An Evaluation of Small Hillside Farmers' Knowledge of and Attitudes toward Environmental Conservation Resulting from the Environmental Education Workshops

A THESIS

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By

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To My Mother, Manuela, and To My Children: Pili, Yara, and Alfredo
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LIST OF ABBREVIATIONS

DEA: Departamento de Educacion Ambiental
DTA: Departamento de Tierras y Aguas
EE: Environmental Education
IICA: Instituto Interamericano de Cooperacion Agricola
OAS: Organization of American States
SEA: Secretaria de Estado de Agricultura
SEEBAC: Secretaria de Estado de Educacion
SURENA: Subsecretaria de Recursos Naturales
UASD: Universidad Autonoma de Santo Domingo
UNEP: United Nations Environmental Program
UNPHU: Universidad Nat’l Pedro Henriquez Urena
US-AID: United States Agency for International Development
CHAPTER I

INTRODUCTION

Conservation of the Dominican renewable natural resources is a challenge for the Government of the Dominican Republic (Hartshorn, 1981). The Dominican Republic is a small country located in the Caribbean Sea (Greater Antilles), which shares, with Haiti, the Island of the Hispaniola.

Natural resources in the Dominican Republic have historically been exploited for different reasons and by different groups of people. Some Dominican officials and several investigators (Southgate, 1984; Erbaugh, 1983; USAID, 1981) have recognized the small farmers as the main cause of natural resources degradation, especially those farmers who grow crops on the hillsides. In addition to farmers, there are other groups of people who share some degree of responsibility in the process of environmental
degradation. Among these are timber producers, charcoal makers, and firewood gatherers. In addition, other factors such as natural phenomena, forest fires (both provoked and natural), uncontrolled grazing, and population pressure (e.g., in form of increasing demand for housing, agricultural land, and energy) have also contributed to the process of natural resources degradation.

At the global level, Spears and Ayensu (1985) indicate that "... forestlands in the developing countries have declined by half and are continuing to be encroached upon at the rate of some 11 million ha/yr, primarily for agricultural settlement." They also state that "tropical watersheds are threatened by overgrazing and soil erosion."

Since the late 1800s some Dominican leaders have been concerned about natural resources conservation or use. This concern was mainly expressed in relation to forest resources conservation. In 1884 a decree was issued on forest resources conservation, which was made valid in 1907 when a special corps of forest rangers was created. However, this and other early conservation actions fell short in controlling natural resource use
because the process of exploitation of such resources was steadily increased. In 1956 a law was passed to declare reforestation as a national priority and also to make the Secretariat of Education responsible for implementing conservation education for the forest, mainly through rural schools. Since that time, a number of legislative and executive actions have been taken on behalf of natural resources conservation, but these actions have not considered the environment as a whole. Rather, they have been concerned with individual resources. Such actions have been implemented to mitigate or control some particular problem affecting a given natural resource. The most significant of these actions was law number 211 passed in 1967, which banned tree cutting and stopped sawmill operations (SEA, 1985).

In a report on evaluation of the Dominican natural resources carried out in 1967 by the Organization of American States (OAS), the country was divided into 14 different hydrographic and watershed areas (Olson et al., 1984). The most important were located in the central mountain range. One of these areas is the Ocoa River watershed on the southeast side of such a mountain (Figure 1). This watershed was ranked number
Figure 1. Location of the Ocoa Watershed in the Dominican Republic.
one in soil loss in a study conducted after the occurrence of two major hurricanes in 1979 (Hartshorn, et al., 1981). In 1981, this watershed, with an area of 844 square kilometers, had a population of 57,970 people, of which 45,308 lived in the rural area (SEA/IICA, 1981).

Shifting agriculture and timber production used to be the main characteristics of the region, however, the pattern has been changed because of land scarcity and resources degradation. Though some perennial crops like coffee are grown, most of the farmers are devoted to growing annual crops like red beans, cabbage, peanuts, and potatoes, among others (SEA/IICA, 1981).

Since the early 1970s, various conservation activities have been implemented in the Dominican Republic, but these programs did not include education or conservation education as a major component. By 1972 the OAS formulated a regional project for forest resources management where forest education was identified as an immediate need (OAS,1972); but this project was not implemented. In the late 1970s, shortly after the Intergovernmental Conference on Environmental Education held in Tbilisi, USSR, in 1977, the
Secretariat of Agriculture started a program on environmental education to demonstrate activities related to soil conservation; that is, conservation education. The project started by demonstrating conservation practices for small farmers growing crops on the hillside of the Central mountain range as a joint effort with the activities of soil conservation being implemented by the Department of Land and Water. Later, activities addressed to teachers, students, and community leaders were implemented (Morillo, 1984). Environmental education (hereafter denoted EE) activities were initially implemented in four watersheds where natural resources were considered in critical condition or because they were located in the catchment areas of expensive hydroelectric dams (Jorge, 1980).

The EE program was the base for implementing the EE component of the natural resources management (hereafter denoted NARMA) project in the Ocoa watershed (USAID, 1981). The main goal of this component was to teach small farmers about conservation of natural resources by using workshops as the main teaching method. A number of workshops have been held in the Ocoa watershed to accomplish the defined goal. Since
farmers of small hillside farms are the principal beneficiary of the EE workshops (USAID, 1981), workshops have been held throughout the entire watershed to facilitate the acceptance of conservation practices. Each workshop was divided into two sessions: a lecture with audiovisuals and a field demonstration (Figure 2).

As a component of the NARMA project, the EE program was designed to meet several needs of small farmers, which were considered necessary to motivate their participation in conservation activities. The EE component has also tried to reach other rural dwellers like students, teachers, rural authorities, community leaders, and housewives.

The specific objective of the EE workshops was to make small farmers aware of natural resources problems and conservation practices, which were related to their activities as part of the environment. In this sense, small farmers have been taught about the relationship between the environment and themselves, as well as their relationship with natural resources. By conducting these workshops, it was expected that small farmers would be encouraged to accept the conservation
Figure 2. Model of the Environmental Education Program Being Implemented in the Dominican Republic.
practices recommended by the soil conservation agents. This function was especially significant since the Agricultural Extension Service is not concerned with conservation practices; thus, extension agents do not promote them (Veloz et al., 1985).

Although over 100 workshops have been conducted, in both Ocoa and Las Cuevas watersheds, the impact of this activity on small farmers' attitudes and knowledge has not been determined. Thus, this study is an attempt to evaluate the effectiveness of EE workshops addressed to small farmers in the Ocoa watershed. The results of this study could be useful to assess other EE programs in other watersheds in the Dominican Republic and other Third World countries with similar conditions. Similarly, this study may make a contribution to the field of environmental education since it was carried out in a developing country with a target population which has not been considered in previous research related to environmental education.

Watershed degradation and natural resources depletion have become important issues in the Dominican Republic. Several laws concerning conservation of natural resources have been passed and a number of
decreea have been issued (SEA, 1985). Likewise, some programs and projects have been implemented in different regions. By the end of the last decade, officials with the sector of Natural Resources realized that natural resources conservation would need more than just conservation techniques (SEA/DTA, 1978). A significant change in the environmental attitudes of Dominican people should be the first step in the conservation process (SEA/DEA, 1979a). At the same time it was assumed that a change in attitudes toward natural resources would imply an improvement in knowledge of natural resources conservation. Thus, it was decided that people should be taught in order to achieve that goal (SEA/DEA, 1979a).

Since early 1979, activities of conservation education, or, in a broader context, environmental education, have been conducted throughout the country. These activities were established for rural dwellers (known as campesinos) in the Dominican Republic, including small farmers, school teachers, students, and community leaders. This population has been impacted basically at the watershed level, whereas EE activities have been implemented at the national level (Morillo, 1984). Emphasis has been on small farmers growing crops
on the hillsides of the Central mountain range where the principal watersheds of the country are located (Hartshorn et al., 1981). Environmental education activities have been conducted to make small farmers and other campesinos aware of the issues related to the environment by teaching them about the environment. In the Ocoa watershed a number of small farmers have, since 1980, shown willingness to participate in EE activities such as workshops before the beginning of the NARMA project activities in the area (SEA/DEA, 1979b).

Small farmers and other rural dwellers have attended a number of workshops held in the Ocoa watershed. According to Tinnemier et al. (1984), these EE workshops appear to achieve the purported goal by motivating small farmers interested in conservation practices.

In the first evaluation report of the NARMA project carried out by Tinnemier et al. (1984), it is remarked that small farmers from the Ocoa watershed are more interested in learning about conservation practices directly related to crop production rather than attending workshops on environmental conservation in
general. Also, they attributed the success of the activities of environmental education (e.g., workshops) to extraneous factors and past activities that took place in the watershed; whereas, the effect of the EE workshops on small farmers' knowledge of and attitudes toward conservation practices is still unknown because evaluation of this specific activity has not been carried out.

**Problem Statement**

This study is centered upon the question: Did the EE workshops conducted by the NARMA staff cause an impact on small farmers' environmental knowledge, conservation attitudes, and adoption of recommended conservation practices?

**Objectives of the Study**

The objectives of this study were:

1. To assess whether or not EE workshops conducted by the NARMA staff produced a gain in the small farmers' knowledge about environmental issues.
a) Do EE workshops help small farmers identify environmental issues in their community?

b) Do EE workshops improve small farmers' awareness of environmental problems and capability to face such problems?

2. To assess whether or not the EE workshops conducted by the NARMA staff caused a shift in attitudes held by small farmers about recommended conservation practices.

   a) Have the EE workshops conducted by the NARMA staff influenced small hillside farmers' decisions to use conservation practices?

   b) Are small farmers willing and able to teach other "campesinos" about conservation practices after attending EE workshops?

   c) Are small farmers willing to continue using conservation practices after the end of the NARMA Project?

   d) Are small farmers' decisions to use conservation practices only influenced by the NARMA Project credit?
Definition of Terms

The following terms and concepts are herein defined for the purposes of this study.

CAMPESINO: the name given to rural dwellers, both farmer and non-farmer, in the Dominican Republic.

CANSADA: the popular term used to identify a parcel or plot which no longer produces good crops without applying some inputs such as fertilizers.

CONSERVATIONIST CREDIT: a type of credit offered to small farmers growing crops on the hillside of the Ocoa watershed to build conservation practices as well as aid for crop production.

CONSERVATION PRACTICES: techniques used to control or prevent soil erosion, maintain water quality, and in general, practices used to maintain the quality of the environment.

CONUCO: is a small parcel or plot where farmers grow crops.

CONVITE: is a way used by Dominican rural dwellers to accomplished work in a cooperative form.
ENVIRONMENTAL ATTITUDES: a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection (From the categories of EE objectives formulated at the Tbilisi Conference on Environmental Education in 1977).

ENVIRONMENTAL KNOWLEDGE: the experience in the environment as well as basic understanding of the environment and its associated problems (Source: same at the above).

IMPACT: effect on small farmers' behavior as result of EE workshops.

INCENTIVES OR PACKAGE OF INCENTIVES: a type of aid used by the NARMA Project to motivate small farmers' participation in the conservation activities conducted in the Ocoa watershed. Incentives include production and conservation credit, grant trees (hardwood and fruit trees) aid for sons of small farmers who are interested in an agricultural career.

MICROWATERSHED: the smallest division of a watershed made to facilitate the process of problem solving in the area and to identify local problems and concerns.
NARMA PROJECT: the short name used for Natural Resources Management Project sponsored by the Dominican Government and the United States Agency for International Development.

OCOA RIVER WATERSHED OR OCOA WATERSHED: the watershed located in the southeast side of the Central mountain range in the Dominican Republic. Ocoa is the name of the main urban community in the watershed.

SMALL FARMERS: a farmer who farms a very small plot. In the Dominican Republic about 69 percent of the farms are less than five hectares (SEA/IICA, 1981). In the area of the Ocoa watershed, 61 percent are less than two hectares (Peña F., 1985).

Limitations of the Study

This study was formulated to assess small farmers' attitudes and knowledge gained as a result of participating in EE workshops. All selected farmers are from the Ocoa watershed who are also participating in the program of credit and EE workshops offered by the NARMA project.
Basic Assumptions

1.- Each edition of EE workshops has followed the same teaching methodology, and farmers have had equal opportunity to attend the EE workshops.

2.- All the small farmers had the same opportunity to get credit by being selected according to the NARMA project requirements and their interest in conservation practices rather than by extraneous influence exercised during the selection process.

3.- The sample selected is representative of the population participating in the program of credit and in the EE workshops implemented as a component of the NARMA project.

4.- The research questionnaire should be responded to honestly to help reduce biases.

5.- Respondents to the research questionnaire will answer the questions according to their knowledge, attitudes, and feelings.
CHAPTER II

REVIEW OF LITERATURE

The categories of objectives to be achieved by environmental education programs were adopted at the Intergovernmental Conference on Environmental Education held in Tbilisi, USSR, in late 1977. These objectives have been spread around the world to motivate the implementation of EE programs. These categories of objectives refer to awareness, attitudes, skills, and participation. According to those objectives and to the defined EE principles, an attempt was made to outline the general approaches for EE activities in both developed and developing countries. At the same Conference, however, it was recognized that environmental problems of developing countries are different from those affecting developed nations (Jaske, 1982). Therefore, EE activities should meet the specific environmental issues affecting each country.
Participants at the Intergovernmental Conference on Environmental Education were agreed in identifying environmental problems of less developed countries as associated with human settlements, environmental health and nutrition, susceptibility to natural disasters, poor agricultural methods, and to rapid exploitation of natural resources (Jeske, 1982). As a developing country, the Dominican Republic has been affected by these defined environmental problems. Of the above cited, this study was concerned with the last two environmental issues: poor agricultural methods and rapid exploitation of natural resources. These two issues have had a direct impact on the Dominican people, especially on rural dwellers.

Recommendation 22 (1.a) of the Intergovernmental Conference on Environmental Education suggests that cooperative efforts to train farmers in environmental issues should be undertaken. In addition, recommendation 18 (b.3) is concerned with carrying out research on knowledge and attitudes of individuals (Jeske, 1978). As a response to this recommendation, a number of studies have been conducted to assess knowledge and attitudes of individuals in several countries, especially in developed countries. Those
studies, however, have not considered farmers as their target population.

By reviewing the current literature related to environmental education, it was found that the research conducted does not provide a baseline for a study to assess knowledge and attitudes of small farmers from developing countries. Neither in developed countries nor in developing countries has such a population been studied by investigators interested in environmental education concerns. According to Napier et al., (1986) "... there is little or no research on environmental concerns associated with the adoption decision-making process." Most of the relevant research has had school students as its target population. According to Diirking and Falk (1985), in the last few years, however, it has been recognized that environmental programs, in order to impact the society, should address four points:

(1) the necessity of educating the whole community, not just school children;

(2) establish communication between the different sectors of the society;
(3) citizens should be exposed to real life educational experiences; and

(4) the notion that EE is not only a privilege but a "responsible, requiring commitment and active involvement on the part of citizens." In regard to programs development in both developed and developing countries, it is stated that:

In developed countries there were organized attempts to develop environmental knowledge and skills among youth; whereas, in developing countries this situation ranged from fairly strong to very limited interest in environmental issues (UNEP, 1982).

The authors of a study conducted in Africa stated that to combine activities to improve the physical, the social, and the economic environment, it is necessary to combine actions on the essential components of such environments. Without this combination, "the project's improvement cannot be sustained by the farmers." It was found, in the same study, that such activities as tree planting, and construction of soil erosion structures, among others, serve as a focus to "induce farmers to participate" (Deru and Tips, 1986).
Roth (1973) has developed a model for environmental management education which includes the biophysical and social-cultural environments, and the concept of environmental management as the basis for implementing environmental management education programs to pursue changes in people's life style. These changes would be produced by the interaction of the components included in the model. Through education, according to the model, people will gain knowledge about the identified environments and their relevant concepts to impact their quality of life.

Roth's model contains the basic elements identified by Deru and Tips (1986). They stated that it is necessary to combine actions on the essential components of the physical, the social, and the economic environments.

Based upon the relationship between the components of the defined environments included in Roth's model for environmental management education and considering the statement of recommendation 22(1.a) of the Tbilisi Conference on Environmental Education, an environmental education program was designed and implemented in the Dominican Republic as a component of a natural
resources management project (Figure 2). This program was designed to be implemented using the agricultural extension approach.

Munguia (1975) points out that "Extension education is needed in order to teach farmers the changes in cultural practices." In his study, carried out in the Dominican Republic, he found that farmers who received technical assistance and followed recommendations made by extension agents had better performance in cropping activities than farmers who did not receive technical assistance. In the same study, Munguia made reference to a study conducted by G.H. Axion and S. Thorat (1972) when they stated that "improved technology without effective extension education will bring about limited change."

In a document of UNEP (1982), it is remarked that "The public's attitude towards the environment changed considerably in the decade after Stockholm." In the same study it is pointed out that people who are wealthier and better educated strive to increase their awareness of environmental issues. In this decade, in some developing countries an active campaign on conservation of natural resources and environmental
issues has been developed to increase the awareness of their population (UNEP, 1982).

In a study conducted in the Dominican Republic, Erbaugh (1983) found that access to extension (agricultural) is not positively related to awareness of erosion as a problem. That contention is supported by Veloz et al., (1985) who stated that extension agents do not promote conservation practices and the Extension Service is not concerned with conservation aspects. Erbaugh also found that there is no significant relationship between access to credit and the perception of soil erosion as a problem; whereas, he found a positive and significant correlation between orientation towards change and awareness of soil erosion problems. Likewise, he found a positive and significant relationship between awareness of erosion as a problem and the propensity to adopt soil conservation practices. In this context, Nowak (1982) stated that a land user, to adopt a remedial technology, should recognize a need, either ecological or economic, for that technology. However, he recognized that some researchers do not support this association. Erbaugh concludes that "Farmers who
perceive change favorably are expected to be willing to alter their agricultural practices."

In their study conducted in Africa, Deru and Tips (1986) stated that in watershed management projects "More emphasis should be placed on rural development planning ... and on rural community organization."
Whereas, Southgate et al., (1984) in a study on soil erosion problems states that "Socially optimal management of watershed's soil resources requires the design of incentives to alter the behavior of farmers who do not gain by switching to more conserving land uses under current economic conditions." Although these related studies, conducted in different areas of the world and by different researchers, are not on environmental education, their final goal is similar to the pursuit of this study, namely to evaluate an environmental education program. The latter study suggests that incentives are needed to alter people's behavior. However, educators and sociologists place emphasis on knowledge and awareness to achieve the same change in farmers' attitudes and behavior, even though the relationship between knowledge and attitudes has not been clearly established. While some investigators, i.e. Burrus-Banmel (1978), found no correlation between
knowledge and attitudes, others, like Hounshell and Ligget (1973), have found an "extremely high" relationship in a study carried out with sixth grade students.

Napier et al., (1986) stated that "Access to information is among the most important predictive factors associated with adoption behavior." They do, however, recognize that there is controversy among authors in regard to the role of education in the adoption of conservation practices. Nevertheless, they agreed that information has some influence in adoption decisions. Napier et al., also suggest that age and farming experience influence adoption of conservation practices.
CHAPTER III

METHODOLOGY

Population and Sample

The population of this study consisted of small farmers who have participated in conservation activities conducted under the NARMA Project in the Ocoa watershed, Dominican Republic. The population was subsequently divided into four groups:

(1) farmers who have attended any of the EE workshops held since the beginning of the project until May 31, 1985;

(2) farmers who have been participating in the credit program;

(3) farmers who have been participating in both the EE workshops and credit program; and
(4) farmers who have not been participating in either the EE workshops or the credit program being implemented under the NARMA Project in the Ocoa watershed.

The concept of sampling is based upon the observation that only one part of a population need be sampled and then it can be inferred that these observations "will be true of the whole population" (Ary et al., 1985). Findings can subsequently be generalized to the universe if the sample represents the population from which it was drawn. Therefore, in sampling some criteria should be specified to assure a valid generalization to the population universe. In this context, according to Miller (1985), two inferential routes can be followed: indirect and direct.
The indirect route was the one utilized in this study and is described as follows:

**Indirect Route (Imperfect Induction)**

```
sampling

Population .................. Sample

Generalize  Describe Data

inference

Parameter .................. Statistic
```
The sampling flow upon which this study was based following the above defined indirect route was:

Target Population

(small farmers)

Accessible Population

(small farmers participating in conservation activities)

Sample

(drawn from the accessible population)

Accepting Sample

(farmers agree to be interviewed)

Data Sample

(data gathered from the accepting sample)

Source: L. Miller, 1985. Course Package, Ag Ed 885, OSU)
After determining how the sample is going to be drawn from the target population, it is necessary to decide on the size of the sample to be studied. Several authors specify that there is no single rule that can be used to determine sample size, therefore, they suggest the use of a sample as large as possible (Ary et al., 1985; Minium et al., 1982; Kerlinger, 1966).

The desired sample size (170 farmers) of this study was determined by using a graph developed by Krejcie and Morgan (1970). In this graph (Figure 3) a relationship is established between sample size and total population. The graph was developed according to a formula that appeared in the article "Small Sample Techniques" published by the National Education Association (1960). This method is adequate for calculating a sample size from a small population, such as the one utilized in the study. The universe was defined as those small farmers who were participating in conservation activities sponsored by the NARMA Project, specifically those who were participating in EE workshops and credit programs.

The sample was drawn from the target population of 300 small farmers cropping on the south-east hillside.
Figure 3. Relationship Between Sample Size and Total Population.

of the Central mountain range in the zone known as the Ocoa River watershed. The accessible population was defined from the lists of farmers recorded by environmental education technicians and soil conservation agents. These lists were obtained from the Office of Land and Water Conservation in Ocoa and from the Department of Environmental Education in Santo Domingo. Each name was identified with a number, starting with one and continuing to 300. This was the final figure utilized in the study after elimination of duplication and identification of community of residence.

The elimination of some names from the lists was made for several reasons: there was repetition of names of people in the same activity; there were some discrepancies between the list obtained in Ocoa and the one obtained in Santo Domingo. The national identification card number was used to establish individual identity and community location.

The above described procedure was made more difficult because agronomists were on a national strike when the study was conducted. Therefore, the investigator had little assistance in clarifying the
duplication found while determining the sample framework. For this reason, it was decided to eliminate from the target population those farmers whose situation was not clearly defined in the lists obtained.

Each number was entered on a square to be cut and deposited in a paper bag. From the bag the numbers were pulled and matched with the list of names to determine sample participants. After matching numbers and names, individuals to be included in the sample were identified and located by community. A new list was subsequently elaborated with the names and communities of those farmers who were included in the sample. Numbers were pulled out of the bag by different individuals. In Ocoa, some technicians and paratechnicians helped to locate farmers in the watershed and to verify the existence of people to be surveyed in that geographic area.

The group of farmers who were not participating in any conservation activity were identified by means of the farmers association membership list. Those associations were from communities where the NARMA Project has implemented any activity. The above
described procedure was used to select those who were
to be included in the study. By using the described
procedure, the sample was defined.

**Design**

Information was gathered utilizing a survey
questionnaire designed to be applied using a face-to-
face personal interview technique. This technique was
used because a high percentage of the small farmers
have not had schooling. It has been found in a previous
study that about 38 percent of the farmers cropping in
the zone had not had schooling (SEA/IICA, 1981). The
instrument used was first elaborated in English and
then it was translated into Spanish for
application to a population from a Spanish speaking
country, the Dominican Republic.

The survey instrument consisted of two parts: (1)
socio-demographic items and (2) environmental education
and natural resources conservation. The last part was
divided into two sections: A and B. The entire
questionnaire comprised 94 questions. Twenty-two of the
questions were included to facilitate future study
projects in the Dominican Republic. Generally, these
questions were designed to provide information about energy farms and additional demographic characteristics. Therefore, only the answers given to the questions designed for each objective of the present study were analyzed.

**Instrument Development**

The instrument development process included the following steps:

1. development of a set of appropriate items according to the objectives of the study and revision of other instruments to obtain items that could be included in the study;

2. selection and editing of questions and statements;

3. format layout and design;

4. evaluation of the instrument made by a panel of experts from The Ohio State University;

5. modification of the instrument according to the recommendations made by the panel of experts;
6. translation from English into Spanish;

7. revision of the Spanish version of the instrument. This revision was made by two Dominican students at The Ohio State University;

8. correction of the Spanish version according to the suggestions made by the two Dominican students;

9. evaluation of the instrument made in the Dominican Republic. This evaluation was carried out by four Dominican professionals affiliated with the areas of agriculture, natural resources management, sociology, and environmental education;

10. modification of the instrument according to the suggested changes;

11. field-validation of the instrument in the Ocoa watershed;

12. modification of the instrument according to the result of the field-validation;

13. editing of the final version of the instrument.
Validity and Reliability

Validity and reliability are two criteria to be met by any research instrument. In this context, the content validity of the instrument used in this study was evaluated by a panel of experts from The Ohio State University (Appendix F) and modified according to the recommendations made. In addition, the Spanish version of the instrument was evaluated by two Dominican students (one Ph.D. candidate and one M.Sc. student) at The Ohio State University. Finally, in the Dominican Republic, the instrument was evaluated by professionals engaged in activities of environmental education and natural resources conservation (Appendix E). These professionals are with the Department of Environmental Education, with the NARMA Project and the Universidad Autonoma de Santo Domingo, with the Undersecretariat for Natural Resources and the Universidad Nacional Pedro Henriquez Urena, and with the Department of Land and Water Conservation. The instrument was once again modified according to their suggestions. The suggestions mostly concerned grammatical construction and terminology because of the translation process from English into Spanish.
After being modified, the instrument was subsequently field-tested for reliability. Twelve farmers from the population were interviewed as well as two technicians. From this test it was determined that some questions should be eliminated and a number of items required a change in the use of terms. Once again the instrument was modified according to the results of the field-test conducted. After that the instrument was printed.

Groups of item-questions were assigned to relate to each objective of the study. The final 13 pages of the instrument included 10 open-ended items, 30 closed items, and 20 multiple choice questions, as well as 34 statements organized according to a modified Likert-type scale. Interviewees answered a total of 94 questions (Appendix B).

**Data Collection**

The survey questionnaire was designed to assess small farmers' knowledge of and attitudes toward conservation of natural resources. In addition, the instrument attempted to obtain information about their attitudes toward the environmental education workshops
and other selected activities undertaken by the NARMA Project. In addition, some socio-demographic information was obtained to meet the objectives of this study and for later use in future project development.

The review of literature produced very few studies with instruments which could be applied to this study. Therefore, most of the questions included in the questionnaire were generated by the author to meet the specific needs of the study. Some of the questions used by Erbaugh (1983) in his instrument were used after being modified. Also, some questions were suggested by the panel of experts that evaluated the instrument. These items were reviewed and some of them included in the instrument.

During the application of the instrument, the investigator received aid from two staff members from the Department of Environmental Education. These two technicians, who have participated in other surveys, were trained by the author.

Interviewers spent 14 working days applying the survey questionnaire. The survey was conducted during the summer of 1985. During this period of time 24
communities dispersed throughout the watershed were visited. It was originally estimated that an average of 20 people could be interviewed each day; however, it was not possible to accomplish that goal for several reasons. First, farmers were engaged in planting activities and were therefore out of their communities. Second, the occurrence of a rainy period made it impossible to reach a number of farmers because of the road conditions. Finally, several farmers were absent from their communities when they were visited. A second visit was attempted in each case, but it was not possible to reach most of the absent participants.

The author conducted 35 interviews and supervised a number of interviews conducted by the other two interviewers. In addition, a review of the each day's completed questionnaires was made during the evening to determine if it was necessary to reapply any of them.

All farmers who were reached agreed to answer the questionnaire. Before asking questions, the purpose of the interview was explained to each individual. Also, participants were made aware that they could refuse to respond to any particular question which they considered was not clearly stated or for personal
reasons. The average time for completing the questionnaire was 40 minutes.

**Data Analysis**

The data from the survey questionnaire was coded, scored, and tabulated for analysis. The statistical analysis was accomplished through the Instructional and Research Computer Center (IRCC) at The Ohio State University utilizing Wylbur and the Statistical Analysis System (SAS).

The principal statistical procedures used in the analysis of the data were the chi-square statistic, the t-test, and the Tukey's Studentized Range (HSD) test. The Tukey test was utilized to compare responses among the four groups and between the groups that have participated in conservation activities and the groups that have not participated.

By using the chi-square statistic, the values which represented the differences between observed and expected frequencies falling into each cell of the two-way tables were obtained. The chi-square value
depends upon the disparity between observed and expected frequencies. If there is a greater disparity, the chi-square value increases until it becomes statistically significant. Because a number of cells of the two-way tables had an observed frequency of less than five and because of different numbers of individuals in each group, it was decided to use the General Linear Model applying the Tukey test to verify the results obtained with the chi-square statistic. The results of the Tukey test are equivalent to the ones obtained from the t-test (SAS, 1983).

The results of the statistical analysis are presented according to the items assigned to each objective of the study. To simplify the description of the response analyses, the items concerning environmental knowledge were grouped into six broad categories of concepts: soil and soil erosion, forests and cutting trees, conservation practices, natural resources, water cycle, and relationship between people and watershed resources.
For the purpose of analysis, response options for each item were recorded as follow:

Strongly Agree/Agree (collapsed) ........ 3
Don't Know .................................. 2
Strongly Disagree/Disagree ............... 1

Yes ............................................ 3
No .............................................. 2
Uncertain ...................................... 1
No Response .................................. 0
CHAPTER IV

RESULTS

This chapter is divided into three major sections. The first two sections address the objectives of the research study through the interpretation of the statistical analyses of the survey data. These analyses were completed utilizing the WYLBUR Computer System and the Statistical Analysis System (SAS) at The Ohio State University's Instruction and Research Computer Center (IRCC). The third section summarizes the responses to three of the open-ended items as well as two of the multiple choice items with more than one answer or combination of options which are relevant for the purposes of the study.

The four groups of small hillside farmers were compared on four statements concerning soil erosion to assess Objective 1 of the study. Respondents of the four groups generally agreed to the statement (item
No.A-4) "soil erosion can be caused by rainfall" (Table 1). They disagreed, however, when compared on the statement (item No.A-5) "soil erosion improves soil fertility" (Table 2). Of the 99 farmers interviewed, only about seven percent responded "Don't Know." They commented that the term "erosion" was not familiar to them. As shown in Table 3, the respondents agreed with the statement (item No.A-11) "soil loss is mostly caused by erosion." Farmers also agreed (Table 4) that "soil loss decreases crop yield" (item No.A-14).

When the four groups were compared on the statement (item No.A-13) "burning crop residues is better practice than incorporating them into the soil," results reveal that respondents generally disagreed (Table 5) with what is stated in the item.

A comparison of respondents' answers to two statements concerning the relationship between water and forests reveals that 87 percent of small hillside farmers disagreed (Table 6) with the statement (item No.A-10) "cutting trees does not affect water cycle." Whereas, all of the farmers agreed (Table 7) that "forest help to maintain the quality of the water" (item No.A-28).
Table 1. Chi-square Comparison of Group Responses to Statement on Cause of Soil Erosion.

<table>
<thead>
<tr>
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<td>(Expected)</td>
<td></td>
<td>(13.9)</td>
<td></td>
<td></td>
<td>(19.1)</td>
<td></td>
<td></td>
<td>(22.6)</td>
<td></td>
<td></td>
<td>(30.4)</td>
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<td></td>
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</tr>
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<td></td>
<td>1</td>
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<td>1.0</td>
<td>4</td>
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<td>6.1</td>
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<tr>
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<td>(2.1)</td>
<td></td>
<td></td>
<td>(2.9)</td>
<td></td>
<td></td>
<td>(3.4)</td>
<td></td>
<td></td>
<td>(4.6)</td>
<td></td>
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<tr>
<td>SD/D</td>
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<td></td>
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</tr>
<tr>
<td>TOTAL</td>
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<td>16</td>
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<td>16.2</td>
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<td>22</td>
<td>22.2</td>
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<td>26</td>
<td>26.3</td>
<td>35</td>
<td>35</td>
<td>35.3</td>
<td>99</td>
<td>99</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

\[\chi^2 = 2.32, \ df = 3, \ Prob = 0.51\]

* A = group with EE workshop; B = group with credit; C = group with both EE workshop and credit; and D = others.
** SA/A = strongly agree/agree (collapsed); DK = don't know; and SD/D = strongly disagree/disagree (collapsed).
& Expected stands for expected frequency, given in parentheses. These notes will apply to tables one through 11.
Table 2. Chi-square Comparison on Group Responses to Statement Regarding Soil Erosion and Soil Productivity.

<table>
<thead>
<tr>
<th>GROUPS*</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA/A</td>
<td>0 0.0</td>
<td>6 6.1</td>
<td>3 3.0</td>
<td>4 4.0</td>
<td>13 13.1</td>
</tr>
<tr>
<td>(Expted) &amp; (2.1) &amp; (2.9) &amp; (3.4) &amp; (4.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DK</td>
<td>1 1.0</td>
<td>0 0.0</td>
<td>2 2.0</td>
<td>4 4.0</td>
<td>7 7.1</td>
</tr>
<tr>
<td>(Expted)</td>
<td>(1.1)</td>
<td>(1.6)</td>
<td>(1.8)</td>
<td>(2.5)</td>
<td></td>
</tr>
<tr>
<td>SD/D</td>
<td>15 15.2</td>
<td>16 16.2</td>
<td>21 21.2</td>
<td>27 27.3</td>
<td>79 79.8</td>
</tr>
<tr>
<td>(Expted)</td>
<td>(12.8)</td>
<td>(17.6)</td>
<td>(20.7)</td>
<td>(27.9)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16 16.2</td>
<td>22 22.2</td>
<td>26 26.3</td>
<td>35 35.3</td>
<td>99 100.0</td>
</tr>
</tbody>
</table>

Chi-square= 8.67    df= 6    Prob= 0.19

Table 3. Chi-square Comparison of Group Responses to Statement on Cause of Soil Loss.

<table>
<thead>
<tr>
<th>GROUPS*</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA/A</td>
<td>15 15.2</td>
<td>20 20.2</td>
<td>26 26.3</td>
<td>33 33.3</td>
<td>94 95.0</td>
</tr>
<tr>
<td>(Expted) &amp; (15.2) &amp; (20.9) &amp; (24.7) &amp; (33.2)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>DK</td>
<td>1 1.0</td>
<td>2 2.0</td>
<td>0 0.0</td>
<td>2 2.0</td>
<td>5 5.1</td>
</tr>
<tr>
<td>(Expted)</td>
<td>(0.8)</td>
<td>(1.1)</td>
<td>(1.3)</td>
<td>(1.8)</td>
<td></td>
</tr>
<tr>
<td>SD/D</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16 16.2</td>
<td>22 22.2</td>
<td>26 26.3</td>
<td>35 35.3</td>
<td>99 100.0</td>
</tr>
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</table>

Chi-square= 2.21    df= 3    Prob= 0.53
Table 4. Chi-square Comparison of Group Responses to Statement Regarding the Relationship Between Soil Loss and Crop Yield.

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>SA/A</td>
<td>15 15.2</td>
<td>22 22.2</td>
<td>26 26.3</td>
<td>33 33.3</td>
<td>96 97.0</td>
</tr>
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<td>(Exptd)k</td>
<td>(15.5)</td>
<td>(21.3)</td>
<td>(25.2)</td>
<td>(33.9)</td>
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<tr>
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<td>- -</td>
<td>- -</td>
<td>- -</td>
<td>- -</td>
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</tr>
<tr>
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<td>0 0.0</td>
<td>2 2.0</td>
<td>3 3.0</td>
</tr>
<tr>
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<td>(0.7)</td>
<td>(0.8)</td>
<td>(1.1)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
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<td>22 22.2</td>
<td>26 26.3</td>
<td>35 35.3</td>
<td>99 100.0</td>
</tr>
<tr>
<td>Chi-square=</td>
<td>2.92</td>
<td>df= 3</td>
<td>Prob= 0.40</td>
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Table 5. Chi-square Comparison of Group Responses to Statement about Burning Crop Residues.

<table>
<thead>
<tr>
<th>GROUPS*</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2 2.0</td>
<td>2 2.0</td>
<td>5 5.1</td>
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<tr>
<td>(Exptd)k</td>
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<td>(1.1)</td>
<td>(1.3)</td>
<td>(1.8)</td>
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</tr>
<tr>
<td>DK</td>
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<tr>
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<td>(0.4)</td>
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<tr>
<td>SD/D</td>
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<td>22 22.2</td>
<td>23 23.3</td>
<td>33 33.3</td>
<td>93 93.9</td>
</tr>
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<td>(20.7)</td>
<td>(24.4)</td>
<td>(32.9)</td>
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<tr>
<td>TOTAL</td>
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<td>22 22.2</td>
<td>26 26.3</td>
<td>35 35.3</td>
<td>99 100.0</td>
</tr>
<tr>
<td>Chi-square=</td>
<td>4.52</td>
<td>df= 5</td>
<td>Prob= 0.61</td>
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Table 6. Chi-square Comparison of Group Responses to Statement Relating Forest to Water Cycle.

<table>
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<th>C</th>
<th>D</th>
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<tr>
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<td>(3.2)</td>
<td>(4.2)</td>
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<tr>
<td>DK</td>
<td>-</td>
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</tr>
<tr>
<td>SD/D</td>
<td>13</td>
<td>13.1</td>
<td>21</td>
<td>21.2</td>
<td>24</td>
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<tr>
<td>(Expected) &amp; (14.1)</td>
<td>(19.3)</td>
<td>(22.8)</td>
<td>(30.8)</td>
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<td>22.2</td>
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<td>Chi-square = 3.15</td>
<td>df = 3</td>
<td>Prob = 0.37</td>
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Table 7. Chi-square Comparison of Group Responses to Statement about Forest and Quality of Water.

<table>
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<tr>
<th>OPTIONS**</th>
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<th>B</th>
<th>C</th>
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<th>TOTAL</th>
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<td>26</td>
</tr>
<tr>
<td>(Expected) &amp; (16)</td>
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<td>(26)</td>
<td>(35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DK</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SD/D</td>
<td>-</td>
<td>-</td>
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<tr>
<td>TOTAL</td>
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<td>22</td>
<td>22.2</td>
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<tr>
<td>Chi-square =</td>
<td>df =</td>
<td>Prob =</td>
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</table>
There was no significant difference (Table 8) when farmers were compared on the statement (item No.A-34) "after a heavy raining period, stream water is colored brown because it contains soil (sediment)." As shown in Table 8, respondents generally agreed (99 percent) with the statement.

Two statements concerning natural resources were used to determine farmers' general knowledge on such concepts. When compared on the statement (item No.A-3) "soil, water, air, and sunlight are necessary for crop production," it was found that all of them agreed (Table 9) with the idea expressed in this item. Likewise, when farmers were compared on the statement (item No.A-33) "soil, water, air, trees, and wildlife are interrelated," results revealed that 95 percent of the respondents agreed (Table 10) and the other five percent responded "Don't Know."

Also, farmers were compared on their responses to the item (No.A-6) "the Ocoa watershed can be cleared because such action does not affect people who live and farm in the watershed." Results reveal that respondents generally disagreed (Table 11) on the statement.
Table 8. Chi-square Comparison of Group Responses to Statement Relating Sediment to Stream Water.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th>C</th>
<th>D Pct.</th>
<th>TOTAL</th>
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<td>SA/A</td>
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<td>(34.6)</td>
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<td>DK</td>
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<td>0.0</td>
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<td>df* 3</td>
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<td>Prob* 0.32</td>
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</table>

Table 9. Chi-square Comparison of Group Responses to Statement Relating Environmental Resources to Crop Production.

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<th>C</th>
<th>D Pct.</th>
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<tr>
<td>SA/A</td>
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<td>(26.0)</td>
<td>(35.0)</td>
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<td>Prob* .</td>
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Table 10. Chi-square Comparison of Group Responses to Statement about Watershed Resources and Farmers.

<table>
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<th>D</th>
<th>TOTAL</th>
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<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>SA/A</td>
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<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>(Exptd)</td>
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<td>(0.4)</td>
<td>(0.5)</td>
<td>(0.8)</td>
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</tr>
<tr>
<td>DK</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SD/D</td>
<td>15</td>
<td>15.2</td>
<td>22</td>
<td>22.2</td>
<td>26</td>
</tr>
<tr>
<td>(Exptd)</td>
<td>(15.7)</td>
<td>(21.6)</td>
<td>(25.5)</td>
<td>(34.2)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>16.2</td>
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<td>22.2</td>
<td>26</td>
</tr>
<tr>
<td>Chi-square</td>
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<td>df=3</td>
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<tr>
<td>Prob</td>
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</table>

Table 11. Chi-square Comparison of Group Responses to Statement Concerning Resources Interrelationship.

<table>
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<tr>
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<th>B</th>
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<td>------</td>
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<td>-------</td>
</tr>
<tr>
<td>SA/A</td>
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<td>14.1</td>
<td>21</td>
<td>21.2</td>
<td>26</td>
</tr>
<tr>
<td>(Exptd)</td>
<td>(15.4)</td>
<td>(21.1)</td>
<td>(24.9)</td>
<td>(33.6)</td>
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</tr>
<tr>
<td>DK</td>
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<td>2.0</td>
<td>1</td>
<td>1.0</td>
<td>0</td>
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<td>(Exptd)</td>
<td>(0.6)</td>
<td>(0.9)</td>
<td>(1.1)</td>
<td>(1.4)</td>
<td></td>
</tr>
<tr>
<td>SD/D</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
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<tr>
<td>TOTAL</td>
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<td>16.2</td>
<td>22</td>
<td>22.2</td>
<td>26</td>
</tr>
<tr>
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<td>df=3</td>
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<tr>
<td>Prob</td>
<td>0.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In order to establish the relationship between farmers who have participated in conservation activities and those who have not, groups A, B, and C were collapsed into one group. For the comparison, a Tukey's Studentized Range (HSD) Test was applied to the means of the responses to the statements discussed in tables one through 11. The results of this test (Appendix C) revealed that groups were not significantly different.

Part (b) of Objective 1 was determined through the application of the chi-square statistic to the responses given to eight items. Since this part attempted to establish the relationship between farmers who have participated in EE workshops (groups A and C) and those who have not participated (groups B and D), groups A and C were collapsed and identified as group "W" and groups B and D (collapsed) are identified as group "R".

The resulting two groups were compared on the statement (item No.A-1) "soil, water, forest, and air are natural resources." Results reveal that 39 farmers out of the 42 who have attended EE workshops agreed (Table 12) with the statement, compared to 50 out of
Table 12. Chi-square Comparison on Group Responses to Statement Concerning Identification of Natural Resources.

<table>
<thead>
<tr>
<th>OPTIONS**</th>
<th>W</th>
<th>R</th>
<th>TOTAL</th>
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</thead>
<tbody>
<tr>
<td>SA/A</td>
<td>39</td>
<td>39.4</td>
<td>50</td>
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<tr>
<td>(Expected)</td>
<td>(37.8)</td>
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<td>(51.2)</td>
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<tr>
<td>DK</td>
<td>3</td>
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<td></td>
<td>(5.8)</td>
</tr>
<tr>
<td>SD/D</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>42</td>
<td>42.4</td>
<td>57</td>
</tr>
</tbody>
</table>

Chi-square = 0.70  df = 1  Prob = 0.40

* W represents the two groups that have participated in the EE workshops (groups A and C collapsed) and R represents the two groups that have not participated in the EE workshops (groups B and D collapsed).

** SA/A = strongly agree/disagree (collapsed);
DK = don't know; and SD/D = strongly disagree/disagree (collapsed).

& Expected = expected frequency, which is given in parentheses.

These notes will apply to tables 12 through 19.
57 farmers who have not participated that also agreed. Table 12 also shows that the two groups are not significantly different (alpha=0.05, p=0.40). Ninety-nine percent of all of the farmers agreed, while 10 percent responded "Don't Know" (Table 12). Generally, this 10 percent argued that the term "natural resources" was unfamiliar to them. When the two groups were compared on their responses to the statement (item No.A-2) "topsoil is the resource base for crop production," it was found that farmers included in both groups totally agreed with such a statement (Table 13).

Also, respondents were compared on the item (No.A-7) "cutting trees in the Ocoa watershed affects wildlife." The analysis reveals that 94 percent of the farmers agreed (Table 14), while a split six percent of both groups disagreed with the idea expressed in the statement. The two groups of interviewees were compared on the statement (item No.A-12) "crop residues left in the "conuco" can help improve soil fertility." Result of this comparison reveals that there was no significant difference between the two groups of farmers. Table 15 shows that 99 percent of the respondents agreed with the statement.
Table 13. Chi-square Comparison of Group Responses to Statement Concerning Soil and Crop Production.

<table>
<thead>
<tr>
<th>GROUPS*</th>
<th>OPTIONS**</th>
<th>TOTAL</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>W</td>
<td>R</td>
</tr>
<tr>
<td>SA/A</td>
<td>42</td>
<td>42.4</td>
</tr>
<tr>
<td>(Expted)&amp;</td>
<td>(42.0)</td>
<td>(57.0)</td>
</tr>
<tr>
<td>DK</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SD/D</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>42</td>
<td>42.4</td>
</tr>
</tbody>
</table>

Chi-square = .  df = .  Prob = .

Table 14. Chi-square Comparison of Group Responses to Statement Relating Forest to Wildlife.

<table>
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<tr>
<th>GROUPS*</th>
<th>OPTIONS**</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>W</td>
<td>R</td>
</tr>
<tr>
<td>SA/A</td>
<td>39</td>
<td>39.4</td>
</tr>
<tr>
<td>(Expted)&amp;</td>
<td>(39.5)</td>
<td>(53.5)</td>
</tr>
<tr>
<td>DK</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SD/D</td>
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<td>3.0</td>
</tr>
<tr>
<td>(Expted)</td>
<td>(2.5)</td>
<td>(3.5)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>42</td>
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</table>

Chi-square = 0.50  df = 1  Prob = 0.70
Table 15. Chi-square Comparison of Group Responses to Statement Regarding Crop Residues and Soil Fertility.

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<td>-----</td>
<td>----</td>
</tr>
<tr>
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<td>DK</td>
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</tr>
<tr>
<td></td>
<td>(0.4)</td>
<td>(0.6)</td>
<td></td>
</tr>
<tr>
<td>SD/D</td>
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<td>99</td>
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<tr>
<td>Chi-square= 1.37</td>
<td>df= 1</td>
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</tbody>
</table>

Table 16. Chi-square Comparison of Group Responses to Statement about Meaning of Environmental Conservation.

<table>
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<tr>
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<th>OPTIONS**</th>
<th>W</th>
<th>R</th>
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<tr>
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<tr>
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<td>(3.8)</td>
<td>(5.2)</td>
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<tr>
<td>SD/D</td>
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<td>1</td>
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<td>(0.4)</td>
<td>(0.6)</td>
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<td>99</td>
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<td>Chi-square= 2.47</td>
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</table>
The statement (item No.A-19) "conservation means to use the environment and its resources in a wise form" was one of the statements utilized to compare the two groups on their knowledge about conservation. Results reveal that the majority agreed with the statement (Table 16). While 89.9 percent of all the farmers agreed, seven farmers from group R chose "Don't Know" as their option and two individuals from group W also chose the same option (Table 16).

A comparison on the statement (item No.A-20) "conservation practices help crop production" revealed that 98 percent of the farmers agreed (Table 17) with the statement. The statement (item No.A-21) "conservation implies that natural resources cannot be used" was also utilized to determine knowledge of the concept of "conservation". As shown in Table 18, results of the comparison made on this statement revealed that 79 percent of all the farmers disagreed with the statement. The last statement analyzed to determine part (b) of Objective 1 was item No.A-23, "terraces are conservation practices used for controlling soil erosion." Results of this comparison, shown in Table 19, revealed that farmers generally agreed with the stated item.
Table 17. Chi-square Comparison of Group Responses to Statement Relating Conservation Practices to Crop Production.

<table>
<thead>
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<tbody>
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<td>42.4</td>
<td>57</td>
<td>57.6</td>
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<td>100.0</td>
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</tbody>
</table>

Chi-square = 1.50  df = 1  Prob = 0.22

Table 18. Chi-square Comparison of Group Responses to Statement Concerning Perception of Resources Conservation.

<table>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD/D</td>
<td>36</td>
<td>36.4</td>
<td>42</td>
<td>42.4</td>
<td>78</td>
<td>78</td>
<td>78.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Expected)</td>
<td>(33.1)</td>
<td>(44.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>42</td>
<td>42.4</td>
<td>57</td>
<td>57.6</td>
<td>99</td>
<td>100</td>
<td>100.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi-square = 4.06  df = 2  Prob = 0.13
Table 19. Chi-square Comparison of Group Responses to Statement about Usefulness of Conservation Practices.

<table>
<thead>
<tr>
<th>GROUPS*</th>
<th>W</th>
<th>R</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA/A (Expted)</td>
<td>42</td>
<td>42.4</td>
<td>55</td>
</tr>
<tr>
<td>DK (Expted)</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>SD/D</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>42</td>
<td>42.4</td>
<td>57</td>
</tr>
</tbody>
</table>

Chi-square= 1.50  df= 1  Prob= 0.22
Generally, there was no significant relationship found between the two groups' responses. In addition to the chi-square statistic, the Tukey's test was also used (Appendix D) for comparison on the above discussed eight statements.

The second objective of the study, concerning small farmers' attitudes toward conservation, was assessed through the statistical analysis of the responses given to 13 items of the survey questionnaire. Data were analyzed using the chi-square statistic and the t-test. While the t-test was applied to evaluate part (a) of the objective, the chi-square was applied to parts (b), (c), and (d).

Considering that part (a) refers to EE workshops, only groups A and C were compared. For this purpose, as stated above, the two groups of respondents were compared on their responses to five items. When compared on the question (item No. B-10) "do you think the EE workshop has helped you understand and seek solutions to natural resources problems in your community?" (Table 20), no significant difference was found between the two groups with EE workshops (groups A and C). When the two groups were compared on their
Table 20. A T-test Comparison of Two Group Means on an Item Related to EE Workshops and Natural Resources Problems.

<table>
<thead>
<tr>
<th>GROUP*</th>
<th>N</th>
<th>MEAN</th>
<th>DEVIATION</th>
<th>DF</th>
<th>T</th>
<th>PROB&gt;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>16</td>
<td>3.00</td>
<td>0.00</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>C</td>
<td>26</td>
<td>3.00</td>
<td>0.00</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

* Group A= EE workshops and group B= EE workshops and Credit. This will apply to tables 20 to 24.

Table 21. A T-test Comparison of Two Group Means on an Item Concerning EE Impact on Farmers' Cropping Practices.

<table>
<thead>
<tr>
<th>GROUP*</th>
<th>N</th>
<th>MEAN</th>
<th>DEVIATION</th>
<th>DF</th>
<th>T</th>
<th>PROB&gt;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>16</td>
<td>3.00</td>
<td>0.00</td>
<td>25</td>
<td>1.00</td>
<td>0.33</td>
</tr>
<tr>
<td>C</td>
<td>26</td>
<td>2.89</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Alpha= 0.05
responses to item (No. B-11) "have any of the EE workshops helped you change your cropping practices?", no significant difference was found (Table 21) between the two groups.

The comparison on item (No.B-13), "before attending any of the EE workshops, did you use conservation practices?", revealed that no significant difference exists between the two groups' responses (Table 22). The item (No.B-14), "before attending any of the EE workshops, did you think about conservation of natural resources?", was also used to compare farmers that have participated in the EE workshops. As shown in Table 23, it was found that the two groups were not significantly different in their responses to the item.

A comparison on item No.B-12, "do you think the EE workshops have helped you on both conserving natural resources and solving environmental problems in your community?", revealed no significant difference (Table 24) in how respondents answered this question.

In general, there was no significant difference between the two groups of farmers on the t-test analysis applied to their responses to the above
Table 22. A T-test Comparison of Two Group Means on an Item Regarding EE Workshops and Use of Conservation Practices.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>N</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
<th>DF</th>
<th>T</th>
<th>PROB &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>16</td>
<td>2.13</td>
<td>0.34</td>
<td>38.6 &amp;</td>
<td>0.78</td>
<td>0.44</td>
</tr>
<tr>
<td>C</td>
<td>26</td>
<td>2.00</td>
<td>0.69</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

& Variances were unequal (P<0.0063), therefore Satterthwaite's Approximation was used (SAS Statistical Manual, pp219-221).
Alpha = 0.05.

Table 23. A T-test Comparison of Group Means on an Item about EE Motivation to Conserve Natural Resources.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>N</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
<th>DF</th>
<th>T</th>
<th>PROB &gt; T</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>16</td>
<td>2.63</td>
<td>0.72</td>
<td>40</td>
<td>1.28</td>
<td>0.21</td>
</tr>
<tr>
<td>C</td>
<td>26</td>
<td>2.88</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Alpha = 0.05

<table>
<thead>
<tr>
<th>GROUP</th>
<th>N</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
<th>DF</th>
<th>T</th>
<th>PROB&gt;T</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>16</td>
<td>2.19</td>
<td>1.05</td>
<td>40</td>
<td>0.12</td>
<td>0.91</td>
</tr>
<tr>
<td>C</td>
<td>26</td>
<td>2.15</td>
<td>1.78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Alpha = 0.05
discussed items, which were designed to evaluate part (a) of Objective 2.

Four items from the survey instrument were used to assess part (b) of Objective 2. In this context, using the chi-square statistic, interviewees were compared on their responses to item (No. B-21), "do you think the community should cooperate with government agencies to implement conservation practices in the Ocoa watershed?" Results of this comparison revealed that all of the farmers but one responded "Yes" (Table 25) to the stated question. Likewise, farmers generally chose "Yes" (Table 26) when they were compared on item No. B-22, "are you willing to help schools organize EE activities in the watershed?" Table 26 shows that 98 percent of the respondents answered in affirmative form and only two farmers chose "Uncertain" as their option to respond to this item.

The four groups of farmers were compared on responses to item (No. B-25), "are you able and willing to teach other 'campesinos' (farmers or nonfarmers) about conservation of natural resources?" Results reveal that more individuals from groups A, B, and C than the expected chose "Yes" as the response to the
Table 25. Chi-square Comparison of Group Attitudes Toward Community Participation in Conservation Programs.

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES (Expected)</td>
<td>16</td>
<td>16.2</td>
<td>21</td>
<td>21.2</td>
<td>26</td>
</tr>
<tr>
<td>NO</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UNCERTAIN (Expected)</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>16.2</td>
<td>22</td>
<td>22.2</td>
<td>26</td>
</tr>
</tbody>
</table>

Chi-square = 3.52  df = 3  Prob = 0.32

* Group A = EE workshop; group B = credit; group C = EE workshop and credit; and group D = others.
& Expected = expected frequency, which is given in parentheses.
This note will apply to tables 25 through 32.
item (Table 27). This table also shows that only eight percent of the farmers from group D chose the same option to respond to the question. On the other hand, when respondents were compared on item (No.B-27), "are you willing to organize "convites" for reforestation purposes?", results revealed that 96 percent of the farmers responded "Yes" (Table 28). The other four percent was equally divided between options "No" and "Uncertain."

In order to assess part (c) of Objective 2, only the three groups of farmers participating in the NARMA Project were compared. In this context, respondents were compared using the chi-square statistic on two items. When the three groups were compared on item (No.B-24) "do you feel that you can use conservation practices with little technical assistance?", results revealed a divided opinion among group’s responses. Seventy percent (45 farmers out of 64) felt confidence and therefore responded "Yes" (Table 29), whereas about 22 percent of them chose "No", and about eight percent answered "Uncertain" (Table 29). When farmers were compared on item (No.B-28), "if the NARMA Project ends, will you continue using conservation practices?", results revealed that 89 percent of the three groups of
Table 26. Chi-square Comparison of Group Attitudes to Help Organize EE Activities in Schools.

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>16</td>
<td>16.2</td>
<td>21</td>
<td>21.2</td>
<td>26</td>
</tr>
<tr>
<td>(Expected) &amp;</td>
<td>(15.7)</td>
<td>(15.7)</td>
<td>(15.7)</td>
<td>(15.7)</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UNCERTAIN</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>(Expected)</td>
<td>(0.3)</td>
<td>(0.3)</td>
<td>(0.3)</td>
<td>(0.3)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>16.2</td>
<td>22</td>
<td>22.2</td>
<td>26</td>
</tr>
</tbody>
</table>

Chi-square = 1.70  df = 3  Prob = 0.64

Table 27. Chi-square Comparison of Group Willingness to Teach Others About Conservation Practices.

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>16</td>
<td>16.2</td>
<td>22</td>
<td>22.2</td>
<td>25</td>
</tr>
<tr>
<td>(Expected) &amp;</td>
<td>(15.8)</td>
<td>(15.8)</td>
<td>(15.8)</td>
<td>(15.8)</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>(Expected)</td>
<td>(0.3)</td>
<td>(0.3)</td>
<td>(0.3)</td>
<td>(0.3)</td>
<td></td>
</tr>
<tr>
<td>UNCERTAIN</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>(Expected)</td>
<td>(4.0)</td>
<td>(4.0)</td>
<td>(4.0)</td>
<td>(4.0)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>16.2</td>
<td>22</td>
<td>22.2</td>
<td>26</td>
</tr>
</tbody>
</table>

Chi-square = 63.85  df = 6  Prob = 0.0001
Table 28. Chi-square Comparison of Group Responses to an Item Concerning Willingness to Organize Reforestation Activities.

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>GROUPS*</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>16</td>
<td>16.2</td>
<td>22</td>
<td>22.2</td>
<td>25</td>
<td>28.3</td>
</tr>
<tr>
<td></td>
<td>(Expted)</td>
<td>(15.4)</td>
<td>(21.2)</td>
<td>(24.9)</td>
<td>(33.6)</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>(Expted)</td>
<td>(0.3)</td>
<td>(0.4)</td>
<td>(0.5)</td>
<td>(0.7)</td>
<td></td>
</tr>
<tr>
<td>UNCERTAIN</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>(Expted)</td>
<td>(0.3)</td>
<td>(0.4)</td>
<td>(0.6)</td>
<td>(0.7)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>16.2</td>
<td>22</td>
<td>22.2</td>
<td>26</td>
<td>26.3</td>
</tr>
</tbody>
</table>

Chi-square= 5.12  df= 6  Prob= 0.53
Table 29. Chi-square Comparison of Three Groups' Attitudes to Use Conservation Practices with Little Technical Assistance.

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>10 15.6</td>
<td>17 26.5</td>
<td>18 28.1</td>
<td>45 70.3</td>
</tr>
<tr>
<td>(Expted)</td>
<td>(11.3)</td>
<td>(15.5)</td>
<td>(18.3)</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>5  7.8</td>
<td>4  6.3</td>
<td>5  7.8</td>
<td>14 21.9</td>
</tr>
<tr>
<td>(Expted)</td>
<td>(3.5)</td>
<td>(4.8)</td>
<td>(5.7)</td>
<td></td>
</tr>
<tr>
<td>UNCERTAIN</td>
<td>1  1.6</td>
<td>1  1.6</td>
<td>3  4.7</td>
<td>5  7.8</td>
</tr>
<tr>
<td>(Expted)</td>
<td>(1.3)</td>
<td>(1.7)</td>
<td>(2.0)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16 25.0</td>
<td>22 34.4</td>
<td>26 40.6</td>
<td>64 100.0</td>
</tr>
</tbody>
</table>

Chi-square = 1.97 \hspace{1cm} df = 4 \hspace{1cm} Prob = 0.74
farmers participating in conservation activities (57 farmers out of 64) responded "Yes" (Table 30) and only seven farmers (11 percent) felt uncertainty about the use of conservation practices after the NARMA Project. They argued, generally, that they economically cannot afford conservation.

To assess part (d) of Objective 2, responses to two items were analyzed using the chi-square statistic. For item No. B-15, "have any of the EE workshops influenced your decision to use conservation practices?", only respondents of groups A and C (with EE workshops) were considered. As shown in table 31, 90 percent of the farmers in these two groups responded "Yes," while about 10 percent answered "Uncertain." Comparison was also made on item No. B-17, "would you use conservation practices if you were not receiving credit from the NARMA Project?" Since this question was particularly addressed to farmers participating in the credit program, only responses of farmers from groups B and C were compared. The comparison revealed that about 98 percent of the respondents answered "Yes" (Table 32), they would use conservation practices if they do not receive credit. The other two percent showed uncertainty when responding to this question.
Table 30. Chi-square Comparison of Three Groups' Attitudes to Use Conservation Practices After the End of the NARMA Project.

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>10</td>
<td>15.6</td>
<td>22</td>
<td>34.4</td>
</tr>
<tr>
<td></td>
<td>(14.3)</td>
<td>(19.6)</td>
<td>(23.2)</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNCERTAIN</td>
<td>6</td>
<td>9.4</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>(1.7)</td>
<td>(2.4)</td>
<td>(2.8)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>25.0</td>
<td>22</td>
<td>34.4</td>
</tr>
</tbody>
</table>

Chi-square= 15.63  df= 2  Prob= 0.0004
Table 31. Chi-square Comparison of Two Groups' Responses to an Item Relating EE Workshops with Adoption of Conservation Practices.

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>A</th>
<th>C</th>
<th>TOTAL</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>----------------</td>
<td>----</td>
<td>------</td>
<td>----</td>
<td>------</td>
<td>----</td>
<td>-------</td>
</tr>
<tr>
<td>YES</td>
<td>14</td>
<td>33.3</td>
<td>24</td>
<td>57.1</td>
<td>38</td>
<td>90.4</td>
</tr>
<tr>
<td>(Expted) &amp;</td>
<td>(14.5)</td>
<td>(23.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UNCERTAIN</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NO RESPONSE</td>
<td>2</td>
<td>4.8</td>
<td>2</td>
<td>4.8</td>
<td>4</td>
<td>9.6</td>
</tr>
<tr>
<td>(Expted)</td>
<td>(1.5)</td>
<td>(2.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>38.1</td>
<td>26</td>
<td>61.9</td>
<td>42</td>
<td>100.0</td>
</tr>
</tbody>
</table>

\[
\text{Chi-square} = 0.33 \quad \text{df} = 1 \quad \text{Prob} = 0.61
\]
Table 32. Chi-square Comparison of Two Groups' Responses to an Item Relating Credit to the Use of Conservation Practices.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YES</td>
<td></td>
<td>22</td>
<td>25</td>
<td>52.1</td>
<td>47</td>
<td>97.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Expected)</td>
<td></td>
<td>(21.5)</td>
<td>(25.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UNCERTAIN</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2.1</td>
<td>1</td>
<td>2.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Expected)</td>
<td></td>
<td>(0.5)</td>
<td>(0.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>22</td>
<td>26</td>
<td>54.2</td>
<td>48</td>
<td>100.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi-square = 0.86  df = 1  Prob = 0.35
Summary of Groups Responses to Open-ended and Multiple Choice Items

Groups B and D were asked to respond to item No. B-26, "why did you not attend any of the EE workshops?"
Responses and frequencies are shown in Table 33.

Table 33. Frequencies and Percentages of Responses to an Item Concerning Participation in the EE Workshops.

<table>
<thead>
<tr>
<th>RESPONSE</th>
<th>GROUPS*</th>
<th></th>
<th></th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not invited</td>
<td></td>
<td>14</td>
<td>24.6</td>
<td>14</td>
</tr>
<tr>
<td>Could not attend</td>
<td></td>
<td>2</td>
<td>3.5</td>
<td>2</td>
</tr>
<tr>
<td>Not motivated</td>
<td></td>
<td>2</td>
<td>3.5</td>
<td>3</td>
</tr>
<tr>
<td>Not had knowledge about</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>Not held in their community</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>No response</td>
<td></td>
<td>4</td>
<td>7.0</td>
<td>12</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>22</td>
<td>38.6</td>
<td>35</td>
</tr>
</tbody>
</table>

* Group B includes farmers with credit only and group D includes other farmers (not conservation activities).
Farmers included in groups A and C were asked the question (item No.B-7), "who was the sponsor of the EE workshop that you attended?" Responses and frequencies are given in Table 34.

Table 34. Frequencies and Percentages of Responses to an Item Regarding Organization of the EE Workshops.

<table>
<thead>
<tr>
<th>RESPONSES</th>
<th>GROUPS*</th>
<th>A</th>
<th>C</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NARMA Project/DEA</td>
<td></td>
<td>15 35.7</td>
<td>23 54.7</td>
<td>38 90.4</td>
</tr>
<tr>
<td>&quot;La Junta&quot;</td>
<td></td>
<td>0 0.0</td>
<td>1 2.4</td>
<td>1 2.4</td>
</tr>
<tr>
<td>Did not remember</td>
<td></td>
<td>0 0.0</td>
<td>2 4.8</td>
<td>2 4.8</td>
</tr>
<tr>
<td>Not response</td>
<td></td>
<td>1 2.4</td>
<td>0 0.0</td>
<td>1 2.4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>16 38.1</strong></td>
<td><strong>26 61.9</strong></td>
<td><strong>42 100.0</strong></td>
</tr>
</tbody>
</table>

* Group A includes farmers with EE workshops only and group C includes farmers with both EE workshops and credit.
As a follow-up question, groups A and C were asked to respond to item No.B-9, "after learning about conservation practices, what practices did you apply?" Responses and frequencies are presented in Table 35.

Table 35. Frequencies and Percentages of Responses to an Item About Use of Conservation Practices After Participation in the EE Workshops.

<table>
<thead>
<tr>
<th>RESPONSES</th>
<th>A</th>
<th>C</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead barriers</td>
<td>2</td>
<td>4.8</td>
<td>4</td>
</tr>
<tr>
<td>Terraces</td>
<td>4</td>
<td>9.5</td>
<td>2</td>
</tr>
<tr>
<td>Planting in contours</td>
<td>2</td>
<td>4.8</td>
<td>0</td>
</tr>
<tr>
<td>Reforestation</td>
<td>2</td>
<td>4.8</td>
<td>3</td>
</tr>
<tr>
<td>Waterways</td>
<td>1</td>
<td>2.3</td>
<td>0</td>
</tr>
<tr>
<td>Incorporation of crop residues#</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>None</td>
<td>5</td>
<td>11.9</td>
<td>16</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>38.1</td>
<td>26</td>
</tr>
</tbody>
</table>

* In group A are included farmers that have attended any of the EE workshops and group C includes farmers participating in both EE workshops and credit.
& Incorporation of crop residues into the soil.
When farmers participating in the credit program (groups B and C) were asked (item No.1-15), "How did you get credit from the NARMA Project?", all of the farmers responded that they received credit through the technicians from the NARMA Project and the Banco Agricola (BAGRICALA), which is the procedure established for credit purposes. Groups A, B, and C responded to the question (item No.B-3), "which was the reason most motivated you to accept conservation practices?" As shown in Table 36, 56 percent of the respondents chose the response "to control soil erosion." Table 36 also shows that the remaining 44 percent was divided among four other responses.

In order to determine how long farmers have been using conservation practices, they were asked item No.B-2, "how long have you been using conservation practices?" A chi-square comparison of the three groups participating in the NARMA Project revealed that about 80 percent of them have been applying conservation practices for up to two years (Table 37). However, the same comparison also showed that 29 percent of this 80 percent have participated for less than one year. In addition, it was noted that only seven farmers (out of 64) responded that they have been using conservation practices for three or more years.
Table 36. Frequencies and Percentages of Responses to an Item Concerning Reason to Use Conservation Practices.

<table>
<thead>
<tr>
<th>RESPONSES</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil cansado&amp;</td>
<td>2</td>
<td>3.1</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>To get credit</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>To control erosion@</td>
<td>6</td>
<td>9.4</td>
<td>13</td>
<td>20.3</td>
</tr>
<tr>
<td>To produce longer$</td>
<td>2</td>
<td>3.1</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>To receive incentives#</td>
<td>1</td>
<td>1.6</td>
<td>4</td>
<td>6.3</td>
</tr>
<tr>
<td>Other+</td>
<td>5</td>
<td>7.8</td>
<td>3</td>
<td>4.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>25.0</td>
<td>22</td>
<td>34.4</td>
</tr>
</tbody>
</table>

* Groups A, B, and C include farmers participating in conservation activities (EE workshops, credit, or both).

& Cansado means when farmers produce very little in their plots because the topsoil has almost disappeared.

@ For controlling soil erosion.

$ For producing longer in the same cropland.

# Incentives such as food for convites, fruit trees, and others.

+ In this case, other was specified as observing neighboring plots with conservation practices.
Table 37. A Chi-square Comparison of Three Groups’ Responses to an Item about Length of Time Using Conservation Practices.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None (Expected) &amp;</td>
<td>5</td>
<td>7.8</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>5</td>
</tr>
<tr>
<td>Under 1 yr. (Expected)</td>
<td>2</td>
<td>3.1</td>
<td>12</td>
<td>18.3</td>
<td>13</td>
<td>20.3</td>
<td>27</td>
</tr>
<tr>
<td>1 to 2 yr. (Expected)</td>
<td>6</td>
<td>9.4</td>
<td>10</td>
<td>15.6</td>
<td>9</td>
<td>14.0</td>
<td>25</td>
</tr>
<tr>
<td>3 to 4 yr. (Expected)</td>
<td>2</td>
<td>3.1</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
<td>2.1</td>
<td>4</td>
</tr>
<tr>
<td>5 to 6 yr. (Expected)</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>1.6</td>
<td>1</td>
</tr>
<tr>
<td>Over 6 yr. (Expected)</td>
<td>1</td>
<td>1.6</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>1.6</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>25.0</td>
<td>22</td>
<td>34.4</td>
<td>26</td>
<td>40.6</td>
<td>64</td>
</tr>
</tbody>
</table>

Chi-square = 25.04  \( df = 10 \)  Prob = 0.0053

* Group A includes farmers with EE workshops; group B includes farmers with credit; and group C represents farmers with both EE workshops and credit.

& Expected = expected frequency, which is given in parentheses.
CHAPTER V

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

Summary

The four groups of small hillside farmers studied in this investigation showed similarity in their general knowledge of environmental issues and conservation practices, as presented in the results of the analyses made. Moreover, it could be said that the evidence reveals that the level of knowledge of the farmers interviewed meet the expectation of the EE program being implemented in the Ocoa watershed.

Though the four groups were not significantly different in their responses to items about environmental knowledge, it cannot be concluded that the EE workshops have failed in the achievement of the pursued objectives.
Also, the same conclusion can be made regarding the results obtained when farmers that have participated in the EE workshops were compared with farmers that have not participated in the workshops. The similarity of knowledge shown by both groups of respondents cannot be taken as a failure of the EE program. But on the contrary, it could be speculated that because of such activities "campeinos" of the Ocoa watershed have increased their environmental knowledge.

In regard to the result of the comparison analyses of items concerning farmers' attitudes toward environmental conservation, it can be deduced that farmers generally showed a positive attitude toward environmental conservation with the exception only of two items. It can be concluded, therefore, that farmers are willing and able to participate actively in conservation activities in the watershed.

In addition, most of the farmers showed willingness to apply conservation practices even after the end of the NARMA Project or if they received little technical assistance. This kind of result was desired from the conservation activities being implemented in the Dominican Republic, since the Government cannot afford
to support "special" conservation projects. In this context, it is expected that farmers may adopt conservation practices in the same manner that they have adopted other cropping practices. However, it cannot be ignored that several farmers have shown uncertainty in continuing to use conservation practices after the NARMA Project and with little technical assistance. Generally, it can be speculated that again the EE program has played an important role in the positive attitude shown by the interviewees.

The uncertainty in teaching other "campesinos" that was found does not mean that farmers are not willing to share their knowledge with others; on the contrary, it represents a comprehensive attitude because farmers included in the group named "others" have not been participating in any conservation activities. Therefore, it could be concluded that they do not have the necessary skill to teach others about conservation considering that very few of the members of this group have applied any practice of conservation.

In relation to the organization of the EE workshops in the watershed, based upon the results shown in Table
33, it can be concluded that because half of the respondents that have not attended any of the EE workshops claimed that they were not invited to participate, organizers of the EE workshops may be using a selective approach to choose farmers or for some other reason are not involving all the farmers from the communities where they are operating. If the former speculation is true, the assumption that every farmer has the same opportunity to participate cannot be considered as valid. Certainly, the program of EE was designed to reach every available individual in a given community where an EE workshop was to be held.

Since the NARMA Project was found to be the major sponsor of the EE workshops in the watershed, it can be assumed that most of the farmers participating in the EE workshops come from the limited areas where the NARMA Project has undertaken activities of soil conservation and reforestation, which in turn could limit the clientele of the EE program.

Although a high percentage of farmers have attended any of the EE workshops, they did not apply what they were taught in such a workshop. It can be speculated,
therefore, that the program does not include follow-up activities.

Researchers such as Southgate et al. (1984) have postulated that incentives should be offered to motivate farmers' adoption of conservation practices. In this study, however, it was found that farmers were more concerned about controlling soil erosion than receiving incentives. It may be speculated that this result has some relationship to the level of environmental knowledge shown by the respondents. It also may be said that access to the EE program, which was a type of extension for natural resources conservation, is associated with the level of awareness of erosion as a problem. Erbaugh (1983) and Veloz et al. (1985) found that agricultural extension (in the Dominican Republic) does not promote conservation activities.

This conclusion is also related to that stated by Nowak (1982) when he noted that to adopt remedial technology it is necessary to recognize a need. In this context, if farmers are aware of the need for erosion control (i.e., as they were shown to be), it is
expected that they will be willing to adopt conservation practices.

A final conclusion of this study is that farmers appear to be most motivated to apply conservation practices since the implementation of the NARMA Project in the watershed. This conclusion is based on the data that show that most of the farmers have for up to two years applied conservation practices.

Implications

The results of this study suggest some modifications to the program of EE being implemented in the Dominican Republic, especially to the EE workshops addressed to small hillside farmers. First, this study suggests the need for a revision of the content of the EE workshops. Second, a revision of the follow-up activities is indicated. In addition, it may be necessary to redefine the approach used to select the clientele of the EE workshops, in terms of both communities and individuals. Finally, it may imply a redirection of the EE workshops objectives. The redirection could be in establishing more specific and measurable objectives, which in turn permit a more...
direct linkage among the different segments of the population in any given watershed.

**Recommendations**

Based on the results of this study and because some questions could not be answered by this investigation, it is recommended that a future study address the source(s) of information of those farmers who have not been participating in the EE workshops or any other conservation activity.

Another recommendation is related to the content and the target population of the EE workshops. First, it is recommended that the EE workshops include other environmental concepts which are not directly related to crop production. In addition, a sound feedback program should be formulated and implemented to assure that farmers apply what they were taught in the workshops or to detect why they are not applying such knowledge. The program will be a source of information to modify in a reliable form the content of the workshops.
A fourth recommendation concerns the field demonstration activity. Evidence has shown that a number of farmers have applied some conservation practices because of the influence of a neighbor’s plot. In this context, it is recommended that demonstration plots be established throughout the watershed where the EE program is being implemented. To that end, coordination with other programs or agencies is highly recommended. Finally, it is recommended that a comparative study on the EE workshops be carried out. This study may investigate the performance of farmers from other watersheds where the EE workshops have been held with farmers from the Ocoa watershed, and that this study be replicated in 3 to 5 years.

In general, it is recommended that prior to the implementation of any EE activity, the general environmental knowledge of the population be determined. This pre-evaluation will facilitate the post-evaluation and will provide input for the design of the specific program according to the needs of the population.
LIST OF REFERENCES

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APPENDIX A
### LIST OF COMMUNITIES VISITED

<table>
<thead>
<tr>
<th>Community</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Limon</td>
<td>La Demajagua</td>
</tr>
<tr>
<td>Los Ranchitos</td>
<td>El Naranjal</td>
</tr>
<tr>
<td>La Horda</td>
<td>El Naranjal Abajo</td>
</tr>
<tr>
<td>Arroyo Colorado</td>
<td>El Naranjal Arriba</td>
</tr>
<tr>
<td>Los Almendros</td>
<td>Los Naranjales</td>
</tr>
<tr>
<td>Los Arroyos</td>
<td>La Nuez</td>
</tr>
<tr>
<td>Los Manaclares</td>
<td>Las Espinas</td>
</tr>
<tr>
<td>La Cienaga</td>
<td>Los Ranchos</td>
</tr>
<tr>
<td>Los Martinez</td>
<td>El Pinar</td>
</tr>
<tr>
<td>Los Negros</td>
<td>El Chicharron</td>
</tr>
<tr>
<td>Rincon del Pino</td>
<td>El Rifle</td>
</tr>
<tr>
<td>El Jengibre</td>
<td>El Puente</td>
</tr>
</tbody>
</table>
APPENDIX B
QUESTIONNAIRE

This questionnaire will be used to assess how the EE workshops are influencing small farmers' knowledge of and attitudes toward conservation practices. Your responses can help improve the quality of the workshops held by the EE component of the NARMA Project. The questionnaire has been divided into two parts; each part has instructions to be followed for completion.

PART I. DEMOGRAPHIC AND SOCIO-ECONOMIC INFORMATION

INSTRUCTION: Please, circle the number(s) of the answer(s) that best fit(s) your condition, or complete the statement given. An example has been provided.

EXAMPLE: I am a citizen of:
1. Haiti
2. Dominican Republic
3. Spain
4. Venezuela

START HERE
1. Sex
   1. Male
   2. Female

2. Marital Status
   1. Divorced
   2. Free union
   3. Married
   4. Single never married
   5. Widowed

3. Education acquired
   1. The last grade that you attended was_______

4. Age: You are
   1. Under 20 years
   2. 20 to 29 years
   3. 30 to 39 years
   4. 40 to 49 years
   5. 50 years or more

5. How many children do you have?_______ (write 0 for none and go to question No. 9)

6. How many of your children are
   1. Under 5 years_______
   2. 5 to 9 years_______
   3. 10 to 14 years_______
   4. 15 to 19 years
   5. 20 years or more

7. Are all of your children attending school?
   1. Yes
   2. No

If No, Why not?_________________________________________
8. Do your children work with you in the "conuco"?
   1. Yes  2. No
   If Yes, How many?______

9. You
   1. Born, live, and work in this community
   2. Born in Ocoa - immigrant to this community
   3. Immigrant from other area off-watershed
   4. Born and live here, but work in other community
   5. Work in this community, but live in Ocoa
   6. Other (specify)__________________

10. How long have you been living in this community?______

11. Are you farmer?
   1. Yes  2. No
   If Yes, go to No. 12. If No, go to No. 13

12. Besides farming, what other occupation do you have?
   1. None  4. Off-farm occupation
   2. Agricultural worker  5. Small businessman
   3. Charcoal maker  6. Other___________

13. What is your principal occupation?
   1. None  4. Small businessman
   2. Agricultural worker  5. Other___________
   3. Charcoal maker

14. Do you have credit from the NARMA Project?
   1. Yes  2. No

15. How did you get credit from the NARMA Project?
   _________________________________

16. Did you complete a conservation plan?
   1. Yes  2. No

17. The land you are working in is
   1. Borrowed  4. Rented
   2. Owned  5. Share cropped
   3. Public (comunal)

18. What is the size of the plot you are working in?
   1. Under 15 tareas*  4. 45 to 59 tareas
   2. 15 to 29 tareas  5. 60 to 74 tareas
   3. 30 to 44 tareas  6. 75 or more tareas

19. How long have you been farming the same plot (conuco)
   1. Less than 1 year  4. 10 to 14 years
   2. 1 to 4 years  5. 15 years or more
   3. 5 to 9 years
20. Do you produce enough food to meet your requirements?
   1. Yes   2. No   3. Other____________

21. Which of the following crops are you growing? Circle all that apply.
   1. Bananas (plantain)   7. Fuelwood trees
   2. Beans   8. Livestock (pasture)
   5. Coffee   11. Potato
   6. Corn   12. Sweet potato
   13. Others__________________

22. What kind of commercialization channel are you using?
   1. Agroindustry   4. INESPRE
   2. CENCERI   5. Middle-man
   3. Cooperative (local)   6. Other____________

23. What kind of cropping association are you using? (More than one crop at one time)
______________________________

PART II. ENVIRONMENTAL KNOWLEDGE AND ATTITUDES

SECTION A. Instructions: Please, circle the response that best describes your feeling about each item. An example is provided.

The following abbreviations are defined as:

SA= Strongly Agree   D= Disagree
A= Agree   SD= Strongly Disagree
DK= Don’t Know

EXAMPLE:
Water pollution affects people’s health   SA A DK D SD

START HERE

1. Soil, water, forest, and air are natural resources.   SA A DK D SD

2. Topsoil is the resource base for crop production.   SA A DK D SD

3. Water, soil, air, and sunlight are necessary for crop production.   SA A DK D SD

4. Soil erosion can be caused by rainfall.   SA A DK D SD

5. Soil erosion improves soil productivity.   SA A DK D SD
6. Mountains of this watershed can be cleared because it does not affect people who live and work here.  
7. Cutting trees in this watershed affects wildlife.  
8. People who start fires in forest land should be fined.  
9. There is more forest in this zone now than 20 years ago.  
10. Cutting trees does not affect water cycle.  
11. Soil loss is mostly caused by erosion.  
12. Crop residues left in the "conuco" can help improve soil fertility.  
13. Burning crop residues is better than incorporating them into the soil.  
15. Trees are the foe of small farmers.  
16. There are more people living now in the watershed than 10 years ago.  
17. Deforestation can cause soil erosion.  
18. The land you are farming in can be abandoned after 3-5 years because you can get another easily.  
19. Conservation means to use the environment and its resources in a wise form.  
21. Conservation implies that natural resources cannot be used.  
22. Wildlife should be hunted because they eat your crops.
23. Terraces are conservation practices used for controlling soil erosion.

24. Conservation practices do not permit cropping activities in the "conuco".

25. Dominican snakes and owls kill rats and mice, therefore, they help farmers.

26. After a period of rain, streams retain water longer than they did 10 years ago.

27. Students should learn about natural resources and conservation.

28. Forest helps maintain the quality of water.

29. Natural resources conservation is responsibility of every Dominican.

30. Communities should cooperate with government agencies for implementing conservation programs.

31. Reforestation should be done on both public and private lands.

32. Land owners should reforest if they are allow to use trees later.

33. Soil, water, air, trees, and wildlife are interrelated.

34. After a heavy raining period, stream water is brown because it contains soil (sediment).

SECTION B. Instructions: In the questions below, please circle the number of the response that best fits your feeling on each item. An example is provided.

EXAMPLE: Where do you live?

1. in Azua 4. in Santiago
2. in Bani 5. in Oxiesco
3. in Ocoa
START HERE

1. Do you use conservation practices?
   1. Yes
   2. No
   If No, Why not?__________________________________________

2. How long have you been using conservation practices?
__________________________________________________________

3. Which of the following reasons most motivated your decision to use conservation practices?
   1. Soil "cansado"
   2. To get credit
   3. To control soil erosion
   4. To produce longer in the plot
   5. To receive incentives
   6. Other__________________________

4. Are you obtaining better production in the same plot after using conservation practices?
   1. Yes
   2. No
   3. Uncertain

5. After using conservation practices, you are obtaining
   1. Less money
   2. More money
   3. The same amount of money
   4. Other__________________________

6. Have you attended any of the EE workshops?
   1. Yes
   2. No
   If No, Why not?__________________________________________

7. Who did sponsor the workshop?
__________________________________________________________

8. Which workshop(s) have you attended? List all that apply.
   ________________________________ __________________________
   ________________________________ __________________________

9. After learning about conservation practices, what conservation practices did you apply?
   ________________________________________________________

10. Do you think the EE workshop helped you understand and seek solutions to natural resources problems in your community?
    1. Yes
    2. No
    3. Uncertain

11. Have any of the EE workshops helped you change your cropping practices?
    1. Yes
    2. No
    3. Uncertain
12. Do you think the EE workshops helped you on both conserving natural resources and solving environmental problems in your community?
   1. Yes  2. No  3. Uncertain

13. Before attending any EE workshop, did you use conservation practices?
   1. Yes  2. No  3. Uncertain

14. Before attending any EE workshop, did you think about conservation of natural resources?
   1. Yes  2. No  3. Uncertain

15. Have any of the EE workshops influenced your decision to accept conservation practices?
   1. Yes  2. No  3. Uncertain

16. If you were not using conservation practices before NARMA Project, which of the following describe your situation? Circle all that apply.
   1. No one told you about the need for natural resources conservation.
   2. Somebody told you about but you did not believe in conservation practices.
   3. There was no incentive to apply conservation practices.
   4. You did not feel any need for conservation practices.
   5. You thought that conservation practices caused damage to your "conuco".

17. Would you use conservation practices if you were not receiving credit from the NARMA Project?
   1. Yes  2. No  3. Uncertain

18. Which of the following reasons most influenced you to use conservation practices? Circle all that apply.

   1. Low crop yield.
   2. It is easy to get credit.
   3. Motivation from the EE workshops.
   4. Influence of paratechnicians.
   5. Influence of the conservationist agent.
   6. "Junta" decision.
   7. Other ________________________________
19. Which of the following is the best channel to organize EE workshops in your community?

1. Cooperative  
2. Farmers association  
3. "Alcalde Pedaneo"  
4. "Junta"  
5. Political party  
6. School teachers  
7. Other_______________________

20. Do you think that the government should be the only responsible for activities of natural resources conservation?

1. Yes  
2. No  
3. Uncertain

21. Do you think the community should cooperate with government agencies to implement conservation practices in the watershed?

1. Yes  
2. No  
3. Uncertain

22. Are you willing to help schools organize EE activities in the watershed?

1. Yes  
2. No  
3. Uncertain

23. When did you realize that conservation of natural resources is an urgent need in the watershed?

1. Since you are receiving credit.  
2. Since the "Junta" told you about.  
3. Since production in your "conuco" decreased.  
4. Since you attended an EE workshop.  
5. Since you cannot get other "conuco" as easily as you did 10 years ago.

24. Do you feel you can use conservation practices with little technical assistance?

1. Yes  
2. No  
3. Uncertain

25. Are you able to teach other "campesinos", farmers or non-farmers, about conservation of natural resources?

1. Yes  
2. No  
3. Uncertain

26. Are you able and willing to teach other farmers how to use conservation practices?

1. Yes  
2. No  
3. Uncertain
27. Are you willing to organize "convites" for reforestation purpose?

1. Yes  
2. No  
3. Uncertain

28. If the NARMA Project ends, will you continue using conservation practices?

1. Yes  
2. No  
3. Uncertain

29. Conservation of natural resources is an investment for the long term, for this reason, do you think conservation should not be done?

1. Yes  
2. No  
3. Uncertain

30. Are you only interested in using conservation practices with returns in the short-run?

1. Yes  
2. No  
3. Uncertain

31. Have you received plants from the NARMA Project?

1. Yes  
2. No

If No, Why not?________________________________________
Then go to No.34.

32. Which of the following plants have you received? Circle all that apply.

1. Coffee  
2. Fruit trees  
3. Hardwood trees  
4. Ornamental trees  
5. Other__________

33. If you are not receiving any incentive from the NARMA Project, which of the following would you like to receive?

1. Credit  
2. Coffee  
3. Food for "convites"  
4. Fruit trees  
5. Hardwood trees  
6. Scholarship  
7. T-shirts/caps  
8. Other__________

34. Do you know what is called energy farm?

1. Yes  
2. No

If No, give an explanation.

35. Do you use firewood as energy source?

1. Yes  
2. No

If Yes, How much?________________________
36. Do you get the firewood that you use from?

1. Your plot (conuco)
2. Public land (in your community)
3. Public land in other community
4. The neighbor farm
5. The store (buying it)
6. Other ________________________________

37. Do you think that getting firewood now is

1. Easier than 5 years ago
2. More difficult than 5 years ago
3. The same as it was 5 years ago

38. Do you think an energy farm could help your community?

1. Yes 2. No 3. Uncertain

39. Do you think the NARMA Project should help establish an energy farm in your community?

1. Yes 2. No 3. Uncertain

40. Would you be able to help get land to establish an energy farm in your community?

1. Yes 2. No
If No, Why not? ________________________________

41. Would you be able to help establish an energy farm in your community?

1. Yes 2. No

42. Would you be able to work in an energy farm for community use?

1. Yes 2. No
If No, Why not? ________________________________

43. Do you think an energy farm for the community should be controlled by

4. The "Junta" 5. The Local Cooperative 6. The NARMA Project
44. List in order the main reasons for planting trees in your community and in the watershed.

1. ____________________________________________________________
2. ____________________________________________________________
3. ____________________________________________________________
4. ____________________________________________________________

45. Please, make any comment that you may have about the NARMA Project and/or the EE workshops.
________________________________________________________________
________________________________________________________________

Thank you for your help.

Date________________________ Completed by________________________

Community______________ With Assistance of_____________________

   Time: Started_________________  
   Ended_______________________

* NOTE: 1 hectare is equal to 15.9 Dominican tareas.
CUESTIONARIO

Este cuestionario será usado para tratar de determinar si los cursos de educación ambiental del Proyecto MARENA están influyendo en el conocimiento y actitudes que sobre la conservación y uso de los recursos naturales tienen los pequeños agricultores de la cuenca de Dcoa. Sus respuestas y opiniones serán de gran utilidad para conocer cómo están funcionando dichos cursos y podrían ayudar a mejorar la calidad de los próximos entrenamientos que serán ofrecidos por el Proyecto MARENA.

El cuestionario ha sido dividido en dos (2) partes, por favor lea las instrucciones que tiene cada parte antes de comenzar a contestar las preguntas.

PARTE I. INFORMACIONES DEMOGRAFICAS Y SOCIOECONOMICAS

INSTRUCCIONES: Por favor, haga un círculo alrededor del número de la respuesta que mejor se ajuste a su condición o complete en la raya en blanco la información solicitada. A continuación hay un ejemplo que ilustra la forma de contestar.

EJEMPLO:
Yo soy ciudadano de
1. España 2. República Dominicana
2. Haití 3. Venezuela

AHORA COMIENCE AQUI

1. Sexo
   1. Masculino 2. Femenino

2. Estado civil
   1. Casado 2. Divorciado
   3. Unión libre (Amancebado) 4. Soltero, nunca casado

3. Educación adquirida
   1. Hasta que curso usted llegó?__________

4. Usted tiene:
   1. Menos de 20 años 2. Entre 20 y 29 años
   3. Entre 30 y 39 años 4. Entre 40 y 49 años
   5. 50 o más años

5. Cuántos hijos usted tiene?______ Escriba 0 si no tiene hijos y pase a la pregunta 9.
6. Diga cuántos de sus hijos son:
   1. Menores de 5 años____ 4. Entre 15 y 19 años
   2. Entre 5 y 9 años_____ 5. De 20 años o mayores
   3. Entre 10 y 14 años____

7. Están todos sus hijos asistiendo a la escuela?
   1. Sí
   2. No
   Si la respuesta es No, ¿por qué?__________________________

8. Trabajan sus hijos con usted en el conuco?
   1. Sí
   2. No
   Si la respuesta es Sí, ¿cuántos?_____________________

9. Usted:
   1. Nació, vive y trabaja en esta comunidad (microcuenca).
   2. Nació en Ocoa, pero se trasladó a este lugar.
   3. Se trasladó a este lugar de otra comunidad fuera de Ocoa.
   5. Trabaja en este lugar, pero vive en el pueblo de Ocoa.
   6. Otro (especifique)______________________________

10. ¿Cuántos años tiene usted viviendo en este lugar?__________

11. ¿Usted es agricultor?
   1. Sí
   2. No
   3. Otro
   Si responde Sí, pase a la No.12; pero si es No, pase a la 13

12. Además de agricultor, ¿qué otro trabajo usted hace?
   1. Ninguno
   2. Fuera de la agricultura
   3. Obrero agrícola
   4. Pequeño comerciante
   5. Quemador de carbón

13. ¿Cuál es su principal ocupación?
   1. Ninguna
   2. Obrero agrícola
   3. Pequeño comerciante
   4. Quemador de carbón
   5. Otro_____________________

14. ¿Usted tiene crédito de los que ofrece el proyecto MAREN?A?
   1. Sí
   2. No
   3. Otro__________

15. ¿Cómo usted consiguió crédito del Proyecto MAREN?
-------------------

16. ¿Usted tiene un plan de conservación para su parcela?
   1. Sí
   2. No
17. El terreno que usted trabaja es:
   1. A partir beneficios
   2. Rantado (arrrendado)
   3. Prestado
   4. Tierra comunal
   5. Propio

18. ¿Cuántas tareas tiene el conuco que usted está trabajando?
   1. Menos de 15 tareas
   2. Entre 15 y 29 tareas
   3. Entre 30 y 44 tareas
   4. Entre 45 y 59 tareas
   5. Entre 60 y 74 tareas
   6. 75 o más tareas

19. ¿Cuánto tiempo usted tiene trabajando el mismo conuco?
   1. Menos de 1 año
   2. De 1 a 4 años
   3. De 5 a 9 años
   4. De 10 a 14 años
   5. 15 años o más

20. ¿Produce su conuco suficiente alimento para satisfacer sus necesidades?
    1. Sí
    2. No
    3. Otro_______

21. ¿Cuál o cuáles de los siguientes cultivos está usted produciendo? Haga un círculo alrededor del número de los que usted cosecha?
    1. Arboles para leña
    2. Batata
    3. Café
    4. Guandul
    5. Habichuelas
    6. Maíz
    7. Maní
    8. Papa
    9. Patos (ganadería)
   10. Plátano (y/o guineo)
   11. Repollo
   12. Yuca
   13. Otros_______

22. ¿A quién vende usted sus cosechas?
    1. Agroindustria
    2. CENCIERI
    3. Cooperativa (local)
    4. INESPREE
    5. Intermediario
    6. Otro_______

23. ¿Cuáles cultivos usted produce al mismo tiempo en cada periodo de cosecha?_______________________________

PARTE II. CONOCIMIENTO Y ACTITUDES SOBRE EL AMBIENTE Y LOS RECURSOS NATURALES

Esta parte está compuesta de dos (2) secciones. Cada sección tiene las instrucciones a ser seguidas para contestar las preguntas.
SECCION A. INSTRUCCIONES: Por favor, haga un círculo alrededor de la respuesta que mejor manifieste su opinión acerca de cada afirmación. Para su conveniencia, un ejemplo ha sido provisto.

Las siguientes abreviaturas se definen así:

CA = Completamente de Acuerdo
A = De Acuerdo
NS = No Sabe
D = En Desacuerdo
CD = En Completo Acuerdo

EJEMPLO:
La contaminación del agua afecta la salud de la gente.

AHORA COMIENCE AQUI

1. El suelo, el agua, los árboles y el aire son recursos naturales.

2. El suelo es el recurso base para la producción agrícola.

3. El agua, el suelo, el aire y la luz del sol son necesarios para producir cosechas.

4. La lluvia puede causar la erosión de los suelos.

5. La erosión hace que los suelos aumenten su capacidad para producir cosechas.

6. Los árboles que hay en las montañas pueden ser cortados porque eso no afecta a la gente que vive y trabaja en la zona.

7. Si se cortan los árboles de las montañas de aquí, los pájaros y otros animales silvestres serán afectados.

8. Las personas que hagan fuego en los montes deben ser multados.

9. En esta zona hay más árboles ahora que los que habían hace 20 años.
10. La tumba de árboles no afecta la época de lluvia en la zona.

11. La pérdida de suelo es mayormente causada por la erosión.

12. La fertilidad del suelo puede ser mejorada si los residuos o paja de las cosechas se dejan en el conuco.

13. Es mejor quemar los residuos o paja de las cosechas que dejarlos e incorporarlos en el terreno.

14. La pérdida de suelo reduce la producción de los cultivos.

15. Los árboles son enemigos de los agricultores.

16. Ahora hay más gente viviendo en esta zona que la que había hace 10 años.

17. La deforestación puede causar erosión.

18. El conuco que usted está trabajando puede ser abandonado a los 3 ó 5 años, porque le es fácil conseguir otro.

19. Conservación significa usar los recursos naturales en forma racional.

20. Las prácticas de conservación ayudan a mejorar la producción de los cultivos.

21. Conservación quiere decir que los recursos naturales no pueden ser usados.

22. Los pájaros y otros animales silvestres deben ser cazados porque ellos se comen los cultivos.

23. Las terrazas y zanjas de laderas son prácticas de conservación usadas para controlar la erosión.

24. Las prácticas de conservación no permiten que el conuco sea sembrado.
25. Las culebras de aquí y las lechuzas matan ratas y ratones, por tanto, ellas ayudan a los agricultores.

26. Después de un tiempo de lluvias, los ríos y arroyos duran más tiempo con agua ahora que hace 10 años.

27. Los estudiantes deben aprender en las escuelas sobre conservación de los recursos naturales.

28. La foresta (árboles) ayuda a mantener la calidad del agua.

29. La conservación de los recursos naturales es responsabilidad de cada dominicano.

30. La comunidad debe apoyar los esfuerzos de las instituciones oficiales para desarrollar programas de conservación.

31. La reforestación debe ser hecha tanto en tierras comunales como privadas.

32. Los propietarios de tierras deben participar en programas de reforestación si se les permite usar los árboles cuando estén de provecho.

33. El suelo, el agua, el aire, las plantas y los animales están relacionados entre sí.

34. Después de un fuerte tiempo de lluvias, el agua de los ríos y arroyos es color marrón porque contiene gran cantidad de suelo.

SECCION B. INSTRUCCIONES. Por favor, haga un círculo alrededor de la respuesta que a su opinión mejor conteste cada pregunta o complete el espacio en blanco. Para su orientación, a continuación hay un ejemplo.

EJEMPLO:

Usted vive en el municipio de:

1. Azua
2. Bani
3. Ocoa
4. Dajos
5. Santiago

3
1. ¿Usted usa prácticas de conservación?
   1. Sí  2. No

   Si la respuesta es No, ¿por qué? ________________________________
   y pase a la pregunta No. 6. Si la respuesta es Sí, ¿cuáles?
   ____________________________________________________________

2. ¿Cuánto tiempo usted lleva usando prácticas de conservación?
   ____________________________________________________________

3. ¿Cuál de las siguientes razones lo motivó más para que usara prácticas de conservación?
   1. El suelo estaba cansado y producía poco.
   2. Para poder conseguir crédito.
   3. Para controlar la erosión del suelo.
   4. Para conseguir incentivos.
   5. Para producir por más tiempo en el conuco.
   6. Otra ______________________________________________________

4. ¿Usted está produciendo más y mejores cosechas en mismo conuco después de estar usando prácticas de conservación?

5. Después de estar usando prácticas de conservación, usted está obteniendo?
   1. Menos dinero  2. Más dinero  3. La misma cantidad de dinero
   4. Ningún dinero

6. ¿Ha asistido usted a algún curso de educación ambiental?
   1. Sí  2. No

   Si la respuesta es Sí, ¿en qué año? ____________, Pase a la No. 7.
   Si la respuesta es No, ¿por qué? ________________________________
   Pase a la No. 16.

7. ¿Quién lo organizó? _________________________________________

8. Diga en los cursos de educación ambiental que usted ha participado
   ____________________________________________________________
   ____________________________________________________________

9. Como resultado de lo que aprendió en los cursos de educación ambiental y/o conservación de suelos, ¿qué nuevas prácticas de conservación usted aplicó? ________________________________
10. ¿Los cursos de educación ambiental lo han ayudado a buscar soluciones a los problemas que tienen los recursos naturales en su comunidad?
   1. Sí  
   2. No  
   3. No Sabe

11. ¿Alguno de los cursos de educación ambiental lo ha ayudado a cambiar o mejorar la forma de sembrar que usted usaba?
   1. Sí  
   2. No  
   3. No Sabe

12. ¿Usted piensa que los cursos de educación ambiental lo han ayudado a solucionar problemas en su comunidad y al mismo tiempo lo han animado a conservar los recursos naturales?
   1. Sí  
   2. No  
   3. No Sabe

13. Antes de asistir a un curso de educación ambiental, ¿usted usaba prácticas de conservación?
   1. Sí  
   2. No  
   3. No Sabe

14. ¿Antes de asistir a un curso de educación ambiental, usted había pensado en que los recursos naturales debían ser conservados?
   1. Sí  
   2. No  
   3. No Sabe

15. ¿Usted cree que los cursos de educación ambiental han influido en su decisión de aceptar prácticas de conservación?
   1. Sí  
   2. No  
   3. No Sabe

16. Si usted no usaba prácticas de conservación antes del Proyecto MARENA, ¿cuál o cuáles de las siguientes razones describe su situación en ese tiempo?
   1. Ninguna persona le habló sobre la necesidad de conservar los recursos naturales.
   2. Alguien le habló sobre ello, pero usted no creía en las prácticas de conservación.
   3. No habían incentivos para usar prácticas de conservación.
   4. Usted no sintió ninguna necesidad de usar prácticas de conservación en su conuco.
   5. Usted pensó que las prácticas de conservación causaban daños al terreno (conuco) y que después no podría ser sembrado.

17. ¿Usted usaría prácticas de conservación si no estuviera recibiendo crédito del Proyecto MARENA?
   1. Sí  
   2. No  
   3. No Sabe
18. ¿Cuál o cuáles de las siguientes razones influyó más en usted para que usara prácticas de conservación?
1. Los cultivos producían poco.
2. Es más fácil conseguir crédito.
3. Se sintió motivado por los cursos de educación ambiental.
4. Siguió el consejo de los paratécnicos.
5. Siguió el consejo del técnico de conservación de suelos.
6. Lo hizo por decisión de la "Junta".
7. Otro___________________________

19. ¿Cuál de los siguientes es el mejor medio para organizar cursos de educación ambiental en su comunidad?
1. La cooperativa local
2. La asociación de agricultores
3. El Alcalde Pedáneo
4. La "Junta"
5. Los partidos políticos
6. Los maestros
7. Otro___________________________

20. ¿Usted cree que la conservación de los recursos naturales debe ser solamente responsabilidad del gobierno?
1. Sí
2. No
3. No Sabe

21. ¿Usted cree que la comunidad debe participar en forma activa en los programas de conservación que el gobierno desarrolle en la zona?
1. Sí
2. No
3. No Sabe

22. ¿Usted está dispuesto a ayudar a las escuelas a organizar actividades de educación ambiental en la zona (cuenca)?
1. Sí
2. No
3. No Sabe

23. ¿Cuándo usted se dio cuenta de que la conservación de los recursos naturales es una necesidad urgente?
1. Cuando comenzó a recibir credito de MARENA.
2. Cuando la "Junta" le habló sobre ello.
3. Cuando notó que la producción de su conuco comenzó a disminuir.
4. Cuando asistió a un curso de educación ambiental.
5. Cuando notó que ya no le era tan fácil conseguir terreno para hacer otro conuco como lo era hace unos 10 años.

24. ¿Usted cree que puede usar prácticas de conservación si recibe menos asistencia técnica?
1. Sí
2. No
3. No Sabe

25. ¿Usted está dispuesto a enseñar a otros campesinos, agricultores y no agricultores, sobre conservación de recursos naturales?
1. Sí
2. No
3. No Sabe
26. ¿Usted está dispuesto a enseñar a otros agricultores a construir y usar las prácticas de conservación que usted conoce?
   1. Sí
   2. No
   3. No Sabe

27. ¿Usted está dispuesto a organizar convites para realizar actividades de reforestación en esta zona?
   1. Sí
   2. No
   3. No Sabe

28. Si el Proyecto MARENA finaliza, ¿usted continuaría usando prácticas de conservación?
   1. Sí
   2. No
   3. No Sabe

29. Los resultados de la conservación solo se ven después de un tiempo, por esta razón, ¿usted cree que no se deben realizar prácticas de conservación?
   1. Sí
   2. No
   3. No Sabe

30. ¿Usted está solamente interesado en usar prácticas de conservación que le devuelvan lo que usted invierte en un corto tiempo?
   1. Sí
   2. No
   3. No Sabe

31. ¿Usted ha recibido plantas del Proyecto MARENA?
   1. Sí
   2. No
Si la respuesta es No, por qué?

Pase a la No. 34.

32. ¿Cuál o cuáles de los siguientes tipos de plantas ha recibido usted?
   1. Arboles frutales
   2. Café
   3. Arboles maderables
   4. Plantas ornamentales
   5. Otro

33. Si usted no está recibiendo ningún incentivos del Proyecto MARENA, ¿cuál de los siguientes le gustaría recibir?
   1. Crédito para conservación/producción
   2. Arboles frutales
   3. Café
   4. Arboles maderables
   5. Una beca para un hijo(a)
   6. Alimentos en los convites
   7. Camisetas y cachuchas
   8. Otro
34. ¿Usted sabe lo que es una finca de energía?
   1. Sí
   2. No
   Si no sabe, darle una explicación.

35. ¿Usted usa leña para preparar sus alimentos?
   1. Sí
   2. No
   Si la respuesta es Sí, ¿qué cantidad?_____________________

36. La leña que usted usa en la casa, la consigue:
   1. En su parcela
   2. En tierra comunal en su lugar
   3. En la parcela del vecino
   4. En tierra comunal de otro lugar
   5. En el cojudo, comprándola
   6. Otro__________________________

37. Usted cree que conseguir leña ahora es:
   1. Más fácil que hace 5 años
   2. Más difícil que hace 5 años
   3. Igual que hace 5 años

38. ¿Usted cree que una finca de energía puede ayudar en su comunidad?
   1. Sí
   2. No
   3. No Sabe

39. ¿Usted cree que el Proyecto MARENA debe ayudar a establecer una finca de energía en su comunidad?
   1. Sí
   2. No
   3. No Sabe

40. ¿Usted estaría dispuesto a ayudar a conseguir el terreno necesario para una finca de energía en su comunidad?
   1. Sí
   2. No
   3. No Sabe
   Si la respuesta es No, ¿por qué?__________________________

41. ¿Usted estaría dispuesto a ayudar a establecer una finca de energía en su comunidad?
   1. Sí
   2. No
   3. No Sabe

42. ¿Usted estaría dispuesto a trabajar en una finca de energía que sea para uso de la comunidad?
   1. Sí
   2. No
   3. No Sabe
   Si la respuesta es No, ¿por qué?__________________________
43. ¿Quién usted cree debe administrar una finca de energía en su comunidad?
   1. La oficina de Agricultura  5. El Alcalde del lugar
   2. El Proyecto MARENA   6. La Junta
   3. La asociación de agricultores  7. Otro__________
   4. La cooperativa del lugar

44. ¿Cuáles usted cree son las razones más importantes para sembrar árboles en su comunidad y en la zona (cuenca)? Por favor, ponga la más importante de primero y sigue así.
   1. ___________________________________________________________
   2. ___________________________________________________________
   3. ___________________________________________________________
   4. ___________________________________________________________

45. COMENTARIO: Por favor, haga cualquier comentario que usted tenga sobre los cursos de educación ambiental o el Proyecto MARENA.
                                                                                                                              
MUCHAS GRACIAS POR SU AYUDA.

Fecha_________________________ Lugar_________________________
Comenzó_________________________ Terminó_________________________
Contestado por________________________________________________
Con la asistencia de (entrevistador)__________________________
MEANS COMPARISON USING TUKEY'S STUDENTIZED RANGE (HSD) TEST.

<table>
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<th>GROUP**</th>
<th>N</th>
<th>MEAN***</th>
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* Items described in Appendix B (Instrument).
** Group W= groups A and group C collapsed and group R= groups B and D collapsed.
*** Means with the same letter are not significantly different. Alpha= 0.05 and critical value of Tukey's Studentized Range= 2.807.
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APPENDIX D
MEANS COMPARISON OF GROUPS RESPONSES USING TUKEY'S STUDENTIZED RANGE (HSD) TEST.

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LIST OF DOMINICANS THAT EVALUATED THE INSTRUMENT

At The Ohio State University

Alberto Rodriguez................Ph.D. Candidate
Luisa Valdez......................M.Sc. Student

In the Dominican Republic

Ing. Agron. Maximo Aquino M....NARMA Project/UASD
Lic. Migdalia Montes de Oca....DEA/SEEBAC
Dr. Marcos Pena F...............SURENA/UNPHU
Lic. Iris Rossi....................DEA
PANEL OF EXPERTS

Dr. John F. Diinger......Resources Development
Dr. Rosanne W. Fortner.....Environmental Communication
Dr. Merlyn M. Larson.......Forestry
Dr. Gary W. Mullins.......Environmental Interpretation
Dr. Robert E. Roth.........Environmental Education
Dr. Clinton L. Shepard.....Environmental Education