A.I.D. Project Impact Evaluation Report No. 22

The Product is Progress: Rural Electrification in Costa Rica

October 1981

U.S. Agency for International Development (AID)

PN-AAJ-175

A.I.D. IMPACT EVALUATIONS

PROGRAM EVALUATION DISCUSSION PAPERS

No. 1: Reaching the Rural Poor: Indigenous Health Practitioners Are There Already (March 1979) PN-AAG-685
No. 2: New Directions Rural Roads (March 1979) PN-AGG-670
No. 3: Rural Electrification: Linkages and Justifications (April 1979) PN-AAG-671
No. 4: Policy Directions for Rural Water Supply in Developing Countries (April 1979) PN-AAG-691
No. 5: Study of Family Planning Program Effectiveness (April 1979) PN-AAG-672
No. 6: The Sociology of Pastoralism and African Livestock Development (May 1979) PN-AAG-922
No. 7: Socio-Economic and Environmental Impacts of Low-Volume Rural Roads -- A Review of the Literature (February 1980) PN-AAJ-135
No. 8: Assessing the Impact of Development Projects on Women (May 1980) PN-AAH-725
No. 9: The Impact of Irrigation on Development: Issues for a Comprehensive Evaluation Study (October 1980)
No. 10: A Review of Issues in Nutrition Program Evaluation (July 1981) PN-AAJ-174

EVALUATION REPORTS

PROGRAM EVALUATIONS:

No. 1: Family Planning Program Effectiveness: Report of a Workshop (December 1979)
No. 2: A.I.D.'s Role in Indonesian Family Planning: A Case Study with General Lessons for Foreign Assistance (December 1979) PN-AAH-425
No. 3: Third Evaluation of the Thailand National Family Planning Program (February 1980) PN-AAH-006
No. 4: The Workshop on Pastoralism and African Livestock Development (June 1980) PN-AAH-238

PROJECT IMPACT EVALUATIONS

No. 1: Colombia: Small Farmer Market Access (December 1979) PN-AAH-768
No. 2: Kitale Maize: The Limits of Success (May 1980) PN-AAH-723
No. 3: The Potable Water Project in Rural Thailand (May 1980) PN-AAH-850
No. 4: Philippine Small Scale Irrigation (May 1980) PN-AAH-749
No. 5: Kenya Rural Water Supply: Program, Progress, Prospects (June 1980) PN-AAH-724
No. 6: Impact of Rural Roads in Liberia (June 1980) PN-AAH-750
No. 7: Effectiveness and Impact of the CARE/Sierra Leone Rural Penetration Roads Projects (June 1980) PN-AAH-751
No. 8: Morocco: Food Aid and Nutrition Education (August 1980) PN-AAH-851

(continued on inside backcover)

THE PRODUCT IS PROGRESS:

Rural Electrification in Costa Rica

PROJECT IMPACT EVALUATION NO. 22

by

Paula O. Goddard, Team Leader
(Bureau for Program and Policy Coordination)

Gustavo Gomez, Management Consultant
(San Juan, Puerto Rico)

Polly Harrison, Regional Social Science Advisor
(USAID/Nicaragua)

George Hoover, Engineer
(Bureau for Latin America and Caribbean Region)

Survey Team

Ricardo Wing Arguello
Carlos Brenes Castillo
Francisco Guido Cruz
(Centro Investigaciones Sociales, San Jose, Costa Rica)

Agency for International Development

October 1981

ALLIANCES IN PROGRESS

RURAL ELECTRIFICATION METER

TABLE OF CONTENTS

Appendices

FOREWORD

In October 1979, the Administrator of the Agency for International Development initiated an Agency-wide ex-post evaluation system focusing on the impact of AID-funded projects. These impact evaluations are concentrated in particular substantive areas as determined by A.I.D.'s most senior executives. The evaluations are to be performed largely by Agency personnel and result in a series of studies which, by virtue of their comparability in scope, will ensure cumulative findings of use to the Agency and the larger development community. This study of the impact of A.I.D. Rural Electrification in Costa Rica was conducted in September 1980 as part of this effort. A final evaluation report will summarize and analyze the results of all the studies in this sector, and relate them to program, policy and design requirements.

Executive Summary

Between 1965 and 1969 A.I.D. loaned $3.3 million to the Banco Nacional de Costa Rica for purposes of electrifying, through member-owned cooperatives, three diverse areas of Costa Rica: San Carlos, San Marcos and Guanacaste. The loan was supplemented by $818,000 in local funds and was used for construction and placement in operation of three rural electric cooperatives and a new transmisson line 32 kilometers in length. The cooperatives which A.I.D. funded today encompass roughly 7 percent of the total electrification effort in Costa Rica or 23 percent of the rural electrification consumers.

It is the conclusion of the evaluation team that this A.I.D. loan to Costa Rica was wisely conceived; with a few exceptions the project goals were met. The cooperatives are all now in good financial health and the areas which they serve have demonstrated varying degrees of economic growth during the seventeen year period since the project began, some of which is attributable to electrification. The cooperatives also seem to serve the rural poor better than other available electricity distribution systems. The team believes that the project's success was enhanced by the Costa Rican environment: an abundant potential for hydro-electric power, supportive local institutions and a national orientation toward equitable development.

The evaluation team examined the impact of electrification in each of the three cooperative sites at the home/farm level and at the community/commercial level. The team concluded that in agriculture the impact of electrification varied widely -- largely according to the type of production activity (e.g., whether growing sugar, coffee, rice, raising poultry, dairy or beef cattle). In general electricity had the greatest impact in the processing stages and less in production on the farm.

- In San Carlos, electrification has dramatically increased the profitability of several agro-industries, especially dairying.
- In San Marcos, electrification contributed to the quadrupling of coffee production. However, significant diversification of agriculture did not take place.
- In Guanacaste, a region which has witnessed a slower pace of overall growth and development, cooperative electricity is important to the population even when major economic benefits are not directly attributable to it.

At the community/commercial level, electrification was credited with generating a "rebirth" in one area (San Carlos), and generally increasing the number of small businesses, shops, tourism, as well as expanding social services, in particular educational opportunities for adults in rural areas. Prior to 1970 one of the major constraints to expanding educational

opportunities for adults was the absence of electricity to provide lighting for late afternoon and evening classes. Today there are 100 night primary schools and 27 night secondary schools throughout the country. In addition, there are now 600 centers in rural areas providing literacy and some primary education to economically disadvantaged adults.

After analysing the results of electrification usage and non-usage in a 96-household survey and from observations and interviews on commercial and social usage in the project areas, the A.I.D. evaluation team drew ten key lessons:

1. the probability of significant impact by electricity on economic growth depends considerably on the setting of the project area;

2. as income goes up the ability to utilize rural electrification productively goes up which in turn further raises income;

3. rural electrification can be financially at risk until a certain degree of development is accomplished;

4. projects should be designed with relatively high contingency budget for working capital and with assured subsidies to sustain financial viability during the first years;

5. successful establishment of rural electrification cooperatives is greatly enhanced by supportive attitudes and policies on the part of national government and local institutions;

6. impact of electrification on agriculture and agro-industry can be partially predicted according to the types of production activities taking place in the area;

7. electricity can be a favored type of household energy even for the very poorest; yet,

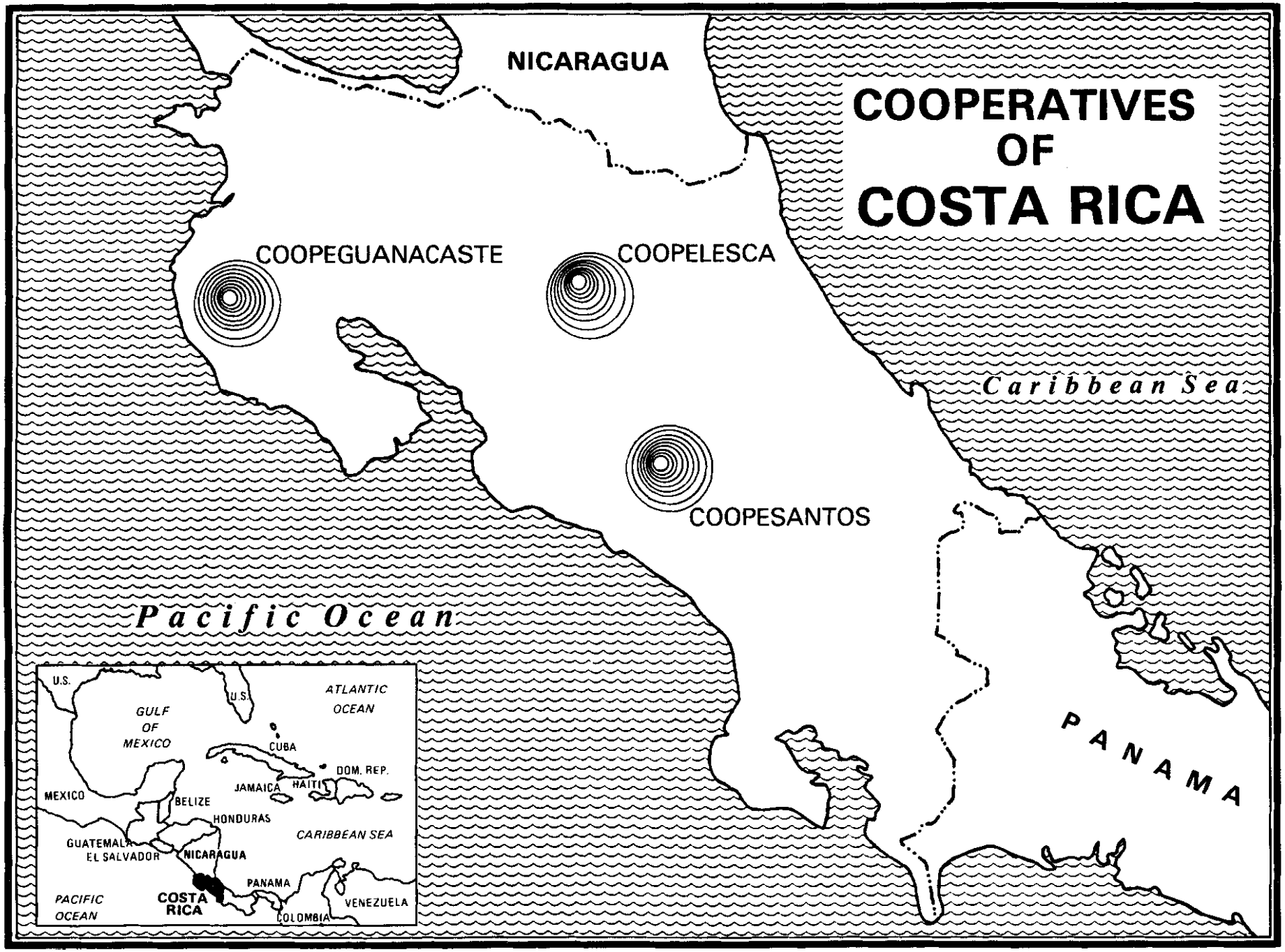
8. use of electric stoves to replace firewood for cooking appears to be rare;

9. if rural electrification cooperatives are expected to carry out educational or promotional programs and activities, funds to support this must be granted; and

10. electrification seems to have a neutral effect on migration patterns between urban and rural areas when taken as a singular, causal factor. But in combination with other rural development interventions it enhances the attractiveness of rural life.

ACKNOWLEDGEMENTS

The evaluation team is grateful to a number of people for their assistance. First, we would like to thank the staff of the three cooperatives (and in particular Victor Hugo Rodriguez, Misael Monge and Freddy Arroyo Ramirez) for their cooperation during the evaluation. Their helpfulness, honesty and genuine pride in their accomplishments were impressive. Secondly, we were appreciative of the thorough and extensive work undertaken by the survey team from the Centro Investigaciones Sociales in San José. Their limitless energy and enthusiasm for the project contributed greatly to our on site data collection efforts. And finally, as team leader, I would like to say a special word of thanks to Deborah R. Purcell and Robin Y. Renrick for their editorial assistance and especially to team member Polly Harrison, whose substantive contribution to this project was in many respects the key to its success.


NICARAGUA
COOPERATIVES
OF
COSTA RICA
COOPEGUANACASTE
COOPELESCA
COOPESANTOS
Caribbean Sea
Pacific Ocean
PANAMA
U.S.
U.S.
ATLANTIC
OCEAN
GULF
OF
MEXICO
CUBA
DOM. REP.
JAMAICA
HAITI
MEXICO
BELIZE
HONDURAS
CARIBBEAN SEA
GUATEMALA
EL SALVADOR
NICARAGUA
PANAMA
PACIFIC
OCEAN
COSTA
RICA
COLOMBIA
VENEZUELA

"The town will wake up when we get light."*

I. Introduction

It has been a little over a decade since the power was turned on in Guanacaste, San Carlos and San Marcos de Tarrazu, where the first three rural electric cooperatives in Costa Rica were established. Between 1965 and 1969 the U.S. Agency for International Development (AID) loaned $3.3 million to the Banco National de Costa Rica (BNCR) for purposes of electrifiying, through member-owned cooperatives, three diverse areas of Costa Rica. The loan was supplemented by $818,000 in local funds and was used for construction and placement in operation of three rural electric cooperatives and a new transmission line 32 kms. in length. All power generation was supplied by the existing Instituto Costarricense de Electricidad (ICE) plants. Technical assistance was supplied by the National Rural Electric Cooperative Association (NRECA).

The June 1965, Capital Assistance Paper served as the evaluation team's point of reference for the impact study. From this document we derived several general questions which served to guide the provided a framework for our methodology:

- To what extent was rural electrification an impetus to economic growth in the project areas?
- To what extent did rural electrification raise standards of living?
- Who are the cooperative consumers and how do they perceive the benefits of rural electrification service?

The impact evaluation team concluded that in general, this AID loan to Costa Rica was wisely conceived. We believe that the country's history, culture and political climate were ripe for the success of such a rural electrification project and that for a relatively small investment a considerable return was achieved. Taken as a whole the project demonstrated remarkable effectiveness in several key respects. For example, we noted that:

- the project was completed within the two months of the estimated completion date and within originally authorized AID funds;
- the cooperatives are all now in good financial health;
- the demand for electricity was real. The ten year user projections were exceeded by 45%;
- the consumers generally report satisfaction with the quality and cost of the electric service;

*Quotation from household survey respondent.

- the areas which the three AID-funded coops serve have demonstrated varying degrees of economic growth during the 17 year period since they were originally targeted in the feasibility studies, at least some of which is attributable to electrification; and,

even though this was not one of the stated goals of the project originally,

- the cooperatives seem to serve the rural poor better than the other available electricity distribution systems.

Further, we identified several important characteristics of the project environment which enhanced the project's success:

- Costa Rica has physical attributes which provide abundant potential for hydro-electric power. Electricity can always be cheap in that country.

- Costa Rica has enjoyed relative political stability.

- The country has had a national orientation toward equitable development.

- The sites selected for the cooperatives offered a relatively concentrated population.

- There was an adequate talent pool within the country to provide sound management and leadership of the cooperatives.

- There were positive relationships between the implementing institutions of this project, and supportive local and national government policies.

- The local populace was sufficiently committed to the success of the cooperatives.

However, we also concluded that there was a flaw in the project design. It lumped together three distinct and dissimilar sites for the new cooperatives under one single set of project purposes and goals, each with different potential to support the predicted outcomes. Had the difference in cooperative settings been calculated more explicitly at the planning stage, the project design would have been better tailored to each cooperative area. As it was, the impact of the cooperatives varied considerably:

- In San Carlos' dynamic atmosphere electrification has dramatically increased the profitability of several agro-industries, especially dairying.

- In San Marcos, electrification contributed to the quadrupling of coffee production. However, significant diversification of agriculture did not take place.

In Guanacaste, a region which has witnessed a slower pace of overall growth and development, cooperative electricity is important to the population even when major economic benefits are not directly attributable to it.

II. Project Setting and History

Costa Rica in the early 1960's was essentially an agricultural country with an economy primarily dependent on the exports of coffee and bananas. The region contributing the largest portion of the gross national product was the central valley (meseta central) surrounding the capital where 95% of the country's coffee was grown. There were three or four other productive zones where bananas, cocoa, sugar and beef were raised. The population was growing rapidly (4% per annum) and was approximately 65% rural. The country's infrastructure including installed electrical capacity, paved roads, potable water and sewerage systems, was limited, and extended only into the meseta central and the few other key production areas. It was a country with a history of democratic institutions, political stability, and a commitment to equitable development unique in the region.

During 1963 and 1964 AID and NRECA consultants visited Costa Rica. The consultants selected three sites for electrification based on these areas' potential for economic growth and on the interactive effects of other development interventions planned or underway at the time. All three areas had considerable agricultural potential and by 1963 had achieved varying degrees of development. Taken together they contributed (3%) to the GDP in coffee, beef, sugar and milk production. With the country's fast growing population and an economy dependent on exports of food crops, the choice of Guanacaste, San Carlos and San Marcos for locating the electrification cooperatives was based primarily on the food growing potential of those regions both for export and for local consumption.

A. Guanacaste

The Guanacaste area, selected for service by COOPEGUANACASTE, is in the peninsula of Nicoya. A region of approximately 800 square kilometers, it is quite distinct geographically, culturally and economically from the rest of Costa Rica. Somewhat isolated and considerably less developed than, for example, the meseta central, Guanacaste's main agricultural activities were raising beef cattle and sugar, rice and cotton production. According to the 1964 project feasibility studies there were a few small sugar mills, rice processing plants and isolated carpentry and mechanical shops, utilizing independent thermal-powered electric generators scattered around the region. This area was the poorest of the three. It had long been a net exporter of population, and was relatively devoid of major infrastructure projects. With disproportionately large numbers of landless and near-landless, there remain even today some territories in the mountainous south central area and along the coast which are inaccessible for large parts of the year by road.

B. San Carlos

On the other hand the San Carlos cooperative, COOPELESCA, was established in nearly a boom-town setting. This area had already achieved a degree of development "momentum" at the time of the initiation of the project. The timing of the new electric service paralleled other development interventions (e.g. farm to market roads, agricultural credit programs) and the climate and terrain provided the greatest potential for diversified agro-industry. During the pre-project period, San Carlos had been experiencing a high rate of population in-migration. The 600 square kilometers to be served by the electric cooperative supported a highly economically active population with average family incomes roughly double those of Guanacaste. Meat, milk and timber production were increasing along with sugar cane, coffee and rice.

C. San Marcos

The third site selected for an electrification cooperative (COOPESANTOS) was San Marcos, an area heavily dominated by coffee farms and to a lesser extent, sisal production. Prior to the opening of a feeder road from the region to nearby San Jose in the late 1950's, this area had remained extremely isolated. With the newly achieved access to markets for coffee (the country's number-one export) came greater importance and demand for services, including electricity. The quality of the coffee grown in the San Marcos area is particularly high and the potential for expanded coffee milling, rope and sack manufacturing, and production of food crops for internal consumption was great, though largely untapped at the time.

In 1949 the government power entity, the Instituto Costarricense de Electricidad (ICE), was organized. In those early days ICE was only interested in generation and transmission of electricity to the towns in the productive meseta central. During the 1950's however, pressure for rural electrification began to grow. The Costa Rican Government turned to external sources of financing for electrification: the World Bank and the Inter-American Development Bank. The response by these two institutions was favorable toward electricity generation and urban electrification but "unsympathetic" toward electricity distribution and rural electrification. Current officials of ICE who were involved in those negotiations remember the World Bank's response to their request for rural electrification funds in the 1950's: "It is uneconomical to bring electricity to the people. Let the people move closer to the electricity."

AID was more responsive for two reasons: the first was the favorable political climate in the United States surrounding the foreign aid program to Latin America resulting from the Alliance for Progress. Secondly, the influence of the rural electrification cooperative movement in the United States had extended to the foreign aid program.

And, enthusiasm for cooperatives had a historical basis in Costa Rica as well as in the United States. Beginning in the 1920's through housing, buying and agricultural cooperatives, and savings and loan associations,

Costa Rica had developed a strong heritage of cooperativism by the 1960's. Throughout this period, the central government lent support to cooperatives through strengthening legislation and by establishment of a section within the national bank to foster cooperatives.

III. Project Goals

In the 1964 project feasibility studies the selection of sites for the three cooperatives was based primarily on the food growing potential of those regions for both export and domestic use. Additionally, the project planners predicted the following would result:

- diversification of agriculture
- expansion of the existing food processing and other agro-industries
- introduction of new agro-industrial and commercial enterprises
- higher incomes for the area's inhabitants
- a deterrant to out-migration from the areas and a magnet for immigration
- development of successful cooperative models to be replicated by other communities

The project was seen as a key ingredient in an overall strategy to improve rural standards of living which in turn would reduce population pressure on the capital city and its immediate surroundings. Rural electrification was identified in the project paper as "unquestionably" one of the requirements to bring about modernization for the country as a whole.

IV. Project Impact

A. Economic Growth

The team examined the impact of electrification on economic growth on two levels: the home/farm level and the community/commercial level. Because the three cooperative areas are so heavily dominated by agriculture-based activities we concluded that in general, the best determinants of successful utilization of electricity were:

- the type of agricultural activity engaged in (e.g. whether growing sugar, coffee, rice, raising poultry, dairy or beef cattle); and
- the point along the production/processing continum where electricity is applied.

We found that in most agricultural activities the availability of a cheap, reliable, 24-hour source of electricity had greater impact in the processing stages and less in production on the farm. Only in dairy, pig and poultry farming did we see unmistakable reliance on cooperative electricity in the production stages. Milking machines, electric fencing, refrigerated storage, warming for hens and piglets, and pumped water for feeding, washing and cooling animals were activities which were greatly enhanced by the availability of central-grid power. On the other hand, on-farm use of electricity in coffee, rice and sugar production was minimal. Irrigation by electrically pumped water was in evidence only in a few large rice farms in Guanacaste although we were told at the COOPEGUANACASTE headquarters that this type of irrigation was on the increase. Probably the activity in which cooperative electricity was most beneficial to the rice, coffee and sugar farmers was in the proliferation of machinery and equipment repair shops which, according to their owners, owe their existence to the availability of cooperative power. In our discussions with mechanics and farmers alike we were told of the positive impact these shops had had on the production capacity of the farms. Power tools and 24-hour electric light in their workshops provide a crucial service to the area and one which had implications significant to overall productivity.

San Carlos

In the dairy industry in San Carlos there was a direct and positive relationship between the availability of cooperative power and growth. In this industry electricity is important at all stages from cultivation to marketing and its absence at any point would significantly reduce the volume of production.

- Electrified fences are cheaper to install than non-electrified fences. They require only a few wire strands and are therefore easier and cheaper to install and maintain. Cows, which tend to suffer from infected scrapes and tears to their udders from barbed wire fences, will only receive a harmless shock from the electric fences.

- Electric milking machines can increase a cow's milk production by roughly a third in volume when applied twice a day. More constant and reliable than human milking, machines amortize their initial costs to farmers in a short period of time by increasing the milk output dramatically.

- Refrigeration is a requirement if the milk is to be sold to a dairy cooperative. By law, non-refrigerated milk can only be used for home consumption, animal feed and cheese-making. The profits to a dairy farmer for milk sold to a cooperative as compared to those for homemade cheese are triple. Electrification allows family labor (usually female) improved working conditions and time to carry out other activities which normally would have been devoted to hand milking and cheese-making.

- Milk requires constant cooling/heating at reliable temperatures in all stages of processing. The Dos Pinos Dairy Cooperative in

> the San Carlos area, which receives more than 50% of its milk supply from small dairy farms (20 or fewer cows), has raised profits to its members by roughly 50% since the pre-electrification period when farmers bore the costs of transporting milk several hours away to the nearest electric powered processing plant. The cheaper cooperative electricity (compared to the cost of electricity produced by the previous diesel plant) enabled the Dos Pinos plant to process milk locally at the very time when transport costs rose markedly. This cost reduction directly benefited the farmer.

In our interviews in the San Carlos region, we were told of a widespread phenomenon of conversion from other types of farming activities (such as growing sugar cane) to dairying, which paralleled the growing availability of cooperative electricity. (Between 1950 and 1973 the amount of land devoted to livestock in San Carlos jumped by 275%.) Sugar production which is subject to unstable market prices is abandoned as soon as electricity comes within reach. We found that even small land holders were convinced that the initial capital investment in animals and electric equipment and other conversion costs would be quickly amortized and dairying would bring great profits.

San Marcos

San Marcos provided us with a view of the relationship between the growth of the coffee industry and the expansion of rural electrification. This area which was targeted originally by the project planners for siting of a cooperative because of its coffee growing potential has indeed witnessed a tremendous increase in coffee output. For example, one coffee cooperative which processed 12,000 units of coffee in 1962 (using power from a diesel generator), in 1980 is processing 50,000 - using cooperative power. Prior to the cooperative service many hours of operation were lost due to maintenance problems with diesel generators and the plant's processing capacity was severely limited by "down time." With more reliable cooperative power, the processing capacity has increased often by as much as 300-400%.

But just how much the increased reliability of the plant which the cooperative power provides stimulated coffee production per se we were unable to determine. It was impossible to separate the impact of rural electrification from the other factors such as improved access roads and steady increases in world coffee market prices which were influential during the same time period.

We noted too that the predicted diversification of agriculture in San Marcos which the project planners envisioned did not appear to have taken place. In fact, we believe the opposite has resulted: there has been increasing concentration of coffee production in that region. We believe this is largely a phenomenon resulting from the high profitability of coffee farming during the boom years in the early seventies which coincided with the early years of cooperative electric service. Certainly any

tendencies toward diversification of agriculture during those years would logically have been mitigated by the sudden attractiveness of high prices to be received in the world coffee market, a factor which the project planners could not have foreseen.

Guanacaste

It was interesting to note that cooperative electricity played only a minor role in Guanacaste's extensive sugar production activities. On-farm use of electricity was virtually nil. And although processing of sugar cane requires hugh amounts of electricity for refining during the four months of the harvest, we found that the larger the scale of the plant, the less the plant consumed of cooperative electricity.

- Larger sugar processors are able to supply their own needs for power by burning sugar by-product (bagasse) as fuel. The largest plant in the region relied on cooperative electricity only during the early years when the volume was too small to produce an amount of bagasse equal to the plant's energy needs. But as the cane volume grew, reliance on cooperative power for running the refinery decreased, until the point of 100% fuel self-sufficiency was met. Other plants are in various stages of achieving fuel (bagasse) self-sufficiency.

- In the smallest scale sugar processing, the on-farm production of crude sugar for local consumption, the presence of cooperative power did make a difference to some enterprising cane farmers who were able to supplement their income by small ventures into home-processed sugar. With an electrified refining mechanism (trapiche) these poorer farmers have expanded their production and sales of home processed sugar.

In Guanacaste's rice production we also saw a relationship between the scale of the operation and the impact of electrification. Although we were told by the cooperative staff that the practice was widespread, we saw little evidence of electrified pumping for rice irrigation: the on-farm use of electricity in rice production appeared to be negligible. In rice processing however, electricity is essential.

Table 1

Production Activity	On Farm Use of Cooperative Electricity	Processing Use of Cooperative Electricity
coffee	little to none	much (mechanized washing and sorting)
sugar	little to none	much in small plants (refining) little to none in large plants
cotton	little to none	much (ginning)
rice	some (irrigation)	much in larger plants (milling)

(continued on next page)

Production Activity	On Farm Use of Cooperative Electricity	Processing Use of Cooperative Electricity
dairy cattle	much (refrigeration, mechanized milking, fences)	much (refrigeration and processing)
beef cattle	some (pumped water)	much (refrigeration and butchery)
poultry	much (warming)	much (refrigeration)
pork	much (warming, washing cooling)	much (refrigeration)

- The smallest scale millers, who process rice for local consumption, seem to have been unable to gather the financial resources necessary to purchase the new equipment for the hook-up to cooperative power when it first became available. They have kept their diesel-powered mills in operation as long as the machinery has lasted. The millers remarked, however, that over the years the monthly costs of supplying diesel fuel for generators has steadily increased and now greatly exceeds (it is double) the cost of an equivalent amount of power from the cooperative. They planned to convert as soon as the old diesel machinery was no longer functioning, and felt with the increases in production volume made possible by cooperative power, and the elimination of diesel costs, the amortization of the investment would result fairly quickly.

- In large scale rice operation we found heavy reliance on cooperative power both for drying and hulling. Rice must be properly dried or spoilage will ensue. Electrification has made possible facilities for rice drying in large volume. (A smaller scale operation would dry rice by exposing it to sunlight in drying yards - a factor which limits the volume by the capacity of the space available for drying.) A mill operator in Filadelfia maintained that the capacity of his mill has tripled since conversion from an "unreliable" diesel generator to cooperative power. He said the mill's capacity for processing far exceeds the volume of rice produced in the region, and it was his belief that this excess plant capacity served to stimulate rice growers in the area to grow more rice as a result. This concept of increased processing capacity serving to stimulate crop production is similar to the situation we noted in San Marcos coffee production.

Examining our household survey results in regard to the utilization of electricity on farms provides us with a mixed picture. On one hand, only five respondents in our survey sample of 96 used electricity in agricultural activities. Yet four of these five claimed improvements in productivity and income attributable to electrification and again,

livestock producers are a higher percentage of the users than crop producers. Also we see:

- a correlation between larger landholding and use of electricity on the farm,

- there are more cultivators of lucrative permanent crops and annuals among the electrified group and more cultivators of the less lucrative basic grains among those without electricity.

Considering the heavy emphasis in the project paper on providing electrification for agricultural purposes, the team was somewhat surprised by the low level of usage on farms. Of course, some crops simply do not lend themselves much to electrical inputs in cultivation (coffee, sugar). In other cases (rice, cotton) there simply may be a long lag time between electrification and the accumulation of sufficient financial resources for small farmers to afford the up-front costs of the material inputs, such as pumps and irrigation. A third factor is probably reflective of a deficiency in the project design. The goal of increased agricultural productivity was established by the project planners but the resources for outreach to the farmers (in the form of technical assistance and encouragement for farmers to invest in more advanced, electricity-powered technologies) were absent from the project's design. The cooperative managers all expressed their desire to provide better educational and promotional services to farmers who might put electricity more productively to use, but they cited lack of staff and funds as the constraint. (The same applies to the promotion and development of home industries.)

These kinds of ancillary services which are tailored to the setting are probably a necessity to ensure meeting the project's "productivity" goals. The mere availability of the electric power alone will not lead to full productive use either in the home or in the farm. A program of instruction paired with economic incentives, such as reductions in rates for implementation of new types of technologies (e.g. irrigation) or discounts on appliances and equipment would be the type for which the AID project should ideally have provided resources.

B. Household Use

The cooperatives which AID funded today encompass roughly 7% of the total electrification effort in the country, or 23% of the rural electrification consumers. In this regard the team was interested in examining what type of population the AID-funded cooperatives serve and what if any, differences exist between the cooperative clients and those served by the other electric power distribution systems. There is one other small rural electrification cooperative (non AID-funded) and there are several privately owned electric companies in Costa Rica. The remainder of rural service is provided by ICE's own rural electric division.

There was no client population explicitly targeted in the project paper. The goal was generally accelerated rural development that would benefit households, farms and businesses in the three cooperative areas. The unspoken hypothesis was that the project would benefit a certain population in certain aspects of their lives. The main questions considered by the team were: What is the population like? How did it benefit? How does it value those benefits?

In our survey we conducted a total of 96 household interviews. They were derived from AID-funded cooperative clients, non AID-funded cooperative clients, private company clients and some served by ICE. We also surveyed a small number who had no electricity at all. Over half the respondents identified themselves as agricultural workers. Twenty percent of our total sample described themselves as agricultural day-laborers with no fixed relationship to any employer, ("jornalero"), a position which in Costa Rica is extremely low on the economic scale. All but four households had electricity or were in some stage of obtaining it; of those four, two felt no need and two lacked money for the hook up.

- In attempting to answer the question of how well the AID-funded cooperatives are reaching the poor we applied a standard of "Poverty" to a monthly income for a family of six of ¢2,292 (US $268) or "Extreme Poverty" of ¢1,528 (US $179) utilized by ICE in its recent expansion plans and projections. Using these terms we found that 54% of households in our sample with electricity and 50% of households without it are below the Poverty line, and that 39% of households with electricity and 36% of households without electricity are below the Extreme Poverty line. Given this evidence we feel it reasonable to say that in Costa Rica electrification is reaching the poor. Another test of this conclusion is the fact that of the 20 jornaleros, all but three had electricity, even though this group is one of the country's most economically disadvantaged.

- We also found that among our respondents who fell below the Extreme Poverty line more of these were clients of the AID-funded cooperatives than of the other distribution systems. This indicated to us that the AID-funded cooperative were reaching farther into the poverty areas than were the other systems. It suggested to us that the cooperatives siting and rate policies which were designed to show sensitivity to local needs were slightly directing the benefits of electric service to the poor.

The cooperatives demonstrated a commitment to the poor explicitly in their rate policies. COOPEGUANACASTE for example, determines the monthly rate for minimum service on the basis of the size of the consumer's property. In the words of the Chairman of the Board of Directors, "We take an indirect approach to poverty." Using an assumption that dwelling size is as good an indicator of economic status as any other, the rates go up or down depending on the square footage of the property. (The cooperative also uses this system in establishing rates for industrial consumers: the larger the premises, the higher the rate.) Literally then, the big people

are subsidizing the small.

One conclusion the team reached early in the evaluation was that Costa Ricans seemed to value electricity very highly. In our household survey, it was particularly interesting to note how clearly the male respondents seemed to understand the relationship between electrification and the advantages to women. This valuing of electrification as a boon to women was born out by the survey responses on appliance use in the home: four of the six most-often-owned appliances fall in the exclusive province of female domestic work (iron, refrigerator, blender, washing machine). And for example, among small scale dairy farmers, replacing the hand cheese making operation which consumes 4-5 hours daily of a woman's time, was often cited as a primary reason for investing in electrified milking and refrigeration.

As for other economies, one that has not occurred is the substitution of electricity for firewood for cooking. Among our survey sample with electricity only 22% had purchased electric stoves and only two of these households cooked exclusively with electricity. The reasons cited for not using electric stoves were the expense and a preference for the taste of food cooked on a wood fire.

In contrast to the extensive utilization of electricity for alleviating domestic chores (our survey sample averaged 5.1 appliances per household) even by those who can be classified as "poor" (many respondents whose income fell below the ICE "Poverty" line had two or more appliances), we found a medium degree of usage for deriving income from home industry. Of the total electrified households in our sample, 23% had some kind of homebased enterprise with electrical input -- most frequently a small bar. Ninety percent of these owners cited electricity as a factor in the installation or expansion of the business; sixty-three percent said electrification had been a factor in increasing earnings.

Interestingly, when the household-use responses are looked at from a geographic basis, those from the San Carlos "growth zone" were the ones most often citing direct economic benefits from electrification; those from the less promising economic situation in Guanacaste were more likely to cite the advantages of electric light for studying, a more indirect economic motivation it would seem.

It appeared to the team that the priority assigned to electricity changes (logically) as conditions change and that there is a psychological ripple effect from the spread of electricity itself. As other major infrastructure projects are completed (e.g. roads, water supply), and as the electric service becomes more widely available, tolerating its absence becomes less and less possible. One may conclude from our survey (and other recent studies in Costa Rica where electricity was named as the top priority by several communities) that electricity is: 1) valued by those who have it; and 2) by those who do not because of the proximity of those who do. It is important to note here, that in the three cooperative areas

re visited, no fewer than 70% of the potential customers had received lectricity and that the country as a whole is close to 80% electrified (65% of all households).

C. Industrial and Commercial Use

Industrial and commercial users of electricity abound in all three cooperative areas though with somewhat greater incidence in San Carlos than in the other two regions. According to the Municipal Executive in Ciudad Quesada, the major town in San Carlos, electrification has generated a "rebirth" in the area. Prior to the cooperatives' existence, 1,000 licenses were issued for businesses; this year there were 5,000. Eighty percent of these are considered "small" (one or two workers). He attributes this growth largely to the presence of electricity.

Several small business owners speculated for us on the impact of electrification on the number of workers they employed and other aspects of their businesses.

- A cement block factory in Guanacaste. The block making machines are common hand-powered units to which a small (1-2 hp) motor has been added. Without electricity the owner would hire only three workers, instead of the presently employed eleven, and his operation would be scaled down to selling sand and gravel extracted from the stream rather than block-making.

- A sawmill in Nicoya. The mill utilizes electricity for saws, planers, a lathe, tool repair and lighting: sixteen men are employed. Though the owner has been in business over twenty years and most of time he relied on diesel power, he maintains he could not remain in operation today without electricity...he could not keep up the profitable volume of business he has now achieved with cooperative power.

- An auto mechanic shop in San Marcos. Prior to electrification the owners used a small diesel generator primarily to power the welding tool. Now he utilizes a variety of power tools, without which he feels he could not do business. (Two owner-workers, two hired workers).

- A hotel/restaurant in Tamarindo. A first-class tourist operation employing 27 men and 27 women all from the immediately surrounding region, an isolated coastal area. The owner said he would have established the business without electricity had it not been available but the qualitative difference it makes in the hotel's service (24-hour air-conditioning, refrigeration), and the lower cost compared to a diesel fueled generator, allowed for expansion (and therefore greater employment opportunities) and profits which can sustain the business' growth.

D. Social Service Users

Among the cooperatives customers, approximately two-thirds are residential consumers, one-third are public and commercial users. As is the case for household clients, small businesses pay rates commensurate with the size of their premises. Public lighting, hospitals and schools also receive discounted rates. The impact of electricity on the expansion of health and educational facilities was clearly in evidence in all three cooperative areas. Costa Ricans in general have a strong commitment to maintaining high standards in these sectors and the country's remarkably high literacy rates (89.8% - 1973 census) and positive health indicators (1978 life expectancy: 70 years) reflect this commitment.

Especially noteworthy was the extensive network of rural schools (primary, secondary, technical, adult educational centers) which has developed in the country over the past ten years. According to the national director of Adult Education, prior to 1970 one of the major constraints to expanding educational opportunities for adults in the rural areas was the absence of electricity to provide lighting for late afternoon and evening classes. At that time (1970) there were 40 night primary schools (Escuelas de Noche) in the country, mostly clustered around the capital. Today there are 100 Escuelas de Noche and 27 night secondary schools (Colegios de Noche) located throughout the country. These provide primary and elementary curricula to adults (over 16 years) on the premises of day schools, but after hours. Many school buildings are utilized for two or three types of educational programs in rotational sessions extending sixteen hours a day, twelve months a year. In addition, since 1975, some 600 "Educational Centers" have been established in rural areas which provide literacy and some primary education to adults where ad hoc classrooms are set up locally. Approximately 18,000 students are enrolled in this program. These centers are provided a teacher by the Ministry of Education on the request of ten or more students when they have combined and formed a group. They meet three nights a week and on weekends. A prerequisite for a community being granted an "Educational Center" is access to an electrically lighted room for classes. The enrollees in these centers are exclusively rural and many are economically disadvantaged.

The health facilities in the cooperative areas are by any standard quite modern. The difference electricity has made in these facilities is both qualitative and quantitative. For example, after electrification the hospital in Nicoya was upgraded from a daytime outpatient clinic to a 100 bed hospital. With a staff of 350 (21 doctors) the hospital serves an area of 1300 square kilometers; the hospital offers all services. The hospital administrator believes that the expansion would not have taken place had cooperative electricity not been available. The reliability of electricity is a key factor in providing such services as surgery. Fear of not having proper maintenance and repair of diesel generators, though perhaps not entirely rational, prevails in the minds of medical decision makers. Central grid power offers psychological, if not actual, security in this regard. The hospital does have an extensive system of back-up diesel generators in case of emergency power outages and this, according to the hospital's director is "all they (diesel generators) are good for."

V. Viability of the Cooperatives

Judging the comparative success of the cooperative as a mechanism for distributing power over other means depends on what criteria are employed for judgment. From our household survey and interviews with business owners and public officials, we found that the cooperatives all get high marks if judged by:

- recognition rates. Only 13% of the cooperative members were not able to identify themselves as such.

- general community perceptions. Only 6.4% of the members felt the cooperative was "bad" -- 70% responded "very good" or "good" to the question, "What do you think of the Cooperative?"

- quality of service. There were no complaints.

- extent of service. The three cooperatives currently reach about 75-80% of their potential clientele. This exceeds the original ten years projection by 45%.

And a mixed picture emerges in the area of:

- participation. Over half of the survey sample who were cooperative members attended cooperative meetings last year, which is a relatively high percentage.

- financial viability. Today's bank and ICE credit ratings are "excellent" or "very good." All three cooperatives have operated with profits for the past four or five years. Yet all the cooperatives had serious losses during the first 5 to 6 years of operation. The losses were primarily due to the unpredicted low growth rate in the number of users and the relatively low consumption of electricity per user. This combination of factors did not allow the cooperatives to receive revenues high enough to cover their costs. The project paper anticipated this outcome, but the losses came out much higher than what had been projected.

- As decapitalization increased during the first years, the cooperatives became more concerned about achieving a higher ratio of consumers per kilometer of line and a more profitable mix of high and low consumers. It has been their policy since then to keep a more adequate balance between their social objectives and the need to protect their financial health. The decisions regarding the expansion of the lines to new communities take into account the impact on financial viability of the cooperatives. The higher the profits at a given time, the greater the willingness of the cooperatives to consider their social objective in providing electricity to low income communities.

- replication. No other rural electrification cooperatives per se have yet been created following the AID-funded cooperatives as institutional models, but in at least one region (San Carlos) we

were told that two local savings and loan associations patterned themselves after the electric cooperative. In the opinion of ICE officials, the lack of replication of rural electrification cooperatives was due to lack of loan funds from donors, not a lack of interest in developing the cooperatives in the country.

- promotion. No effective programs to encourage utilization of electricity more productively are underway.

Of course, an overriding factor in the cooperatives' positive relationships and subsequent good reputation with the consumers must be the perceived fairness of the costs charged to customers. The minimum (30 KW hr.) monthly charge for electricity in the three project areas ranges from US $1.65 to U.S. $1.88, or about 2% of the monthly minimum wage. The charge for 100 KW hr. averages $5.31. The relatively low cost of cooperative electricity is attributable to several important factors:

- the decreasing reliance on (diesel-fueled) thermal generation of electricity made possible by abundant hydro-electric potential in the country.
- government policies which provide for subsidized rates for block purchase of power supplied by ICE to the cooperatives.
- the willingness and ability of the consumers to make capital contributions and investments for expansion of service.
- sound cooperative management practices which have adopted proper mixes of profitable users and non-profitable users.
- supportive banking and credit arrangements which provide low interest loans to consumers and allow the cooperatives to be co-signatories on all the loans to individuals for hook-ups as well as to communities for extension of lines.
- proper design and installation of the systems.

VI. Conclusions and Lessons Learned

The team summarized the project's results as follows:

- The AID-funded rural electrification cooperatives did (to varying degrees) accelerate the socio-economic growth of the project areas. We believe the converse is also true: absence of the rural electrification effort would have been a significant constraint to development of all three project areas.
- The three cooperatives proved over time to be effective means for distributing power to the areas served. However, a proliferation of rural electrification cooperatives did not take place.

- Only one area (San Carlos) of the three areas served by AID-funded cooperatives experienced a net in-migration subsequent to electrification. It would appear that the greater degree of employment opportunity in the San Carlos area was the determining factor.

- The impact of rural electrification on minimum users (i.e., the poor who can only afford electric light) in the project areas should not be underestimated. The people valued it; they were willing to go into substantial debt to obtain it. Electricity if nothing more is an important symbol of progress which carries with it psychological momentum for self-improvement on both the individual and community levels.

In many ways Costa Rica has proved to be an optimum environment for AID's relatively small investment in rural electrification. Though the project suffered somewhat from having been conceived and planned as a single entity which then was implemented in three widely diverse regions, as a whole, the timing and coordination with other development interventions seems to have been just about right to support the project's success over the long run. The expansion of small businesses, shops, tourism, agro-industry and social services which the team observed in all three areas does appear to owe partial existence to the presence of cooperative electricity, and these enterprises undoubtedly would not have kept pace with the demand and potential for expansion inherent in the setting had electricity not become available at a critical time.

Obviously, the question arises of whether Costa Rica (with its unusual political attributes, high degree of hydro-potential and enterprising population) is not so anomalous as to be irrelevant to other countries. The team believes, however, that this is not the case. The lessons to be learned from this Costa Rica project will guide future planners to look for similar settings or at least to pursue as many as possible of the same characteristics when identifying and differentiating settings for future investments in rural electrification. Costa Rica may be a special case in certain ways but a number of its characteristics are shared by other countries. Therefore, some or all of the success of this project may be able to be duplicated elsewhere given the following lessons learned:

1) The probability of significant impact by electrification on economic growth depends to a large extent on the setting of the project area, the production potential and the coordination and timing of other interventions, especially roads. The impact is optimized in settings where expansion and improvements of infrastructure and social services are planned or underway and where agricultural potential is great.

2) As income goes up the ability to utilize rural electrification productively goes up which, in turn, further raises income.

3) Rural electrification can be expected to be financially at risk until a certain degree of development is accomplished in the project area. Rural

electrification enhances development and the latter also enhances the profitability of the former.

4) Accurate financial forecasting of rural electrification projects is difficult. Therefore projects should be designed with a relatively high contingency budget especially for working capital and with assured subsidies to sustain financial viability at least during the first several years.

5) Successful establishment of rural electrification cooperatives is greatly enhanced by the existence of supportive and mutually reinforcing attitudes and policies on the part of the national government, the power generating authority and the cooperative management.

6) The impact of electrification on agriculture and agro-industry can be partially predicted according to the production activities which are taking place in the area. For example, livestock producers may be able to successfully utilize electricity in all facets of their operations quite profitably, while coffee growers are less likely to use electricity on the farm.

7) In areas where the cost of electricity can be kept down owing to abundance of hydro-electric power and in areas where the poor populations are fairly concentrated, electricity can be a favored type of household energy even for the very poorest in the society.

8) However, even in areas where electric appliances are favored household conveniences, the use of electric stoves to replace firewood for cooking will be rare.

9) If rural electrification cooperatives are expected to carry out educational programs and activities to motivate participation by the members or to increase productive utilization of electricity, funds to support these activities must be granted over and above the cost of financing the operation of the electric service.

10) Electrification seems to have a neutral effect on migration patterns between urban and rural areas, when taken as a singular causal factor in pulling or expelling population. However, in combination with other rural development interventions it enhances the attractiveness of rural life primarily by contributing to the expansion and availability of agricultural profits, employment opportunities and social services.

APPENDIX A
THE CLIENT POPULATION

The Household Population[1/]

Of a total sample of 96.52 (54%) were male and 44 (46%) female. Fifty-eight (60%) were heads of household; of those 58, nine (15%) were women. Average household size for the total sample was 6.48, with a wide range from 5.6 in the ICE area around Naranjo to 9.1 in the JASEC area.[2/] Average household size in dwellings without electricity was slightly higher, 6.64.

Eighty-three respondents (86%) owned their own homes,[3/] ten (105) were living in borrowed (prestada) houses, and three were renting. Home owenership had almost nothing to do with electrification, that is, families living in rented or borrowed houses were no less likely to have adopted it than were homeowners. In some cases the electricity was already in the house; in others, permission was asked of the owner to install it and cost responsibilities were shared in various ways.

The majority of the sample identified themselves as workers in agriculture, 57 or 59.4% of the total. Of these, 46 (47.9%) defined themselves primarily as farmers (agricultores or ganaderos), and 19 (19.8%) as agricultural day-laborers (jornaleros). Twenty-two (22.9%) had employment lumped as "other" -- metalworker, tailor, forest guard, butcher, waiter, odd-jobber, washerwoman, tailor/shoemaker, rural guard, small-business employee, industrial mechanic, carpenter, policeman, and domestic. Five respondents defined themselves as tradespeople (comerciantes) and four single female heads-of-household were housewives supported by kin, usually older children. Nine (9.4%) of the heads-of-household had more than one type of employment; two of these were smallholders who had to do day labor to survive, but the rest were entrepreneurs who combined farming with other ventures.

As for differences between the areas of AID-funded cooperatives and non-AID-funded power distributors, there was a tendency for the former to have a lower percentage of respondents who defined themselves primarily as farmers and fewer day-laborers, but percentages in every other category were almost equal. Regionally, the highest percentages of farmers and lowest percentages of agricultural day-laborers were in the San Carlos area (COOPELESCA and the non-AID-funded cooperative of Alfaro Ruiz). The highest percentages of day-laborers were in the ICE area (mainly because the sample deliberately picked up a seasonal skew from the inclusion of laborers newly arrived to pick the coffee crop), and in Guanacaste which has congenitally high levels of day-laborers due to large numbers of landless and near-landless. It should be noted that it is neither uncommon nor stigmatized for even self-sufficient farmers to occasionally take day labor to spruce up their cash flow or for rather well-off rural families to go to the coffee harvest to have some fun and pick up a lump of cash for

*Footnotes I-II at end of appendix.

special purchases (including appliances). However, he who describes himself as only an agricultural day-laborer with no fixed relationship with an employer is, truly, the poorest of the poor. Twenty percent of the total sample was composed of jornaleros. (See Table 1, "Occupations, Heads-of-household, Survey Sample".)

There were 14 households in the total sample without electricity. This may seem a very small proportion of the total "N", perhaps reflecting the non-random nature of the sample but also expressive of what seem to be clear tendencies: 1) there are few non-adopters in nucleated settlements, whatever their size; 2) non-adopters in are most often found at the unfeasible periphery of electrified nuclei or 3) in settlements which have no electrification whatsoever. Three non-electrified settlements were visited and studied in terms of separate households and overall community perceptions, so that the small "N" does not really represent the qualitative weight of the data on such communities.

Of the 14 households without electricity, 13 (93%) had tried to get it, and of these, 10 (77%) had not done so simply because they lived in peripheral areas or communities not yet reached by one of the cooperative delivery systems. All the communities without electricity were at some stage in the process of hooking up to the system:[4/] one had gone through all the fund-raising and bank loan procedures, had poles sunk, and was awaiting the stringing of the lines and the household connections; another had garnered all the community commitments and was awaiting the mobile bank unit to make final loan arrangements; and the third had formed a Pro-Electrification Committee which had brought COOPELESCA representatives out to do the prerequisite socio-economic study. That study had determined a cost to the community of ¢240,000 (U.S $28,000) which for the 60 families in the community would mean an average expense of ¢4,000 (US $467); most of them were going to take out a bank loan with a five-year repayment period.

The four households in the sample not considering electrification either felt no need for the service (N=2) or lacked money for the hookup (N=2). Members and leaders of the three non-electrified communities visited were asked if in the process of going about getting electrification there had been any resistance to the idea in general, other competing community priorities, or cases of households unable to pay the several costs entailed or which were indisposed to go into debt to do so. The answer was consistently "no"; in all cases the push to electrify had arisen in the community and not from the cooperative and the community tendency was to complain about the slowness of the cooperative to respond to their needs. This is not to say there was no complaining about cost, but Costa Ricans today helplessly watch inflation outstrip their best effort. Their assumption about the cost of electrification is that it costs money, more money, just like everything else, yet they are willing to pay. In the view of these respondents, lack of electrification was not due to poverty but to institutional sluggishness or client inaccessibility: some people simply lived too dispersed and in too distant locations to be feasibly served.

The claim has been made based on analysis elsewhere that the poor cannot afford the hookup to rural electrification systems.[5] The case in point is Bolivia where, as in Costa Rica, the money in the AID Loan for capital costs (partial down-payments for hookups and internal wiring) ran out, so that clients are now bearing much more of the burden of installation costs than originally envisioned. The added weight of this burden to the adopter since the coops were energized in 1969 is substantial (see Table 2, "Age Ranges and Model Ages/Cost Ranges and Model Costs..."). The data in that table are pretty patchy, mostly because the earliest adopters could not recall what they had paid for the different components of getting power into their homes. While older adopters cannot remember and newer adopters cannot disaggregate and quantify the various areas of increased cost -- higher minimum costs,[6] payment for line construction,[7] higher interest rates on bank loans, etc. -- the greater costliness of rural electricity is well understood at the household level. According to the 1971 Capital Projects Evaluation, respondents at the time were aware that coop electricity cost more than ICE electricity but rationalized it as justified by higher costs of bringing in the service and by the lack of any other prospective source of reliable, affordable energy.

Is this because, as "impact studies of rural electrification consistently find," household users of rural electricity are the better off among the rural population?[8] The issue of who and where the poor are in Costa Rica is complex. For expedience, let us accept a pair of poverty lines recently developed by ICE for its projected rural electrification expansion. They have adopted a basic shopping basket which contains minimal satisfaction of needs for food, housing, education, health, transportation, clothing, and communications. In 1979 colones such a basket cost ¢4,756 (US $555) per person per year or ¢2,380 (US $278) for a family of six per month. ICE determined a Poverty Line of 50% or 1979 annual per capita income (¢9,168) and an Extreme Poverty Line of 33% of that figure. According to that calculation, a monthly income for a family of six of ¢2,292 or less indicates poverty, a monthly income of ¢1,528 indicates extreme poverty.[9]

For purposes of simplicity we divided the incomes of the survey respondents into groups which were empirically plausible. The ICE Upper Poverty Line falls into the ¢2,001-2,500 bracket and the Lower or Extreme Poverty Line falls into the ¢1,201-1,500 bracket. There will have been some changes since 1979: inflation, then at 9.2%,[10] rose to double-digit level in 1980 when there was also a *de facto* evaluation of the colón and general agreement that wages were not keeping pace, conditions which most seriously affect the agricultural wage-laborer.

An examination of Table 3, "Income Levels, Households Without and Households With Electricity," finds that 53.6% of households with electricity and 49.8% of households withut it are below the Poverty Line, and that 39% of households with electricity and 35.6% of households without it are below the Extreme Poverty Line. If one controls for Non-Responses (See Table 4, "Income Levels...Corrected for Non-Responses"), the figures change as follows: 71% of households with electricity and 70% of those without are below the Poverty Line, and 52% of households with electricity

and 50% of those without are below the Extreme Poverty Line.

Given the non-randomness of the sample and the small number of respondents without household electrification, one does not want to go overboard, but it is reasonable to say that rural electrification is reaching the rural poor when 54% (or 71%, depending on which calculation you prefer) of those served are at or under what seems a plausible poverty line. And, given the fact that there is an almost equal percentage of households above that poverty line in with- and without-electricity groups, one cannot claim that rural electrification in general is favoring the non-poor. There is a higher percentage of electrified households at the very upper income strata; these households paid very high installation costs in every case and their monthly payments are based on commercial ratesand may to some extent subsidize electrified households in the lowest income strata. Almost completely within those strata are the agricultural day-laborers mentioned above; for those in the survey sample for whom the jornal was the main source of income, average salary was estimated at ¢892.44 per month. For those with a little bit of land, average 2 mz., average monthly household income was ¢1,500.

The next question to be asked is whether the AID-funded cooperatives are doing a better job of reaching the poorer elements of the population than other power distribution systems. Table 5, "Income Levels...AID-Funded...Other Rural Electrification Distributors," indicates that both system types are equally good at reaching those at or below the Extreme Poverty Line but that the AID-funded systems do less well with households with incomes between ¢1,501 and ¢2,500. This relationship prevails even when the correction is made for Non-Responses (see Table 6). In the corrected table, the AID-funded cooperatives had reached 66.7% of the survey population at or below the Poverty Line and 57.6% at or below the Extreme Poverty Line. The group of Other Rural Distributors were reaching 81.4% and 51.8%, respectively. Thus the AID cooperatives are reaching deeper into the lowest socio-economic levels than are other delivery systems in similar areas, primarily because of the nature of its geographical extension. Poverty is frequently claimed to be a function of distance and inaccessibility in Costa Rica[11/]. To the extent that the rural cooperatives address that function, they may be viewed as redistributive.

FOOTNOTES

1/ The siting and selection of the survey sample on which the household data are based are described in the Appendix H "Methodology".

2/ The difference is predictable. The ICE area has more urban settlements, better road access, and is more integrated into the San José Metropolitan Area/AMSJ. The JASEC area surveyed was far more remote and with more difficult access in general and to urban settlements in particular. The spread is somewhat more extreme than the variation encountered in the World Fertility Survey which found that women in the urban portion of the Central Valley have 3.8 children on the average, while outside the Central Valley rural women bear 5.4 children (cited in: Inter-American Development Bank, ECONOMIC AND SOCIAL PROGRESS IN LATIN AMERICA, Washington, D.C., 1979). Family size averages for other survey areas were: COOPELESCA, 6.0; COOPESANTOS, 6.4; and COOPEGUANACASTE, 6.9.

3/ Since the sample combined heads-of-household and spouses in order to get approximate parity between male and female respondents, numbers and percentages apply to data about heads-of-household and the household unit itself (e.g., data on occupation of head-of-household) even when respondent was the female spouse. When the latter also performed some income-earning activity, that is noted.

4/ This process is spelled out elsewhere and its dimensions and meaning are contemplated in the section on "The Valuing of Rural Electrification", as well as later in this discussion.

5/ J. Tendler. NEW LIGHT ON RURAL ELECTRIFICATION: THE EVIDENCE FROM BOLIVIA. Berkeley, California: September 1980.

6/ COOPESANTOS R.L. INFORME CONJUNTO DEL CONSEJO DE ADMINISTRACION DE GERENCIA. San Marcos de Tarrazu. March 2, 1980.

7/ F. Masson and J. Rixse CAPITAL PROJECTS EFFECTIVENESS EVALUATION. San José August 1971.

8/ J. Tendler. RURAL ELECTRIFICATION: LINKAGES AND JUSTIFICATIONS. Washington, D.C.: Agency for International Development, PPC/E. April 1979. The countries cited are Costa Rica (1973), Colombia, El Salvador, and the Philippines.

9/ ICE, 1979: op.cit.

10/ IDB, 1979: op.cit.

11/ OFIPLAN, MAPEO DE LA POBREZA, San José, 1979; USAID, CDSS 1982-86.

Appendix A

Table 1 Occupations, Heads of Household, Survey Sample (N=96)

	Area of Coopesantos (N=17)		Area of Coopeguanacaste (N=13)		Area of Coopelesca (N=30)		All AID-Funded Coop Areas (N=60)		Area of CoopeAlfaro R. (N=5)		Area of JASEC (N=12)		Area of ICE (N=19)		All Non-AID-Funded Distributors (N=36)		Total Sample (N=96)		Households without Electricity (N=14)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
*Occupation**																				
Farmer[1]	10	58.8	3	23.1	18	60.0	31	51.7	5	100.0	2	16.7	8	42.1	15	41.7	46	47.9	7	50.0
Day Laborer[2]	2	11.8	4	30.8	4	13.3	10	16.7	0	0.0	3	25.0	6	31.6	9	25.0	19	19.8	4	28.6
Tradespeople[3]	2	11.8	0	0.0	1	3.3	3	5.0	0	0.0	1	8.3	1	5.3	2	5.6	5	5.2	0	0.0
Housewife[4]	1	5.9	1	7.7	0	0.0	2	3.3	0	0.0	1	8.3	1	5.3	2	5.6	4	4.2	0	0.0
Other[5]	2	11.8	5	38.5	7	23.3	14	23.3	0	0.0	5	41.7	3	15.8	8	22.2	22	22.9	3	21.4
Heads of household with more than one employment[6]	1		1		4		6	10.0	1		1		1		3	8.3	9	9.4	1	7.1
Households where wife also worked	1		1		0		2	3.3	0		0		0		0	0.0	2	2.1	1	7.1

[1]*Agricultor* or *ganadero*.
[2]*Jornalero*.
[3]*Comerciantes*.
[4]Single women supported by kin, usually children.
[5]Metalworker, tailor, forest guard, butcher, waiter, odd-jobber, washerwoman, tailor/shoemaker, rural guard, employee in small business, industrial mechanic, carpenter, policeman, domestic.
[6]Farmer/day laborer, farmer/businessman, dairy farmer/salt warehouse, dairy farmer/block factory/sawmill, farmer/trucker, watchman/signpainter.
*"Occupation" refers to the respondent's self-identification and priority in the cases where he or she had more than one job or income-earning activity.

Appendix A

Table 2. Age Ranges and Modal Ages/Cost Ranges[1] and Modal Costs, Installed Household Electrical Systems, by Cooperative and Non-AID-Funded Power Distributor

	Age Range	Modal Age	Installation Cost Range	Modal Payment For Installation
Coopesantos	4 to 12 yrs	10 yrs.	$ 200- 205	$ 205
Coope-	3 mos. to 10 yrs.	3 mos.[2]	$1800[2]	$1800[2]
guanacaste	—3 to 11 mos.	11 mos.[2]	$1035[2]	$1035[2]
	—3 to 4 yrs.	4 yrs.	$ 420-1200	$ 500
	— to 10 yrs.	10 yrs.	N.D.[3]	N.D.[3]
Coopelesca	3 mos. to 10 yrs.			
	—3 to 9 mos.	8 mos.	$1000-4000	$1000
	—3 to 4 yrs.	4 yrs.	$ 500- 800	$ 500
	— to 10 yrs.	10 yrs.	$ 200-29,000[4]	N.D.[4]
Coopealfaro				
Ruiz	5 to 8 yrs.	5 yrs.	$ 500-12,500[4]	$1000
JASEC	3 to 15 yrs.	10 yrs.	$ 120- 660	$ 200
ICE	4 to 15 yrs.	10 yrs.	$ 15- 800	$ 25[5]

[1]Costs are quoted in colones for the year of installation as remembered. US 1.00 = in 1973, ¢7.61; in 1977, ¢8.57; in 1980, ¢8.57 official rate with a volatile street rate.
[2]There were only two cases, so these are not modal figures but single items.
[3]People in this group simply could not remember what they paid, but recalled that it was "cheap."
[4]These high-rate upper limits are cases of dairies in the San Carlos area which were putting in refrigeration, milking machines, etc. There was no modal figure in the 10-year group.
[5]People have trouble remembering this, too, though they recalled some community fund-raising and that the small amount they had to pay was absorbed into their monthly bills.

Appendix A

Table 3. Income Levels, Households, Without Electricity and Households With Electricity (N=96)

Monthly Family Income Levels	Total Households		Households Without Electricity		Households With Electricity		Percentages of Households Without Electricity Below Selected Poverty Lines[2]			Percentages of Households With Electricity Below Selected Poverty Lines		
	No.	%	No.	%	No.	%	Cumulative %	Poverty Line	% Below P.L.	Cumulative %	Poverty Line	% Below P.L.
¢[3] 0-300	3	3.1	0	0.0	3	3.7	0.0			3.7		
301-400	3	3.1	0	0.0	3	3.7	0.0			7.4		
401-500	2	2.1	1	7.1	1	1.2	7.1			8.6		
501-600	2	2.1	2	14.3	0	0.0	21.4			8.6		
601-700	2	2.1	0	0.0	2	2.4	21.4			11.0		
701-800	4	4.2	0	0.0	4	4.9	21.4			15.9		
801-900	0	0.0	0	0.0	0	0.0	21.4			15.9		
901-1,000	7	7.3	1	7.1	6	7.3	28.5			23.2		
1,001-1,200	7	7.3	0	0.0	7	8.5	28.5			31.7		
1,201-1,500	7	7.3	1	7.1	6	7.3	35.6	Extreme Poverty Line	35.6	39.0	Extreme Poverty Line	39.0
1,501-2,000	11	11.5	1	7.1	10	12.2	42.7			51.2		
2,001-2,500	3	3.1	1	7.1	2	2.4	49.8	Poverty Line	49.8	53.6	Poverty Line	53.6
2,501-3,000	2	2.1	1	7.1	1	1.2	56.9			54.8		
3,001-4,000	8	8.3	1	7.1	21.3 7	8.5	21.9 64.0			63.3		
4,001 and over	11	11.5	1	7.1	10	12.2	71.1			75.5		
No response[1]	24	25.0	4	28.6	20	24.4	N.R.'s			N.R.'s		
TOTALS	96	100.0	14	100.0	82	100.0						

[1]Includes both those who resisted response and those whose income was so erratic and from so many sources that a reliable calculus could only be obtained through greater expense of interview time and, more importantly, time for establishing stronger rapport. We also included under "No Response" a couple of respondents whose statements of income were blatantly suspect. This is a high NR rate but we preferred to accept reality and predicate our analysis on responses we "believed in" and which were, furthermore, cross-validated by other questions on occupation, land tenure and use, and income sources.

[2]Poverty Lines are based on ICE 1979 "Basic Needs Shopping Basket" for food, housing, education, health, transportation, clothing, and communications. Families of 6 members whose monthly income is ¢2,400 or less are below the Poverly Line; those families with less than ¢1,528 per month are below the Extreme Poverty Line. Consumer prices went up by 9.2% in 1979 and at even a higher rate in 1980, and there has been a *de facto* devaluation of the *colón;* wages have kept up with neither.

[3]Official exchange rate, October 1980: US $1.00=¢8.57; street rate US $1.00=¢13.00 (variable).

Appendix A

Table 4. Income Levels, Households Without and Households With Electricity, Corrected for Non-Responses (N=72)

Monthly Income Levels	Total Households Responding (N=72)		Households Without Electricity Responding (N=10)		Households With Electricity Responding (N=62)		Percentages of Households Without Electricity Below Selected Poverty Lines[1]			Percentages of Households With Electricity Below Selected Poverty Lines		
	No.	%	No.	%	No.	%	Cumulative %	Poverty Line	% Below P.L.	Cumulative %	Poverty Line	% Below P.L.
¢[2] 0-300	3	4.2	0	0.0	3	4.8	0.0			4.8		
301-400	3	4.2	0	0.0	3	4.8	0.0			9.6		
401-500	2	2.8	1	10.0	1	1.6	10.0			11.2		
501-600	2	2.8	2	20.0	0	0.0	30.0			11.2		
601-700	2	2.8	0	0.0	2	3.2	30.0			14.4		
701-800	4	5.6	0	0.0	4	6.5	30.0			20.9		
801-900	0	0.0	0	0.0	0	0.0	30.0			20.9		
901-1,000	7	9.7	1	10.0	6	9.7	40.0			30.6		
1,001-1,200	7	9.7	0	0.0	7	11.3	40.0			41.9		
1,201-1,500	7	9.7	1	10.0	6	9.7	50.0	Extreme Poverty Line	50.0	51.6	Extreme Poverty Line	51.6
1,501-2,000	11	15.3	1	10.0	10	16.1	60.0			67.7		
2,001-2,500	3	4.2	1	10.0	2	3.2	70.0	Poverty Line	70.0	70.9	Poverty Line	70.9
2,501-3,000	2	2.8	1	10.0	1	1.6	80.0			72.5		
3,001-4,000	8	11.1	1	10.0	7	11.3	90.0			84.0		
4,001 and over	11	15.3	1	10.0	10	16.1	100.0			100.1		
TOTAL RESPONDENTS	72	100.2	10	100.0	62	99.9						

[1]Poverty Lines are based on ICE 1979 "Basic Needs Shopping Basket" for food, housing, education, health, transportation, clothing, and communications. Families of 6 members whose monthly income is ¢2,400 or less are below the poverty line, those with ¢1,528 per month are below the Extreme Poverty Line. Consumer prices went up by 9.2% in 1979 and at an even higher rate in 1980, and there has been a *de facto* devaluation of the *colón;* wages have kept up with neither.

[2]Official exchange rage, October 1980: US $1.00=¢8.57; street rate US $1.00=¢13.00 (variable).

Appendix A

Table 5. Income Levels, Households With Electricity Served by AID-Funded Rural Electrification Cooperatives, and Those Served by Other Rural Electrification Distributors (N=82)

Monthly Income Levels	Coopesantos		Coope-guanacaste		Coopelesca		All AID-Funded Coops		Percentages of Households Served by AID-Funded Coops Under Selected Poverty Lines			Coope-Alfaroruíz		JASEC		ICE		All Other Rural Electr. Distributors		Percentages of Households Served by Other Rural Electrification Distributors Under Selected Poverty Lines		
	No.	%	No.	%	No.	%	No.	%	Cumulative %	Poverty Line	% Below P.L.	No.	%	No.	%	No.	%	No.	%	Cumulative %	Poverty Line	% Below P.L.
¢[3] 0-300	2	13.3	0	0.0	1	4.3	3	6.4	6.4			0	0.0	0	0.0	0	0.0	0	0.0	0.0		
301-400	0	0.0	0	0.0	1	4.3	1	2.1	8.5			0	0.0	0	0.0	1	5.6	1	2.9	2.9		
401-500	0	0.0	2	22.2	0	0.0	2	4.3	12.8			0	0.0	0	0.0	0	0.0	0	0.0	2.9		
501-600	1	6.7	0	0.0	0	0.0	1	2.1	14.9			0	0.0	0	0.0	0	0.0	0	0.0	0.0		
601-700	1	6.7	0	0.0	0	0.0	1	2.1	17.0			0	0.0	0	0.0	0	0.0	0	0.0	0.0		
701-800	1	6.7	1	11.1	0	0.0	2	4.3	21.3			0	0.0	1	8.3	1	5.6	2	5.7	8.6		
801-900	0	0.0	0	0.0	1	4.3	1	2.1	23.4			0	0.0	0	0.0	0	0.0	0	0.0	8.6		
901-1,000	0	0.0	1	11.1	2	8.7	3	6.4	29.8			0	0.0	1	8.3	1	5.6	2	5.7	14.3		
1,001-1,200	0	0.0	0	0.0	3	13.0	3	6.4	36.2			1	20.0	2	16.7	1	5.6	4	11.4	25.7		
1,201-1,500	0	0.0	1	11.1	1	4.3	2	4.3	40.5	Extreme Poverty Line	40.5	1	20.0	1	8.3	3	16.7	5	14.3	40.0	Extreme Poverty Line	40.0
1,501-2,000	1	6.7	1	11.1	1	4.3	3	6.4	46.9			0	0.0	4	33.3	2	11.1	6	17.1	57.1		
2,001-2,500	0	0.0	0	0.0	0	0.0	0	0.0	46.9	Poverty Line	46.9	0	0.0	0	0.0	2	11.1	2	5.7	62.8	Poverty Line	62.8
2,501-3,000	1	6.7	0	0.0	0	0.0	1	2.1	49.0			0	0.0	0	0.0	0	0.0	0	0.0	62.8		
3,001-4,000	3	20.0	0	0.0	1	4.3	4	8.5	57.5			0	0.0	1	8.3	1	5.6	2	5.7	68.5		
4,001 and Over	0	0.0	0	0.0	6	26.1	6	12.8	70.3			1	20.0	1	8.3	1	5.6	3	8.6	77.1		
No Response[1]	5	33.3	3	33.3	6	26.1	14	29.8				2	40.0	1	8.3	5	27.8	8	22.9			
TOTALS	15	100.1	9	99.9	23	99.7	47	100.1				5	100.0	12	99.8	18	100.3	35	100.0			

[1]Includes both those who resisted response and those whose income was so erratic and from so many sources that a reliable calculus could only be obtained through greater expense and, more importantly, time for establishing stronger rapport. We also included under "No Response" a couple of respondents whose statements of income were blatantly suspect. This is a high NR rate but we preferred to accept reality and predicate our analysis on responses we "believed in" and which were, furthermore, cross-validated by other questions on occupation, land tenure and use, and income sources.
[2]Poverty Lines are based on ICE 1979 "Basic Needs Shopping Basket" for food, housing, education, health, transportation, clothing, and communications. Families of 6 members whose monthly income is ¢2,400 or less are below the poverty line, those with less than ¢1,528 per month are below the Extreme Poverty Line. Consumer prices rose 9.2% in 1979 and at an even higher rate in 1980, and there has been a *de facto* devaluation of the *colón;* wages have kept up with neither.
[3]Official exchange rate, October 1980=US $1.00=¢8.57; street rate US $1.00=¢13.00 (variable).

Appendix A.

Table 6. Income Levels, Households With Electricity Served by AID-Funded Rural Electrification Cooperatives, and Those Served by Other Rural Electrification Distributors, Corrected

Monthly Income Levels	Coopesantos		Coope-guanacaste		Coopelesca		All AID-Funded Coops					Coope-Alfaroru Ruiz		JASEC		ICE		All Other Rural Electr. Distributors				
¢[3]	No.	%	No.	%	No.	%	No.	%	Cumulative %	Poverty Line	% Below P.L.	No.	%	No.	%	No.	%	No.	%	Cumulative %	Poverty Line	% Below P.L.
0-300	2	20.0	0	0.0	1	5.9	3	9.1	9.1			0	0.0	0	0.0	0	0.0	0	0.0	0.0		
301-400	0	0.0	0	0.0	1	5.9	1	3.0	12.1			0	0.0	0	0.0	1	7.7	1	3.7	3.7		
401-500	0	0.0	2	33.3	0	0.0	2	6.1	18.2			0	0.0	0	0.0	0	0.0	0	0.0	3.7		
501-600	1	10.0	0	0.0	0	0.0	1	3.0	21.2			0	0.0	0	0.0	0	0.0	0	0.0	3.7		
601-700	1	10.0	0	0.0	0	0.0	1	3.0	24.2			0	0.0	0	0.0	0	0.0	0	0.0	3.7		
701-800	1	10.0	1	16.7	0	0.0	2	6.1	30.3			0	0.0	1	9.1	1	7.7	2	7.4	11.1		
801-900	0	0.0	0	0.0	1	5.9	1	3.0	33.3			0	0.0	0	0.0	0	0.0	0	0.0	11.1		
901-1,000	0	0.0	1	16.7	2	11.8	3	9.1	42.4			0	0.0	1	9.1	1	7.7	2	7.4	18.5		
1,001-1,200	0	0.0	0	0.0	3	17.6	3	9.1	51.5			1	33.3	2	18.2	1	7.7	4	14.8	33.3		
1,201-1,500	0	0.0	1	16.7	1	5.9	2	6.1	57.6	Extreme Poverty Line	57.6	1	33.3	1	9.1	3	23.1	5	18.5	51.8	Extreme Poverty Line	51.8
1,501-2,000	1	10.0	1	16.7	1	5.9	3	9.1	66.7			0	0.0	4	36.4	2	15.4	6	22.2	74.0		
2,001-2,500	0	0.0	0	0.0	0	0.0	0	0.0	66.7	Poverty Line	66.7	0	0.0	0	0.0	2	15.4	2	7.4	81.4	Poverty Line	81.4
2,501-3,000	1	10.0	0	0.0	0	0.0	1	3.0	69.7			0	0.0	0	0.0	0	0.0	0	0.0	81.4		
3,001-4,000	3	30.0	0	0.0	1	5.9	4	12.1	81.8			0	0.0	1	9.1	1	7.7	2	7.4	88.8		
4,001 and Over	0	0.0	0	0.0	6	35.3	6	18.2	100.0			1	33.3	1	9.1	1	7.7	3	11.1	99.9		
Total Respondents	10	100.0	6	100.1	17	100.1	33	100.0				3	99.9	11	100.1	13	100.1	27	99.9			

[1]Poverty lines are based on ICE 1979 "Basic Needs Shopping Basket" for food, housing, education, health, transportation, clothing, and communications. Families of 6 members whose monthly income is ¢2,400 or less are below the Poverty Line, those with ¢1,528 per month are below the Extreme Poverty Line. Consumer prices rose by 9.2% in 1979 and at an even higher rate in 1980, and there has been a *de facto* devaluation of the colón; wages have kept up with neither.
[2]Official exchange rate, October 1980: $1.00=¢8.57; street rate US $1.00=¢13.00 (variable).

APPENDIX B
THE USES AND NON-USES OF HOUSEHOLD ELECTRIFICATION

Domestic Standard Of Living

The conventional wisdom is that the poor who do manage to scrape up the money for the installation of electricity do not use it very much. In one of the earliest (1971) evaluations of the Costa Rican rural electrification project by Masson and Rixse, the proportion of customers using only the minimum consumption (20 kwh/month) was over 50% in all three cooperatives. In Los Santos it had even shown a tendency to rise to 54%. Seven years later, an NRECA evaluation found no change among the COOPESANTOS residential users; 50% were consuming the minimum amount which was then pegged at 30 kwh/month.1/

Rates encountered in the impact evaluation survey were notably higher in terms of consumption (see Table 1, "Consumption of Electricity..."). The percentage of minimal users (¢0 - 20 per month) among AID-funded cooperative members was 35.5%, followed by customers spending ¢31-40 month. Sixteen percent were spending ¢80 and well over that, primarily dairy farmers in the COOPELESCA area.

The customers of other non-AID-funded distributors tended to spend more per month on electricity, although they are, as the poverty line analysis indicated, not that much more affluent over all. Thirty-one percent of that group spent over ¢80/month and 23% spent between ¢51-80, principally in the JASEC area. Minimal users for the non-AID group represented 19% of its total number, a little over half that of the cooperative group. For the latter, there is a fair correlation between monthly income levels and the amount spent on electricity at the lower and upper ends of the income spectrum, with great inconsistency in the middle. For the former group, higher incomes clearly correlated with greater monthly expenditures on electricity but with everything else very scattered for reasons that are not altogether clear. One potential explanation, which we will discuss below, is that the JASEC and ICE areas visited are coffee-dominant. As such, the coffee harvest (cogida) comes to play a key role in domestic economics. A large family which participates fully in a good harvest will all of a sudden find itself with thousands of colones, part of which usually goes to purchase at least one appliance. This can be seen as a form of savings, especially in inflationary times and where using a savings bank does not harmonize with custom or convenience. Monthly income figures, unless harvest income is carefully prorated across the year, will consist of low peon wages, other own-farm income, or both, while monthly electric bills reflect expenditures on the appliances accumulated with each year's cogida.

Whatever their expenses, in reality all Costa Ricans are getting something of a break as far as utilities, including electricity, are

*Footnotes 1-18 at end of Appendix.

concerned. From 1966 to 1979, although the overall price level increased by 263%, the prices of electricity, gas, and water increased by 192%.[2/] For the few cases in the sample, of individuals or communities without electricity, there was a well-elaborated comprehension of electricity as being cheaper than independent diesel-operated generators, costing less in terms of start-up investment, not to mention its greater reliability and lack of aggravation. All distributors of power, cooperatives included, had excellent reputations regarding incidence of blackouts or brownouts and repair times. Such generators were going to be relegated to standby status when central-grid power came in. This same benefit was identified and analyzed in the 1973 University of Florida evaluation, and has been promoted in cogency as petroleum prices have risen.

The picture sketched by Masson and Rixse in 1971, of overall low ownership of electric appliances, has changed. In the entire sample of electrified homes, there was only one with no appliances at all (COOPESANTOS: an elderly man who lived alone), and four cases with only one aplliance (COOPEGUANACASTE, two cases of jornaleros, one with an income of ¢400/month, the other with a TV and an income of ¢500/month, and one case of a man who guarded tourist homes with a refrigerator and an income of ¢1000/month; and in the ICE area, two cases, one a jornalero with an average monthly income of ¢944 and a TV, and an elderly woman supported by her children with a gift percolator she never used. All other households had two or more appliances.

For all households in the survey sample with electricity (N=82), the average number of appliances was 5.1 For the total of cooperative households (N=47), the average was 4.5, for the others (N=35), 5.1. The cooperative sample was quite skewed by the low average rate for Guanacaste (2.0 appliances/household) which lowered the rate for the group as a whole even with the contribution of the COOPELESCA households which averaged 5.7 appliances per household (see Table 2, "Ownership of Electric Appliances").

There are really no surprises here. The number of appliances follows rather smoothly the income distribution for the geographic areas and related cropping patterns comprised by the sample. Knowing the regional dynamics of poverty (and wealth) in Costa Rica, even given micro-environmental variations, one might have predicted how many people would have how many appliances and where. However, the claim that people who buy appliances cannot be classified as poor does not holds up very well even for rural Costa Rica, or, for that matter, any developing country beyond some indeterminate per capita income figure and where income distribution is something less than egregious. To be sure, all of the individuals with no or one appliance were well below the Extreme Poverty Line and the number of appliances correlated with reported income levels, but the fact remains that many people below the Poverty Line had two or more appliances, one of them usually major (i.e., refrigerator). One may say that there is something wrong with the ICE Poverty Lines, but in the light of the recent AID poverty study, they seem reasonable to us. One may also say that Costa Ricans have different values than development analysts, an issue which will be elaborated on below. And one may also say that appliances are perceived as a form of security or savings, a phenomenon

dealt with the above.

The most prevalent appliance was the iron, not surprising in view of the burden of ironing with irons heated on the fire or with heavy charcoal irons, especially given the low kwh consumption of that appliance.

The TV and refrigerator were next, varying in priority by region. This is consistent with the current context: Costa Rica has lively televison program variety and TV-watching is a valued family and neighborhood or community activity, and the refrigerator is reaching the point of becoming a sine qua non. Rawson has analyzed in careful detail the well-planned but flexible strategies of food-purchasing in rural Costa Rica, and the presence of a refrigerator plays a major role in such strategies[3]. Although the price of meat has risen sharply (half of Costa Rican meat production is exported, so that local consumer prices are always competing with the seductiveness of the presently greedy world market) and people claim they are consuming less as a result, they still say they would eat more if they had some way of keeping it. One respondent in San Carlos reported that people with refrigerators shared their space with neighbors and, observing life elsewhere, there does seem to be a certain amount of that sort of sharing but not enough to solve larger problems of week-long food storage for a large number of individuals. We were not able to do the kind of meticulous analysis that would permit neat conclusions about costs vis-a-vis economic and nutritional benefits, but if people felt they could eat better more easily with a refrigerator, we are prepared to accept that. Since most people had acquired their irons first, then their refrigerators and/or TVs, these are obviously their priorities. They may be "consumerist" and "non-productive" but they are not seen as trivial to family well-being. The average Costa Rican rural male, who may not be noted for his active participation in domestic chores but who frequently does much of the weekly bulk food-purchasing, is as likely to perceive these meanings as is the Costa Rican rural female.

As for other economies, one that has not occurred is the substitution of electricity for firewood (lena) for cooking. While 18 (22%) of the electrified household had purchased electric stoves, only two households cooked only with electricity, plus one which had a backup gas stove. Seven of the households with electric stoves, used them as secondary to firewood for emergency or early-morning short-order cooking, or for occasional baking. One really security-conscious housewife had all three types of stoves. This leaves us with seven households which had purchased electric stoves but did not use them because they did not like them or found them to work poorly, preferred lena, or found electric cooking simply too expensive. Since they had usually held onto the old wood-burning apparatus, it was easy enough to toss a cloth over the electric stove and ignore it or use it for storage. "One of those mistakes one makes," sighed one housewife who could ill afford to have made it.

The decision against electric stoves may not be invariably economically rational. Regular use of an electric stove would consume at least 100 kwh per month[4]. Anyone well enough off to buy an electric

stove is paying more than the minimum (around ¢14.20-15.75 for 30 kwh) monthly rate; each additional 50 kwh above that costs ¢0.4516, so the regular monthly use of an electric stove would cost a minimum of ¢45.16 additional (US $5.29 at ¢8.54/$1)[5].

The cost and measurement units of firewood vary widely. In some cases it is a free good, which people gather on their own land or from neighboring fincas, especially very large ones with owners who are absentee or have no need for it themselves and permit its gathering as a social gesture which, not incidentally, keeps the acreage picked up. Kindling is almost always gathered by some member of the household, never bought.

In some cases, people find, shop, and hire a truck, and pay only the transport (flete), a sum determined by distance and wit.

The units of purchase encountered were:

1) the carretada (deriving from the traditional ox-carts in which wood use to be hauled), now hauled by Datsun-type truck and therefore called a pickup; prices range from ¢50 to ¢125, differing from area to area but more or less constant within them;

2) a camión, a standard pickup truck, which can cost ¢400;

3) a palo, contracting for a whole standing tree which costs around ¢300 and which entails different cutting and hauling arrangements but can last a small family a whole year.

Monthly firewood use seems to hover around one carretada for a family of six to as many as 12 individuals, a quarter- or half-carretada for very small families. The range may seem wide but larger, poorer families do not, unfortunately, eat that much more food so that there is not that much more to cook. Such families may also be a bit more careful about usage. When they run out, they gather what they need to get to the point where there is cash again. Some families also use about four liters to a gallon of kerosene (canfín) per month for firestarting, a monthly cost of from ¢8.50 to ¢12, depending on point of purchase.

Thus a minimum monthly family expenditure for firewood and kerosene for cooking could be zero and a reasonable average would be around ¢75, about ¢30 more than the cost of reasonable monthly use of an electric stove which has, of course, to be amortized. Part of this amortization could derive both from the possible savings on firewood and kerosene and from savings on candles. At ¢.60 or ¢.70 apiece, using a minimum of one a night, it is not unusual for a family to spend ¢18-20 a month, and as much as ¢36 for a large family, an amount in any case more than the standard minimum light bill. This was not the case in 1973 when there was a comparative direct cost advantage of candles over electric lighting[6]. The switch is another side-effect of petroprice increases; the standard Costa Rican candle is paraffin-based. Beeswax and tallow (which,

ironically, was Costa Rica's first major export product out of Guanacaste during the Colonial Period) do not seem to be used for standard candles.

Why, then, do people use firewood for cooking? The invariable reasons were: they prefer it, the food taste better, it is easier and faster, and it can be found as a free good when there is no cash. So while users see no problem getting firewood and see no personal costs, deforestation in Costa Rica is running at around 60,000/has./yr. with a reforestation rate ofunder 400/has./yr.[7] In 1979, 9,000,000 m^3 were out of which only 28% was used, approximately half for industrial processing and half for fuel. Thus about 1,260,000 m^3 of Costa Rica's vanishing forest cover is being used for firing wood-burning stoves, a high ecological and ultimately socio-economic cost. With total conversion to hydro-power by 1985, cheap electric power and the promotion of electric stoves might make a lot of economic sense. (See Table 3, "Patterns of Fuel Use, Survey Sample".)

Approximately one-third of households with electricity had expanded their system in some way since the initial installation, slightly less in the AID-funded cooperative areas, slightly more in the others, again reflecting the issue of relative affluence. Motivation for expansion varied slightly between the two groups, but for both it centered on wanting more appliances, more light in the house, or as part of expansion of the house itself. The addition of more light often made what one respondent termed a "package" (un paquete) with planned or hoped for appliances (see Table 4, "Expansion of Household Electrical Systems").

Home Industry

What leaps to instant notice, particularly in the AID cooperative areas, are the low rates of expansion of household electrical systems for the addition of some sort of business activity, only 15% of the total electrified households, less (8%) in the AID cooperative areas. This is a slightly distorted picture, since more households than that had some household business activity involving electricity: their establishment did not necessarily imply expansion of the existing system, only their willingness to pay greater monthly electric bills.

A closer look (see Table 5, "Home Businesses Using Electricity..."), brightens the picture. Of the total electrified households, 23% had some kind of home-based industry with some electrical input. The most frequent expression of the relationship was the pulpería, often the center of hamlet life and important even in urban neighborhoods. In rural areas it can be a counter tacked onto the front of a residence with a minimal stock of basic items, or something separate and rather grander which may combine a sort of general store, a place to buy sodas or a shot of guaro, or to watch TV and listen to the Rockola.

Eleven of the 19 businesses had existed before electrification and for all but one, getting electricity had permitted them to expand. The seven new businesses had been made possible by the advent of electricity. One

pulpería had made no entrepreneurial response to the potential, and monthly earnings hovered around ¢600/month net. The causal arrows flow from poverty to stagnation; there was neither enough "primer" cash available nor clientele to encourage expansion, and personal misfortune provided the coup de grace. The site, San Carlos de Tarrazú, was in 1979 the district with the sixth-highest rate of malnutrition as measured by Iowa standards, a place whose poverty and isolation no single intervention could hope to conquer.

The economic effects of the establishment of the new businesses were: 12 of the 19 reported net earnings improved. The three who reported doubled earnings, if their statements were correct, would have been at or near the poverty line before the electrification; one was already doing quite well without it. At the lowest levels, (e.g., the case of the woman who made ice cream in Guanacaste, living in a borrowed house while her husband scraped up ¢400 a month as a jornalero), one might even say her electrified business was costing her money. We calculated that she netted ¢16.00 per week on ice cream-making, or ¢64 per month; her electric bill ran around ¢30-35, with the refrigerator and four droplights the only pull. In addition, since the electricity had been installed in the community only 11 months before, she was also paying off a ¢1,035 bank loan for the connection which was another ¢30 a month. The refrigerator had been, of course, another cost. The benefit of electricity in this case was a social and not a net economic one and was so perceived by the respondents; as she said, "It makes life better. Besides, it's lonely here and it's nice to have people come in to buy something."

The 1971 and 1973 evaluations of the rural electrification cooperatives project noted that it had had little effect on the proliferation of home industries. The explanations prefered were: 1) lack of promotion by the cooperative; 2) lack of a handicraft tradition in Costa Rica, and; 3) lack of adequate markets. In the last seven years, handicrafts have been developed elsewhere in Costa Rica and internal and external markets can, in many cases, be created if they do not exist.

The Survey Sample

Sixty-one (64%) of the survey sample (N=96) owned or had access to land for cultivation and/or pasture, 35 (37%) did not. Percentages of access to land, the nature of that access, and lack of access, differed by area (see Table 6, "Access to Land for Cultivation") in predictable ways which conform, if not perfectly, to income levels among farmers and day-laborers. We share the same misgivings about income and landholding data gathered through standard survey methodologies, however, when the internal relationship are consistent and the overall patterns do not diverge from what we know of the structure and dynamics of the regions concerned, we feel that we can speak with clean conscience.

The AID-funded cooperative members as a group have somewhat less access to land than the non-AID group and lower rates of ownership. The skew is introduced primarily by the COOPEGUANACASTE area where only six

respondents out of 13 had land and only three of those owned it. The best off in terms of access to land was the area of Alfaro Ruiz, followed by the COOPESANTOS area. (See Table 7, "Landholding by Farm Size").

We include here the data on amount of land under cultivation with the caveat noted elsewhere that, with the exception of holdings of 2 hectares or less, small farms are not necessarily poor farms, the chief discriminator being the cultivation of a high-value permanent crop, usually coffee, and medium-sized farms not necessarily indicative of wealth if they are in basic grains. The largest, most lucrative farms in the sample are in the COOPELESCA area, the smallest, least lucrative in GUANACASTE.

Only five respondents used electricity in their agricultural activities, in other words only eight percent of those with land (N=61). Range of holding size in this group was from 5 mz. to 400 mz., but as can be seen from Table 8, "Use of Rural Electrification in Agriculture"), landholders who used electricity in agricultural production were almost all medium (50 and 80 mz.) and large (250 and 400 mz.) farmers, whose principal activity was dairying. The "smallholder" with only 5 mz. had them all irrigated and was raising flowers and high-value vegetables for sale. He also had a restaurant with an adjacent stand where he sold those flowers and vegetables, and claimed that he netted more through that activity than from the restaurant. Only one respondent, who had technified his dairying operation, claimed no improvement in income as a result of this change[9/].

All other respondents saw major increases in income, at least double. The respondent who saw only a little increase was in the process of technifying his poultry-raising operation and had not yet seen substantial improvements in income.

While four out of the five were in an AID-funded cooperative area, all of those four were in the COOPELESCA/San Carlos region. The fifth was also in that region but got his electricity from COOPEALFARORUIZ, not from one of the AID-funded cooperatives.

Thus, as similarly reported in the 1973 University of Florida evaluation, livestock (i.e., dairy cattle) producers were more likely to use electricity and use it for productive purposes than were farmers whose principal production was crops. Again similarly, farm size of such livestock producers is, on the whole, larger.

Production Profiles

There are no dazzling differences between households with and without electricity, nor could there be given the small size of that subsample. Still, there are some suggestive patterns worthy of notice (See Table 9, "Production Profile"):

1) Households without electricity cultivate nothing only for sale.

2) There are proportionately more producers of basic grains[10/] and annual crops[11/] among households without electricity and more of those, in turn, produce both for the market and subsistence than do households with electricity.

3) A substantially lower proportion of households without electricity produce permanent crops[12] and "other" essentially commercial crops[13/] and have far fewer beef or dairy cattle.

In Costa Rica, the most consistent discriminator of farm well-being is not invariably size of landholding per se but the cultivation of cash crop, either a permanent crop such as coffee or a high-value annual such as vegetables or flowers. Coffee is the most dependable predictor, even with its vulnerability to the world market. A second predictor is the presence of livestock, even on the smallest farms. Thus small and even medium-sized farms with no such cash crop and no livestock, almost by definition dependent on annual crops, principally basic grains and/or root crops.[14/] Thus we can assume that households without electricity as described by their production patterns are poorer than households with electricity.

This leads naturally to the question: are people poor because they have no electricity or do they have no electricity because they are poor? Given the few households which use electricity in agricultural production and their concentration in one rather well-endowed geographic area, it is hard to claim that people are poor because they have no electricity. There would seem to be no causal flow from household availability of electricity to more lucrative cropping mixes.

Nor is it quite correct to say that people have no electricity because they are poor, given the fact that almost all the non-electrified households wanted electricity and were prepared to or committed to pay for it at considerable sacrifice. Almost without exception, the portion of the sample without electricity lacked it because they had not yet been reached by the system; in large measure, the absence of that service, lower levels of economic well-being, and dependence on a low-return agriculture are correlates of enduring isolation. Since isolation does not mean poverty for everyone, witness large frontier livestock breeders, it must be a special kind of isolation with special entailments of history, geography, economics, and power.

The comparison of production mixes (see Table 9, "Production Profiles") for the areas served by the AID-funded cooperatives and the non-AID-funded distributors of electricity is helpful in beginning to address the several ramifications of isolation. Comparison between the two groups shows rough equivalence in overall crop mix and the balance of on-farm consumption and sale. In fact, the non-AID group does somewhat better across the board in terms of market participation and cultivation of higher-value crops. However, when the COOPEQUANACASTE subsample is removed, the remaining two AID-funded cooperatives do almost twice as well as the non-AID areas in terms of market participation, production of higher-value crops, and crop diversification. There is less

diversification in the COOPESANTOS, JASEC, and ICE areas because of the dominance of coffee in those abutting zones. The COOPELESCA and COOPERALFARORUIZ areas display more diversification, and COOPELESCA heavily weights both the market orientation and diversification of crop profile of the total AID-cooperative sample.

To be just, the on-farm use of electricity must be seen from the perspective of nationwide availability of electricity. In a 1972-73 survey,[15] 79% of the communities in Costa Rica had no public electricity,[16] and 90% had no public lighting, which was in any case usually concentrated in the community's central residential concentration. No communities under 250 population had any public lighting whatsoever. Access to electricity was, at the community level, a factor both of community size and geographical location. All communities over 2,751 in population, 57% of communities between 1,001 and 2,750, 29% of communities between 501 and 1,000, 16% of communities between 250 and 500, and 7% of communities under 250 had public electricity.

By geographic area, all communities in the AMSJ had public power, as did 76.5% of the Intermontane Valley. However, in the communities of the Atlantic Region and the North and South Pacific Areas, only 8%, 2.5%, and 4% had electricity, respectively, and no communities in the Northern Plains had any public power whatsoever. There is reason to assume that, except for the Atlantic Region where the city of Limón accounted for virtually all of the provision of power, the available public power in the North Pacific and South Pacific areas[17] were due to the existence of the rural electrification cooperatives.

This is not to say that the regions without public power were totally without electricity. In the Atlantic Region, for example, although only 8% of communities had public power, 75% had private power service, in the Northern Plains, 52%; only 27.5% of South Pacific communities were so endowed.

The 1972-73 national picture of communities served, then, looked like this:

	Public Power	Private Power	Total With Some Kind of Power
AMSJ	100.0	----	100.0
Intermontane Valley	76.5	11.8	88.3
Atlantic Region	7.7	75.0	22.7
North Pacific	3.7	52.0	55.7
South Pacific	2.5	27.5	30.0
Northern Plains	0.0	40.0	40.0

Outside the AMSJ and Intermontane Valley far more communities depended on private power than on public power, especially in communities with between 500 and 2,750 inhabitants. By community size, the public and private power situation in 1972-73 looked like this in terms of percentages of communities served:

Community Population Size	Public Power	Private Power	Total With Some Kind of Power
0-250	6.8	23.3	30.1
250-500	15.8	39.5	55.3
501-1,000	28.6	65.3	93.9
1,000-2,750	57.1	42.9	100.0
2,751-4,500	100.0	33.3[13/]	100.0
4500 +	100.0	---	100.0

Thus, except for most of the Southern Pacific and Northern Plains, and except for communities under 500 population, there was some sort of available electrical power in 1972-73. To be sure, the distribution range and quality of private power was quite limited and much more expensive than public power. This fact has served to enhance both the awareness of the advantages of central-grid electricity and the sense of relative deprivation which will be discussed in the section on "Values".

FOOTNOTES

1/ NRECA. EVALUATION REPORT: RURAL ELECTRIC COOPERATIVE OF LOS SANTOS, R.L. Washington, D.C.: November 1978.

2/ Banco Nacional de Costa Rica. CUENTAS NACIONALES, SERIES 1970-1978. San Joše: 1979.

3/ I.G. Rawson. CULTURAL COMPONENTS OF DIET AND NUTRITION IN COSTA RICA. Ph.D dissertation. University of Pittsburgh. 1975

4/ Davis et al., 1973: op. cit.

5/ COOPESANTOS, 1980: op. cit.

6/ Davis et al., 1973: op. cit.

7/ Few people complained, as they now do in many developing countries, of how difficult it was to find firewood. This is puzzling since in 1973 the University of Florida team found most respondents reporting firewood as a free good. One might have expected people to remark the difference. Though Costa Ricans have excellent noses for the winds of economic change, there may be a lag in realizations about relative costs or a simple status factor -- why hunt and chop wood if you can pay someone to do it for you? -- reflecting a certain fluidity in rural value systems.

8/ The Guaitil ceramics cooperative outside Santa Cruz is an excellent example, though not a household one, of possibilities for skills development, the creation of a market, the contribution of electrification to quality and quantity production, and -- the need for training, concern, and patience.

9/ The survey team found, for the most part that, at the household level, people at lower socio-economic levels were more likely to come forth with reliable income data, if one were ready to take some time with them to figure it out. We found less readiness in the ICE area, perhaps because everyone knows who decides how much people pay for power.

10/ Rice, beans, corn, sorghum, other.

11/ Plantain, banana, yuca, potatoes, taro (malanga), other.

12/ Coffee, cacao, fruit trees, other.

13/ Vegetables (hortaliza), flowers, pasture (improved and unimproved), tabacco, other.

14/ S. Daines. AN ASSESSMENT OF THE AGRICULTURAL SECTOR IN COSTA RICA. San José. February 1977. Despite the comment about farm size, any crop mix on less than 2 has. cannot provide subsistence, never mind self-sufficiency.

15/ DINADECO/AITEC. ESTUDIO DE TIPOLOGIA DE COMUNIDADES. San José. 1973. Sample N=1,434 in 109 communities of different sizes in all regions of Costa Rica, selected by stratified random sampling techniques.

16/ Defined as that provided by some government agency or national private enterprise, or by a municipality, for community use.

17/ the DINADECO/AITEC regionalizations aggregated as "South Pacific" what the agricultural regionalization breaks into Central and South Pacific. The rural electrification projects did reach into part of the Central Pacific zone but did not touch the South Pacific.

18/ This "excess" is not explained in the DINADECO/AITEC study, but one supposes it must refer to communities which depend on both, the private power being used for backup or residual from the period before 1940 when the area outside the AMSJ was essentially without public power.

Appendix B

Table 1. Consumption of Electricity by Survey Sample, AID-Funded Cooperative Members, and Customers of Non-Aid-Funded Distributors (In colones)[1]

Colones Spent per Month	Percent of Total Sample Consuming	Rank	Percent of Customers of Non-AID-Funded Distributors Consuming	Rank	Percent of AID-Funded Coop Members Consuming	Rank
$ 0-20	28.1	1	19.2	3	35.5	1
21-30	8.8	5	11.5	4	6.5	5
31-40	21.1	3	11.5	4	29.0	2
41-50	3.5	6	3.9	5	3.2	6
51-80	15.8	4	23.1	2	9.7	4
80 and over	22.8	2	30.8	1	16.1	3
TOTAL	100.1					

[1]Since minimal charges vary slightly across distributors and broken in an awkward way for easy computation, we took $0 to 20 as embracing the fact and the concept of minimal consumption. The base minimum is 30 kwh.

Appendix B

Table 2. Ownership of Electric Appliances, AID-Funded Cooperatives and Non-AID-Funded Power Distributors (N=82)

	Electric Appliance	Coopesantos (N=15)		Coope-guanacaste (N=9)		Coopelesca (N=23)		All AID-Funded Cooperatives (N=47)		All Non-AID-Funded Power Distributors (N=35)		Total (N=82)	
1	iron	12		6		22		40	85.1	32	91.4	72	87.8
2	television	12		5		19		36	76.6	32	91.4	68	82.9
3	refrigerator	10		7		21		38	80.9	23	65.7	61	74.4
4	radio	5		0		13		18	38.3	13	37.1	31	37.8
4.5	blender	7		0		11		18	38.3	13	37.1	31	37.8
5	washing machine	1		0		11		12	25.5	9	25.7	21	25.6
6	electric stove	3		0		5		8	17.0	10	28.6	18	22.0
7	phonograph	5		0		2		7	14.9	6	8.6	13	15.9
8	vacuum cleaner	0		0		5		5	10.6	5	14.3	10	12.2
9	sewing machine	0		0		3		3	6.4	6	8.6	9	11.0
9.5	tape recorder	1		0		4		5	10.6	4	11.4	9	11.0
10	percolator	1		0		4		5	10.6	2	5.7	7	8.6
11	hot plate	2		0		1		3	6.4	3	8.6	6	7.3
11.5	electric pot	0		0		3		3	6.4	3	8.6	6	7.3
12	lamps	2		0		2		4	8.5	1	2.9	5	6.1
13	water boiler	1		0		0		1	2.1	3	8.6	4	4.9
13.3	water pump	1		0		1		2	4.3	2	5.7	4	4.9
13.6	various	0		0		3		3	6.4	1	2.9	4	4.9
14	toaster	0		0		0		0	0.0	1	2.9	1	1.2
14.5	clock	0		0		0		0	0.0	1	2.9	1	1.2
Total No. of Appliances		63		18		130		211		170		381	
% of Total Appliances			29.9		8.5		61.6		55.4		44.6		100.0
Average No. of Appliances per Household		4.2		2.0		5.7		4.5		Coopealfaro Ruiz 5.4 JASEC 7.8 ICE 4.4 Combined 5.7			5.1

Appendix B

Table 3. Patterns of Fuel Use, Survey Sample (N=96)

Distributor System	firewood alone No.	%	charcoal alone No.	%	electricity alone No.	%	gas[1] No.	%	firewood + electricity No.	%	firewood + gas No.	%	firewood + electricity + gas No.	%	electricity + gas No.	%
AID-Funded Cooperatives (N=59)[2]																
Coopesantos (N=17)	15		1		0		0		1		0		0		0	
Coopeguanacaste (N=13)	13		0		0		0		0		0		0		0	
Coopelesca (N=30)	25		0		0		1		1		1		1		0	
Subtotal	53	89.8	1	1.7	0	0.0	1	1.7	2	3.4	1	1.7	1	1.7	0	0.0
Non-AID-Funded Distributors (N=36)																
Coopealfaro Ruíz (N=5)	2		0		0		0		2		0		0		1	
JASEC (N=12)	8		0		1		1		2		0		0		0	
ICE (N=19)	17		0		1		0		1		0		0		0	
Subtotal	27		0		2		1		5		0		0		1	
Totals (N=95)	80	84.2	1	1.1	2	2.1	2	2.1	7	7.4	1	1.1	1	1.1	1	1.1

[1]Propane. No one used kerosene for cooking; however a small amount was used on a regular basis for fire-starting.
[2]One respondent, a single male, ate his meals elsewhere.

Appendix B

Table 4. Expansion of Household Electrical Systems (N=82)

Distributor System	No. with Electricity	Households: Expanding System No.	%	Reasons for Expansion: More Light No.	%	Acquire More Appliances No.	%	Expansion of House No.	%	Add Business Activity[1] No.	%	Other No.	%
AID-Funded Cooperatives													
Coopesantos	15	5	33.3	0		4		0		0		1	
Coopeguanacaste	9	0	0.0	0		0		0		0		0	
Coopelesca	23	8	34.8	7		6		4		1		0	
Subtotal	47	13	27.7	7	53.8	10	76.9	4	30.8	1	7.7	1	7.7
Non-AID-Funded Distributors													
Coopealfaroruíz	5	5	100.0	2		3		1		1		0	
JASEC	12	3	25.0	0		1		2		0		1	
ICE	18	5	27.8	4		2		2		2		0	
Subtotal	35	13	37.1	6	46.2	6	46.2	7	53.8	3	23.1	1	7.7
TOTALS	82	26	31.7	13	50.0	16	61.5	11	42.3	4	15.4	2	7.7

[1]These figures will not quite jibe with the data on subsequent tables and discussions of uses of electricity for household business and increased agricultural production. This is partly because expansion of the system was not always necessary to add a bit of household industry, partly because there were some problems of technical comprehension.

Appendix B

Table 5. Home Businesses Using Electricity, Served by AID-Funded Cooperatives and by Non-AID Funded Power Distributors (N=82)

(Households with Electricity)	Total Home Business No.	%[1]	Types	Had Before Electricity Installed? Yes	No	Electricity Factor in Installation? Yes	No	Electricity Factor in Expansion? Yes	No	Has Electricity Improved Earnings? Yes	No	By How Much: Same	A Little	Double	Over Double	Reported Monthly Income[8]
AID-Funded Cooperatives (N=47)																
Coopesantos (N=15)	6	40.0	pulpería[3]		X	X			X	X			X			$ 4,000
			pulpería	X			X		X		X	X				600
			pulpería	X			X	X		X			X			N.R.[5]
			ice-cream making		X	X			X	X			X			2,900
			ice-cream-making		X	X			X	X			X			800
			primitive painter	X			X		X		X	X[2]				3,940
Coopeguanacaste (N=9)	2	22.2	ice-cream-making		X	X			X	X			X			400
			butcher		X		X		X		X	X[2]				N.R.[2]
Coopelesca (N=23)	4[4]	17.4	seamstress	X			X	X		X				X		3,800
			tailor/shoe-mender	X			X	X			X	X				400
			sawmill/block factory		X	X		X		X					X	15,000
			cheesemaking	X			X	X			X	X				12,000[6]
Subtotals: Total N=47; Total Businesses=	12	25.5		6	6	5	7	5	7	7	5	5	5	1	1	
Non-AID Funded Power Distributors (N=35)																
Coopealfaroruíz (N=5)	1[4]	20.0	restaurant, sales stand for flowers vegetables		X	X			X	X				X		100,000[7]
JASEC (N=12)	4	33.3	pulpería	X			X	X		X				X		5,000
			milk sales	X			X	X			X	X				1,600
			soldering shop		X	X			X		X	X				3,200
			tailor	X			X	X		X			X			1,800
ICE (N=18)	2	11.1	pulpería	X			X	X		X				X		2,000
			pulpería	X			X	X		X			X			N.R.
Subtotals: Total N=35; Total Businesses=	7	20.0		5	2	2	5	5	2	5	2	2	2	3		
TOTALS FOR SAMPLE (N=82)	19	23.2		11(57.9%)		7(36.8%)		10(52.6%)		12(63.2%)		7(36.8%)	7(36.8%)	4(21.1%)	1(5.3%)	

[1]Percentages of N for each distributing entity, of subtotals and totals.
[2]The painter and the butcher both appreciated electricity, but the painter said that while it was easier on his eyes, it wasn't improving his painting. The butcher had just gotten started and seemed somewhat dazed. Earnings were not improved, but life and business were easier.
[3]The *pulpería* is, more often than not, the center of Costa Rican hamlet life and important even in urban neighborhoods. In rural areas one might think of it as the general store, in more urban settings as the neighborhood grocery. Smallness and limited stock are implied but this varies by entrepreneur.
[4]The numbers for the San Carlos area may seem small but they expand when the agricultural home business is added (see next section).
[5]This respondent could not come up with a net or gross figure but the monthly electric bill ran around ¢280, which suggests some volume.
[6]This family has 80 mz., a salt warehouse, sells milk, etc. The cheesemaking is, however, a household activity.
[7]Monthly gross sales, estimated average.
[8]Total household income; we could not disaggregate with precision in all cases what source provided how much and contented ourselves with pushing gently on a total household income, who and what contributed to it, and how much electricity-related activities had added in general terms, i.e., "same," "a little," etc.

Appendix B

Table 6. Access to Land for Cultivation, Survey Sample (N=96)

Power Distribution Entity	Cultivated Any Land		Landholding Arrangements[1]							
			Owned		Rented		Owned & Rented		Owned & Borrowed	
	No.	%	No.	%	No.	%	No.	%	No.	%
AID-Funded Cooperatives										
Coopesantos (N=17)	12	70.6	10	83.3	0	0.0	0	0.0	2	16.7
Coopeguanacaste (N=13)	6	46.1	3	50.0	2	33.0	1	16.7	0	0.0
Coopelesca (N=30)	19	61.3	17	89.5	0	0.0	2	10.5	0	0.0
Subtotal (N=60)	37	61.7	30	81.1	2	5.4	3	8.1	2	5.4
Non-AID-Funded Distributors										
Coopealfaroruíz (N=5)	5	100.0	4	80.0	0	0.0	1	20.0	0	0.0
JASEC (N=12)	7	58.3	7	100.0	0	0.0	0	0.0	0	0.0
ICE (N=19)	12	63.2	11	91.7	1	8.3	0	0.0	0	0.0
Subtotal (N=36)	24	66.7	22	91.7	1	4.2	1	4.2	0	0.0
TOTALS (N=96)	61	63.5	52	85.2	3	4.9	4	6.6	2	3.3

[1]There are a number of other landholding and tenure arrangements which were asked about. Since they did not appear in our sample, they are excluded here.

Appendix B

Table 7. Landholding by Farm Size, Portion of Survey Sample (N=96) With Access to Land (N=61)

Amount Cultivated (has)	Coope-santos (N=12)	Coope-guanacaste (N=6)	Coope-lesca (N=19)	Subtotal (N=37)		Coope-alfaroruíz (N=5)	JASEC (N=7)	ICE (N=12)	Subtotal (N=61)		TOTAL (N=61)	
				No.	%				No.	%	No.	%
0.5-1	5	1	0	6	16.2	1	4	8	13	21.3	19	31.1
1-3	4	2	1	7	18.9	1	1	1	3	4.9	10	16.4
3-5	1	2	1	4	10.8	2	1	0	3	4.9	7	11.5
5-10	2	0	1	3	8.1	0	0	1	1	1.6	4	6.6
10-20	0	0	4	4	10.8	1	1	1	3	4.9	7	11.5
20-50	0	0	5	5	13.5	0	0	1	1	1.6	6	9.8
50-100	0	0	3	3	8.1	0	0	0	0	0.0	3	4.9
100-200	0	0	1	1	2.7	0	0	0	0	0.0	1	1.6
200-500	0	1	2	3	8.1	0	0	0	0	0.0	3	4.9
500-1000	0	0	0	0	0.0	0	0	0	0	0.0	0	0.0
1000-2500	0	0	1	1	2.7	0	0	0	0	0.0	1	1.6
2500 or more	0	0	0	0	0.0	0	0	0	0	0.0	0	0.0

Appendix B

Table 8. Uses of Rural Electrification in Agriculture

Distribution System	Size of Holding	Production for Own Consumption	Production For Sale	Agro-Industrial Enterprise(s)	Monthly Income	Changes	Increase in Productivity Due to Electrification
Coopelesca (got 10 yrs. ago)	80mz	dairy products	dairy products	dairy; salt warehouse;	¢12,000	milking machines; electric saw; pump for water for cows; lighting	same
Coopelesca (got 10 yrs. ago)	250mz.	dairy products	dairy products	dairy; sawmill; block factory	¢15,000*	refrigeration; 2 pumps; lighting	more than double
Coopelesca got 4 yrs. ago)	400mz.	dairy products	dairy products	dairy	N.R.*	refrigeration	double
Coopelesca (got 9 mos. ago)	50mz.	beans, corn, fruit, dairy products	dairy products chickens	poultry-raising	¢1,000* net	heating new chicken house	a little
Alfaroruíz (got 6 yrs. ago)	5mz.	some vegetables for own and restaurant use	flowers vegetables restaurant	restaurant	¢100,000 (gross)	irrigation (3 pumps), lighting, refrigeration	double

*Interviewer skeptical about figures.

Appendix B

Table 9. Production Profiles, Households Without Electricity and Households with Electricity (N=96)

Crop Category[1]	All Households (N=96)						Households Without Electricity (N=14)						Households With Electricity (N=82)					
	Own Use		Sale[6]		Both		Own Use		Sale		Both		Own Use		Sale		Both	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Basic Grains[2]	43	44.8	0	0.0	10	10.4	4	28.6	0	0.0	5	35.7	39	47.6	0	0.0	5	6.1
Annual Crops[3]	16	16.7	0	0.0	2	2.1	7	50.0	0	0.0	0	0.0	9	11.0	0	0.0	2	2.4
Subtotal I	59	61.5	0	0.0	12	12.5	11	78.6	0	0.0	5	35.7	48	58.6	0	0.0	7	8.5
Permanent Crops[4]	12	12.5	9	9.4	16	16.7	1	7.1	0	0.0	3	21.4	11	13.4	9	11.0	13	15.9
Other[5]	16	16.7	6	6.3	20	20.8	2	14.3	0	0.0	2	14.3	14	17.1	6	7.3	18	22.0
Subtotal II	18	29.2	15	15.7	36	37.5	3	21.4	0	0.0	5	35.7	25	30.5	15	18.3	31	37.9
Totals[7]	77	100.0	15	15.7	48	50.0	14	100.0	0	0.0	10	71.4	73	89.1	0	0.0	38	46.4

[1]Includes livestock, poultry (latter only when for sale).
[2]Rice, beans, corn, sorghum, other.
[3]Plantain, banana, tobacco, yuca, potatoes, taro *(malanga)*, other.
[4]Coffee, fruit, other.
[5]Vegetables *(hortaliza)*, flowers, pasture (unimproved and improved), other.
[6]"Sale" should be understood as describing something that is produced wholly or almost wholly for the market and varies by product. It would be unusual, except in the case of grains (including coffee) which must be processed before use, for a man who produced 5 manzanas of cabbage not to keep any, unless of course he was sick and tired of it.
[7]Nothing will total to 100.0 except by accident and/or to basic N's since we are dealing with behavior concerning certain crop categories and behaviors which in many instances are simultaneous.

APPENDIX C
VALUING OF RURAL ELECTRIFICATION

For Costa Ricans, the cardinal value of electrification is what it contributes to the quality of life at the household level. In our sample survey, (Table 1, "Value of Electrification ..") there were no startling differences in perceptions by sex; what was startling was the large number of male respondents (who constituted 54% of the total survey sample) who were appreciative of what electricity contributed to improvement of women's domestic situations. To be sure, the question was asked at the household level and that context itself is enough to potentially skew responses in a domestic direction, although the question was framed broadly.

In that context, there was a relatively high number of responses indicating perception of a potential economic role for electrification at the household, personal, and community levels. This was very much the case in the households without electricity (N=14). Of those who did not have electricity and spoke of what they would do if they had it, 57% said they would live better in general, 43% would make adjustments in their cropping patterns or agricultural methods (primarily dairying), 14% would buy electrical appliances, and 7% would begin a household enterprise (sum exceeds 100% due to multiple responses).

What does not emerge in the table are some instructive variations. The first is a geographic bias in valuing: those who had realized or foresaw such economic benefits were almost exlcusively in the area of COOPELESCA in the San Carlos growth zone, with those exceptions in the COOPESANTOS area who tended to see benefits in terms of commerce and small-scale, essentially home-based, industrial activities. Respondents in Guanacaste saw little such potential, largely because they saw little potential in anything but education and emigration.

Accordingly, Guanacaste respondents, especially females, were more likely to refer spontaneously to the advantages of electricity for studying and for night school. In this sense, the perspective is indirectly an economic one. It is quite clear that men are about three times more likely to perceive economic benefits in electrification than are women. Costa Rican rural women, in general, are more likely to perceive economic opportunities as tied to emigration to urban centers, primarily the AMSJ, in the service, commercial, or light manufacturing industries; rural electrification is not seen as part of that, even if the urban center is essentially rural by definition.

In the towns of Nicoya or Santa Cruz, for example, respondents, when prodded, would note the difference a steady supply of good electricity had made in a number of ways, but in the main had already come to take it for granted as part of the environment. When encouraged to elaborate, most often the expansion of the road network was identified as the first link in the causal chain of growth.

---

*Footnotes 1-3 at end of appendix.

Finally, the number of answers which marked rural electrification as key to the arrival of community services was relatively small. This is, in a way, not fair to the cause of rural electrification since, at the same time the rural electrification system was expanding, the Costa Rican government was making unprecedented efforts in expansion of delivery of community health services, school dining rooms, and school building and improvement which had an implacable rationale and momentum of its own. As part of the incumbent Liberación government's platform and policy, such interventions, among others, were a matter of public knowledge and record; it is not surprising that they would have been viewed as an autonomous phenomena, not dependent on rural electrification. This is not to say that rural electrification was viewed as having no role in such services: the enhancement of educational services through night-school establishment and the decided improvement in the capacity of health posts to provide vaccines and medicines were spontaneously noted and valued.

There appears to have been a change in the priority assigned to electricity since the beginning of the decade, partly due to government achievements since then and partly due to a psychological ripple effect from the spread of electricity itself. In 1972-73, the DINADECO/AITEC community study found that communities displayed a massive predilection for infrastructural and service improvements as opposed to resolution of problems of a social or economic nature (e.g., high prices, poor housing, low salaries, or general poverty and misery). Of the interviewed population, 32% cited as a problem water service, 22% streets and roads, 13% lack of electrification, 12% lack of penetration roads, 9% lack of jobs, and 7.5% inadequate electrical service.

Since that time, priorities have changed, logically, as circumstances have changed. With greater government activity in expansion and improvement of the road network, of potable water systems, community health delivery, and schools, electrification has risen to the top as an infrastructural priority. The ICE survey carried out in the Dry Pacific, Northern Plains, and Atlantic Regions in preparation for expansion of its own Rural Electrification Program, found electrification as the number one priority (mentioned by 72.5% of respondents), followed by water (still a problem in the view of 50% of respondents), and telephone and transportation tied at around 24% (see Table 2, "Needs of the Population").

An even more recent study, without potential for bias toward "electric" responses, examined the developmental role of the telephone and, as part of that, its role in people's lives and priorities.[1/] To pursue the priority of the telephone in comparison with other goods and services likely to be available in a small town, respondents were asked which item they would choose if their town could have only one of them. The choice was always between the telephone and something else and the list was compiled to represent reality in terms of government programs active in rural Costa Rica. The results of this exercise are presented in Table 3, "Priority Assigned to Telephone...".

Kilgour interprets the highest ranking given to electricity as owing to its "newness added to its 'basic-ness'," a ranking she finds "interesting considering the controversy among development experts over whether rural electrification should get priority in a Basic Human Needs Strategy."

We feel that this conclusion is partial. The concepts of newness and perceptions of 'basic-ness' derive from awareness of existence and possibilities. The Kilgour interviews were carried out in 12 towns around four tertiary cities. Included were the following sites in the cooperative areas: Filadelfia, Hojancha, Pital, Venecia, Aguas Zarcas, and Puerto Viejo de Sarapiquí. One may conclude that electricity is 1) valued by those who have it and 2) by those who do not because of the proximity of those who do.

It is small wonder that only two of the households without electricity surveyed for the impact evaluation felt that one could "live well" without electricity. Thus electrification is simply seen in rural Costa Rica as a logical concomitant of development, as a natural and appropriate symbol and component of a better life. It is as well part of the consumerism and delight in technology that has characterized Costa Rica since the early 19th century, values not necessarily varying by class or by rural as opposed to urban residence.[2/] According to Seligson:

> "The greatest source of new wealth (in Costa Rica) was the establishment of import taxes in 1839, taxes on the mountains of imported good which filled the holds of boats returning to Costa Rica after having delivered their shipments of coffee....
>
> "Other benefits of the 'miracle coffee' began to appear....The boats which returned from the continent were loaded with an ample variety of new products, among which the most important were tools for agriculture and construction. These improved efficiency in the field and the health of homes. Adobe construction was replaced by brick and wood, windows were installed to bring light and air into what had been dark dwellings. Iron stoves took the place of smokey open hearths and sets of china replaced the old wooden bowls. A real revolution occurred in agriculture with the advent of the steel hoe, the plow, the shovel, the saw, the machets, and the ax, a revolution of efficiency, in the same way the corn mill and the rice winnower saved women hours of tedious work. The boats also brought new cloth for more comfortable clothing, books to stimulate the mind, and medicines to cure the body, Doctors, golden age of the coffee boom." [3/]

FOOTNOTES

1/ M. Kilgour. Fieldwork (1980) for doctoral dissertation in progress, graciously shared with the impact evaluation team.

2/ M.A. Seligson. "The 'Dual Society' Thesis in Latin America: A Re-examination of the Costa Rican Case." SOCIAL FORCES, Vol. 51, No. 1, September 1972.

3/ M.A. Seligson. EL CAMPESINO Y EL CAPITALISMO AGRARIO DE COSTA RICA. San José: Editorial de Costa Rica. 1980.

Appendix C

Table 1. Value Priorities With Regard to Electrification

Rank	Category	Males	Females	Total[3]	Total
	Household Welfare			Number of *Responses* for Each Item	Number of *Responses* for Each Category
1	Food preservation safer/better/more economical (fewer trips to market, less spoilage)/better diet	19	9	28	
2	Ironing easier	12	13	25	
3.0	Housework easier in general	11	10	22	
3.3	Cooking easier[1]	9	13	22	
3.6	More time at night	12	10	22	
4	Quality of cooked food better[1]	7	5	12	
5	More convenient/easier/more practical	7	4	11	
6	Can buy more appliances as financially possible	5	5	10	
7	Cleaner	4	3	7	
8	Prettier, brighter, happier	1	5	6	
9	Safer	2	2	4	
10	Quality of light better	1	2	3	
10	Better for studying	1	2	3[2]	
10	Healthier	1	2	3	
10	More dependable	2	1	3	
10	Television links to news from city, keeps family home more, is entertainment/education where little to do	0	3	3	
11	Quieter (than generator)	1	0	1	185
	Economic Improvement at Household and Community Levels				
1	Permits(ted) establishment or expansion of personal economic activities	10	3	13	
2	Cheaper than alternative energy Sources for home and business	6	2	8	
3	Develops(ed) more businesses in the community	4	3	7	
4	Sugar mills *(ingenios)* can operate at greater capacity and handle all raw material farmers can supply	3	0	3	
5	Land values go up	1	0	1	
5	Permits irrigation	0	1	1	33
	Community Welfare				
1	Facilitates (d) or improves(d) available services (primarily health)	7	8	15	
2	Safety	0	4	4	19
	Overall Quality of Life for Home and Community Improved	12	7	19	19

[1]Interesting because not this many respondents had electric stoves.
[2]This number would be more impressive if we were to add the informal informants, that is, the schoolchildren to whom the survey gave rides in large, enthusiastic numbers. They all thought electricity was wonderful for studying; many travelled long distances back and forth and had only the night-time hours for studying.
[3]Totals sum to well over sample size due to multiple answers.

Appendix C

Table 2. Needs of the Population
(number of responses and total percentages)

Activity or Service	Atlantic Region	Dry Pacific	Northern Zone	Total Responses	%
Electricity	48	154	83	288	72.5
Water	24	77	89	190	47.9
Telephone	27	31	39	97	24.4
Transportation	22	47	26	95	23.9
Medical Services	5	23	30	58	14.6
Better roads	11	15	24	50	12.6
Recreation ctrs.	6	2	4	12	3.0
Churches	7	—	13	20	5.0
Jails	—	—	3	3	0.8
Police	—	—	2	2	0.5
Schools/ secondary schools	4	—	1	5	1.3
Other	10	4	9	23	5.8
None	4	—	1	5	1.3

Source. Instituto Costarricense de Electricidad. PLAN NACIONAL DE ELECTRIFICACION RURAL. II ETAPA. San José. July 1979

Appendix C

Table 3. Priority Assigned to Telephone Compared to Other Available Goods and Services

(1)	(2)		Telephone (3)		(4)		(5)	
Other Good or Service	Chose Phone		Chose Other Item		Could Not Decide		Total	
	#	%	#	%	#	%	#	%
Electric Lights	6	3.7	156	95.7	1	.6	163	100.0
Primary School	10	6.1	153	93.9	—	—	163	100.0
Church	32	19.6	128	78.5	3	1.8	163	100.0
Trash Collection	42	25.8	119	73.0	2	1.2	163	100.0
Health Post	49	30.1	112	68.7	2	1.2	163	100.0
Better Bus Service	58	35.6	103	63.2	2	1.2	163	100.0
Paved Streets	59	36.2	103	63.2	1	.6	163	100.0
Community Center	69	42.3	91	55.8	3	1.8	163	100.0
Another Primary Teacher	82	50.3	78	47.9	3	1.8	163	100.0
****Telephone****	73		73					
Agricultural Extension Agent	89	54.6	69	42.3	5	3.1	163	100.0
Another Nurse	92	56.4	68	41.7	3	1.8	163	100.0
Community Development Office	98	60.1	63	38.7	2	1.2	163	100.0
More Rural Police	104	63.8	57	35.0	2	1.2	163	100.0
4-H Club	115	70.6	44	27.0	4	2.5	163	100.0
Mail Service	127	77.9	36	22.1	—	—	163	100.0
Telegraph Service	143	87.7	19	11.7	1	.6	163	100.0
	1175		1175		34			

APPENDIX D
THE COOPERATIVE MODEL

The central questions about the cooperative model which provided the organizational base for the rural electrification project are: 1) why cooperatives?, 2) what were the alternatives to that organizational form?, 3) what were and are the relative advantages of the cooperative?, and 4) are they replicable and should they be replicated?

One of the earliest evaluations of the cooperatives, by Masson and Rixse in 1971, noted that cooperative clients were not aware of the cooperative as being the source of their electricity and that AID-funded rural electrification cooperatives suffered from loss of interest on the part of those clients who were aware of it, on the part of the cooperative itself, and on the part of AID; once the infrastructure is in place, the principal concern is keeping it working and, perhaps, extending it.

The appropriateness of the cooperative model per se in Costa Rica was not the issue it might have been in other places at other times. While one would not want to say that the cooperative was a venerable institution in Costa Rica, there was certainly adequate precedent by 1960. According to Hall (1978: op. cit.), the first cooperative in Costa Rica was a coffee cooperative, La Victoria, founded in 1943 on an expropriated coffee finca in Grecia. In 1947, a "Section for Promotion of Agricultural Cooperatives" was formed in the National Bank, but the movement did not take off until the end of the 1950's. Cooperatives have had considerable success in Costa Rica and the coffee cooperatives had real effect on the structure of production.

The 1972-73 DINADECO/AITEC community study found that in all regions, community members were much more likely to belong to a cooperative than to community development associations, both in the past and at the time of that study. The areas of greatest participation in both organizational forms were, in order of importance, the Intermontane Valley, the North Pacific, and the AMSJ. All three rural electrification cooperatives are in the first two areas. Cooperative membership displayed much more stability than did that of community development associations, perhaps because there were enduring economic benefits from and commitments to cooperatives, while community development activity often clustered around discrete projects.

At the same time, the study found a low general rate of attendance at meetings of cooperatives and, for that matter, any kind of organization of an essentially political or economic type such as businessmen's groups, labor unions, and political-party meetings. Community assistance groups of almost any kind were found to have much higher attendance rates.

The canton of San Carlos already had, before COOPELESCA was founded in 1965, a lively interest in cooperatives, awakened by a local priest who was a key figure in establishing COOCIQUE (Cooperativa de Ahorros y

Créditos de Ciudad Quesada/Savings and Loan Cooperative of Ciudad Quesada) and COOPELESCA itself. Coocique as of March 1980 was the largest and strongest such coop in Costa Rica in terms of number of members and capital flow, and was the first in Central America to promote school savings cooperatives, of which there are now five in Ciudad Quesada (Molina G., 1980: op. cit.).

In the wake of the apparent success of these two cooperatives followed: COOPESANCARLOS in 1970 (agro-industrial/coffee/bananas), and subsequently COOPEVENECIA (savings and loan); COOPEPITAL (finance and savings and loan); COOPEVEGA, COOPEISABEL, and COOPE-LLANO VERDE (multiple service agricultural cooperatives); and COOPEANDE No. 7 (savings and loan for teachers). All the San Carlos cooperatives are affiliated with an umbrella organization, URCOZON (Unión Regional de Cooperativas de la Zona Norte).

The recognition rates among cooperative members of where their electricity came from was much improved over those found in the evaluations carried out in the early '70s. Out of the total sample of AID-funded cooperative members (N=47), only 6 or 13% did not know they were cooperative members. Extraordinarily, the worst "awareness" rates were among the COOPELESCA group; 22% of those known to be members claimed they were not. The best awareness rates were in the COOPEGUANACASTE group.

This would seem not to make any sense at all, especially in the light of our discussion about cooperativism in the San Carlos area and especially since 100% of the members of COOPEALFARORUIZ, not far away, knew they were members of that cooperative (it was not AID-funded). Even going back through the raw data and discussing the possibility of poor question-phrasing, misunderstandings, etc., the COOPELESCA phenomenon simply does not explain itself. The COOPEGUANACASTE record is easily understood; there has never been any other source of electricity (other than private or community diesel units) on the Nicoya Peninsula and standard procedure was for communities to seek out the cooperative when they wanted to be connected to the system.

Of the total sample of 47, 23 (close to half) had attended no meetings in the last year. The lowest attendance rates were at COOPEGUANACASTE, the best at COOPESANTOS. Of the former, 89% had attended no meetings during thelast year, of the latter, 27%. (See Table 1, "Participation in Rural Electrification Cooperatives...").

Of the total sample of cooperative members, only six individuals were encountered who had official positions on the coop board: two were board members and four were delegates. This group tended to be more active as measured by number of meetings attended, as might be expected. No attempt was made to seek these people out for interviews; they simply fell into the sample.

Perceptions of the cooperatives were generally favorable. In fact, responses to the pre-test questionnaire indicated that we should add the category 'very good' to those we had, i.e., 'good', 'so-so' (regular), 'bad', and 'useless'. Combining negative with ambivalent appraisals, the most positively perceived cooperative was COOPESANTOS, next COOPELESCA, last COOPEGUANACASTE.

Only 6.4% of all members of the AID-funded cooperatives felt the cooperative was 'bad', primarily because they had been slow coming in with electricity after making promises to do so. There were a few criticism of the cooperative for being "only a business" (sólo negocio hacen), the intent being that the cooperative was like any other commercial enterprise with none of the participatory or educational aspects cooperatives were supposed to have. (See Table 2, "Opinions...")

There was also a certain amount of ambivalence about the cooperatives deriving from the high costs of new hookups. The overall impression was: 1) in general, new customers (or communities) were having to go after the cooperatives to seek connections, rather than being the recipients of any promotional activity; 2) the time involved in getting from request to actually having light in one's home was excessive; 3) once electricity was a reality, the only contact with the cooperative is when the trucks came in to do any repair or maintenance work. On that score, opinion was unanimous: there were no complaints about the technical quality of the service or the speed with which repairs were made. Failures in the system were attributed to natural causes, primarily storms, and were never the cooperative's fault.

To be sure, the cooperatives have done little in the way of promoting the productive uses of electricity or even educating consumers about the best uses of household electricity (e.g., underutilization of the minimum, relative costs of fuelwood versus electric cooking, etc.) and the sense of "belonging" even economically, of sharing investment and returns, of exploring possibilities for profitable community uses of electric power, is somewhat lacking.

One has, however, to be careful not to fall into the trap of the participatory mythology; just because people do not go to meetings is not per se bad if there is no reason for them to do so.

Yet the technical success is no small matter. The amount of anguish currently being expended on issues of maintenance -- community water systems, latrines, irrigation networks, school buildings and health posts -- is enormous. The current fashion is to believe that people do not, or communities do not, maintain things because they did not participate in getting them. This is often true; it is equally often not true. Community after community has struggled with central and municipal governments for any number of infrastructural improvements which they then proceed to "permit" to deteriorate, break, write or paint on, or use for other purposes. This may be partly political and partly cultural; it may also be

due to the fact that communities simply do not have the money or expertise to do what needs doing.

In the case of electricity, people pay bills for a service which they get, in some instances, at a preferential rate, a service which is well carried out -- maintenance of a system. Everyone is happy; in the DINADECO survey, community after community commented that the delivery of electricity and the service was the only thing they were invariably pleased with. This is no small accomplishment.

Appendix D

Table 1. Participation in Rural Electrification Cooperatives: Membership and Attendance at Meetings

	Membership								Attendance at Meetings[1] No. per year											
	a) Total Sample		b) Non-Members[1]		c) Members		d) Members Who Did Not Know They Were Members		1		2		3		4		5		None		N.R.[2]	
Cooperative Area	No.	%	No.	% of a)	No.	% of a)	No.	% of c)	No.	% of c)	No.	% of c)	No.	% of c)	No.	% of c)	No.	% of c)	No.	% of c)	No.	% of c)
Coopesantos	17	100.0	2	11.8	15	88.2	1	6.7	7	46.7	2	13.3	1	6.7	0	0.0	1	6.7	4	26.7	0	0.0
Coopeguanacaste	13	100.0	4	30.8	9	69.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	8	88.9	1	11.1
Coopelesca	30	100.0	7	23.3	23	76.7	5	21.7	9	39.1	1	4.3	0	0.0	0	0.0	2	8.7	11	47.8	0	0.0
Subtotal, AID-funded coop areas	60	100.0	13	21.7	47	78.3	6	12.8	16	34.0	3	6.4	1	2.1	0	0.0	3	6.4	23	48.9	1	2.1

[1]Based on preceding 12-month period.
[2]Single case of respondent whose son was a delegate to the coop but no one in family knew how many coop meetings he attended.

Appendix D

Table 2. Opinions of the Cooperatives (AID-funded, members only)

	Very Good		Good		"So-So"		Bad		N.R.[2]		Total Members	
Cooperative Area	No.	%	No.	%	No.	%	No.	%	No.	%		
Coopesantos	3	20.0	8	53.3	2	13.3	0	0.0	2	13.3	15	100.0
Coopeguanacaste	0	0.0	6	66.7	1	11.1	1	11.1	1	11.1	9	100.0
Coopelesca	4	17.4	12	52.2	1	4.3	2	8.7	4	17.4	23	100.0
Total	7	14.9	26	55.3	4	8.5	3	6.4	7	14.9	47	100.0

[1]In Spanish, *"regular."*
[2]Includes no opinion/did not know anything about.

APPENDIX E
ELECTRICITY AND MIGRATION

In order to understand the migration behavior of the Impact Evaluation survey sample and to determine what relation, if any, there is between migration and rural electrification, one must first look at patterns of migration of the country as a whole and thereafter the patterns of migration in the countries (cantones) served by the rural electrification cooperatives.

The two major time periods to be considered are those between 1950 and 1963, the decade before the project was launched,[1] and between 1963 and 1973 during which the project was put into place. Particular attention will be paid to the 1968-1973 quintile which is the period addressed by the migration component of the 1973 Census; the rural electrification projects were also energized during that period, in 1969. The CSUCA methodology[2], on which the present discussion is largely based, melded analyses of Vital Statistics and of the 1950,1963, and 1973 Censuses.

The Pre-Project Period

During the 1950-1963 period there were five major poles or clusters of attraction for migrant currents, named by the dominant canton in the cluster:

1. Golfito. Principal pole of attraction in Costa Rica, due to expansion of banana production. Received from more distant cantons (Puntarenas, Nicoya, Pérez Zeledón, San José) and from the nearby canton of Aguirre where banana production had declined.

2. Pérez Zeldón-Buenos Aires. Areas of expansion of subsistence agriculture in frontier regions. Received from cantons southeast of San José but outside Central Plateau, i.e., from Acosta, Puriscal, and Dota.

3. Bagaces. Attraction was existence of large amounts of unutilized land in the latifundio which covered most of the canton.

4. San Carlos. Already established as a growth area by 1950, having increased in population by 81% since 1940, mainly due to key road linkages and health interventions.[3] Between 1950 and 1963, the population grew by 121%, one of the highest rates in the country. Most immigrants came from nearby cantons of Zarcero, Naranjo, San Ramón, and Palmares, where commercial agriculture was listless and offering little opportunity, especially compated to the increasingly accessible, uncolonized upper reaches of San Carlos.

*Footnotes 1-16 at end of appendix.

Nicaraguan Frontier (cantons of Upala, Los Chiles, and Guatuso). Attraction of remoteness and lack of roads which left large amounts of unoccupied land available and particularly alluring for livestock development. Received from neighboring cantons of Tilarán, San Carlos, and Bagaces, and rural areas of Puntarenas Central, as well as from frontier departments of Nicaragua.

During this period, the main migratory currents flowed toward neighboring cantons offering opportunities for spontaneous colonization or toward more distant contons where the principal magnet was the labor-intensive banana industry. Rural-to-urban migration was relatively unimportant; where it occurred, it did so in cantons bordering on major urban centers (e.g., San José), those in the process of urbanization due to major changes in the production structure but still preeminently agricultural (e.g., San Carlos), and peripheral cantons where plantation dominance generated a life style characterized by more "urban" amenities (e.g., Golfito).

As for the cantons which were to be the sites of the AID-funded rural electrification projects, only one, San Carlos (to be attended by COOPELESCA), was a focus for in-migration in 1963. Furthermore, that rate had slowed during the 1950-1963 intercensal period to 18.2, from the 36.1 registered in the 1950 Census. In the area to be served by COOPESANTOS, Cartago Central was experiencing reduction in its heavy out-migration but was still a net sender. In the province of San José, only Desamparados, in large measure a suburb of San José city, displayed in-migration; the other cantons, except for Tarrazú where the cooperative headquarters would be situated, were all areas distinguished by high and increasing out-migration rates.

In the parts of Guanacaste Province to be served by COOPEGUANACASTE, Liberia, Santa Cruz, and Carrillo had been strong expellers of population until 1950; by 1963, the flow from Liberia was diminishing slightly and Santa Cruz and Carrillo were in rough equilibrium as essentially population exchange cantons. Nicoya and Puntarenas Central had not only lost their 1950 status as poles of attraction but were beginning to lose population.

Thus of the three areas chosen as targets of the rural electrification project, only one, San Carlos, was a clear pole of attraction. In the COOPEGUANACASTE area, only Nicoya had in the 1950 pre-censal period demonstrated net in-migration, a trend thoroughly reversed by 1963 and, in any case, the attempt to locate the cooperative in Nicoya was unsuccessful. The fallback to Santa Cruz was not unreasonable; its location was geographically strategic as an intermediate point between the Nicoya Peninsula and the mainland, it was closer to the Interamerican Highway, and the evidence from the 1963 Census indicated that the heavy flow of out-migraiton from Santa Cruz had been stanched.

As for COOPESANTOS, the entire area except for the periurban canton of Desamparados was one of heavy out-migration, with only Tarrazú showing any signs of remission.

Therefore the statement in the Project Paper that "the areas chosen for the location of the three cooperatives are growth areas in that there is an annual net increase of population" is only minimally accurate.

The Post-Project Period

The 1963-1973 period brought major alterations in the migration profile. In the 1950-1963 period, 12 cantons (seven of which were in the San José Metropolitan Area/AMSJ) of the 37 cantons analyzed by CSUCA[4] had shown strongly positive net in-migration rates and eight showed moderately positive net in-migration. By 1973, only six of the country's most rural cantons showed any attraction for migrants and, except for Pococí, Siquirres, and Buenos Aires, that attraction was feeble. There were only two instead of five major migration poles: 1) the Panama frontier area around Buenos Aires and the Golfito banana zone, although Golfito's net was only minimal; and 2) the Pococí-Siquirres-Limón Central area on the Atlantic Basin. Unfortunately a large number of cantons which were increasingly playing important roles in national migration flows could not be included in the CSUCA analysis of the 1968-1973 period because they were decreed as separate cantons too late to permit longitudinal analysis.[5] (As a general guide for this discussion, refer to Figure 1, "Costa Rica: Net Interregional Migration 1968-1973.)

The patterns of migration in the 1968-73 quintile again showed flows to peripheral areas, although in reduced degree. There was continuing movement of population "surpluses" out of already colonized or more densely settled cantons into the most remote areas, generally virgin territory without road access, in effect Costa Rica's last frontiers. There was new movement into the Atlantic Basin in pursuit of jobs generated by the renaissance of the banana industry in the zone. Rural-to-urban migration, particularly to the AMSJ became much more important; the number of cantons with close to null balances increased, especially in the Central Valley which was the area of greatest intraregional mobility during the period.[6] Rates of in-migration clearly increased with community size: while in three-quarters of communities with less than 1000 inhabitants there was virtually no in-migration, in 54% of communities over that size there was perceptible in-migration, ranging from "some" to "a lot".[7]

There was also growth in the amount of daily fluidity of migration, obviously paralleling growth in transportation options. In 44% of all Costa Rican communities in 1972-73, varying proportions of the population moved from their community of residence to another community to work, primarily in the AMSJ and Intermontane Valley where urban and residential nuclei are closest together. This was only slightly less true in the Atlantic and North Pacific regions where communities are somewhat more distant from one another and less easy of access. In the South Pacific and Northern Plains, there was very little such movement, partly because of

transportation problems but also because these areas are characterized not only by dispersed but by small communities. The same survey found that smaller communities had, not surprisingly, relatively higher rates of unemployment. Highest rates of daily labor migration were found among larger communities where infrastructure made industrial, commercial, and service activities plausible and also made them accessible.

The volume of such migration in terms of communities involved in daily emigraton (44%) was dwarfed by the percentage (71%) of communities which were sending out seasonal labor migrants, primarily those in the North Pacific (93%) and the AMSJ (86%). The percentages of South Pacific, Intermontane Valley, and Atlantic communities (67%, 65%, and 61.5%, respectively) emitting seasonal migrants were somewhat lower. Few of the Northern Plains communities (20%) sent such migrants.

Contrary to the patterns of daily migration which involved what were in effect exchange of laborers among larger communities, seasonal migration[8/] tended to come from smaller communities, which the same survey found, again not surprisingly, to have substantially higher rates of unemployment, to larger communities. The principal destinations for seasonal in-migration were, in order of importance at the time, the South Pacific (bananas), the Intermontane Valley (cane and coffee), the Atlantic Basin (bananas), the AMSJ (coffee and miscellaneous non-permanent, urban employment in construction, commerce, and services), and the North Pacific (cane, cotton, and rice[9/]).

There was also movement into secondary or tertiary urban settlements in some provinces, principally into Limón, Turrialba, Puntarenas, and Liberia. Limón is both a port city and the fulcrum of the Atlantic Coast banana industry. Funtarenas plays a similar role and is the major export point for livestock. Both ports service the coffee and sugar export markets. Turrialba is at the border of the Central Valley, surrounded by or on the edge of a rich variety of high-value crops for both export and internal consumption. Liberia is the hub of the livestock industry. The growth of all these urban centers, like Costa Rica's transport network, has in effect followed the development of export crops on which, to a great extent, their continued vitality and further growth depend, all things being equal.

All over the country, the sheer number of destination sites proliferated throughout the decade, the total effect being one of expansion in the range and frequency of migration moves, the general rule being: the larger the community, the higher the in-migration rates.[10/] There is also some back-migration as migrants fail to make it in the Metropole or return either unsuccessfully or with a grubstake from the banana zones.

The four-year period after the rural electrification cooperatives were energized (1969) roughly corresponds to the Census quintile. It is worth examining for correlations or even causal connections. The secondary and tertiary cities served by COOPEGUANACASTE (Santa Cruz, Liberia, and Nicoya

Central) all show some dimunution in the virtual flood of out-migration characteristic of the pre-1963 period. In fact, the urban population of the province of GUANACASTE double between 1963 and 1973, growing at a rate of 5.1% per year while the rural areas barely achieved an annual rate of 5.1% per year while the rural areas barely achieved an annual average increase of 1%. The province has, nonetheless, low rates of urbanization: about 20% of the total provincial population was defined as urban in 1973, compared to 41% for the country as a whole.[11/]

The growth of these urban settlements has a great deal to do with improved road access. Between 1963 and 1973, with most of the accomplishment occurring between 1970 and 1973, road density in the region doubled from 6.6 km. per 100 km^2 to 12.75 kms. per 100 km^2.[12/] However, it is hard to argue that infrastructural fact in itself was enough to enhance urban appeal. The same forces which push rural residents out of the region's rural areas (i.e., the continued expansion of the livestock industry and of mechanized agriculture, are not the sorts of forces which compensate for their rural impingements by generating new employment in the region's urban centers. At least some of the labor-absorptive capacity of those centers had to come from jobs made possible by central-grid electrification, in the case of the Nicoya Peninsula available only through COOPEGUANACASTE; the nature and extent of these jobs will be discussed elsewhere. The harsh facts that do appear to remain are that the promise of tourism has not yet been realized on the Peninsula, that the provinces remains a net expeller of population, and that the reasons for those facts may overwhelm any other separate or combined developmental interventions.

San Carlos (COOPELESCA), which had been a pole of attraction before 1950 and somewhat less so by the 1963 Census, was showing a net population loss by the 1968-73 quintile due to out-migration principally to neighboring cantons, all with urban nucleations, perhaps due to rapid expansion of beef cattle production which reduced labor options for some of the population. The University of Florida 1973 Rural Electrification evaluation team was startled by the number of their 1968 respondents who had moved out of the San Carlos area by 1972, since they considered the area to be a progressive one with substantial economic potential in relation to other areas. Scrutinizing the characteristics of that migrant group, the team found them to be a "progressively oriented group rather than an illiterate, constantly shifting, uninvolved people." The team's conclusion was that the arrival of central station electricity was not in itself sufficient to keep such people from moving out of the area, and that the migration factor would have to be considered in projections of number of consumers and total energy consumption.[13/]

The conclusion was premature and reveals the planning problems inherent in fluid populations and adjustments for lag times. The net-loss trend of 1968-73 in San Carlos seems to have reversed itself since the early 1970's, due to three factors: 1) waves of colonization and land invasion fanning northward into generally unsettled territory; 2) expansion of infrastructure to serve both newer and older areas, and 3) urbanization not only of Ciudad Quesada but of smaller nucleations, all embraced by the rapidly increasing net of COOPELESCA lines. In 1973 the canton of San

Carlos registered a density of 16.3 inhabitants per km^2; by 1979, the figure was 19.1.[14/] The field survey arried out for the present evaluation found the COOPELESCA area with the highest rates in the sample of in-migration over the last five years. The next Census should find the canton restored to its customery magnetism.

Finally, the COOPESANTOS area (excluding the idiosyncratic per-urban cases of Aserrí and Desamparados) shows an erratic pattern that is hard to analyze. All cantons show reductions in out-migration in the 1963-1973 intercensal period, but Tarrazú (the site of the cooperative headquarters) and León Cortés show increases in the second half of that period. Most of the movement among these cantons and their neighbors is within the Meseta Central, in other words, intraregional, and it is not clear whether we are seeing the development of what are essentially bedroom communities which are daily or seasonal launching pads for a peripatetic regional labor force, limited by the continued dominance of coffee and a corollary reluctance to high-risk diversification except among the most affluent.

Yet, the migration data refer in the main to the first four-year period after the cooperatives began to deliver services. Since 1973 there are many signs of further changes in migration flows in Costa Rica which have not been studied extensively since the last Census. One fact that is palpable and continues to explain most of the migration occurring in Costa Rica is the reason for it: the search for land and work.

Migration in the Survey Samples: Rates and Reasons

Of the 96 respondents, 54 (56%) had been born in the community they were living in at the time of the survey. 42 (44%) had come from at least one other place. Rates of migration in the areas of the AID-funded cooperatives (N=60) were higher overall than those of the populations served by non-AID-funded power distributors (N=36). Of the former, 34 (57%) had been born elsewhere; of the latter, only eight (22%) had not been born in the community of current residence. Much of the difference is explained by the high percentages of in-migration in the San Carlos area (77% of 30); the COOPESANTOS and COOPEGUANACASTE areas had lower but not trivial percentages of in-migration, 41% and 38.5%, respectively. (See Table 1, "Migrants in Survey Sample.)

It is tempting to conclude that, the rural electrification cooperatives drew in more migrants than did other modes of power distribution. Unfortunately, such a claim is not so easily made.

First, 11 (79%) of the 14 respondents who had no household electricity at the time of the survey had migrated to their present place of residence, a much higher percentage than that for the sample as a whole.

Second, although 79% of the 42 migrants had not had electricity in their previous residence, 69% of those migrants had not encountered

electricity when they or their family(ies) had arrived at the community of present residence. Thus it would be hard to trace a causal path from absence of electrification to presence of electrification as a component of the migration complex.

Third, migrants do not cite the presence of electricity in the destination site as even partial motivation to migrate. Only one respondent mentioned electricity as a factor contributing to her decision to move. A single woman with five dependents, needed a site where she could work in a restaurant (soda), a job suited to her limited skills but in a quasi-urban setting where salaries were better. Still, her freely offered reasons for migration were: seeking work, availability of education for children, and the availability of a house lot.

In fact, work and land where the primordial reasons for migrating. Of the 42 migrants, 22 (52%) had been seeking work and 19 (45%) had been seeking land to cultivate, often both. The next most important single reason (12%) was education for children, followed by availability of a house (7%), usually through family connections. The balance offered a miscellany of multiplicity (33%) of reasons. (See Table 2, "Reasons for Migration").

These findings, whose non-randomness we feel we must point out, are supported by data encountered in two other (and random) surveys. The most recent is the ICE survey[15/] undertaken as part of the preparation of Stage II of its Rural Electrification Program. Of that sample in three areas (Atlantic, Dry Pacific, and Northern regions), one-third to one-half had migrated. 32% had done so to seek work and 17% to find "better opportunities," the overwhelming majority of those from the Dry Pacific, (i.e., GUANACASTE). Of those who had not moved, 60% had stayed because they had land, 52% because they had work. 23 (6%) mentioned lack of electricity as a motivation but this was not clarified in the ICE presentation so that respondents' priorities might be better examined.

The DINADECO/AITEC study cited earlier found similar priorities in late 1972, the precedence of work or land as motivation varying by region. The major difference among the studies, then, is one degree and the prominance of one or the other of two alternative motives. Thus rural electrification does not per se act as a magnet for migration and can only be said to do so by indirection by contributing to the generation of employment.

The fact that the San Carlos area had the highest rates of in-migration is instructive in this regard: in an established but "unfinished" growth area, supported by steady expansion of infrastructure, with potential for diversified production, an aggressive and expansionist rural electrification program may be fairly said to function positively in the formula to keep them down on the farm.

While detailed data was not gathered on out-migration and the weight of availability of electricity in restraining out-migration, the foregoing data and a recent qualitative study on the dynamics of poverty in Costa Rica[16/] strongly indicate that, where jobs and land are not available and electricity is not used for generating new employment or income, access to household electricity plays no role in detaining out-migration. Where jobs and land provide self-sufficiency, as in the case of the stable coffee-producing areas served by JASEC and ICE around Cartago and Naranjo, rural electrification becomes more a factor in improving quality of life and, once more by indirection by restraining population outflows, at least in the older generations.

FOOTNOTES

1/ The major feasibility study for the project was carried out in 1964 (see G. Benjamin) and the project was signed in 1965.

2/ CSUCA/Programa Centroamericano de Ciencias Sociales. ESTRUCTURA DEMOGRAFICA Y MIGRACIONES INTERNAS EN CENTROAMERICA. San José: Editorial Universitaria Centroamericana (EDUCA). 1978.

3/ J.R. Molina G. APUNTES PARA UNA GEOGRAFIA FISICA Y HUMANA DEL CANTON DE SAN CARLOS. San Carlos. 1980.

4/ Some cantons were excluded for analysis by the CSUCA team which was wedded to a rural-to-rural migration model and so eliminated analysis of cantons with high urbanization rates and/or low labor-force participation in agriculture. In this writer's view, the decision was arbitrary, not justified by the facts or the findings of the study itself, and dilutes the power and utility of the analysis.

5/ The principal Census question on migration was: where did you live five years ago?

Province of Alajuela: Upala, Los Chiles, and Cuatuso, all decreed in March 1970.

Province of Heredia: Sarapiquí, decreed in November 1970.

Province of Guanacaste: La Cruz and Johancha, decreed in July 1969 and November 1971, respectively.

Province of Puntarenas: Coto Brus, Parrita, and Corredores, decreed in December 1965, July 1971, and October 1973, respectively. Coto Brus would seem to have been eligible for analysis; its exclusion is not explained.

Province of Limón: Talamanca, Matina, and Guácimo, decreed in May 1969, July 1969, and May 1971, respectively.

6/ Sistema de Información en Nutrición (SIN). ALGUNAS CARACTERISTICAS DE LOS MIGRANTES INTERREGIONALES, INTRAREGIONALES, E INTERNACIONALES. San José. May 1980. Between 1968 and 1973, 11 out of every 100 persons in the Central Region changed his or her canton of residence.

7/ These data are based on the perceptions of community leaders and residents interviewed as part of the 1972-73 DINADECO/AITEC survey of 109 communities (sample N=1,434), ESTUDIO DE TIPOLOGIA DE COMUNIDADES, San José, 1973.

8/ "Seasonal migration" is defined as "absence from habitual place of residence for two weeks or more to seek work in other communties."

9/ In the course of the '70s, cotton production has declined precipitously and rice production is increasingly large-scale and increasingly mechanized. This migration flow, with the exception of the cane harvest, has by now become a brief trickle.

10/ DINADECO/AITEC, 1973: op. cit.

11/ Instituto Costarricense de Electricidad (ICE). PLAN NACIONAL DE ELECTRIFICATION RURAL, II ETAPA: INFORME DE VIABILIDAD. San José. July 1979.

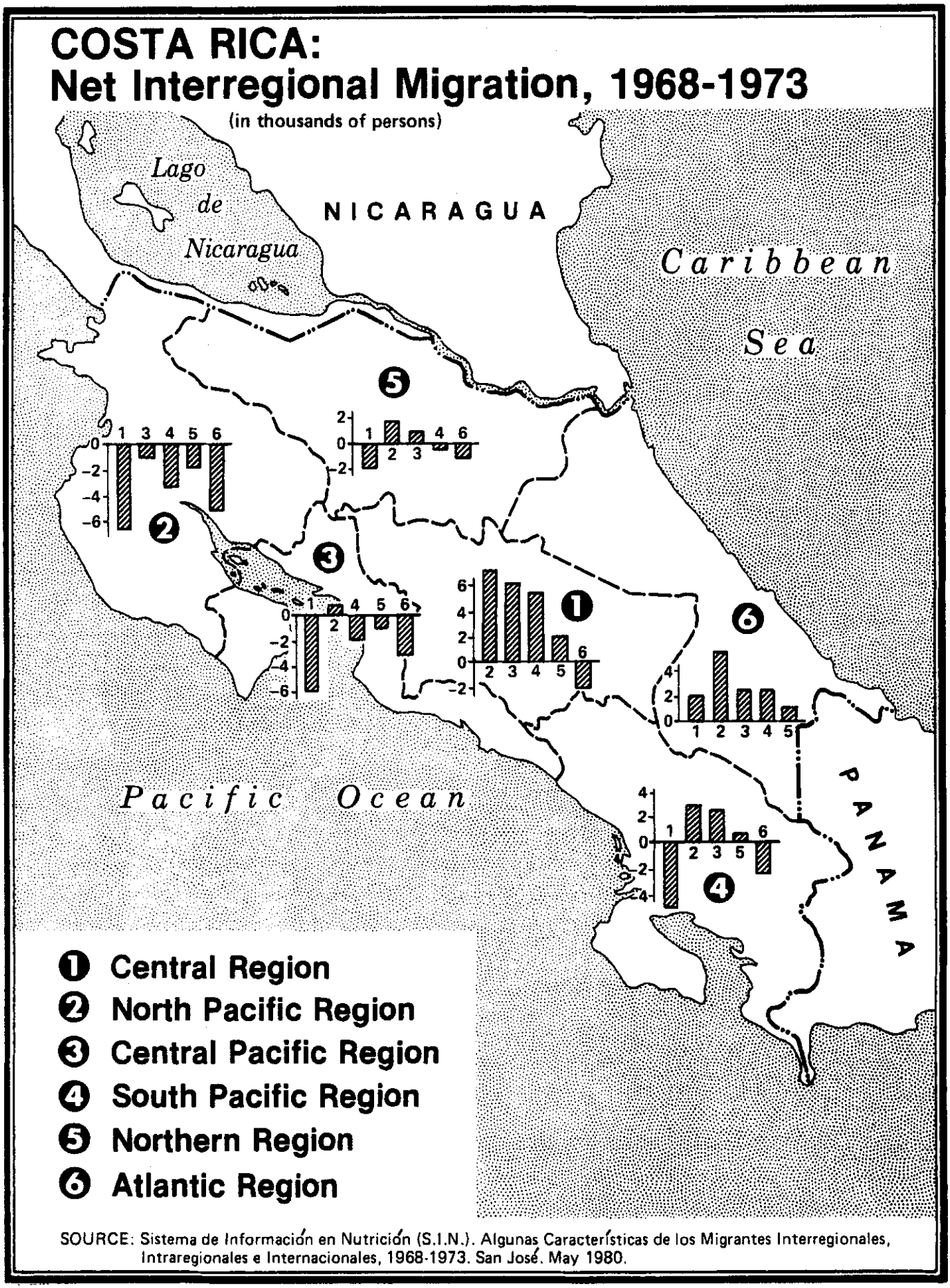
12/ Ibid.

13/ J.M. Davis, J. Saunders, G. Moses, and J.E. Ross. RURAL ELECTRIFICATION: AN EVALUATION OF EFFECTS ON ECONOMIC AND SOCIAL CHANGES IN COSTA RICA AND COLOMBIA. Gainesville: University of Florida. August 31, 1973. (Contract AID/csd-3594).

14/ Molina G., 1980: op. cit.

15/ ICE, 1979: op. cit. The ICE Survey sample "N" is never really given in the document of reference. The "N" used here is an estimate.

16/ Social Science Research Team. ANALYSIS OF CAUSES OF POVERTY IN COSTA RICA (working title). San José: USAID. October 1980.



SOURCE: Sistema de Información en Nutrición (S.I.N.). Algunas Características de los Migrantes Interregionales, Intraregionales e Internacionales, 1968-1973. San José. May 1980.

Appendix E

Table 1. Migration During the Period 1950-1973 in the Cantons Served by the AID-

Name of Cooperative And Location	Provinces	Cantones	Net Migration Rates 1950[1] Census	Net Migration Rates 1963[1] Census	Migration Patterns, Status According to 1963 Census, Compared to 1950 Census and General Behavior Prior to 1950[1]	Origins In-Migrants	Destinations Out-Migrants
Coope-guanacaste (Sta. Cruz)	Guanacaste	Liberia	—43.36	—33.99	Strong out-migration; diminishing[3]	n.d.[4]	n.d.[4]
		Nicoya	20.64	— 2.07	null; wave of in-migration braked; beginning to lose	*Puntarenas, San Ramón, Santa Cruz*	*Golfito,* Puntarenas, Santa Cruz
		Santa Cruz	—25.32	— 5.53	null; wave of out-migration braked	*Nicoya,* Puntarenas, Osa, San José	*Carillo, San José,* Golfito, Nicoya, O
		Carrillo	—21.39	0.20	null; wave of out-migration braked	*Sta. Cruz,* Liberia, San José	*Liberia,* San José, Puntarenas Golfit
		Nandayure	n.d.[2]	n.d.[2]	n.d.[2]	n.d.[2]	n.d.[2]
		Hojancha	n.d.[2]	n.d.[2]	n.d.[2]	n.d.[2]	n.d.[2]
	Puntarenas	Central	19.03	— 1.61	null; wave of in-migration braked	n.d.[4]	n.d.[4]
Coopesantos (San Marcos de Tarrazú)	San José	Desamparados	—12.82	26.87	Strong in-migration; reversal from moderate out-migration	n.d.[4]	n.d.[4]
		Tarrazú	—54.68	—31.46	Strong out-migration, slowing somewhat	*Desamparados,* Aserrí, Dota	*Pérez Zeledón*
		Aserrí	—13.73	—17.02	moderate out-migration, increasing	n.d.[4]	n.d.[4]
		Acosta	—28.48	—38.05	strong out-migration, increasing	Aserrí, Desamparados	*Pérez Zeledón*
		Dota	—31.13	—43.28	strong out-migration, increasing	*El Guarco* (Cartaga) Tarrazú, Pérez Zeledón	*Pérez Zeledón*
		León Cortés	n.d.[2]	n.d.[2]	n.d.[2]	n.d.[2]	
	Cartago	Central	—37.08	—17.05	moderate out-migration, slowed	n.d.[4]	n.d.[4]
Coopelesca (Ciudad Quesada)	Alajuela	San Carlos	36.07	18.20	strong in-migration, slowed	*Alfaroruiz, Naranjo,* Grecia, San Ramón	*Grecia,* San Ramón, San José, Nara
	Heredia	Sarapiquí	n.d.[2]	n.d.[2]	n.d.[2]	n.d.[2]	n.d.[2]

COSTA RICA

[1]Source: CSUCA/Programa Centroamericano de Ciencias Sociales. *Estructura Demográfica y Migracionas Internas En Centroamérica.* San José: Editorial Universitaria Centro Americana (EDUCA). 1978.

[2]As of 1963, the *cantón* (county) of León Cortés was part of the canton or Tarrazú and was not made a separate entity until the 1963-1973 intercensal period. The same was true of Nandayure county in the province of Guanacaste. The canton of Sarapiquí was not "created" until a decree in November 1970, Hojancha in November 1971.

[3]Definition of rates according to CSUCA as follows: more than — 25%=strong out-migration; from — 25% to — 7.4%=moderate out-migration; from — 7.5% to 4.9%=null or almost null net, i.e. balance between out-and in-migration; from 5% to 14.9%=moderate in-migration; from 15% up=strong in-migration.

[4]Some cantons were excluded for analysis because high urbanization rates and/or low EAP participation in agriculture, since interest of study in rural to rural migration, an arbitrary and counter-productive decision in this writer's view. Order of mention indicates order of importance; italicized names are most important exchange cantons.

[5]The 1968-1973 data are based on the 1973 Census and refer to the population over age 5, those under age 5 apparently having been assumed not to have existed before 1973, which is not necessarily the case. The 1963-73 data are based on analysis both of the Census and Vital Statistics for the period. Thus slight variations in the data base may affect some of the less

Appendix E (Cont.)

...nded Rural Electrification Cooperatives

Net Migration Rates, 1963-1973 Period	Net Migration Rates, 1968-1973[1,5]	Changes in Migration Patterns 1963-1973[1,5]	Origins In-Migrants	Destinations Out-Migrants
n.d.[4]	n.d.[4]	n.d.[4], but according to CSUCA study of other cantons, Liberia receiving from Bagaces, Cañas, Carrillo, Sta. Cruz		
—15.81	—12.04	increased out-migration over decade, faint slowing at end	*Nandayure*, Sta. Cruz, AMSJ	*AMSJ*, Pococí, Golfito, Puntarenas Central
—10.90	— 7.01	moved from balance to moderate out-migration, slowing mildly at end decade	*Nicoya*, Carrillo, AMSI, Liberia Central, Golfito	*AMSJ*, Liberia Central, Pococí, Golfito
— 5.68	— 7.80	from balance to moderate out-migration, increasing at end of decade	*St. Cruz*, Liberia Central, AMSJ	*Liberia Central*, AMSJ, Sta. Cruz
—44.39	—12.11	strong out-migration, slowing at end of decade but with Turrubares, the next highest expeller for decade	*Nicoya*, Puntarenas Central, Golfito, S. Ramón	*Golfito*,Sarapiquí, Puntarenas Central, Osa, AMSJ, Nicoya
n.d.[2]	n.d.[2]	n.d.[2]	n.d.[2]	
n.d.[4]	n.d.[4]	n.d.[4] but note that receiving from Orotina, Abangares, Nandayüre, Nicoya, Cañas, and sends to Montes de Oro, Rbangares, Osa, Aguirre		
n.d.[4]	n.d.[4]	n.d.[4]	n.d.[4]	
— 5.87	—11.93	out-migration slowed over decade, increase toward end	*León Cortés, Pérez Zeledón*, AMSJ, Aguirre, Dota	*AMSJ*[5], Pérez Zeledón
n.d.[4]	n.d.[4]	n.d.[4]	n.d.[4]	n.d.[4]
—27.70	—14.53	continued strong out-migration, some slowing end of decade	*AMSJ*, Pérez Zeledón, Siquirres	*AMSJ*, Aguirre
—13.55	—12.38	slowing out-migration	*El Guarco, Cartago, Central*, AMSJ, Tarrazú	*AMSJ Cartago Central*, El Guarco, Tarrazú, Golfito
— 5.29	— 7.84	null but tipping to moderate out-migration toward end of decade	*AMSJ*, Pérez Zeledón, Tarrazú, Dota, Acosta	*AMSJ*, Pérez Zeledón, Tarrazú
n.d.[4]	n.d.[4]	n.d.[4] but note that receiving from Dota, Alvarado; sends some to Mora, Dota		
— 6.01	— 4.26	in-migration stopped, moderate out-migration over decade, slight increase toward end of decade	*Grecia*, San Ramón, Naranjo, AMSJ	*AMSJ*, Alajuela Central, Grecia, Pococí, San Ramón, Naranjo
n.d.[2]	n.d.[2]	n.d.[2] but note that CSUCA study indicates receiving from Grecia, Abangares, Nandayure, Osa		

Appendix E

Table 2. Migrants in Survey Sample, by Numbers and Percents in Areas of AID-Funded Cooperatives and of Non-AID-Funded Distributors (N=96)

	Coope-santos		Coope-guanacaste		Coope-lesca		Coope-alfaroruíz		JASEC		ICE	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Born here	10	58.8	8	61.5	8	26.7	3	60.0	11	91.7	14	73.7
Born elsewhere	7	41.2	5	38.5	22	73.3	2	40.0	1	8.3	5	26.3
TOTAL	17	100.0	13	100.0	30	100.0	5	100.0	12	100.0	19	100.0

Appendix E

Table 3. Reasons for Migration (N migrants, 42; 34 in coop areas, 8 in non-coop areas)

Reasons for Migration	Coopesantos Area	Coopeguanacaste Area	Coopelesca Area	All Coop Areas		"Non-Coop" Areas		Total for Migrant Sample	
				No.	%	No.	%	No.	%
Seek work	2	4	10	16	47.1	6	75.0	22	52.4
Seek land	3	0	12	15	44.1	4	50.0	19	45.2
Education for children	1	0	4	5	14.7	0	0.0	5	11.9
House available	2	0	0	2	5.9	2	25.0	4	9.5
Had family in area	1	0	2	3	8.8	0	0.0	3	7.1
House lot available	1	0	0	1	2.9	0	0.0	1	2.4
Personal problems	0	0	0	0	0.0	0	0.0	0	0.0
Availability of electricity	0	0	1	1	2.9	0	0.0	1	2.4
Availability of other services	1	0	0	1	2.9	0	0.0	1	2.4
Other (miscellaneous)	3[1]	2[2]	3[3]	8	23.5	0	0.0	8	19.1
Multiple reasons	4	0	7	11	32.4	3	37.5	14	33.3

[1]To get married, better climate.
[2]To get married, assigned as teacher.
[3]Business available, cost of living cheaper.

APPENDIX F
SURVEY METHODOLOGY

The purpose of the survey was to provide some quantitative weight for or against the principal theories the impact evaluation team evolved about the AID-funded rural electrification project in Costa Rica. There was neither enough preliminary data, decisions, or field time to build a sample frame that would permit true randomization. Nor was there the opportunity, or the money, to do a repeat of a computerized evaluation survey carried out in 1973. Rather than trying for an ersatz randomization, we made a pragmatic selection based on the knowledge and intuitions of the survey team, which included three experienced Costa Rican social scientists from the Centro de Investigaciones Sociales and the USAID Regional Social Science Advisor who also had had long experience in the country.

Site selection criteria included: sites in each cooperative area, in a non-AID-funded cooperative area, in the area of a municipal power distributor, and in the area of a national distributor. Thus sites were selected in the jurisdictions of COOPESANTOS, COOPEGUANACASTE, COOPELESCA, COOPEALFARORUIZ, JASEC (Junta Administrativa de Servicios Electricidad), Costa Rica's national power-generating and distributing entity.

Within each zone, the team chose sites which would reflect the variety of production systems (which are viewed by many analysts as being the principal predictor of economic well-being in rural Costa Rica); sites with adopters and non-adopters; sites not yet reached by electrification; and sites which were in the same production zone but under the jurisdications of different power distributors, to control for possible differences in distributor styles and relationships. A few sites were selected which had gotten electrification only recently. The result was a survey universe of 17 different communities, in eight cantons, in four provinces, in a total sample of 96 households.

Within each community, an intuitive selection was made of respondents at different socioeconomic levels and the decision was taken to assure a roughly 50/50 male/female sample split.

The survey instrument contained 61 questions, all closed-ended except for the last one, which addressed the perceived values and utility of electification.

We also determined that the survey team should deal only with home commerce or industry which was part of or attached to the respondent's dwelling as these occurred naturally in the process of respondent selection. The other three members of the evaluation team, after the whole team had had one morning's discussion with cooperative representatives, were to 1) continue research at the level of cooperatives and other

pertinent institutions (e.g., ICE, banks, the Municipal Institute/IFAM, etc.) and 2) carry out interviews with different types and sizes of commercial and industrial users of rural electrification.

The survey instrument, the list of sites, and basic data on the counties (cantones) surveyed follow:

Rural Electrification Cooperative or Distributor	Site	Canton	Province	No. of Interviews
COOPESANTOS	San Marcos	Tarrazú	San Jose	5
	San Carlos	Tarrazú	San Jose	7
	San Antonio de Coralillo	Cartago	Cartago	6
COOPEGUANACASTE	Huacas	Sta. Cruz	Guanacaste	1
	Brasilito	Sta. Cruz	Guanacaste	2
	Potrero	Sta. Cruz	Guanacaste	1
	Cartagena	Sta. Cruz	Guanacaste	2
	Santa Cruz	Sta. Cruz	Guanacaste	3
	Rosario	Nicoya	Guanacaste	4
COOPELESCA	Boca de Arenal	San Carlos	Alajuela	12
	Sta. Rosa de Cutris	San Carlos	Alajuela	12
	Acapulco de Cutris	San Carlos	Alajuela	6
COOPEALFARORUÍZ	Sta. Rosa de Zarcero	Alfaro Ruíz	Alajuela	5
JASEC	Tablón	El Guarco	Cartago	6
	Quebradilla	Cartago	Cartago	6
ICE	San Miguel	Naranjo	Alajuela	7
	San Jerónimo	Naranjo	Alajuela	12

Plus a number of unstructured interviews that came our way.

APPENDIX G
BIBLIOGRAPHY

1. Acción Internacional Técnica (AITEC). Desarrollo Rural en Costa Rica. San José. May 1976.

2. Acción Internacional Técnica (AITEC). Estudio de Tipologia de Comunidades. San José. 1973.

3. Cecelski, Elizabeth, et al. Household Energy and the Poor in the Third World. Resources for the Future. 1979.

4. Cooperativa de Electrificación Rural de Alajuela (COOPELESCA). "Inform de Contabilidad." San Carlos. December 1979.

5. Cooperativa de Electrificación Rural de Guanacaste R.L. (COOPEGUANACASTE). "Informe de Contabilidad al 31 de Julio de 1980." Santa Cruz. 1980.

6. Cooperativa de Electrificación Rural de Guanacaste R.L. (COOPEGUANACASTE). [Preguntas y Respuestas]. Santa Cruz. 1980?

7. Cooperativa de Electrificación Rural de San Carlos R.L. (COOPELESCA). Estatuto. 1969-1979.

8. Cooperativa de Electrificación Rural Los Santos R.L. (COOPESANTOS). "Estatutos." 1974?

9. _____ "Estatutos Con Las Reformas Introducidas in la Asamblea #14 de 24 de Febrero de 1974." 1974.

10. _____ "Informe Conjunto del Consejo de Administración y de Gerencia." San Marcos de Tarrazú. 2 March 1980.

11. _____ "The Origen and Development of COOPESANTOS." By Misael Monge Alvarado. (Translated from Spanish). 25 April 1979.

12. Costa Rica. Banco Nacional de Costa Rica. Cuentas Nacionales, Series 1970-1978. San José. 1979.

13. Costa Rica. Instituto Costarricense de Electricidad. Informe de Operaciones de las Principales Empresas Electricas de Costa Rica. 1978.

14. _____ Instituto Costarricense de Electricidad (ICE). Informe de Operación de las Principales Empresas Electricas de Costa Rica. Vol. 1 & 2. 1978.

15. _____ Instituto Costarricense de Electricidad (ICE). Plan Nacional de Electrificación Rural, II Etapa: Informe De Viabilidad. July 1979.

16. _____ Instituto Costarricense de Electricidad (ICE). Politicas Sobre el Desarrollo Electrico de Costa Rica. 1979.

17. _____ Instituto Costarricense de Electricidad (ICE). Tarifas para Suministro de Energia Electrica. 1980.

18. _____ Instituto de Fomento y Asesoria Municipal. Memoria Anual 1979. 1980.

19. _____ Instituto Nacional de Fomento Cooperativo (INFOCOOP). Información General Sobre INFOCOOP. Publicaciones-INFOCOOP. 1978.

20. _____ Instituto Nacional de Fomento Cooperativo (INFOCOOP). Ley No. 5185 del 20 de Febrero de 1973: Ley de Asociaciones Cooperativas y Creación del Instituto Nacional de Fomento Cooperativo. Publicaciones-INFOCOOP. 1979.

21. _____ Instituto Nacional de Fomento Cooperativo (INFOCOOP). Memoria Anual 1979. 1980.

22. _____ Ministerio de Economia, Industria y Comercic. Dirección General de Estadistica y Censos. IV Censo de Comercio 1975. 1980.

23. _____ Ministerio de Economia, Industria y Comercio. Dirección General de Estadistica y Censo. IV Censo de Manufactura 1975. Vol. 1. December 1977.

24. Costa Rica. Ministerio de Economic, Industria y Comercio. Dirección General de Estadistica y Censos. Censos Nacionales de 1973: Agropecuario. 1974.

25. _____ Minsterio de Educación Pública. Caminos Nuevos en Educación de Adultos. By A. Alfaro. 1979.

26. _____ Sistema de Información en Nutrición (SIN). Algunas Caracteristicas de Migrantes Interregionales, Intrarregionales, e Internacionales. Casa Presidencial. Oficina de Información. May 1980.

27. _____ Sistema de Información en Nutrición (SIN). La Mortalidad Infantil por Cantón 1972-1977. Casa Presidencial. Oficina de Informes. April 1980.

28. Development Associates, Inc. "A System for Evaluating the Economic and Social Impact of Rural Electrification in Bolivia." Final Report. Contract No. AID/otr-C-1382. 1976.

29. Instituto Mixto de Ayuda Social (IMAS). Estimación de la Población Marginada de Costa Rica. San José. August 1978.

30. Inter-American Development Bank (IDB). "Costa Rica Arenal Hydroelectric Project." Project Report. 3 October 1974.

31. Inter-American Development Bank (IDB). Economic and Social Progress in Latin America. 1979.

32. Luis Carlos Umana y Asociados. "COOPEGUANACASTE R.L. Dictamen a los Estados Financieros y Economicos al 31 de Diciembre de 1979." San José. February 1980.

33. Lundberg, Donald E. Costa Rica. Gasa Gráfica Ltda.-San José. 1976.

34. Maroto Casorla, J.L. "Viabilidad Economica y Organizacion Administrativa y Contable de Tres Cooperativas de Electrificación Rural." (Thesis). University of Costa Rica, Faculty of Economics. October 1974.

35. The Mitre Corporation. "Energy and Development in Central America." Vol. II: Country Assessments. (Final Report). Contract No. AID/SOD/PDC-C-0146.

36. Mohs, Edgar. "Evaluation of Nutrition in a Transitional Society: Costa Rica." 1977.

37. Molina, Jorge Rolando. "Apuntes para una Geografia Pisica y Humana del Canton de San Carlos." 1980.

38. Murdock, Steve H. "The Potential Role of the Ecological Framework in Impact Analysis." Rural Sociology. Vol. 44, No. 3. Fall 1979.

39. National Rural Electric Cooperative Assoc. "Evaluation Report: Rural Electric Cooperative of Los Santos R.L." By James D. Lay. Washington, D.C. November 1978.

40. National Rural Electric Cooperative Assoc. "Evaluation Report: Rural Electric Cooperative of Guanacaste R.L. and Rural Electric Cooperative of San Carlos R.L." By James D. Lay and Joan H. Hood. Washington, D.C. 1978.

41. Programa Centro Americano de Ciencias Sociales. Estructura Demografica y Migraciones Internas en CentroAmerica. San Jose. Editorial Universitaria Centro Americana. (EDUCA). 1978.

42. Rawson, I.G. "Cultural Components of Diet and Nutrition in Costa Rica." Ph.D. Dissertation. University of Pittsburgh. 1975.

43. Robert Nathan Associates. "Contribution of AID Documentation to Evaluation of Its Rural Electrification Projects." Vol. II. n.d.

44. Seligson, M.A. El Campesino y el Capitalismo Agrario de Costa Rica. Editorial de Costa Rica. 1980.

45. Seligson, M.A. "The 'Dual Society' Thesis in Latin America: A Reexamination of the Costa Rican Case." Social Forces. Vol. 51, No. 1 September 1972.

46. Smith, Douglas V. "Rural Electrification or Village Energization?" Interciencia. Vol. 5, No. 2 March-April 1980.

47. Tendler, J. New Light on Rural Electrification: The Evidence from Bolivia. Berkeley, California. September 1980.

48. Thurow, L.C. "Plenty of Trouble Ahead." Book review, New York Timesbook Review. 26 October 1980.

49. U.S. Agency for International Development. "Bolivia: Rural Electrification." Project Impact Evaluation. AID Loan 511-L-046 and 511-L-049. July 1980.

50. _____ "Capital Projects Effectiveness Evaluation." By F. Masson and J. Rixse. August 1971.

51. U.S. Agency for International Development/Costa Rica. "An Assessment of the Agricultural Sector in Costa Rica." By D. Daines. February 1977.

52. _____ "Country Development Strategy Statement FY 82-86." January 1980.

53. _____ "Analysis of Causes of Poverty in Costa Rica." (Working Title). October 1980.

54. _____ Development Loan Committee. "Loan Authorization. Costa Rica: National Bank of Costa Rica (Rural Electric Cooperatives)." AID Loan No. 515-L-015. 24 June 1965.

55. _____ "Electric Power Projects Three Rural Electric Cooperatives in Costa Rica." Capital Projects Effectiveness. Post Evaluation of Completed Capital Projects. 1971.

56. _____ "The First Three Rural Electric Cooperatives in Costa Rica." Final Report. AID Loan 515-L-015. By National Rural Electric Cooperative Assoc. October 1969.

57. _____ Office of Evaluation. "Rural Electrification: Linkages and Justifications." AID Program Evaluation Discussion Paper No. 3. By J. Tendler. April 1979.

58. U.S. Agency for International Development. Office for Private Overseas Programs. "AID-Supported Rural Electric and Agricultural Cooperatives in Ecuador, Colombia, Costa Rica, Nicaragua, Honduras and Guatemala." Final Report. By Gordon Roth. August 9- September 4, 1971.

59. _____ "The Philippines: Rural Electrification." Costa Rica. Country Demographic Profiles. 1976.

60. U.S. Department of Commerce. Bureau of Census. Costa Rica. Country Demographic Profiles. 1976.

61. U.S. Department of State. Costa Rica Post Report. February 1979.

62. U.S. Department of State. Bureau of Public Affairs. "Costa Rica." Background Notes. January 1980.

63. University of Florida. Center for Tropical Agriculture. "Rural Electrification: An Evaluation of Effects on Economic and Social Changes in Costa Rica and Colombia." By James E. Ross et al. (Final Report). Contract No. AID/csd-3594. 31 August 1973.

64. World Bank. Rural Electrification. A World Bank Paper. 1975.

65. Zschock, Dieter K. "Health Care Financing in Central America and the Andean Region." Workshop Report. Latin American Research Review. Vol. XV. No. 3. 1980.

No. 9: Senegal: The Sine Saloum Rural Health Care Project (October 1980) PN-AAJ-008
No. 10: Tunisia: CARE Water Projects (October 1980)
No. 11: Jamaica Feeder Roads: An Evaluation (November 1980)
No. 12: Korean Irrigation (December 1980)
No. 13: Rural Roads in Thailand (December 1980) PN-AAH-970
No. 14: Central America: Small Farmer Cropping Systems (December 1980) PN-AAH-977
No. 15: The Philippines: Rural Electrification (December 1980) PN-AAH-975
No. 16: Bolivia: Rural Electrification (December 1980) PN-AAH-978
No. 17: Honduras Rural Roads: Old Directions and New (January 1981) PN-AAH-971
No. 18: Philippines Rural Roads I and II (March 1981) PN-AAH-973
No. 19: U.S. Aid to Education in Nepal: A 20-Year Beginning (May 1981) PN-AAJ-168
No. 20: Korean Potable Water System Project: Lessons from Experience (May 1981) PN-AAJ-170
No. 21: Ecuador: Rural Electrification (June 1981) PN-AAH-979
No. 22: The Product is Progress: Rural Electrification in Costa Rica (October 1981) PN-AAJ-175
No. 23: Northern Nigeria Teacher Educational Project (Sept. 1981) PN-AAJ-173
No. 24: Peru: CARE OPG Water Health Services Project (October 1981) PN-AAJ-176
No. 25: Thailand: Rural NonFormal Education - The Mobile Trade Training Schools (October 1981) PN-AAJ-171

SPECIAL STUDIES

No. 1: The Socio-Economic Context of Fuelwood Use in Small Rural Communities (August 1980) PN-AAH-747
No. 2: Water Supply and Diarrhea: Guatemala Revisited (August 1980) PN-AAJ-007
No. 3: Rural Water Projects in Tanzania: Technical, Social, and Administrative Issues (November 1980) PN-AAH-974
No. 4: The Social Impact of Agribusiness: A Case Study of ALCOSA in Guatemala (July 1981) PN-AAJ-172
No. 5: Korean Elementary - Middle School Pilot Project (October 1981) PN-AAJ-169

PROGRAM DESIGN AND EVALUATION METHODS

Manager's Guide to Data Collection (November 1979) PN-AAH-434

Directory of Central Evaluation Authorities (April 1981)
(distribution restricted to official agencies)

Those documents with an identification code (e.g., PN-AAG-585) may be ordered in microfiche and paper copy. Please direct inquiries regarding orders to:

Editor of ARDA
Bureau for Development Support
Agency for International Development
Washington, D.C. 20523