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**HIGHLANDS AGRICULTURAL  
DEVELOPMENT PROJECT**

**FINAL IMPACT EVALUATION  
COMBINED REPORT**

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HIGHLANDS AGRICULTURAL DEVELOPMENT PROJECT

IMPACT EVALUATION

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## I. EXECUTIVE SUMMARY

1. Project Purpose and Description. The Highlands Agricultural Development Project (HAD) began in 1983 as an agricultural diversification project designed to raise small farmer incomes and increase the flow of hard currency into the country by raising and exporting non-traditional agricultural products. One component included support for small irrigation systems and soil conservation practices for groups of farmers to allow them to more fully utilize lands, especially in the dry season. In 1985 the project area was expanded to include more area but still within the North Western part of the highlands. The early phase of the Project was considered successful enough to be expanded to cover all of the country except Region VIII (The Peten). In 1990 further modifications were made in project goals and operations to include watershed management, private sector marketing, agricultural research, and integrated pest management, while continuing the earlier emphasis on small farmer irrigation systems and conservation practices for non-traditional export crops.

2. Purpose and Methodology of Impact Evaluation. The purpose and methodology used for the impact evaluation follows the guidelines found in the project documents. The earliest document call for a 'grant financed impact evaluation to verify if the project purpose was achieved' Later documents specified 'initial baseline sample surveys of the project area; periodic surveys during the life of the project; and a final impact survey.' The content areas for areas were outlined for the evaluation: 'characteristics of the farm households... cropping and livestock patterns and yields; soil conservation and water uses; household incomes, purchases, expenditures and consumption; credit and technical assistance received; marketing patterns; family characteristics, education, literacy, and the roles of women and children.'

The overall goal of the final impact evaluation was to document the impact of the HAD Project at the beneficiary level in terms of changes in agricultural practices, agricultural production, agricultural income, and levels of living; at the institutional level in terms of changes in the capacity to deliver services to the farmers; and, at the national level in terms of changes in labor utilization, food availability and nutrition, increased income, conservation of natural resources, productive infrastructure, and international balance of payments.

To meet the evaluation goals a combination of methodologies was used in the design of six separate studies. An Impact Survey was designed to include the same representative sample used in the Baseline Survey of 1990 with an additional inclusion of farmers that are in the FEAT (Special Fund for Technical Assistance). Case Studies were designed to cover issues that are not easily covered in a survey such as: household economy, labor utilization, women's roles, variations in irrigation methods, integrated technical assistance, and pesticide management practices. An Institutional Impact Study was designed to study the impact of the Project on the capacity of public and private institutions to deliver services to the farmers. A National

Impact Study was designed to look at the aggregate impact of the project at the national level. A FEAT Study was designed to do an indepth study of the effect of privatized extension services. Finally, a Watershed Management Study was designed to measure the impact of the activities outlined for the 20 micro-watershed areas covered by the Project. Each of the studies was done separately and the results are synthesized in the findings that follow.

### 3. Findings and Conclusions

Overall Impact: At the farm level there has been a net positive effect on agricultural practices. The changes are most notable for conservation practices and for farmers that have participated for more than three years. The impact on agricultural production and crop value is more evident with two-thirds of the farmers reporting an increase in production value in absolute terms with a medium value increase of 44.7% in the two year period between 1990 and 1992. This in turn gives higher farm income and improvement in levels of living. This can be noted in changes in housing and household items with an average of one improvement per household in construction items as well as one item in household equipment. The institutional impact is not as clearly defined nor as evident as the findings at the farm level. There is not consistent evidence of an improved capacity to deliver coordinated services. The FEAT program of privatized extension services has reached the early stages of institutionalization and shows real possibilities for the future. The aggregate impact at the national level is more impressive with an estimated crop value of Q87,326,810 in 1992 as compared to Q67,998,840 in 1990; an estimated value of irrigation infrastructure of Q39,076,312; an increase in the value of export crops from Q2,900,000 in 1990 to Q4,900,000 in 1992 which has a direct relation to the international balance of payments.

Personal and Household Characteristics: A profile of the HAD beneficiaries is found in the following personal characteristics: 65% 'Indian'; 75% married; 69% Catholic; 23% Protestant; husbands age, 43 and 66% with some primary education; wives age 39 and 50% with some primary education; household size, 6.8 persons; 30% of men work some off farm and 10% migrate. The housing characteristics can be summarized as follows: adobe walls, 72%; dirt floors, 48%; running water, 55%; and latrines, 85%. Also, 25% have bicycles; 9% with trucks; 4% with motorcycles and a few had cars. The families served by the FEAT privatized extension service had slightly different characteristics: higher proportions 'Indian'; more Protestant; higher work migration, adobe walls, and dirt floors; and younger in age, lower proportions reporting legal marriage, less formal schooling, fewer latrines, fewer sewing machines, and much less electricity.

Farm Characteristics: The average cultivated area reported was 1.8 manzanas and less than one-half manzana was irrigated. Almost all farmers reported some agricultural equipment with sprayers and dusters the most common. Most farms had some animals with cows and chickens the most common. The farmers in the FEAT were much the same in most farm characteristics except they

reported less farm equipment. There were few changes in average cultivated area during the last few years but there has been a slight increase in irrigated area.

Agricultural Production: Most of the farmers used chemical fertilizer, insecticides, fungicides, conservation compost, and improved seed. A lesser number reported terraces, ditches, and other conservation measures. There has been some change in agricultural practices during recent years but more in the application to commercial and export crops. There has been a marked increase in plantings of commercial crops and the increased crop value is directly related.

Technical Assistance and Credit: The increased production value is closely related to the shift in the type of crops grown and the application of improved agricultural techniques, yet few of the beneficiaries attribute this directly to the technical assistance that they have received from public sector institutions. To the contrary, they are generally critical of the service although more than half of them indicated that they had received help in the last year. In contrast, the farmers served by the FEAT technicians recognized its value and felt that it was an important part in their success in increased production and income estimated at over 200% in the first year.

Almost half of the farmers reported the use of production credit within the last three years. Even a higher proportion indicated that they had credit experience in the past.

Conservation, Watershed and Pesticide Management: Conservation practices such as terraces, compost use, and soil erosion protection barriers have become part of the regular cultivation practices of the beneficiary farmers. There is also evidence that the farmers are using some precautions in their use of pesticides. Yet, the Case Study and FEAT Study investigations conclude that there is a general degradation of the environment as a result of the intensified cultivation which depends highly on the use of agrochemicals. There is also evidence that some of the water sources are now being overused so that there is insufficient water to give adequate coverage to all of the farmers at some times in the season. The watershed areas defined for activities under this project do not completely correspond to the same areas where the irrigation projects are located. Farmer beneficiaries do not feel directly responsible and that they can not afford to spend a great deal of time on activities that have no immediate economic payoff.

Institutional Impact: Although there are a few indications of improved institutional capacity to deliver farm level services in the public sector as a result of the HAD Project, the results of the investigation are generally negative. The government institutions are perceived as suffering a great deal due to the economic and social problems within Guatemala in the last decade. At the same time that the HAD Project was trying to help in coordinated service delivery, there is evidence that the general resources available to the institutions from regular sources was almost non-existent. The administrative structure previously

available and established to coordinate Project activities was not seen as adequate and even perceived by many as an obstacle. Demoralization and professional envy were common as resources seemed available and abundant for some and not for others. There is no clear administrative structure at this time for continuation of the Project, yet the farmers and field technicians are committed to continue and often have made investments that do not allow them to walk away. In contrast to the public institutional structure, there seems to be an internal structure in the FEAT program that is becoming institutionalized although it is felt that it can not stand alone and needs to be related in some way to the public sector either through the credit or technical assistance offices.

National Level Impact: Although some of the farm and institutional level impacts from the HAD Project are modest and do not reach the goals expected, the aggregated results at the national level are impressive. In labor utilization, 87% of the families use family labor and 70% use hired labor for a net increase in local labor utilization and a decrease in seasonable migration. Although there has been no marked change in dietary habits, there has been a slight increase in subsistence crop production that produces the bulk of family nutrition and a 36% increase in vegetable production which contributes both directly and indirectly to nutrition. The increased value of rural productive infrastructure is also impressive and estimated at 39 million Quetzales. The increased rural production value has increased from an estimated 68 million Quetzales in 1990 to 87 million Quetzales in 1992. The conservation of natural resources is difficult to quantify on a national level yet there are 88 working groups organized and functioning through the country working in 20 micro-watershed areas that were not there before. National guidelines have been established for the use and control of pesticides that can help prevent some of the environmental problems in the future. The increase crop production now accounts for 14% of the horticultural exports and represents a 4.9 million dollar value for the international balance of payments. Finally, it is difficult to measure the indirect impact of the project but there is a noticeable increase in vegetable production, conservation activities, training of public and private sector technicians, exposure to markets, etc., as a result of the HAD Project.

4. Lessons Learned and Recommendations. There are a number of lessons that can be taken from the HAD Project experience that have design and application implications for future projects. The lessons with planning implications can be summarized in the following topic areas: -the need for periodic project reprogramming; -the importance of longer project time periods; -the adequate use of productive infrastructure; -the success of smaller sized project units; -the danger of increasing the scale of smaller successful projects; -the need to clarify target populations at planning time; and, -the need for comprehensive studies of water sources in irrigation projects.

The lessons related to project organization and administration are summarized as: -the breakdown of interagency coordina-

tion and cooperation; and, -problems related to organizational structures and external development assistance.

The lessons related to project operation are summarized as: -the difficulty in early adoption of pesticide management practices; -farmer motivation based on concrete economic benefits; -conflicting roles imposed on agricultural technicians; -the importance of group organization skills; -the effective use of planning by objectives; and, -the need for combining production and marketing technology.

The lessons related to impact measurement and evaluation are summarized as: -the difficulty of obtaining project impact measures; -the difficulty in obtaining accurate income information; and, -the utility of further analysis of project results.

Finally, the lessons related to alternative development strategy are summarized as: -the impact of export cropping on small landholders; -changing roles of women; and, -the viability of privatized agricultural services.

## II. HIGHLANDS AGRICULTURAL DEVELOPMENT PROJECT

### COMBINED IMPACT EVALUATION REPORT

#### A. PROJECT HISTORY AND DESCRIPTION

The Highlands Agricultural Development Project (HAD-I) was first initiated in the early 1980's as a regional and experimental one. In 1988, as the experimental project was ending, a second stage, HAD-II was initiated. The second stage was expanded to cover most of the country whereas the first one was concentrated in a much smaller area.

The Highlands Agricultural Development Project in Guatemala was initiated to help meet some of the urgent needs found in the rural areas. This area has best been described as one with "widespread poverty" as evidenced by: high population density and population growth that approaches 3% per year; a dependent population with 43% under the age of 15 years; educational facilities that are inadequate with 36.5% of those beyond school age who have not finished primary and a rate of illiteracy that is estimated at 77%; 30% of the population that do not speak Spanish, which is the principal language of formal schooling and of the government service agencies; sanitary toilet facilities are lacking in 84% of the rural households; agriculture that is characterized as 'minifundia' with many families on very small plots of land that are below the subsistence level; approximately 70% of the population of the area classified as 'rural' with an average farm size less than 5 acres; rapid migration of Highlands people to the capital city; and a decrease in total agricultural production which results in a negative balance of foreign trade. (Nesman 1991)

#### HAD-I

The Highlands Agricultural Development Project, Phase I (HAD-I) which began in 1983 had as a goal the improvement in the productive resource base of the rural poor in the Central and Western Highlands of Guatemala. It included: improving access roads maintenance, creating a pilot reforestation program and constructing small scale irrigation and soil conservation systems. In 1985 the project's original territory was expanded. It also increased activities in soil conservation and small scale irrigation systems. (AED 1991)

At the same time that the HAD-I project was operating, the Small Farmer Diversification Systems Project was also in progress which emphasized agricultural research, extension, credit and marketing. This project also was building model farms and strengthening the agricultural research institutes. Its goal was to increase the production and marketing of non-traditional horticultural crops and increase intensive livestock production on family farms in the Northwestern Highlands. (AED 1991)

Prior to the formal planning for the HAD-I project, there was a growing realization that changes were needed in agricultural production. Land was limited so that changes in technology seemed the best solution. Some of the local farmer groups had

already found ways of making changes with the help of private cooperative organizations and government extension workers. One aspect that worked particularly well was the development of small irrigated plots for growing non-traditional crops for export. The highland climate was particularly favorable for vegetable crops. At this point the government, with assistance from USAID and other international agencies, initiated the formal planning process of the HAD-I project. Funding for this project was provided through a USAID loan with detailed stipulations for its use.

The HAD-I project was regionalized in the Northwestern Highlands so that most of the agency level planning was carried out in the same area that the farms were located. From the very beginning, community groups were formed to plan and later operate the local irrigation system. Although the general parameters for the project were established by the government and international agency donors, the actual plan for day-to-day operation was guided by input from the farmers.

The original plan was flexible and was modified as needed and as new resources became available. Later, funds became available for drilling wells so that new community irrigation systems could be established in areas where streams were not available. New marketing opportunities developed so that different crops could be grown. The results of the HAD-I project were favorable and served as an experimental or pilot project stage for the planning of HAD-II.

#### HAD-II

The problems and needs of the remainder of the Guatemalan Highlands were not unlike those found in the Northwestern part. In reality, they were more acute due to the isolation of some of these remaining areas and the difficulty for government services to reach them. The same needs were also expressed by farmers in other areas of the country not considered as part of the Highlands. As a result, the planning now began to focus on all of the country where small irrigation systems might work. The only area not included was the Peten in the far Northeast due to isolation and low population density.

The second phase was called by the same name (HAD-II). The scope of the new phase is best described in the project documents: "Phase II of the HAD Project combined both the concepts of the Small Farmer Diversification Systems Project and Had I with the exception of the roads component. The geographical coverage expanded into all the regions except Region VIII....(with)... 275 miniriego projects that were funded by the project since the beginning up to the end of 1990. Watershed management was added as a major component which has combined the soil conservation and reforestation elements. The small-scale irrigation systems (miniriegos) that are the core of this project rely on the watershed for their viability. If the watershed is improperly managed, the availability of adequate water supplies for the expansion of irrigation systems will be affected". (AED 1991:2)

In 1990 further additions were included which increased the

resources allocated for watershed management, private sector marketing and agricultural research, and integrated pest management. ...the coordinating unit comprised the Vice Minister of Agriculture, the UAP project administrator, and the USAID chief ORD. This group attempted to guarantee appropriate coordination, participation and support from both the USAID offices and the implementing agencies of the government at both the central and regional levels..... The lower level teams of technical agents with each region contained members from the participating agencies (EIMATS). They attempted to meet frequently to jointly solve the technical and marketing problems of the individual miniriegos..... The regional agricultural development committees (COREDA) met periodically to coordinate and manage the activities of the six agencies within the miniriego project". (AED 1991)

Further revisions were made in 1992 which gave priority to 180 of the irrigation areas and place more of the decision making within the structure of the Ministry of Agriculture. Management by objectives was used to direct the activities of specific projects and USAID funds were dispersed directly to the Guatemalan government.

#### LIST OF REFERENCES

AED. 1991.

Highlands Agricultural Development Project-Phase II: Mid-term Evaluation general Report. Washington: academy for Educational Development.

MAGA 1990.

Curso-Taller Metodologias de Integracion de Equipos Inter-Institucionales. Guatemala City: Ministerio de Agricultura, Ganaderia y Alimentacion.

Smith, Gary. 1988a

"Highlands Agricultural Development Project, Phase II: Institutional Analysis". Guatemala City: USAID Guatemala.

#### B. IMPACT EVALUATION DESIGN

The design of the impact evaluation was initiated with a review of Project documents. Some of the relevant sections of the documents are presented in following paragraphs:

"During the initial period of the project, prior to initiation of project activities at the field level, grant funds will be used to undertake a complete project specific and socioeconomic baseline study of areas to be included within the project..... The contracted team will obtain baseline data against which project targets and progress indicators can be measured at later dates....."

During the last year of project activities a grant financed impact evaluation will be undertaken to verify if the

impact evaluation will be undertaken to verify if the project purpose was achieved, and when the attainment of goals is possible. Also analysis of discrete project activities will be undertaken to ascertain whether the interventions in fact contributed to the target group's productivity." (USAID 1983:53)

"Project impact upon target farmers will be assessed by means of a three-phase program consisting of: Initial baseline sample surveys of the project area; Periodic surveys during the life of the Project; and a final impact survey.

The objective of the baseline survey will be to collect information describing the characteristics of the farms households, and rural communities to be affected by the project and relevant to its goals and purposes; cropping and livestock patterns and yields; soil conservation and water uses; household incomes, purchases, expenditures and consumption; credit and technical assistance received; marketing patterns; family characteristics, education, literacy, and the roles of women and children. The information will be used (1) to aid in the design of project activities best adapted to local circumstances; and, (2) to provide a data base against which subsequent changes wrought by the project may be assessed by surveys in the final impact evaluation.

The baseline survey will be undertaken as early as practicable during the first year of the project. A plan will be developed to determine the most effective schedule for surveys to be undertaken in each of the project areas. The final impact survey is planned for the second half of the last year." (USAID 1988:91-92).

A partial Baseline Survey was conducted in 1985 with 33 completed interviews as part of an indepth study that focused on household economy. The data was processed and tabulated but had not been analyzed in depth until recently to see how it might be used in the final impact evaluation.

A more complete Baseline Study was initiated in 1990 by PRODESARROLLO under contract with LBII, including completed interviews with 491 participants in the HAD Project that were selected through standard probability sampling techniques. The study generated detailed demographic information and descriptive data on all aspects that were outlined in the original project paper. The original contract did not include statistical analysis so that it has only recently been examined in terms of its usefulness in the final impact evaluation. The analysis of these and other data sources are the basis for the recommendations outlined in the following paragraphs.

#### IMPACT EVALUATION DESIGN

The overall goal of the final impact evaluation is to docu-

ment the impact of the HAD Project at the beneficiary and community level, at the service institution level, and at the national level. Stated in another manner, the questions that guide the final impact evaluation of the HAD Project are --- What is the impact of the Project ---

- at the beneficiary level in terms of changes in agricultural practices, agricultural production, agricultural income, and levels of living?
- at the institutional level in terms of changes in capacity to deliver services to the farmers? and,
- at the national level in terms of changes in labor utilization, food availability and nutrition, increased income, conservation of natural resources, productive infrastructure, and international balance of payments?

It was evident that a combination of evaluation methodologies was needed if all of the impact questions were to be answered. Many of the questions and the corresponding indicators could be investigated directly on the farms at the beneficiary level. If a representative sample of the beneficiaries were interviewed, then the data could also be aggregated and expanded to the institutional and national levels to help measure the impact at those levels.

There were other items that could only be measured at the institutional and national level if they were to be evaluated. This required a different kind of investigation and a number of special studies were needed in addition to the farm level survey.

Specific questions were allocated to six separate studies, each with its own methodology. These studies are briefly listed below in terms of the questions to be answered and the methodology to be used.

#### 1. Impact Survey

The questions for the impact survey follow closely those outlined in the original project documents -- as a result of HAD project intervention, what changes can be found in:

- crop production and value
- farm characteristics
- cropping systems
- irrigation use
- cultivation practices
- harvesting and marketing practices
- pesticide use and control
- farm animal production
- conservation practices (not included in Baseline Studies)
- credit use (not included in Baseline Studies)
- training and technical assistance
- personal and family characteristics
- levels of living
- community participation (not included in Baseline Studies)

The following guidelines were used in developing the methodology for the impact survey: follow the sampling design as prepared for the 1990 Baseline Survey so that the same 491 beneficiaries can be reinterviewed; follow the same sampling procedures to draw an additional sample of 100 beneficiaries from the FEAT Service areas for interviewing and comparative analysis; follow the format and wording of the 1990 questionnaire and suggest ways for eliminating questions of doubtful reliability and validity with the goal in mind of reducing the number of items; include suggestions for items that could be better included in case studies; and, add retrospective questions (not to exceed (25) that can be used to indicate changes in agricultural practices and production prior to 1990.

## 2. Case Studies:

The case studies were designed to cover a number of Project components or expected outcomes that are not easily determined with quantified data collection alone. These areas were grouped together for a more qualitative approach using case study investigation. The areas included are: household economy, labor utilization, women's roles, irrigation types, integrated technical assistance, and pesticide management.

The methodology for the case studies used the following guidelines: select a sample of 10-12 irrigation groups that fall within the list selected for the survey sample and considering a mix between priority and non-priority service areas, pump vs gravity fed irrigation systems, and regional distribution; conduct structured informal group interviews ('sondeo') with a representative sample of 10 organized groups in the program; and, conduct structured informal interviews with from 2 to 5 (based on the size of the irrigation group) beneficiary families selected as representative from the groups that are interviewed (there should be a minimum of 30 families interviewed).

## 3. Institutional Level Study

In the revised project plan of 1988 there were 23 activities listed for the Project. These activities were to be carried out by a number of different institutions, mostly within the Ministry of Agriculture. In the revision of 1992, the list of activities was consolidated and simplified so that priorities could be outlined. The revised list of activities and related institutions are as follows: technical assistance for agriculture (DIGESA); technical assistance for animals (DIGESEPE); technical assistance for forestry (DIGEBOS); privatized technical assistance (FEAT); crop investigation (ICTA); marketing (INDECA); and credit (BANDESA). There are also a number of auxiliary organizations that give organizational support (LBII, CARE, UAP, PEACE CORPS, ETC..).

The specific goal of the Institutional Study is to measure the impact of the Project on the different institutions involved

in terms of present and future capacity to deliver services to the farmers. Also, it is important to determine the impact of the auxiliary organizations and the organizational structure on project operation.

The methodology used for the Institutional Level Study included the following guidelines: review statistical information on beneficiary impact from 1990 baseline and 1993 followup surveys; and summarize the results of informal structured interviews conducted with key institutional personnel.

#### 4. National Level Study

This study is designed to cover a number of Project components or expected outcomes at the national level such as: changes in labor utilization, food availability and nutrition, increased income, conservation of natural resources, productive infrastructure, and international balance of payments.

The following guidelines were used for developing the National Level Study methodology: use the relevant statistical data from the beneficiary level surveys to estimate the impact at the national level; use statistical information from other sources related to study questions; and, interview project personnel and key individuals in other agencies to get comparative social and economic information.

#### 5. FEAT (Special Fund for Technical Assistance)

The specific goals for the final impact evaluation of the technical assistance offered by the FEAT component include the same ones that apply to the Public Sector which seek to document changes in: use of recommended agricultural practices, agricultural production, agricultural income, and levels of living at the farm level. In addition, the FEAT evaluation seeks to document the impact of privatized technical assistance when compared to that of the Public Sector in terms of cost, willingness to pay, and perception of utility by the farmers.

The study methodology was developed with the following guidelines: conduct structured informal group interviews ('sondeo') with a representative sample of at least 12 of the organized groups in the program; and, conduct structured informal interviews with at least two individuals selected as representative from the each of groups that are interviewed. In addition, a parallel study will be conducted as part of the Impact Survey of HAD beneficiaries which will include 100 farmers in the FEAT project areas.

#### 6. Watershed Study

The impact evaluation of this component is related to the goals and activities outlined for the 20 micro-watershed areas covered by the program. These included extension and training

CARE who was also responsible for the design and completion of the impact evaluation of this component.

The design was based on the measurement of project impact as measured by: the improvement of soil, water and forest resources; new knowledge and skills the participants have obtained in the areas of agricultural, forestry and environmental practices; the level and quality of key forestry and agricultural practices that have been adopted and replicated; the general benefits that can be noted from the perspective of the beneficiary; and, how sustainable is the present level of activities after project termination in September 1993?

The study methodology was developed using the following guidelines: use of an appropriate method of gathering information in order to answer the questions; use of interviews with participants and technical personnel; an evaluation of the adequacy of field methods used by the technicians; and, use of field observation of agroforestry, forestry, soil conservation, and group organization activities.

### C. FINDINGS AND CONCLUSIONS

The following synthesis includes all of the above mentioned studies. Each of the studies is available in its entirety as a separate volume and the executive summaries of each one is included with this report as an annex.

Although the methodology varies between studies, many of the same topics are investigated by more than one study. The varied methodologies give an opportunity to detect aspects that one study and one methodology alone might not pick up. The synthesis is organized by topic areas in the following order: Impact Overview; Personal and Household characteristics; Farm Characteristics; Cropping and Livestock Patterns; Credit and Technical Assistance; Conservation, Watershed and Pesticide Management; Institutional Impact; and, National Impact.

#### 1. OVERALL IMPACT

At the farm level there have been changes in use of agricultural practices as a result of the project although many of the farmers indicate that they already used most of the modern practices (ie.: fertilizer, insecticides, fungicides, etc. etc.,) before the project started. The major shift is in the application of these practices to commercial crops and in an more exact fashion.

A more measurable change can be found in the increase in agricultural production and crop value among the project beneficiaries. Even in the short two year period between the 1991 and 1993 surveys, it was found that two-thirds of the farmers had a positive increase in production in absolute terms. The medium increase in value was 44.7% which is well over the 14.2% inflation rate. It was also found that the increased crop value was

increase in value was 44.7% which is well over the 14.2% inflation rate. It was also found that the increased crop value was closely related to additional commercial crop production rather than traditional subsistence crops.

The increase in crop production and value that the project beneficiaries have also been reflected in living conditions. There have been significant improvements in house construction (wall, roof and floor) and in home facilities (water, toilet and lights). Also, improvements can be noted in household equipment such as radios, television, sewing machines, refrigerators, gas stoves, electric irons, clothing closets vehicles and bicycles.

These changes at the farm level can also be noted at the national level with an increase in value of agricultural production value estimated at Q87,326,810 in 1992 as compared to Q67,998,840 in 1990. In that almost all of this increased value is found in commercial crop production, it represents a change in estimated export value of 4.9 million dollars in 1992 as compared to 2.9 million in 1990 and a direct positive effect on international exchange and balance of payments.

The increase in agricultural production also represents additional food for consumption at home. Not all of the vegetable crops grown are destined for export but may find their way into the local market as well as used for home consumption. Although the increased production of commercial crops is significant, the value of traditional subsistence crops has continued at much the same level (even with a slight increase in absolute level) so that a net total increase of food products is available for local consumption.

The investigation of project impact on service institutions has not rendered as favorable report although there are some instances of increased capacity to deliver coordinated services at the farm level. The many of the farmers were not favorable when talking about the technical assistance that they had received nor were they ready to recognize that the improved practices and increased crop production came from the recommendations given them by government service agents. The constant changes in administrative and organizational structures within the project and the Ministry of Agriculture seem to have had a demoralizing effect throughout the system. Interagency coordination was lacking in most cases yet there were some irrigation groups, pre irrigation, crop research, agricultural extension, credit, forest and water conservation, and marketing technicians worked together to provide integrated development assistance.

The FEAT program for privatized technical assistance has already proven itself as a workable approach and shows even more promise for the future. There were high hopes for the SISE information system in the early days of its establishment as a project emphasis and after a period of difficulties and lack of perceived value, it now has the capacity to provide information for future agricultural decision making and there is renewed interest among public sector institutions to continue its use.

## 2. PERSONAL AND HOUSEHOLD CHARACTERISTICS

The majority (65.3%) of the HAD beneficiaries are 'Indian' by self definition and more than half (53.6%) of them speak a dialect in the home. The two major groups represented are Mam (39.8%) and Cakchiquel (30.3%) with lesser numbers of Quiche (14.5%), Aguateco (10.0%) and a few Jacalteco and Achi. Most of the couples are married (75.3%) although a number also reported a 'free union' relationship (15.7%). The predominant religious affiliation was Catholic (68.5%) although there are also many Protestants (22.5%). The average age of the farmers was 43 and his wife 39. The majority of farmers had some primary (65.5%) although almost one-fourth reported no schooling (23.8%). The women had less schooling with almost one-half (49.9%) with none. The proportion of school age children that attended school was higher for boys (80.9%) than for girls (78.1%). The household size averaged 6.8 members. Work migration was reported by 10.2% of the men and to a lesser degree for the women and children. The men did report some off-farm work (29.5%) during the year but women and children less. There were many families (38.0%) that also reported self-employment during the year with 29.2% of the men and 15.0% of the women. There were also a few families (9.5%) that reported money sent by children living away.

In terms of housing characteristics, most of the houses had adobe walls (71.5%), although there were some with blocks or bricks as well (19.4%). Dirt floors were most common (48.3%), followed by cement (36.9%) and a few with tile (11.0%). More than half (55.2) of the homes had their own water supply and a smaller proportion (26.9%) shared the water supply with neighbors. Sanitary toilets were reported by 85.0% and 24.8% reported making improvements on their homes.

Different means of transportation were also reported: 24.5% had bicycles, 8.6% had pickup trucks, 3.8% had motorcycles, and a few (1.4%) had cars.

The families that are participating in the FEAT program show some differences in a few personal and household characteristics. When compared to the people served by the public sector, those in the FEAT areas: are more likely to be Indian (75.3%); are less likely to be legally married (62.3%); more likely to be Protestant (38.0%); slightly younger (38 years old); more likely to have no formal schooling (33.3% vs 23.8%); and more likely to migrate for work (19.5%).

In terms of housing characteristics the Farmers in the FEAT program were more likely to have houses with adobe walls (81.8%); more likely to have tile roofs (55.8%); more likely to have dirt floors (76.6%); less likely to have running water (37%); less likely to have a sanitary toilet (75.3%); and much less likely to have electricity (7.8%).

In terms of household equipment, the Farmers in the FEAT program were much less likely to have Television (5.2%); much less likely to have sewing machines (19.5%); much less likely to

have a refrigerator (1.3%); less likely to have a gas stove (6.5%); much less likely to have an electric iron (5.2%); and much less likely to have a set of furniture (3.9%).

The following changes in living conditions have been noted giving an indication of the impact of the HAD project on the lives of the beneficiary and their families:

There has been a slight but positive change in levels of living as measured by selected household indicators. A series of questions were included in the Impact Survey of 1992 asking about key housing materials and services before and after entrance in the PDA program. There were six items that were combined to form an index to measure change. There was a positive change in all six of the items with an average change of .342 points on the combined index. The changes recorded for the individual items were: wall construction, 10.9%; floor material, 16.2%; roof type, 7.1%; water source, 18.5%; toilet facilities, 56.1%; and lighting, 31.4%.

There has been a positive change in levels of living as measured by changes in household equipment between 1990 and 1992. Ten identical questions were included in both the 1990 and 1992 surveys concerning the ownership of selected household equipment. The items and the corresponding changes are as follows: radio, 3.4%; TV, 5.5%; sewing machine, 4.8%; refrigerator, 3.1%; gas stove 2.1%; electric iron, 2.4%; clothing closet, 12.3%; electric equipment, -1.9%; auto 1.2%; and bicycle 5.7%.

While not statistically significant, in relation to the number of years in the project, the trend of change is favorable with 77.9% of the 421 homes experiencing at least one positive change in the home.

Regarding the number of household items such as radios, television, sewing machines, refrigerators, gas stoves, irons, closets, vehicles, and bicycles, there is an average increase of one item per household, though this increase is not related statistically to the number of years of participation. The greatest change can be noted in the number of closets, radios and bicycles.

### 3. FARM CHARACTERISTICS

The farms of the beneficiaries are small with an average cultivated area of 1.8 manzanas. Slightly less than one-half manzana (0.457) was under irrigation which was 38.8% of the total land planted. A few of the farmers (14.7%) did not irrigate any crops in 1992 and at the other extreme, 11.9% had no other plantings than those that were irrigated.

Almost all of the farms (98.1%) reported some kind of agricultural equipment or construction. Most often reported were: sprayers, 81.9%; dusters, 78.1%; grain silos, 22.6%; drying floor, 21.1%; storage shed, 19.0%; plow, 17.3%; stable, 16.9%; cart, 11.6%; and water pump, 7.4%.

Most of the farms (89.5%) also had some kind of animals. The proportion of farmers reporting each type of animal and the average number on these farms is as follows: cows, 50.8% reporting with an average of 7.3 on each of those farms; horses, 25.1% and 1.6; donkeys, 7.4% and 4.5; pigs, 43.4% and 2.5; sheep and goats, 16.4% and 4.5; and, poultry, 80.7% and 15.6.

When compared to regular HAD beneficiaries, the farmers in the FEAT program had fewer plots of land; their land was generally more hilly; they were more likely to have plows (24.7%); less likely to have sprayers (63.6%); and less likely to have drying floors (14.3%).

The following changes in farm characteristics have been noted that give indications of project impact in this area:

There was no significant change in the reported area planted in 1990 and 1992. The area reported in 1990 was an average of 1.822 manzanas and in 1992 it was 1.800 manzanas. Upon closer analysis, it is found that 35.4% reported no change in the two year period, 32.1% reported less land planted and 33.5% reported more land planted.

There was slightly more land irrigated in 1992 than in 1990 but the difference is not statistically significant. The average area irrigated in 1990 was 0.403 manzanas and 0.457 manzanas in 1992. With additional analysis it is found that 41.8% of the farmers had no change in area irrigated from 1990 to 1992, 26.4% reported less land, and 31.8% reported more.

There was some change noted in land tenure. Most of the farmers own the irrigated land but there are a few that do plant on rented land. The total land planted and irrigated remained much the same from 1990 to 1992 but the percentage of rented land was reduced from 30% to 26% in this period.

#### 4. AGRICULTURAL PRODUCTION:

A number of key production and conservation practices were included for field investigation in the impact survey. It was found that the level of use was as follows: chemical fertilizer, 97.4%; insecticide, 84.1%; fungicide, 69.6%; compost, 65.8%; improved seed, 65.6%; herbicides, 51.3%; terraces, 29.7%; diversion ditches, 26.6%; planted barriers, 24.5%; and, constructed barriers, 19.2%.

When the priority areas are compared to the areas that did not receive as much technical assistance after 1991, it is found that they reported significantly more use of herbicides, live conservation barriers, fungicide use, and combined agricultural practice change. The increased value of their agricultural production is higher also but the difference is not statistically significant.

The comparative crop value of the most important commercial

crops in 1992 is as follows: 'brocolli', 368 Quetzales in the priority area vs 561 Quetzales in the nonpriority area; 'arveja china' 302 vs 139; 'zanahoria', 64 vs 208; 'tomate', 1239 vs 1886; 'repollo', 105 vs 256; 'coliflor', 217 vs 196; 'cebolla', 120 vs 880. Coffee was also mentioned with a comparative production value of 848 vs 210.

There is a positive relationship between project participation and the use of recommended practices. 'Project participation' was measured by the number of years that the farmer had been in the project. 'Use of recommended practices' was measured by how many of the 10 selected agricultural practices the farmer was presently using. The correlation between the number of years and the number of practices was slight but statistically significant.

Some agricultural practices are more closely related to project participation than others. A closer examination of the 10 practices included in the index shows that five of the practices have a strong positive relationship with project participation (use of: terraces, living barriers, compost, herbicides, and insecticides). The remaining five practices do not show a positive relationship to project participation (use of: dead barriers, chemical fertilizers, fungicides, and improved seed).

The strongest relationship between project participation and use of recommended practices is for those farmers who have been in the project from 4 to 6 years. A closer examination of the number of years in the project shows that farmers that have been in the project between 4 and 6 years are using 5.6 practices while those with less than 4 years are using 4.9 practices and those with more than 6 years are using 5.5 practices.

There has been an overall increase in agricultural production value. The sample has experienced an overall increase in the value of agricultural production. Nearly two-thirds of the farmers had a positive increase in agricultural production value in absolute terms, 53.4% had a positive rate of change, and the median increase in value was 44.7%, well over the 14.2% inflation rate. Also, the percentage of farmers producing over Q20,000 increased from 7% to 9%, and one-third of the farmers had an increase in production value of 100% or more.

The increased production value is closely related to commercial crop production. The increase in agricultural production value was achieved through increased value of production in commercial crops, not subsistence crops, which remained basically static. This demonstrates that the project has had a positive effective in its principal area of focus, which is commercial crop production.

There is a negative relationship in project participation (as measured by the number of years in the project) and crop production value. There are indications, although the reasons are not clear, that the group of farmers who have been in the project more than six years have done less well than those with five years or less experience.

There was considerable increase in crop value between 1990 and 1992 among the participants in the PDA project. The average crop value in 1990 was Q 2,974 and Q 4,305 in 1992. The difference between the two years is statistically significant. The crop value was calculated by combining all of the crops reported for the given year and using a standard unit value for each crop. All crops were included, both subsistence and commercial as well as irrigated and non-irrigated areas.

The majority of the farmers in the PDA program reported an increase in crop value in 1992 as compared to 1990. Most (65.3%) had at least some increase in crop value and 53.4% had an increased value of more than Q 1,000; some as high as Q20,000. There were 20.7% that reported the same crop value for the two periods.

The increase in crop value is positive even when the inflation rate is considered. The data was analyzed further to determine if the increase in crop value was greater than the official 14.22% inflation rate registered between 1990 and 1992. Subtracting this factor removed an additional 15 cases from those that reported a positive change in production value. Increasing the margin of inflation to as high as 20% still leaves 55.5% of the farmers with a positive crop value increase in 1992 over 1990.

The correlation between participation in PDA (as measured by the number of years in the program) and the change in crop value between 1990 and 1992 is positive but not statistically significant. Further investigation shows that those farmers that were in the project less than 4 years had the greatest change in crop value 1990 and 1992. For this group, the difference is statistically significant. This group of farmers represents 36% of the total sample interviewed.

The greatest change in crop value between 1990 and 1992 is related to commercial crops rather than subsistence. Upon closer inspection it was found that only 31% of the crops classified as subsistence had a value increase between 1990 and 1992 as compared to 53% of the crops classified as commercial.

## 5. CREDIT AND TECHNICAL ASSISTANCE

Technical assistance at the farm level was one of the main components of the HAD Project. This was directed at making the maximum use of irrigation to increase crop production and diversify in the direction of commercial crops for local and export markets. This technical assistance was to include marketing, conservation and watershed management, credit use, and pesticide management. The assistance was to be done through farm visits by extension agents and other experts and through short courses.

More than half the farmers (57.5%) interviewed in the impact survey in 1993 reported that they had received technical assist-

ance during the last crop year. This is an increase of 3.6% from those reported in the baseline survey of 1990. This increase is not statistically significant.

An additional question concerning experience with technical assistance prior to entering the project and a significantly larger proportion reported (65.6%) earlier experience. More disturbing are the results coming from the case studies where the dissatisfaction with public sector assistance was openly expressed. This was also found in the field visits during the Institutional study. Most farmers did not acknowledge that the new practices and increase in crop production were a result of the technical received. This disturbing information is not inconsistent with the findings from diffusion of innovation studies which have found that farmers are more likely to attribute their new ideas and practices to 'friends and neighbors' rather than official project sources.

In contrast to the above findings, the farmers in the FEAT areas recognized the assistance given to them by the paid agents and felt that they were an important part of their success in increasing production and income. Also, it is interesting to note that the farmers in the HAD priority areas report a statistically higher number of technician visits than those in the non-priority areas.

The use of production credit was also included in the investigation. Credit use during the previous three years was reported by 42.3% of the farmers. It was also found that 19.7% had used credit only one of the three years, 8.6% for two years, and 13.8% for all three years. Even a larger proportion of the farmers (60.6%) reported production credit experience prior to entrance in the project. There is a slight increase of 3.6% in credit use reported between the time of the baseline survey in 1990 and the impact survey of 1993 but this difference is not statistically significant.

There was a slight increase in reported technical assistance from 1990 to 1992. In 1990, 53.9% of the farmers reported that they had received technical assistance. This increased to 57.5% in 1992.

There was a considerable increase in reported production credit use among beneficiary farmers from 1990 to 1992. Production credit use was reported by 20.0% of the farmers in 1990 and 42.3% in 1992. The farmers were also asked if they had credit experience prior to their entrance in the PDA project and 60.0% answered to the affirmative.

## 6. CONSERVATION, WATERSHED AND PESTICIDE MANAGEMENT

Conservation and environmental issues were important considerations in the planning of the HAD Project. Special components for conservation, reforestation, watershed management, and pesticide control were included as part of the project activities. Attempts to measure the results of these efforts were included in

the Impact Survey, the Case Studies, the Institutional Analysis and the FEAT Study.

A number of key conservation practices were included in the field investigation in the impact survey. It was found that the level of use was as follows: compost, 65.8%; terraces, 29.7%; diversion ditches, 26.6%; planted barriers, 24.5%; and, constructed barriers, 19.2%.

There is evidence of an increased use of pesticides as a result of project activities. There is also evidence of increased use of precautions by those applying pesticides. In the Case Studies it was found that 60% of the farmers reported using rubber boots and 70% reported using gloves while applying pesticides. The use of masks was also reported. At the same time, many still do not use proper precautions and particularly contract workers may be the most vulnerable to the detrimental effects of improper use of pesticides. There is also evidence that some of the more toxic pesticides are still being used by a few farmers.

There may have been some additional negative environmental effects from the project. This is best stated in one of the conclusions of the ECOTEC investigation, "In terms of the program's negative aspects, the diversification in production towards non-traditional crops has brought changes in agricultural technologies, including an increase in the use of agrochemicals and more intensive soil use, which may have long term negative effects on the population."

There are contradictory views among the farmers that the additional cropping is 'wearing out' the soil yet they feel that the present high levels of production and income justify the practices that are being used. There seems to be a knowledge gap concerning the environmental impact of the recommended technical package. Some of the pressure to use increased agrochemicals seems to be coming from credit sources and crop buyers.

It was found that some of the irrigation systems are short of water at the end of the irrigation cycle. During the Case study investigation it was found that farmers at the high end often do not get enough water. The farmers often felt that they did not have enough control of the water source for a secure future.

There were also a number of findings from the Watershed study that are listed in the following paragraphs.

In 1993, 73.8% or 1698 of the projected 2,300 farmers participated in the planning and implementation of Project activities. At the same time, the personnel of Care, DIGEBOS, and Peace Corps completed the preparation of management plans for 20 watersheds. Also, 84 of the 88 existing watershed committees had received some kind of training which was included talks and field trips (70%) with a few additional demonstrations and short courses. Farmers have indicated increased knowledge and interest as a result of the training activities.

An estimated 345 hectares have been covered by the improvement/protection practices applied in the watershed areas. Conservation practices have been reported in 33.5% of the total area, reforestation in 31.4%, and forest improvement practices in 23.0%. At least two conservation practices have been initiated by 22% of those interviewed. The beneficiary farmers reported that lack of time and seed material prevented further increases in watershed activities. The pressure of time needed for income producing activities was a strong obstacle although the utility of compost production served as a motivation.

Fire control training has been useful but there was no indication of the existence of organized fire-prevention brigades in any of the areas studied. A number of the communities indicated that the training in fire control that had been part of the training events had been useful and in two occasions had been applied during the last year to control fires.

There have been fewer plantings for firewood and construction lumber among the project participants than anticipated. Of the 2,290-thousand crees proposed only 281.3-thousand have been established. The survival rate of these plantings is estimated at 72.%. Many of the farmers do not know exactly why the trees that were planted did not survive although lack of sufficient rainfall and the presence of leaf-cutting ants were mentioned as problems. The future management of present plantations is in doubt. There is some ambivalence among farmers about the role of DIGEBOS in forestry management and regulation.

There is only slight evidence of increased firewood availability as a result of the project. The project related plantings are still small and only 7.4% of the groups indicated any increase at the present time. Approximately 40% of the farmers interviewed buy firewood and only 29.8% use exclusively from their farms.

There is some evidence of increased crop production as a result of soil conservation practices among the participants. Increased production was reported by 14% of the farmers and this was attributed to soil retention, soil improvement, use of compost, green manure, and the elimination of burning residue. The

farmers reported increase in yields of corn (26%), vegetables (24%), potatoes (12%), and beans (20%). There has been some indications of lower use of chemical fertilizers and 43% of the farmers report that they now use compost as recommended by the project. There has been some crop diversification as a result of the project including, improved pasture, 'maguey', flowers, fruits, and coffee, were mentioned by 8% of those interviewed.

Forestry management groups have been formed in many communities. Groups have been formed in 88 communities (of the 100 projected) which fit the cultural patterns of Occidente more than Oriente. The average size of the group is 25 persons. The composition of the groups is mostly male (61.2% male only). Some others do have women members (22.2%) and a few (16.6%) have only

women members. Most of the groups have a work plan and about 2/3rds of the groups indicate that they follow the plan. Most of these groups will require some assistance for continuation in terms of technicians and material resources although it is estimated that 22.2% are sufficiently well established to continue functioning on their own.

Women participate in some of the activities sponsored by almost half (48%) of the groups. Women are particularly active in the preparation and care of plant nurseries and are most interested in fruit crops and flower planting. Women are full members in 37% of the organized groups and recognize the need for more technical assistance that they feel could be best provided by women promoters.

The technicians and promoters of DIGEBOS have demonstrated capability in the design and supervision of project activities. As a result training and experience in the project, 22 technicians and 24 promoters have capacity in planning and design. Also, 14 technicians and 24 promoters have demonstrated ability in community group supervision and assistance.

#### 7. INSTITUTIONAL IMPACT

As a result of the HAD Project, it was expected that there would be an increase in the capacity of the governmental institutions to help farmers improve their crop production, income, and levels of living. The results of this effort were included for measurement in the Impact Survey and the Case Studies. Also, a special effort was made to measure the results through the Institutional Study.

As a result of this investigation it was found that there has been some indication of increased institutional capacity to deliver farm level services. At the farm level there are indications that the HAD Project has helped in the improvement of farm production and income. Only 40% of the farmers interviewed in the Institutional Study recognized that the Ministry of Agriculture related institutions were responsible for the improvements, yet, within DIGESEPE there was agreement that the Project experience had helped in the process of establishing priorities; within DIGEBOS there is recognition that the Project had helped in the development of an integrated approach to watershed management; and, in DIGESA there was a recognition of a new methodology of planning by objectives that has now become the mode of operation.

There is also evidence that changes at the institutional level have resulted in improved agricultural practices, increased value of farm production land improved levels of living. The shifting emphasis in DIGESA and INDECA from basic grains to market oriented vegetable crops has been noted in all of the studies. The initiation of the farmers market experiment by INDECA can be seen in the 28 groups that have been organized in the San Martin Sacatepeque area. The establishment of a new experimental plots by ITCA is also an indicator.

There has been some evidence of institutional coordination and cooperation as result of PDA activities. The Institutional Study found evidence in the field that the personnel of DIGESA and BANDESA worked out ways of coordinating their efforts so that the new irrigation projects could be established. They also worked out coordinated efforts to make production loans available. The technicians of DIGESA and those of DIGEBOS also developed working relationships to deal with soil and water conservation issues. The experience in coordination of local planning for resource allocation and farm service delivery that came through the brief life of the EIMAT groups helped develop personal relationships among the technicians and with local leaders that has continued in some areas.

The Project's organizational and administrative structure was perceived as an obstacle rather than a factor contributing to success in the HAD Project. The Institutional Study found such expressions as: 'the coordinating committees did not meet so they could not function well'; 'there was always conflict between the different organizations'; 'there was little local participation'; 'there was a push to open new projects rather than make the older ones successful'; 'there was a parallel and competing structure of administration'; 'there was no working model for operations'; 'there was no structure for providing promised resources at the community level'; and a general feeling that there was a large number of committees and offices that were formed without a clear understanding of the unique role of each and how they were interrelated (ie: SPADA, CE, CT, UAP, SER, COREDA, COSUREDA, CNC, CTN, LBII, CATIE/MIP, PIPAA, SISE, FEAT, ETC., ETC..). Further, there did not seem to be a clear understanding of how each entity fit into a coordinated delivery system.

There has been little evidence of improved management and decision making in the related institutions as a result of the HAD project. During the Institutional Study, interviews were conducted at all levels of the Ministry of Agriculture and there was little evidence that there had been any improvement in management and decision making as a result of the Project. There was some recognition of an improved planning methodology in DEGESEPE through the process of prioritizing of work areas.

There is little evidence that the increased capability of providing information through an establish information system has contributed to the use of this information for administrative and decision making purposes. The Institutional Study found that there were high expectation early in the project that an information system would be established. Later, many of the institutions felt that the methodology was being imposed and was of little utility to them. As the project comes to an end there is renewed interest as the institutions see the capabilities. It was unclear to most of those interviewed as to what might happen to SISE in the future but the hope that it might be combined with parallel operations in other institutions so that it can be used.

### 8. NATIONAL IMPACT

It was expected that the HAD Project would also have a measurable impact at the National level. One of the expected results was increased crop production and particularly in commercial crops for export. At the National level, this increase would contribute directly to the economy and balance of payments. Another expected result at the national level was an increase in local labor utilization with less need for seasonal migration. It should also increase the total credit operation in the country.

An independent study of National impact was included as one of the evaluation methodologies. This study was based in part, on the use of farm level survey data that was expanded to the total Project population. It was also based on an investigation of national economic data from other sources.

In effect, all of the related studies confirm that there has been an increase in the utilization of family labor and at this time, 87% of the beneficiaries use family labor in crop production. In addition, 70% of the farmers now hire other workers from the community for periodic help.

Nutrition impact is partly reflected in the increase in plantings of subsistence crops. The number of plantings increased from 14,746 in 1990 to 16,812 in 1992 (with some farmers planting more than one crop during the year). At the same time, the value of vegetable crop production has increased during the same period by 36% which also has an indirect impact on household consumption.

The findings from the case studies indicate the farmers derive about two-thirds of their income from agricultural crops. The remainder comes from animals and other non-agricultural sources. The increases in agricultural production that have come from Project efforts have made a positive impact on the majority of those that have participated, yet about one-third of the farmers interviewed felt that their situation became worse because of their participation. They cited the debts from irrigation system installation and electricity charges as well as failure to find proper markets for their crops as reasons.

The results of the investigation at the National level also indicate that there have been notable results from the efforts in conservation of National resources. The area covered by soil conservation efforts between 1988 and 1992 is reported to have covered 23,384 hectares under the Social Payment system.

In the environmental area the evidence of impact is modest although the creation of PIPAA which gives a legal basis for control of agricultural production and the use of agro-chemicals. Also the investigation sponsored through ARF and the ICTA/CATIE-MIP program have provided improved methods that are now used in integrated pesticide management as well as providing a training mechanism for farmers.

The changes at the farm level can also be noted at the

national level with an increase in value of agricultural production value estimated at Q87,326,810 in 1992 as compared to Q67,998,840 in 1990. In that almost all of this increased value is found in commercial crop production, it represents a change in estimated export value of 4.9 million dollars in 1992 as compared to 2.9 million in 1990 and a direct positive effect on international exchange and balance of payments.

#### D. LESSONS LEARNED AND RECOMMENDATIONS:

The Had Project has had a comparatively long life span and has included many different activities. This and the combined methodology used for measuring impact have provided a number of useful lessons that can be useful for future project design and implementation. The lessons related to project planning are listed first, followed by those related to project organization and administration, then project operation, alternative activities, and ending with project evaluation issues.

Project Time. Expected results do not come in a short period. As was stated in one of the reports, "the first three years are for learning; the practice does not come until later". Part of the success of this project is because of the longer time duration.

Target Audience. This project again shows that the target audience must be clearly defined at the time of program planning if the activities are to be carried out without conflict. In this project, there were at least two target groups defined, irrigation beneficiaries and mini-watershed areas. It was not always clear how the two were interconnected and how activities could and should be coordinated.

Comprehensive studies of the Water Source. Even though there were studies carried out in most of the areas, there are still instances where the water is not sufficient and where the ownership of the source makes the future uncertain. The costs related to pumping water with expensive electricity also needs to be considered at the planning time.

Project Scale and Duplication. Factors that give success on one scale may not necessary be the same needed to assure success at another scale. The first phase of the HAD Project was considered a success and did not have the problems of organization and administration that came as the project was amplified to cover the whole country. The problems of coordination and resource allocation became major ones as the project was amplified.

Saturation Points Require Reprogramming. As was noted, the watershed program has gone as far as it can go with the present personnel and will require changes to move ahead. The same thing could be applied to almost all present activities in the HAD project.

Coordination and Cooperation. Interagency coordination and cooperation is always difficult but may be easier to accomplish

at the level of technicians working together in the field but seems to break down at the intermediate administrative levels. This may be due to a lack of clear definitions of functions and resource allocation.

Organizational and Institutional Development. This project seems to have been relatively successful in spite of the difficulties in organizational and institutional structures. Applying external development assistance through existing governmental structures seems to 'water down' any possible impact at the farm level. Developing parallel structures may get the resources to the field sooner but the professional envy and demoralization in the governmental institutions may negate the results in the long run. More emphasis is needed in identifying and developing organizational alternatives that work.

Pesticide management. There seems to be two stages that operate in the adoption of pesticides. The first stage is in convincing farmers that the use of the new materials will help in increasing their production and income. The next stage is to impress them with the danger to their own health and the environment. The two do not necessarily go together and it may take more time for the second one to be adopted.

Evidence of Concrete Benefits. Farmers must be able to see concrete benefits almost immediately for them to be willing to invest time and other limited resources in a new enterprise. This was found true in reforestation aspects but applies to other aspects as well.

Dual Role of Technicians. Technicians are often called on to carry out conflicting tasks such as the Forestry agents also being required to control tree cuttings. It makes it difficult for them to work at the same time in a participatory way with the farmers for watershed conservation. Another similar situation arises when extension agents are called on to collect loan payments; it makes their other roles more difficult if not impossible.

Group Organization. This is one of the most important aspects that was mentioned in the evaluation studies yet is not an area that agricultural technicians are trained in.

Planning by Objectives. This has been identified among the technicians as an important lesson learned from the project. It is an aspect that can be emphasized in future projects and ongoing activities.

Production and Marketing Technology. This study emphasized again the importance of developing new marketing outlets to accompany the new crops and increased production.

Export Cropping and Small Landholding. Many of the criticisms of the effects of export cropping on small farmers, such as the gradual concentration of land in the hands of a few, does not seem to be true in this case. There does seem to be some increase in social differentiation where those fortunate enough to

have irrigated land move ahead of the others.

Use of the Increased Productive Capacity. It is estimated that the irrigation infrastructure created by the Project is capable of even higher levels of production than are now being realized. One of the barriers is the high cost of electricity in those areas where water is pumped. This is worthy of further investigation with possible policy implications.

Project Size and Successful Outcomes. It was noted in the field studies that the small irrigation projects seem to be more successful than the larger ones.

Women's Roles. Women have been increasingly involved in the agricultural and conservation activities in this project. There are indications that these new activities are in addition to the traditional household duties which means an additional burden. This area needs further study to determine if it a positive or negative outcome.

Privatized Agricultural Services. The success of the FEAT program indicates that it is a viable alternative to public sector technical assistance. It also may be the only way that present levels of assistance can be maintained or increased due to reduced government budgets and lowered bureaucratic efficiency. It also may be an effective means of providing experience that will improve the efficiency and accountability of public sector extension agents. This program needs to be carried further until it operates without subsidy and finds the needed connecting link with agricultural or credit institutions.

Further Analysis. This project seems to have produced more lasting results than most agricultural development projects. In addition to the investigation and analysis required for this report, further studies are justified to identify in more detail the factors that have worked together to produce these results.

Accurate Data On Farm Income. This study again confirms the difficulty in collecting accurate agricultural production costs and income at the farm level. Subsistence farmers do not keep exact records even on a single crop such as coffee. When they have multiple crops with multiple sales and varying inputs at different time throughout the year then can only give estimates. They also have other reasons that prevent them from giving accurate information to others about their economic situation.

Impact Measures. Exact impact measures are difficult to obtain unless accurate baseline data is collected early in the life of the project from both beneficiaries and a comparative group of nonbeneficiaries.

## 1. SUMMARY

The Ecotechnology Consulting Company (ECOTEC) was contracted to provide a preliminary evaluation of the Special Fund for Technical Assistance (FEAT), one project of the Agricultural Development Program (PDA) within the Agriculture, Livestock, and Food Ministry, funded by the United States International Development Agency (USAID).

The aim of FEAT was to privatize technical assistance channeled to poorer farmers to allow them to install irrigation systems and to diversify their production and make it more responsive to market conditions.

Louis Berger International Inc. (LBII), the company contracted for this preliminary evaluation, established that the population under study consisted of more than 100 groups and some 1300 farmers who were involved with the program in its two years of existence and a group of no fewer than twelve were to be included in this evaluation report. The evaluation would be based on structured informal interviews with the groups, member and non-member farmers, and the staff technicians. The entire evaluation lasted approximately three months.

The evaluation demonstrated that the majority of the FEAT technicians came from the agricultural public sector and had become involved in the program as a means to improve their incomes and to continue their professional development.

In the case of the farmers, the majority turned out to be small scale agriculturalists who were owners of an average land extension of 5.48 cuerdas of 25 X 25 (one cuerda = .044 hectares), with access to irrigation. They joined the program hoping to increase their incomes.

The program was meant to cover the areas of agricultural production, administration, and commercialization. In practice the technicians have not always dealt with the administrative and commercial aspects. This is primarily because the technicians themselves were not sufficiently knowledgeable in these areas so they made productive activities their priority, leaving commercialization to the producers.

The FEAT proposed methodology for the program has changed in practice, especially in the area of honorarium payments to the technicians. The farmers and technicians agreed that payment should be based on a proportion of the benefits obtained by the farmer.

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Generally the farmers were satisfied with the program results as their production has appreciably increased as have their incomes. The principal limitation has been in the commercialization of their products which depends on export companies whose standards have had negative effects on the farmers.

The success of the program is obvious in the fact that none of the groups interviewed have failed to pay the technicians, although they did not seem to know if in the following years they should increase the proportion of the technician's honorarium, given that the program's input is diminishing.

The farmer groups expressed interest in continuing with the program based on the results they get. Currently, their improved incomes have translated into better nutrition, and purchasing commercial products and other benefits, an important aspect of which is that many in the group have not had to go to the southern coast for the export crop harvests which had been a traditional survival strategy.

In terms of the program's negative aspects, the diversification in production towards non-traditional crops has brought changes in agricultural technologies, including an increase in the use of agrochemicals and more intensive soil use, which may have long term negative effects on the population. FEAT technicians have not always been concerned with evaluating this situation and recommending less problematic technologies.

It is also important to point out that the presence of FEAT technicians has created conflict with the public sector agricultural technicians. Far from coordinating their activities, they have been quite divided with the consequent negative effects.

Attempts to analyze the general impact of the program have been limited by the lack of general information regarding the program's coverage from its beginning to the present.

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## Executive Summary

1. Purpose of project. The Highlands Agricultural Development Project was begun in 1983 as an agricultural diversification project designed to raise small farmer incomes and increase the flow of hard currency into the country by raising and exporting non-traditional agricultural products. One component included support for small irrigation systems for groups of farmers to allow them to more fully utilize lands, especially in the dry season. The Project, which has undergone major revisions and changes in methodologies and strategies, is currently in its 10th and final year.

2. Purpose and methodology of evaluation. The purpose of the survey portion of the evaluation was primarily to assess change in the status of small irrigation beneficiaries, principally regarding agricultural practices, value of agricultural production, and level of living. The evaluation focuses on three time periods: before participation in the Project, the 1990 crop year when a baseline survey was carried out, and the 1992 crop year, for which the baseline survey was repeated. The period previous to 1990 was surveyed using retrospective questions in the 1992 survey.

The survey universe consists of 421 beneficiaries of 63 small irrigation systems selected at random from a total of 10,111 beneficiaries in 347 systems in all seven agricultural Regions in Guatemala. These systems included 166 beneficiaries which participated in the priority technical assistance program; the rest did not. In addition, 77 surveys of beneficiaries of the FEAT program were carried out. The survey data thus allow for comparisons between pre-Project, 1990, and 1992; between FEAT and non-FEAT; and between priority and non-priority.

3. Findings and conclusions. Overall, change in the status of small irrigation system beneficiaries has been positive but not dramatic.

a. Agricultural production value.

- Project participants have experienced an overall increase in the value of its agricultural production. Nearly two-thirds of the farmers had a positive increase in agricultural production value in absolute terms, 53.4% had a positive rate of change, and the median increase in value was 44.7%, well over the 14.2% inflation rate.
- The increase in agricultural production value was achieved through increased value of production in commercial crops, not subsistence crops, which remained basically static. Thus, the Project had a positive effect in its principal area of focus: commercial crops.
- There is a clear relationship between the amount of land cultivated and the total value of agricultural production, but only as regards land owned by the farmer, not rented land. The implication is that farmers really do not make money on their rented land, just on their own land.
- Farmers with more than six years of participation in the project have done less well than others, possibly because the groups formed earliest in the project were located in regions with less potential, particularly Regions I (Guatemala) and VII (Huehuetenango-Quiché), and they generally own less land today.
- While the total amount of land cultivated by the average farmer did not increase from 1990 to 1992, the amount of land under irrigation did increase by 14%. This increase appears to be clearly the result of the fact that more farmers were actually using the irrigation system, as the percentage of farmers not using the irrigation system for one reason or another dropped from 26% in 1990 to 15% in 1992.

b. Improved agricultural practices

- The project had a net positive effect on agricultural practices, but changes occurred primarily among farmers who participated in the project for more than three years. In addition, farmers usually adopted no more than one improved practice out of 10 possible practices.

- Change toward improved practices favored soil conservation over other practices. Four of the 10 practices involved soil conservation, two involved fertilization, three involved pesticides, and the last involved improved seed. Two of the four soil conservation practices were the ones most notably affected by the project and among those least likely to be attributable to other factors.
- Improved practices can be attributed to public sector technical assistance. The four soil conservation practices plus natural fertilizer are nearly always attributable to public sector technical assistance, and three of these five show notable positive change during the life of the project. The use of terracing increases from 13.9% for those with three years or less in the project to nearly 50% for those with more than seven years.
- c. Level of living
- While not statistically significant in relation to number of years in the project, the trend of change is favorable: 77.9% of the 421 homes experienced at least one positive change in the home. Changes were mainly in services (latrine, domestic water source, electricity - 72%) and less in house construction characteristics (walls, roof, floor - 23%).
- In services, the greatest change occurred in the existence of a latrine (29.7% before Project, 34.8% after), an important change because of the three services, it is most dependent on individual decision and least likely to be tied to a community-wide project.
- While indoor piped water and electricity might seem independent of individual farmer income and dependent on community collaboration, electrification projects do include a community (and therefore an individual) contributor, so increased income from the Project may play a role in making such a contribution possible.
- Regarding improved housing, changes have been few: floors - 16%, walls - 11%, and roofs - 7%. Most changes have probably involved floors, because a new floor can be installed without additional structural changes.
- Regarding the number of household items, such as radios, television, sewing machines, refrigerators, gas stoves, irons, closets, vehicles, and bicycles, there is an average increase of one item per household, though this increase is not related statistically to number of years of participation.

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