenure categorization, and are therefore not conclusive.

The distribution of the number of parcels farmers own or farm is:

# Parcels	Frequency/%
1	16
2	16
3	23
4	20
5	8
6	7
7	3
8	1
9	1
10	1
11	2
12	1
13	1
	100

Mean = 3.74 parcels/farmer
Standard Deviation = 2.48

55% of the farmers own or farm 3 or fewer parcels of land. The average number of parcels is 3.74, which is higher than what is normally reported for Dubreuil (1.7 parcels) and the Cayes area (2.6 parcels) (Zuvekas, 1978b, p.87). This difference is because some of the parcels farmed are not owned.

The distribution of total farm size in karo (1 karo = 1.29 hectares) is:

Total Farm Size	Frequency/%
0.00 - 0.45	30
0.45 - 0.95	20
0.95 - 1.45	14
1.45 - 1.95	7
1.95 - 2.45	9
2.45 - 5.00	6
5.00	6
Missing	8
	100

The average total size of farmer's plots is 1.41 karos of land per farmer. 71% have access to less than 2 karos, and 50% have access to less than 2 karos of land.

The distribution of average parcel size in karos is:

Average Parcel Size	Frequency/%
0.0 - 0.1	15
0.1 - 0.3	36
0.3 - 0.5	19
0.5 - 0.7	8
0.7 - 0.9	6
0.9 - 1.1	4
1.1 - 1.3	2
1.3 - 1.5	1
1.5	1
	92

The overall average parcel size of all plots is .36 karos or .46 hectares. The average size of plots sampled is approximately the same with .33 karos or .43 hectare.

V. Irrigation System Participation

Several attempts have been made along the lines of organizing the water users of the Dubreuil irrigation system area, with little positive result (J.G. White, 1976, Williams & Sheladia, 1979, USAID/HAITI, 1983). Between the period of 1976 to 1983, although primary importance was attributed to the ability of local farmers to organize and control the irrigation system (at least in the project documents), very little was actually realized in terms of organizing the farmers into water user associations. What is particularly apparent is the lack of continuity in attempts at social organization of the farmers, and the repetitive nature of project assessments and goals, at least with regards to water user associations.

The present findings suggest that the dilemma still exists, and that attempts at social organization, while certainly more focused and directed at overcoming technical and communication problems, have not been successful. Interviews were held with the presidents of the water user groups, and of the nine secondary canals of the irrigation system which have been completed under Phase I of the project, eight have formed water user groups and elected officers (laterals 2 through 9).

The most basic question is how had these groups been formed? All of the presidents, as well as the agronomist in charge and the local agents stated that meetings were called where the water users along

each secondary lateral were requested by the agronomist in charge to attend. The primary reason for these organizational meetings was, as one respondent put it, "When they finished the canal, they wanted to know who would take care of it, so they wanted to know the owners of land irrigated by the canal." When asked how often had the water user groups met, only 3 out of the 8 presidents responded that they had had more than one meeting. From these responses it is immediately obvious that the water user groups are not very active. In terms of current activites, most responded that canal cleaning and maintenance, though not actually taking place, were the primary functions of the group, and that water distribution was not done through a sytematic water schedule, but rather by "taking turns". All were quite vague about future activities of the water user groups, although all the presidents were quite sure of with whom the responsibilities for maintaining the canals rested:

> "Water users, because we need it. When the company finished building it, they turned their backs."
>
> "Water user group, because they benefit from it."

Therefore, it can be assumed that people are quite aware of the need for the water resource, and in particular of the need to ensure the continued access to that resource. This is also demonstrated in the responses to the question "Before the water user group was formed, who took care of the canal?":

"Groupement Communautaire: one community work day."

"The ditch rider would send notices to each water user to clean a section of the canal. If you didn't clean it, he would send you to court where you may have to pay a fine."

"Each person cleaned his own section."

"AID/PDAI paid people by the day's work."

All the landowners: each would work on his section of the tertiary, and the Groupement would clean the secondary."

"The syndic would send a notice to each water user..."

"Each person cleans his own section. The syndic sends a notice when he sees that a section hasn't been cleaned."

"Each person cleans his own canal."

Except for one response which indicated that workers were paid by the government/AID, all responded that the water users maintained their own canals, and in some cases that the local community groups were actively involved. What is even more striking is that when asked what problems did they have with this type of organization, all the presidents said there were no problems. One can deduce that the introduction of a new form of organization, i.e. the recent formation of these new water user associations, was not seen to be vitally important for ensuring day-to-day canal maintenance activities. Furthermore, when asked "Do you think the water user group will work well in the future?", the responses were evenly divided between yes and no:

"Yes, because we're all in the same area, we have the same purpose."

"No, it won't work because people refuse to obey the leaders."

In light of the fact that these are the presidents of the groups responding, serious doubt is placed on the viability of these water user associations as the means through which local organization of irrigation system maintenance and water distribution can be regulated. Are the inadequacies of these groups due to organizational difficulties encountered because of relatively new activities, a common vision among farmers that such groups will not respond to their needs, or perhaps farmer perception that individual activity with respect to their land is the best and most efficient means of securing water access? In any case it is obvious that farmers are well aware of their need for water. The question then becomes under what conditions will farmers actively participate in activities which supposedly will enhance their respective position with regards to continued access to irrigation water?

Variations in the nature and type of participation and involvement of the farmers with the irrigation system are measured through four indicators: 1) general organizational participation; 2) participation in the water user association; 3) attitude towards individual maintenance by water users; and 4) attitude towards the irrigation system in general.

Organizational participation reflects involvement by farmers in several types of local organizations. Respondents were asked whether they were members or officeholders in one or more of the following organizations:

a) community group
b) community council
c) federation of community councils
d) church groups
e) cooperatives
f) agricultural work group.

There is a high proportion of organizational involvement by farmers. 50% were members in 2 or more groups and/or held office in 1 or more groups:

Organizational Participation

No participation	35%
Membership in 1 group	15%
Membership in 2 or more	27%
Officeholder in 1 group	14%
Officeholder in 2 or more	7%
Missing	2%

Participation in the water user associations is much less, with only 28% as members or officeholders:

Participation in water user association

Non-member	69%
Member	22%
Officeholder	6%
Missing	3%

It is evident that while there is a high level of organizational participation among farmers, they generally do not see the water user associations as viable organizations. This is not to say that the need for such an organization is not there. 48% of the farmers had positive attitudes towards the irrigation system, and 59% had positive attitudes towards individual maintenance of the irrigation canal by water users. Attitude towards the irrigation system was measured through responses to

"What types of change has the irrigation system brought about for you?", in addition to the respondent's general knowledge about the irrigation system. Attitude towards individual maintenance by water users was measured through responses to "Who should provide the maintenance for secondary and tertiary canals?".

Attitude towards individual maintenance by water users:

Negative	19%
Indifferent	7%
Positive	59%
Missing	15%

Attitude towards the irrigation system:

Negative	24%
Indifferent	17
Positive	48
Missing	11

Given the frequent attempts at organizing water user associations, it is not surprising that a large percentage of farmers have positive attitudes. It has also been the case however that the manner in which irrigation use and maintenance occurs has never changed — with individual farmers concerned about their own irrigation needs. 58% of the farmers reported their plots were irrigated. This does not provide an indication of whether the source of irrigation was always present or due to recent renovations in the canal system. While the responses therefore indicate positive farmer attitudes towards individual maintenance this does not reflect attitudes about collective organization of the water users.

VI. Socioeconomic Status and Land Tenure Effects on Irrigation System Participation

The dynamics of land tenure issues in Haiti have been focused towards the question of land security and the implications of this for the incorporation of new technology and agricultural practices by rural Haitian peasants. In particular the emphasis has been not only to motivate and organize the peasant population to welcome and adapt to such changes, but rather on the prediction and interpretation of peasant action in order to anticipate and further manipulate their environment. Land security is seen as an important factor in the ability and desire of peasants to improve the value and production levels of their land at a certain cost to them. The hypothesis is that a peasant with greater land security, i.e. ownership with title, will be more inclined to engage in these types of activities, as oposed to a peasant whose land situation is less secure, i.e. sharecropping, short term renting, or particular patterns of preinheritance. Murray (1978a) cautions against interpreting the degree of security as a function of ownership of legal title or other simplistic interpretations that do not consider the variety of tenure forms which exist and which perhaps provide greater security than a piece of paper. More fundamentally, however, Murray argues that "the emphasis throughout (is) the need for short-term cash inducements" (Murray, 1980:48) in order for peasants to incorporate new technology,

and therefore "...we should avoid the pitfall of using 'land tenure insecurities' as a whipping-boy to mask shortcomings in program planning, more specifically the failure to carry out simple plot-by-plot cost/benefit analyses from the point of view of peasant participants in the projects." (Murray, 1978a:39). In light of this, Murray suggests that owners, renters, and sharecroppers alike will participate in irrigation activity because of their perception of the immediate benefits that will accrue to them.

While land security is an important issue, it seems premature to assume that there is differential behavior with regards to agricultural innovation as a function of land security without attempting to determine whether there is differential behavior by farmers of different tenure categories. Needless to say there has been less emphasis on structurally defining the link between land tenure and land security, although some attempt has been made (Groupe de Recherche Pour le Developpement, 1979). The problem is also presented that the plots of most Haitian farmers are not of any one tenure mode. In this study the emphasis will not be with the interpretation of degree of security, although the results will surely provide information of benefit to such analyses. Rather the objective is to determine whether tenancy status is an important gauge towards the anticipation of peasant farmer participation in irrigation system development. While involvement in water user groups is only one form of such participation, it provides some indication of a farmer's

willingness to be involved with relatively new innovations, in this case organizational restructuring of canal operations and maintenance.

Socioeconomic Status and Land Tenure

The table of level of living scores by land tenure status (Table 1) and socioeconomic status by land tenure status (Table 2) suggests that differences in socioeconomic status are reflected in land tenure categories. For all land tenure categories, level of living is normally distributed. If there were a correlation between land tenure status and level of living, the expected results would lead to lower level of living scores for renters, guardian, and sharecroppers, and higher level of living scores for owners or those whose family owned the parcel. The same would be true for the socioeconomic status indicator with a correlation between land tenure status and socioeconomic status. Tables 1 and 2 demonstrate that renters and those who own purchased land have higher mean scores for both level of living and socioeconomic status. What is suggested is that 1) variation in level of living and socioeconomic status represents differential access to resources as operationalized through land tenure status; and 2) land tenure status by itself represents differential access to resources. This reflects the fact that renters and owners who have purchased land both must provide capital to either purchase or rent land, while those who inherit or sharecrop do not need to have these resources available.

TABLE 1

Land Tenure Status	Level of Living Score															
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	>22
Owner – inherited	0	0	3	3	3	8	6	4	3	0	5	1	0	0	0	0
Owner – purchased	0	1	0	1	2	4	5	5	6	2	1	3	0	0	1	1
Owner's family	2	0	1	1	0	2	3	0	1	1	0	0	1	0	0	0
Renter	0	0	1	0	2	0	1	1	3	2	1	0	0	1	0	0
Sharecropper/Guardian	0	0	0	1	3	0	0	0	0	2	1	1	0	0	0	0

TABLE 2

Land Tenure Status	Socio-economic Status Score 1	2	3	Mean
Owner - inherited	19	13	4	1.58
Owner - purchased	14	12	6	1.75
Owner's family	9	1	2	1.42
Renter	5	3	4	1.92
Sharecropper/Guardian	6	1	1	1.38

While there is variation in level of living scores, it can be argued that this does not suffice to conclude that there is hierachical stratification among the farmers. This actually is a quite plausible argument, in light of the fact that Haitian households tend to be conservative in their displays of wealth or material possessions. Even more likely is that while level of living may indicate variation in the rural population, it does not indicate the dynamic means by which resource distribution takes place. It could be concluded that this creates a serious flaw in the use of such a level of living scale to measure rural stratification, particularly in Haiti where such dynamics are primarily through the land market. Given the relatively high correlation between the two independent socioeconomic status indicators, level of living and socio-economic status (5.95), and the similar results with respect to land tenure status would indicate that these indicators are valid.

It is also possible that land tenure status as operationalized in this analysis is not a valid measure of access to resources. It is in this domain that the issue of land security has surfaced, where particular types of land tenure modes are seen to be more secure, and thus interpreted as being a greater economic resource. A non-significant correlation between land tenure status and level of living and socioeconomic status would support Murray's findings that the intricate nature of land tenure patterns in and of themselves provide the necessary access to land resources. In such a case the simplistic categorization

of land tenure status in this analysis would be invalid. In other words while farmers were sampled according to simple plots within the irrigation system, their tenure status on one plot does not indicate the type of access to other plots of land, and as such would be a poor indicator of total land resources.

In summary, one can question the validity of either the level of living scale or the interpretation of land tenure modes as reflecting the nature of differential distribution of resources. The results suggest however that those who purchase land and who rent land are economically better off than the rest of the farmer population.

Socioeconomic Status and Irrigation Participation

Table 3 presents socioeconomic status by level of organizational participation. Those who are office holders in 1 or more organizations tend to have higher socio-economic status scores. For officeholders in 1 group the mean SES score is 2.0, for officeholders in 2 or more groups, the mean SES score is 2.43. For those farmers who do not participate at all in any organization, mean SES score is 1.30. All of the farmers with and SES score of 3 had some form of organizational participation. 5 farmers with an SES score of 1 (9%) also were officeholders in 1 or more groups. While organizational participation is greater among farmers with higher SES scores, it is not limited to them. Lower socio-economic status farmers also participate in a leadership capacity.

TABLE 3

	Socio-economic Status Score			
	1	2	3	Mean
Organizational Participation				
No participation	23	10	0	1.30
Membership in 1 group	8	6	3	1.71
Membership in 2 or more groups	17	6	4	1.52
Officeholder in 1 group	4	6	4	2.00
Officeholder in 2 or more groups	1	2	4	2.43

The same is true for participation in the water users group as indicated in Table 4. While 69% were not members of water user groups, as opposed to 35% non-participation by farmers in 1 or more organizations, those who did participate tended to have higher SES scores. For water user group members the mean SES score is 1.91, for officeholders mean SES is 2.17. One farmer with an SES score of 1 did hold a leadership position. Therefore while level of participation in water user groups is much lower overall, those who do participate have higher socio-economic status than those who participate in other organizations.

TABLE 4

	Socio-economic Status Score			
	1	2	3	Mean
Water User Group Participation				
Non-member	42	21	6	1.48
Membership	9	6	7	1.91
Officeholder	1	3	2	2.17

With regards to both attitudes of farmers towards the irrigation system in general and towards individual participation by water users, those who had positive attitudes tended to have higher SES scores, while those who were indifferent or had negative attitudes had lower SES scores.

TABLE 5

	Socio-economic Status Score			
	1	2	3	Mean
Attitude Towards Irrigation System				
Negative	12	9	3	1.63
Indifferent	12	4	1	1.35
Positive	23	15	10	1.73

TABLE 6

	Socio-economic Status Score			
	1	2	3	Mean
Attitude Towards Individual Participation				
Negative	12	6	1	1.42
Indifferent	7	0	0	1.00
Positive	27	19	13	1.76

Land Tenure and Irrigation Participation

The associations between land tenure status and irrigation participation suggest that renters and owners of purchased land may behave differently than other farmers. Renters and owners of purchased land tend to participate more in organizational activities. Mean scores of organizational participation is 1.83, and mean score of owners of purchased land is 1.52. With regards to water user group participation, renters had highest level of participation, with a mean of 0.73, and owners of purchased land the lowest level of participation with a mean score of 0.26.

	Organizational Participation					
Land Tenure Status	0	1	2	3	4	Mean
Owner - inherited	14	6	10	4	2	1.28
Owner - purchased	10	5	9	4	3	1.52
Owner's family	4	1	5	0	1	1.36
Renter	3	2	2	4	1	1.83
Sharecropper/Guardian	4	1	1	2	0	1.13

Land Tenure Status	Water User Group Participation 0	1	2	Mean
Owner – inherited	29	4	3	0.28
Owner – purchased	24	6	1	0.26
Owner's family	6	5	0	0.45
Renter	5	4	2	0.73
Sharecropper/Guardian	5	3	0	0.38

As indicated earlier most farmers had favorable attitudes towards both individual maintenance by water users and towards development of the irrigation system. However, renters and owners of purchased land have slightly more negative attitudes toward the irrigation system. Mean score on irrigation system attitude is 2.17 for owners

While earlier discussion has alluded to the problem of interpreting land tenure status as a measure of resource access, even more problematic is the static nature of these types of measures. One questions the validity of attempting to predict farmer action as a function of static measures of irrigation participation. These indicators do not provide insight into the internal dynamics by which control of water resources occurs. This is evidenced for example in that while only a relatively few farmers responded that they were members of the water user groups, individual farmers are concerned with maintenance activities on their own parcels and do have interest in increasing their agricultural productivity.

The results indicate that most of the farmers have approximately the same socioeconomic status, most are owners of their own land, and that most farmers have favorable attitudes towards irrigation system development. There is evidence however that owners of purchased land and those who rent land have higher socioeconomic status. While having more fundamental interests in participating in organizational activities, they may have more negative attitudes towards irrigation development.

This analysis points out three issues of concern to further studies on land tenure and irrigation development.

1) There is a need for non static indicators of socioeconomic status, land tenure, and irrigation participation.

2) Analyses of associations between land tenure modes of owners of purchased land and renters and their long-term interests in irrigation, and whether their interests are fundamentally different from others as a function of their higher socio-economic status.

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