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A review of current methodologies by LDC decision-making bodies and international programs in developing nations has identified several approaches to policy formulation and implementation. These approaches are grouped and discussed.

A new approach--the modified bubble-up approach to policy formulation and implementation--was initiated as a pilot effort in Limon Province, Costa Rica. Preliminary results indicate that this approach has promise for application to other small developing nations.

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A METHODOLOGY FOR FORMULATING AND IMPLEMENTING
SCIENCE POLICY FOR A SMALL DEVELOPING COUNTRY
(COSTA RICA)

by

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- (f) Letter from Lic. Oscar Padilla Sellen, Head of Planning Division, IFAM

9. REFERENCES

ABSTRACT

Under a contract from the Office of Science and Technology, AID, Washington, a research effort was mounted to determine an appropriate methodology for formulating and implementing science and technology policy for the development of a small country--Costa Rica.

A review of current methodologies by LDC decision-making bodies and international programs in developing nations has identified several approaches to policy formulation and implementation. These approaches are grouped and discussed.

A new approach--the modified bubble-up approach to policy formulation and implementation--was initiated as a pilot effort in Limon Province, Costa Rica. Preliminary results indicate that this approach has promise for application to other small developing nations.

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1. INTRODUCTION

1A. Background

"We cannot avoid the realization that Science has made it possible to remove unnecessary suffering from a billion individual lives--to remove suffering of a kind which in our privileged society we have largely forgotten. . . It does not require one additional scientific discovery, though new scientific discoveries must help us. It depends on the spread of the scientific revolution over the world. There is no other way."

Lord C.P. Snow
The Two Cultures and a Second Look
(New York, 1963)

Developing nations, large and small, have been grappling with the problem of how to take advantage of the scientific revolution in the industrialized nations. International agencies and the industrialized countries have cooperated with them in the quest for methodologies that are consistent with local situations.

Large developing nations--large in size, human resources, natural resource endowments, etc.--have established Ministries for Science and Technology, Centers for Industrial and Scientific Research, National Science Foundations, etc., as instruments for spreading the scientific revolution. They have also allocated a nominal share of their national income in support of this cause. At best, the results of such efforts can be described as mixed. Certain developing nations, that transplanted the procedures of the industrialized world without adapting them to local situations, were disappointed with the results. In other countries, where the approach was consistent with the science and technology base existing in the country, and not in complete conflict with the social, cultural and religious practices of the country, the efforts have been relatively successful.

Small developing nations, characterized by small population, underutilized natural resources, limited domestic markets, a restricted educational base especially in science and technology and an embryonic yet growing indigenous industrial sector, also need to establish

mechanisms appropriate to their own conditions. There are a fair number of small developing nations in Africa, Asia and Latin America; it is likely, that a workable approach for large developing countries may not be applicable to them.

This report discusses an attempt to develop a practical approach for spreading the scientific revolution in a small developing country-- Costa Rica.

The success of scientific revolution in any country may be measured by the improvement in the lot of its citizens. Betterment in the conditions of life in a country contributes to development of that country. Thus a successful scientific revolution can lead to development of a country with technology serving as the link between scientific opportunities and national development.

1B. Definitions

Certain words that are often used while discussing science, technology and development have a range of definitions, and might have different connotations for different users. Hence some clarification is necessary to define these words and the context in which the words will be used in this report.

Although the title of the report is "Science Policy for a Small Developing Country," the research refers to science, technology and their contribution to development. Therefore "Science Policy" for Costa Rica will be interpreted to mean "Science and Technology Policy" for Costa Rica.

Different labels are given to certain types of decisions of actions depending upon the breadth of their implications. Trivial and repetitive decisions that demand relatively little thought may be called routine actions. Those that are somewhat complex, have wider ramifications and demand more contemplation may be grouped as tactical decisions. The term policy is reserved for those decisions which have the widest ramifications, the longest perspective and which require the most information and thought. However, one man's policy may be another man's tactics.¹

A national science and technology policy should dynamically affect all activities in which the methods and achievements of science and technology are being used to enhance national development in all sectors.² Thus, since science and technology policy should relate opportunities in

science and technology to development, it is necessary to understand what is meant by development. Broad definitions of development such as enhancing the quality of life, accelerating the growth in GNP, etc., need further refinement.

The following definition of development, as proposed by Dudley Seers,³ brings out important features that are pertinent to the situation in many developing nations:

"The questions to ask about a country's development are: (a) What has been happening to poverty? (b) What has been happening to employment? and (c) What has been happening to (economic) inequality (within the country)? If all three of these have declined from high levels, then, beyond doubt, this has been a period of development for the country concerned. If one or two of these central problems have been growing worse and especially if all three have, it would be strange to call the result development even if the per capita income doubled. . . . A 'plan' which conveys no targets for reducing poverty, unemployment and inequality can hardly be considered a 'development plan'."

In this report, although the three aspects of development as proposed by Dudley Seers will be highlighted, considerations of development will not be limited to increasing employment, eliminating poverty and narrowing the economic inequalities within Costa Rica.

To summarize, the word POLICY might mean a whole range of decisions varying from the trivial to the sophisticated. In addition, some relevant criteria need to be established while planning for and evaluating DEVELOPMENT.

2. METHODOLOGIES FOR FORMULATING AND IMPLEMENTING SCIENCE AND TECHNOLOGY POLICIES

2A. The Hour-glass or Top-down Approach

Several international agencies and institutions from the developed world have been engaged in relating science and technology to development of LDCs. A review of the reports reveals some common strategies in their programs. One such strategy might be termed the Hour-glass or Top-down approach to science and technology formulation and implementation.

As the strategy implies, the policy formulation process begins at the highest levels of government. Usually it involves a seminar or workshop at the ministerial level in a developing country to discuss broad policies and plans to relate science and technology to national development.

Harrison Brown, the former foreign secretary of the National Academy of Sciences, indirectly alludes to this methodology when he describes the activities of the U.S. National Academy of Sciences:⁴

"During the past decade the National Academy of Sciences has developed a number of bilateral programs with sister organizations in developing countries aimed at strengthening their local scientific-technological problem-solving competence. In these programs we have brought together natural scientists, social scientists and engineers in roughly equal numbers from our two countries to discuss the problems of development, with particular reference to the role of science and technology. The quality of the discussions and the actions which have resulted have far exceeded our initial expectations. We have helped our colleagues create research councils and institutes; we have jointly modified educational approaches; we have effected nutritional recommendations; we have developed guidelines for industrial research. Indeed, as a result of these experiences I am convinced that the scientific-technological community, worldwide, can play a crucial role in the development process in virtually all developing countries."

The Hour-glass approach to policy formulation is further illustrated by Chart 1 which portrays the overseas activities of NAS/BOSTID.

According to this approach, a team of experts from the developed world meets with a counterpart team from the host country. Often, the members of the counterpart team in the host country are experts chosen from the highest levels of the government. Jointly, the group identifies the relevant role of science and technology and then seeks to incorporate this role into national development plans.

This approach is a centralized-coordinated strategy and has applicability in countries where there is an active pool of scientists and engineers within the policy-making bodies and at the highest levels of government. Working at this level, it might be easier to factor in considerations for science and technology while deciding on fund allocations, plans for national development and programs of implementation.

It follows that an essential pre-condition for initiating the hour-glass strategy is that there exists within the developing country an active pool of science and technology professionals and policy-making bodies. The 1968 UNESCO survey⁵ reports (Table 1) that there were 175 of these in Asia and Latin America, of which 56 dealt with science and 27 with technology. From the number of staff and the expenditure columns for Asia and Latin America, it is clear that the developing countries in the two continents differed in their varying emphasis on science and technology.

CHART I

-7-

CONGO -- A, G, K, T, U

GIANA -- A, D

NIGERIA --

INDIA -- E, H, O A C

INDONESIA -- A, D, E, G, K

PHILIPPINES -- A, B, E, F, G

TAIWAN -- A, B, C, E, F, R H I

ARGENTINA -- A, D, E, G, I, K

BRAZIL -- A, B, D, E, J, Q, U, W, Z

CHILE -- A, G, F, Z, V

COLOMBIA -- A, B, E, Q, R, V, Y

PERU -- A, B, C G

THAILAND -- G A

CENTRAL AMERICA -- H

S.E. ASIA -- H

 = Projected Activity

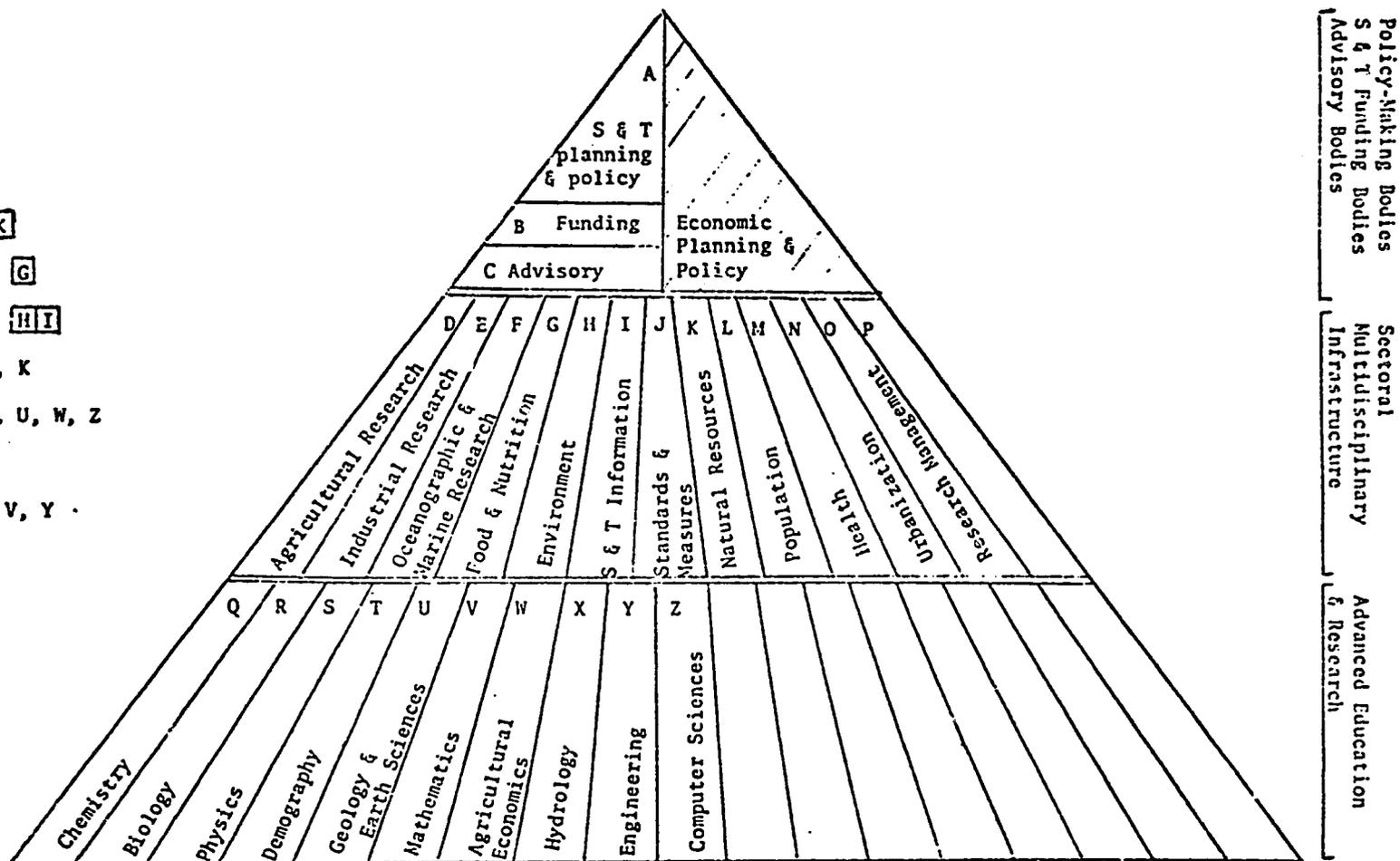


TABLE 1

Number and Resources of Science and Technology Policy-Making Bodies in Asia and Latin America

Categories	<u>Asia</u> (18 countries)			<u>Latin America</u> (21 countries)			<u>Total</u>
	Number of Policy-making Bodies	Staff	Expenditures (\$ million)	Number of Policy-Making Bodies	Staff	Expenditures (\$ million)	Number of Policy-Making Bodies
Sciences	30	6,387	36.073	26	7,540	12.980	56
Technology	19	9,075	53.809	8	814	3.000	27
Research Grants	3	49	12.751	0	---	---	3
Inter-University Activities	0	--	--	3	42	0	3
TOTAL	52	15,511	102.633	37	8,396	15.980	89

SOURCE: Compiled from World Directory of National Science Policy-Making Bodies; Volumes 2 & 3, UNESCO.

John Montgomery⁶ analyzes the current science and technology policy-making strategy and recommends three levels of decision-making bodies required for effectively relating science and technology to national development. The first order of decision-making pertains to the choice of appropriate technologies. Among the science policy-making bodies listed with UNESCO, 84% participated in such decisions. The second order is the choice of the implementing agency responsible for introducing science and technology to the production of goods and services. 64% of the policy-making bodies participated in this exercise. The third order decision involves actions and programs to implement the first two decisions. Only 28% of the science policy units listed in the UNESCO survey indicated some responsibility for the third order decisions.

Montgomery also recommends six communication links to implement the decisions of the national policy-making bodies. Based on the UNESCO survey, he reports on the recognition in Asia and Latin America for such linkages:

--International linkages of science and technology bodies in all countries surveyed, in both Latin America and Asia, are far more numerous than any single set of domestic linkages. The implication is that at present, science policy makers' attention is oriented more toward international than domestic communications.

--Linkages coordinating science and technology activities across sectoral and ministerial lines do not exist at all in 12 of the 21 Latin American countries included in the UNESCO survey, or in 3 of 17 Asian countries. The implication is that developmental science and technology may be excessively fragmented.

--Science and technology policy-making bodies do not recognize any responsibility for the implementation of development or other action programs in 7 of the Latin American and 19 of the Asian countries in the survey.

--Third order decisions, involving conscious efforts to gain public acceptance of science and technology innovations, are not recognized as a function of science policy-making bodies in 10 of the Latin American and 8 of the Asian countries surveyed.

Clearly, one of the major bottlenecks of the hour-glass approach to policy formulation and implementation is the poor domestic linkage, both horizontal (among personnel at the same level but from different ministries and institutions) and vertical (among personnel within each ministry or institution). Due to poor linkages, decision-makers may lack information on the type of technological needs at the field level. Also, decision-makers may encounter difficulties in identifying relevant

research that would enable appropriate technologies to be introduced into field operations. Feedback mechanisms are essential for an on-going evaluation and modification of policies. Weak links result in ineffective feedback mechanisms.

The problems associated with the science and technology policies of the decision-making bodies have prompted the International Development Research Center (IDRC), the Department of Scientific Affairs, Organization of American States (OAS), and a select group of LDCs to initiate a 3 1/2 million dollar study to identify and assess the different methods available for implementing science and technology policies in developing countries.

2B. The Bubble-up Approach

Ineffective linkages, poor feedback mechanisms and lack of citizen participation in the decision-making process often make it difficult to implement science and technology policies and plans formulated at the highest levels of government. National policies and development plans should improve the lot of target groups such as the urban and rural poor, the citizens of depressed areas, etc. These groups are characterized by high unemployment and a relatively low level of economic activity. An informed citizenry, even if involved at least peripherally, in the decision-making exercise, might provide a better opportunity to implement national science and technology policies and plans.

Consequently, a different approach--the Bubble-up Approach--to policy formulation and implementation is proposed. According to this approach, citizen participation is encouraged at all levels of the decision-making process, from the initial identification of technological needs to the implementation of science and technology policies for the country. The decision-making process is initiated not at the highest levels of government, but at the field level where national policies and programs will eventually be implemented. Since citizen participation is highlighted in this approach, it offers a better opportunity to enlist the commitment and enthusiasm of the citizens at large that is considered essential for implementing policies and plans for national development.

Of course, one reason for the evolution of depressed areas might be that citizens from such areas did not possess strong political representation in government to bring about the needed improvement. Consequently,

such areas lag behind other regions of the country. Without strong political representation, adequate financial resources and indigenous technical competence, it is inevitable that the locally generated enthusiasm for change might bubble up via established government channels and soon be contained by the maze of bureaucracy or lost in the politics of the country that envelopes the region. The bubbles may also bypass the system with little benefit to the region.

Nonetheless, there are positive features in both the hour-glass and the bubble-up approaches to policy formulation and implementation. These positive features suggest a new approach to formulating science and technology policy. This decentralized approach evolved as a result of the effort in Limon Province, Costa Rica and will be discussed in a later chapter.

2C. The Sector-specific Approach

While in the hour-glass approach, the science and technology policy is formulated at the highest levels of government and then integrated into national plans for development, in the Sector-specific Approach a series of independent studies might be conducted simultaneously in several sectors. Each sector represents an area in which science and technology have the potential to contribute substantially to enhance development of that sector. The studies seek to identify the appropriate role of science and technology for development of the particular sector. A cross sectoral study that spans the various sector studies would establish the role of science and technology at the national level.

There is evidence that sector-specific science policy-making bodies are active in developing nations. Table 2, compiled from a UNESCO survey of Asia and Latin America, indicates that there are 86 sector-specific science policy-making bodies, 36 in Asia and 50 in Latin America. Also, from Chart 1, it is clear that NAS/BOSTID has conducted several sector-specific studies in LDCs.

What is not clear is whether the sector-specific studies did indeed seek to establish the appropriate role of science and technology in each sector for national development. For instance, if scientists and engineers were called upon to identify the role of science and technology for development of the construction industry, it would be relatively easy for a highly

Table 2
NUMBER AND RESOURCES OF SCIENCE POLICY-MAKING IN ASIA AND LATIN AMERICA

Sector-Specific Areas	Asia (18 countries)			Latin America (21 countries)			TOTAL
	Number of Policy-making Bodies	Staff	Expenditures (\$ million)	Number of Policy-making Bodies	Staff	Expenditures (\$ million)	Number of Policy-Making Bodies
Agriculture	10	981	18.388	10	13,705	46.230	20
Atom	12	11,109	94.663	11	3,668	18.160	23
Geography, Geology Mining, Petroleum	0	--	--	13	2,564	10.140	13
Medicine, Public Health	9	2,304	5.826	12	1,269	3.156	21
Geography	1	20	0.003	1	134	0.614	2
Public Works, Irrigation, Drainage, Floods	2	26	0.051	0	--	--	2
Rubber	1	1,021	0.540	0	--	--	1
Space	1	90	0.028	2	62	0.763	3
Sugar Cane	0	--	--	1	775	1.380	1
TOTAL	36	15,551	119.499	50	22,177	80.443	86

Source: Compiled from UNESCO, World Director of Science Policy-making Bodies (Brussels), Vols. 2 and 3.

discipline-oriented group to come up with a set of recommendations. If, on the other hand, the role of science and technology is to complement national development, i.e., to generate employment opportunities through labor-intensive technologies to alleviate poverty and to help remove disparities in economic levels within the country, then it may not be possible for a discipline-oriented group to come up with a viable solution. Such a problem calls for a multidisciplinary group effort.

Although it may be readily recognized that multidisciplinary collaboration is needed, forging a solution by integrating inputs from several disciplines is difficult. The solution might be either broad and superficial or a collection of chapters individually authored. Such an effort is analogous to the story of the blind men feeling different parts of the elephant and trying to describe the animal.

Not all discipline-oriented experts necessarily qualify as participants in a multidisciplinary team effort. Candidates need to be knowledgeable in the academic as well as non-academic literature, the problems of government and the social realities in the country. Above all, participants should demonstrate a commitment to the multidisciplinary concept and display a willingness to broaden their horizons by including other viewpoints. Experts, who have worked on discipline-oriented problems in a developing country, and have come away with an awareness of the wider implications of the problem, are likely to be good candidates for a multidisciplinary team. It takes time and patience for a multidisciplinary group to coalesce into a cohesive unit before it can put forward a team solution for a sector problem.

Multidisciplinary team effort in each sector also calls for horizontal linkages in addition to the obvious vertical linkages. If science and technology opportunities are related to development in each sector, it facilitates the cross sectoral study to identify the role of science and technology at the national level. A solution sought in the multidisciplinary team mode is likely to be more relevant.

It is essential for the role of science and technology to be relevant to the existing conditions in a particular country. Lord Bowden⁸ illustrates the need for relevance in the education sector:

"I have seen a few new universities in Africa. Some of them are extraordinarily impressive. They will educate the poorest people in the world and yet they have been the most expensive in the world to build. The University of Lagon, for example, cost Ghana several times as much per student place as the University Grant Commission allowed us to spend on universities in England. Students were studying classics and mediaeval French. They bought an atomic pile from Russia to study nuclear physics. I believe that someone wrote a thesis on the effect of Henry VIII's fourth marriage on the doctrinal development of the Church of Scotland, but the new foundations ignored engineering and African Studies."

2D. Others

Three methodologies--the Hour-Glass, the Bubble-Up, and the Sector Specific--have been discussed for drafting and implementing science and technology policies for developing nations. There are other approaches that are relatively more sophisticated and need additional data than what are readily available in developing nations. Under this category there are the Systems Approach,⁹ and the Indicator Approach. The indicator approach utilizes scientific and technological indicators¹⁰ as instruments for science and technology policy-making and planning in developing nations.

This report describes a research effort to come up with a methodology that is best suited for a small country (Costa Rica). Based on this research, it is now possible to hypothesize that the evolving methodology from the Costa Rican experience, with suitable modifications, could be applicable to other small countries in Asia and Africa.

3. THE LIMON PROVINCE STUDY

3A. Costa Rica and the Central American Common Market (CACM)

The Central American Common Market (CACM) was established in 1960 by Costa Rica, Guatemala, El Salvador, Nicaragua and Honduras. Its goals include the eventual elimination of all tariffs and barriers between member nations, a common external tariff for the rest of the world, a unified fiscal policy, a regional industrial policy and a coordinated regional policy for public health, education, labor, transportation and agriculture.

Progress towards these goals has been interrupted since 1969 as a result of an armed conflict between Honduras and El Salvador. Honduras has suspended participation in the CACM since 1970 by imposing tariffs on all imports from the region, subsequently establishing bilateral arrangements with Guatemala, Nicaragua and Costa Rica. Honduras has demanded a thorough restructuring of CACM before it re-enters.

Although attempts have been made to bring Honduras and El Salvador into the fold, economic integration of CACM seems unlikely until the problems among member states have been resolved.

Costa Rica, with a population of roughly 2 million, is one of the smallest of the Latin American republics in population and size (23,000 square miles). With three high volcanic ranges that vary in altitude, there is a variety in climate for a country lying completely within the tropics, i.e., hot, rainy, lowlands along the Caribbean, the temperate central plateau with unusually rich soil from the volcanic ash deposited over centuries, and the dry, hot Pacific coastal region.

The nation's economic indicators present a mixed picture. Over the last two years a dramatic rise in the value of exports has contributed to a healthy growth in the GNP. In 1973, the GNP increased by 20% at current prices (in real terms by about 4-5% compared with 5.2% in 1972). Value of exports has risen 99% during the past five years, though the value of imports rose by 111%. Stiff tax measures on imported items have been imposed to meet the trade deficit problem. However, inflation has become most serious. The consumer price index rose by 30.5% in the year ending March 1974, while in 1972 it rose by 6.9%. The wholesale price index for the first six months of 1974 increased by 28%.¹¹

Costa Rica's population over the past ten years has expanded at an average annual rate of 3.4%, although it has declined since 1970. As of 1973, 36% of the population was 12 years of age and under. Although the national per capita income for Costa Rica is one of the highest in Latin America, unemployment could become a problem for the country.

The Partido de Liberacion Nacional (PLN) holds 27 out of the 57 seats in the Legislative Assembly. Lic. Daniel Oduber Quiros, the PLN candidate, won the presidential election in 1974 with 43% of the total vote cast.

The National Economic and Social Development Plan (1972-78) published under the new administration includes the following objectives:

- Expansion and diversification of output;
- Decline in the unemployment rate;
- Regional Development; and
- Increase in savings and investment.

3B. Project Identification and Initiation

In 1972 a multidisciplinary team from Cornell visited Costa Rica to identify and establish contact with an appropriate counterpart institution with which jointly to conduct the study. Unfortunately, at that point in time, the group was unable to identify a national institution actively engaged in establishing the role of science and technology for national development. (CONICIT, the National Council for Scientific and Technological Investigation, was established in 1973.)

The newness of the area of study and the need to incorporate its findings into plans for national development presented uncertainties about organizing a counterpart team at the national level with staff and financial commitment from the ministries, the autonomous institutions, research centers, universities, etc. Hence, it was not feasible to carry out the hour-glass approach to science and technology policy formulation.

There was, however, considerable interest among individuals from government, autonomous and private institutions, etc. to participate with the Cornell group and conduct the study. Discussions were held with interested and qualified individuals to decide on the methodology (sector-specific or bubble-up) and the definition of projects that would enable the binational group to test the methodology. The methodology, and the projects to test the methodology, were selected jointly by the Cornell and Costa Rican teams.

Important to the selection of the projects was the relevance of the effort to other CACM countries.¹² For a cluster of small countries with similar culture, natural resources, endowments and climatic conditions, science and technology policies and plans for regional (CACM) development broaden opportunities for member countries that otherwise may not be possible.

It was decided to test the bubble-up approach in a depressed area of Costa Rica--the Province of Limon. If the approach to policy

formulation needed modification, it was planned to incorporate such changes during the course of the study. It was recognized that the work in Limon Province would not necessarily lead to a national science and technology policy for Costa Rica. However, Costa Rica being a small country with a small population and a small number of provinces, it was felt that the work in Limon Province would set in motion an approach to policy formulation for the country. Parallel studies in other provinces would undoubtedly provide further refinement to the national policy formulated on the basis of Limon experience.

Implementation of science and technology policies has been shown to be the major stumbling block in the entire process. Recent evaluations indicate that in a great majority of countries, implementation of policies has been "halting, selective and often ineffective."¹³ Policies formulated by a narrow, discipline-oriented group present difficulties when such policies are to be incorporated into national development plans for the country.

To overcome these difficulties, the Limon study was planned such that integration of science and technology considerations into regional development plans would take place continuously at every stage of the project. This was accomplished through a multidisciplinary team (appendix (a)) effort, and by including in the group experts from within and outside the region engaged in regional development of the country.

Thus, the appropriate role of science and technology was not only considered, but its relevance to the development of Limon Province was featured at every stage of the bubble-up process.

3C. Background on Limon Province

Limon was cut off from the rest of the country until 1890, when the railroad connecting Limon to San Jose was completed. In 1900, with the arrival of the United Fruit Company, came the banana boom. This company owned large banana plantations in the rich agricultural zones of the Province. In 1934, the "Panama disease" caused considerable economic loss, resulting in United Fruit Company's abandoning the plantations and moving its operations out of the region. After a period of relative inactivity, a new variety that can resist the disease has been planted in several farms and the banana boom is back.

The Province of Limon has an area of 9,300 sq.km. and a population of 97,316 (1972 census). It is divided into six counties: Limon, Siquirres, Pococi, Matina, Guacimo, and Talamanca. The county of Limon is the most populated.

Limon Province has been in a state of isolation from the rest of the country on account of several factors, one of which was the inaccessibility of parts of the region. The railroad offered the only communication link between some areas of the province and the rest of the country. With the completion of a gravel road from Siquirres to Limon in 1969, there was an influx of people into the region. The migration to the region is bound to increase appreciably when a paved highway is completed in 1975.

The ethnic composition of the population and the existence of foreign companies with large plantations in the region may have contributed to the isolation. The ethnic composition of the Province gives it a unique character in Costa Rica. Presently it is estimated that 49% of Limon's population is white, 46% black, 3% Indian, and 2% of Oriental descent. The black population is descended from immigrants from the Caribbean and other Central American countries who had worked on the railroad. The immigrants were never really assimilated into the national mainstream. It was partly their own choosing, and in part due to inaction at the national level. Until 1948 blacks were unable to travel freely to San Jose and the central part of Costa Rica.

The black population in Limon, however, has managed to preserve its traditions and culture. Most of the blacks still speak an English dialect and their customs, life style, and religion are quite different from those of the rest of the country. However, the third and fourth generation blacks are becoming more integrated into the mainstream of the national culture; they have become bilingual and attend public high schools and universities, while retaining their identification with their ancestors' culture.

Regarding the foreign companies operating in the region, it appears that the development of the region was assumed to be indirectly tied in with the responsibilities of the foreign companies because of their size and importance to the country. This assumption was further strengthened

in 1927 when in a government estimate it was reported that roughly 70% of the inhabitants of the province were "foreigners" brought in by the companies to work on the railroad and the plantations.

3C. (a) Urban Conditions

The urban population of the province is about 32,000 inhabitants, and roughly 25,000 of whom are in the city of Limon. The country's busiest port and the terminal for the Atlantic Railroad are located there. Close by at Moin is the Oil Refinery Plant--RECOPE--the only one of its kind in the country.

Although there are areas in the province where the soil is rich and suitable for vegetables and fruits, practically all these items are trucked to the city from other provinces of the country. The added expense of transportation makes the cost of food in the city of Limon the highest in the country.

Overcrowding of families in the city is an indication of the housing shortage. It is estimated that 37 families of 10 or more members live in a 1-bedroom house and 133 families of 10 or more live in 2-bedroom houses. Ninety-five percent of the houses have 1 to 4 bedrooms, while 59 percent of the families have 4 to 10 members in each family.

Another matter of great concern is the increasing squatter population. The present squatter population is estimated to be somewhere between 8,000 and 10,000. They are primarily concentrated in Barrio Limoncito and Barrio Cristobal Colon (formerly Cieneguita). Most of the squatters construct their own homes, and therefore are not part of the rent paying population. In some instances, squatters build houses which are rented out to other squatters. Basic services such as water and electricity are supplied to the squatter colony by Limon Municipality.

Finally, there is very little in the way of recreational activities for the youth in Limon City. The seriousness of this situation was brought out in the study by the Ministry of Culture, Youth and Sports: "In Limon City the available diversions, classified in order of importance are: drinking (there are 200 bars in the city), gambling (both the national and illegal panamerican lottery), prostitution." This statement serves to bring out the gravity of existing urban conditions.

3C. (b) Urban Labor Force

The total employed labor force of the Province is 13,660 and the age bracket of this work force is estimated to be between 15 and 65. The 1971 unemployment rate for the Province was 9.2%. Unemployment among males for the Province was estimated at 8.1%, while that among females was 12.7%. Of the total work force of 13,660, the urban work force is considered to be 7,060 (5,489 males and 1,671 females). Of the 7,060, 4,417 have had some type of primary education. Thus, more than one-half of the urban labor force has some primary education, but not technical skills. There are 1,914 members of the labor force who have had some type of secondary education and 206 with university training. The unemployed urban labor force is estimated at 6,600. Of this number, 946 are students and 2,500 are women (a majority of women are over 30 years old). Approximately 91% of the urban employed are involved in some type of non-agricultural activity at the docks or on the railroad.

3C. (c) Agriculture

A national problem, which has steadily aggravated with time in Costa Rica, is the deficit balance of payments. Limon Province has great potential for development which could help reduce the foreign debt. Import substitution and the development of traditional and new agricultural products for export seem feasible for the region. For agricultural development, it seems feasible to promote the production of crops and livestock without protracted research by adapting existing knowledge to these activities.

The bitter experience with monoculture is not particular to Limon. It has been repeated in many parts of the world. Agricultural activities based on monoculture have failed due to epidemics of disease, insects, sudden price drops, and loss of markets. Although there are definite advantages to monoculture with efficient production, the mistake normally made is in having monoculture for an entire region. In diversification there is stability. Directly or indirectly, diversification leads to development of the zone, improvement in transport, greater ease of obtaining credit and encouragement for other industries to come to the region. By-products of one production which normally would be wasted can be utilized by another. For example, until recently the

disposing of banana rejects, which annually amount to 2.5 to 3.0 million pounds, has been a problem. Now, with the introduction of livestock to the region, they are used as supplementary feed supporting hog and cattle raising operations.

Thus, to avoid the dangers of monoculture, diversification seems essential for the development of Limon.

Coconut is an important resource which has been exploited to only a minimal degree. Most of the Limon coast-line has planted or natural coconut groves. The total existing area is approximately 3,500 hectares. Like other crops of the area, it has not been cared for because of the very low price of 0.20 colonies per nut at the local market. This price structure is the result of a protective law which assures the internal coconut supply for soap manufacture. The extraction plants are very inefficient, using poor quality copra, with the result that coconut oil is imported.

The present state of most plantings is quite poor because there has been little incentive to improve them. Many trees are more than 80 years old and in many places fallen coconuts are not even collected. Since many groves occurred naturally, they are not properly spaced for optimum production.

Once established, coconut culture is not labor intensive and one family can operate 20 hectares, although most holdings presently are 10 hectares or less. It does not compete with other areas for labor since the coconut groves are generally removed from the banana-producing areas.

What is basically needed to improve production of coconut is an incentive--a better price and established markets. If rural processing plants were run efficiently with technical advice, the growers would be encouraged. The present pricing law needs to be reviewed.

Another natural resource which might be successfully exploited is the green turtle. Until recently, there was organized poaching of the green turtle and its eggs along the nesting grounds at the beaches of Tortuguero. The turtles were caught and brought to market as soon as they came to the beach to nest (appendix (b)). Roughly two-thirds of the Tortuguero nesting colony was derived from the extensive turtle grass pastures off the coasts of Nicaragua and Panama. Alarmed by the

poachers and the poor nesting seasons, a group of high level delegates from Panama, Costa Rica, and Nicaragua met in 1969. The three countries working together, it was believed, could insure survival of the species by giving Costa Rica custody of the nesting ground and a fair share of a controlled yearly harvest. The agreement drawn up at the meeting was not ratified by the governments. Instead, Nicaragua built two big modern turtle-processing plants.

The life cycle of the Tortuguero nesting colony is the best known of any population. Costa Rica has the only green turtle breeding ground remaining in the Western Caribbean; the Nicaraguan pastures are populated by turtles that hatched on the Costa Rican shore. Through the failure of the three countries to ratify the agreement, the uncontrolled exploitation is bound to be reflected in a decline of the available resource. Also, Nicaragua and Costa Rica are depriving their coastal populations of the turtles they desperately need, while at the same time promoting an export industry that is bound to exhaust the resource.

3C. (d) Industrialization

Roughly 20% of the population of Costa Rica lives in metropolitan San Jose. The 1972 population density of the metropolitan area of San Jose was 1,307 people per square kilometer, while that for Costa Rica as a whole was only 36.2. This tremendous difference in population density between the metropolitan center and the country as a whole reflects the tendency for populations and industries to polarize around capital cities where better opportunities for employment and marketing exist. Thus the outlying regions of the country remain sparsely populated with little opportunity for development of their human and natural resources.

Table 3 shows the 1968 to 1972 populations of the seven urban areas of Costa Rica, and Table 4 indicates the population densities of the same areas in 1972. As is noted in Table 3, the average yearly increase in population in metropolitan San Jose was 11,355, while that for other areas was considerably less. At this rate of growth, the population of metropolitan San Jose could reach 462,000 by 1975, further aggravating problems of density, polarization of industry, and inequitable regional distribution of benefits derived from national development programs.

Table 3
POPULATION OF URBAN AREAS OF COSTA RICA

Metropolitan Area	1968	1969	1970	1971	1972
San Jose	383,219	395,401	406,990	417,502	428,718
Alajuela	28,600	29,171	29,820	30,525	31,212
Cartago	22,421	22,397	22,931	23,472	24,018
Heredia	23,513	24,021	24,675	25,197	25,806
Liberia	--	--	--	14,621	15,435
Puntarenas	--	--	--	31,880	33,200
Limon	--	--	--	37,514	39,837

Source: Direccion General de Estadisticas y Censo

Table 4
DENSITY OF URBAN POPULATIONS: 1972

Metropolitan Area	Population	Area	Density
San Jose	428,718	328	1307.0
Alajuela	31,212	327	132.0
Cartago	24,018	143	168.0
Heredia	25,806	520	49.6
Puntarenas	31,880	2,146	9.8
Limon	39,837	1,756	15.5
Liberia	15,435	1,567	22.7

In many developing countries, such as India, Mexico, and in Puerto Rico, industrial estates have played a role in government policies aimed at diverting industries from relatively overpopulated or over-industrialized centers and directing them towards depressed or less developed areas. Such policies have helped promote a geographically balanced development. They served as important national tools in solving the urbanization problems through decentralization of industrial activities and development of the estates as nuclei for further growth in the outlying depressed areas.

A policy of this type would help alleviate some of the population pressures now facing metropolitan San Jose.

Paper and Paper Products

In 1961, the fruit companies began shipping bananas in boxes instead of on the stem, with the result that large quantities of boxes had to be imported. In 1964, the companies began manufacturing boxes in Costa Rica, so that imports of the boxes fell sharply and import of cardboard for their manufacture became important. During the three-year period from 1965 to 1967, while an annual average of 349,000 metric tons of bananas were being exported, an average of 22,700 metric tons of miscellaneous cardboard and paper were imported, nearly all for the manufacture of boxes. Approximately 65 kilograms of cardboard are needed to pack a metric ton of bananas.

Imports of newsprint grew fairly steadily from 3,200 metric tons in 1957 to 7,603 metric tons in 1968. The volumes imported correlate reasonably well with the growth of Costa Rica's population. Increased circulation and new newspaper publications might account for the steady upswing in recent years.

Based on projected gross domestic product (since the volume of these imports remains about the same proportion of GDP), it is estimated that a total of 50,000 metric tons of paper and cardboard products, other than newsprint and material for banana boxes, will be imported in 1980.

The following table gives the value of paper, and carton and paper products that were imported during 1967 to 1973.

Table 5

	CIF VALUE IN MILLIONS OF COLONES						
	1967	1968	1969	1970	1971	1972	1973
Paper & Cartons	60.2	81.6	91.1	131.0	132.0	153.2	198.0
Paper Products	14.5	19.3	16.7	25.3	20.7	27.3	34.1

Source: Comercio Exterior de Costa Rica 1973
Direccion General de Estadisticas y Censo

During discussions in Costa Rica, statements were often made regarding the potential for using the swamp palm tree "yolillo" for manufacturing paper. The team was unable to discover whether research has been conducted on yolillo to determine its suitability for manufacturing paper. The large yolillo groves in the region serve a very important function in the low lands. Through transpiration, the tree drains the region of large amounts of water. Cutting down the trees might disturb the ecological balance and inundate greater areas (appendix (b)). However, the large number of yolillo leaf stems that are each more than 15 feet in length might be trimmed on a rotational basis, thus assuring that the tree itself would not be destroyed. Still, one must consider the fact that yolillo groves are in marshlands that are not easily accessible and transport of yolillo leaf stems might be a difficult and expensive operation.

To satisfy requirements for economies of scale, paper industries can be approached on a regional basis since the Atlantic coastal regions of Panama and Nicaragua are endowed with similar vegetation and forestlands. A pulp and paper industry, in view of the paper and pulp shortage in the developed world, has potential for consideration as an "integration industry" for CACM countries, provided fair distribution of benefits is worked out and agreed upon by the participating countries.

Drawback Industries

As previously noted, the unemployed labor force is estimated at 6,600. Of this number, 946 are students and 2,500 are women. The majority of the women are over 30 years old. Recently there was an interest in learning to sew and many housewives organized small sewing clubs. As a result of the local interest, a Corte y Confeccion Program was initiated to improve

the skills and capabilities of women in dressmaking and tailoring. In 1969, the National Apprenticeship Institute conducted training programs for two groups. Of the 29 who attended the program, 17 graduated. In 1971, 25 of the 26 who enrolled graduated. There are plans for an expansion of the program and enrollment in sewing is rising steadily.

There exist possibilities for the establishment of certain drawback industries such as apparel manufacturing. These labor-intensive industries might help alleviate the critical problem of unemployment among women in the region and offer tremendous incentive to the businessman in terms of skilled and low-cost labor.

Rural Industries

Since more than two-thirds of the regional population is involved in agricultural activities, the team tried to identify the types of industries that exist in areas outside the city of Limon.

The 1963 Agricultural Census reported several industries operating in the rural areas of Limon Province. Only a few of the industries reported in the 1963 census were found to be operating in 1973. Some of the industries that had failed were:

- A marmalade, guava, and fruit jelly making plant in Siquirres that had failed for want of working capital and a lack of regular supply of fruits;
- Three yucca starch (almidon) operations in the Siquirres-Guapiles area went out of business because of competition from other CACM countries that were able to sell the same product cheaper in this area; and
- A corn milling and cacao dehydration plant had failed because of a lack of cheap transportation, need for a stable and reliable supply of raw materials, and insufficient technical knowledge and advice.

Six municipal slaughterhouses, the cacao drying and processing plants, the sawmills, and the banana packing operations have continued to function. In most of these operations, the technology used is quite primitive and inefficient. Without further technical and financial supports, these will remain marginal operations.

Tourism vs Industrialization

The natural tropical forests, lagoons, and canals in the Atlantic Zone offer an ideal setting for establishing similar wildlife sanctuaries in Costa Rica. If a suitable area is declared a National Reserve, then

wildlife suited to the area and common to the Central American Region might be protected by law and allowed to live in this restricted area. Camera safaris to such parks could become an attraction to CACM and foreign tourists.

Tortuguero offers another reason to develop tourism (appendix (b)), while at the same time protect the green turtles' nesting ground at Tortuguero beach. Archie Carr, in the March 1972 issue of Audubon reported that:

"There was organized exploitation along the entire nesting beach. The turtles were turned for the market as soon as they came out of reach of the surf and despite the rapid spread of anxiety over its decline...the position of the green turtle is clearly degenerating."

Since then, the Government of Costa Rica has initiated steps to protect the green turtles' nesting grounds along Tortuguero beach by declaring this stretch of beach a National Park. Park guards are posted to prevent poachers from operating in this area. On a clear night, it is not uncommon to witness several turtles lumbering from the sea to dig holes and lay 300 to 500 eggs.

A tourist package that includes a visit to Cahuita, a short boat ride on the natural canal to a camera safari at a wildlife park, a trip to Tortuguero to observe the green turtles at night and to fish in the Atlantic, might offer the needed variety to attract tourists and the increasing number of back-to-nature fans.

Opportunities to develop tourism within the region must be evaluated against a background of several other programs that are planned for the region. For instance, the Ministry of Transport and Public Works has been successful in its efforts to link navigable rivers and lagoons so that it is now possible to travel by boat from Moin to Barra Colorado and on up to the San Juan River. The Department of Planning Ministry of Transport, in the April 1968 report, "Estudio de Factibilidad Economica de la Canalizacion de las Lagunas del Atlantico," has justified developing the canal as a means of transportation based on:

- Projected passenger traffic along the canal;
- Projected transport of agricultural products from areas close to the canal; and
- Potential for industries, fishing, and tourism in the region.

It was the opinion of the team that further studies assessing different opportunities are needed before policies and plans for development of the region can be formulated.

There are fast growing hyacinth groves on either side of the canal. It is reported that the banana packing chemical wastes dumped into the rivers and carried to the canals have quickened the growth of the hyacinth. The manatee, a tropical aquatic herbivorous mammal that lives in the lagoons, had helped to keep the hyacinth growth in check. Indiscriminate harpooning has made the manatee an almost extinct species in Costa Rica. The killing of the manatee and the phosphate in the wastes have contributed to the abundance of hyacinth groves along the canals and lagoons. The tides, currents, and waves created by boats separate hyacinth patches from the groves and set them adrift along the canal. Often, the brush and trees on the banks of the canal are cleared and dumped into the canal. Aground trees, floating branches, and drifting hyacinths are hazards to navigation.

The sedimentation in the canals is another important factor that needs consideration. Sediment transported by the rivers is deposited in certain sections of the canal. The present cost of dredging operations, which operate continuously, 24 hours a day, is estimated at 500 colones per hour. This operation is considered inadequate to keep the canal open for continuous use. Riverworks at appropriate locations on the rivers that link with the canal is an approach to reduce the sediment in the canal. Economic justification for such works would require quantification of the increased benefits from agricultural, industrial, and tourist activities that might result if the canal is properly maintained.

Of the many approaches to developing the region, one might be to encourage only agricultural and industrial activities. On the other extreme, since the soils in certain areas of the region are constantly washed of nutrients, it might be better to promote only tourist trade, with no industrial or agricultural activity, thus leaving a major part of the region largely underdeveloped. Yet another alternative might be to promote a fair mix of agricultural and industrial activity with tourism. In this case there must be adequate guarantees so that one

activity would not imperil the other. This approach might also assure that the environmental quality of the region is maintained.

If the main thrust of development is to take place in agricultural and industrial sectors only, then the passenger and cargo traffic along the canal will be heavy. It must be remembered that there is negligible flow in the canals since the region is relatively flat and the total volume of water in the canals and lagoons is relatively small. The lagoon waters are almost stagnant. The combination of the small amount of,relatively still water and the high degree of economic activity might quickly pollute the inland waters, destroying the attractiveness the region holds for tourism. Problems of pollution are already evident despite the low industrial and agricultural activity in the region. The wastes and oil spills, probably from the refining operation at Moin, have coated the banks of the canal at Moin with a black slimy spread which extends for several kilometers up the canal. Shrimp and oyster beds that once thrived in Moin River and canal have been destroyed. The annual tarpon fishing contest that used to be held in Moin River and canal has been discontinued.

Among the three approaches, it seems rational to declare certain areas of Limon Province as national parks and develop them for tourism; at the same time, opportunities in the remaining areas for agricultural and agro-industrial activities ought to be explored. For this approach, it is necessary to establish adequate safeguards against pollution.

The need for further studies takes on added relevance because of recent reports on negotiations between Costa Rica, Iran and Venezuela to install a large refinery (possibly at Moin, Limon Province) that would supply the entire CACM countries with gasoline and petroleum products. Recent reports also indicate that offshore drilling near Moin has already begun.

There appears to be considerable hydroelectric potential in the Province. Current estimates indicate that only 3% of the large hydroelectric potential in Talamanca area of Limon Province has been developed.

The proposed studies would provide valuable background information for an energy policy for the country. Undoubtedly such studies would delve into the pros and cons of large scale industrial activity that

inevitably would result if the decision is to establish a new refinery in Limon Province.

3D. Summary and Recommendation

The Limon study may be described as a broad brush survey of the natural resources existing in the Province and the potential for utilizing these for regional development.

This region has been neglected for years and consequently its resources have not been fully explored. Although there presently exists a sincere commitment at the national level to develop this region, progress has been slow.

The immediate need is for further studies that would lead to development of policies and plans to implement such policies. Very few studies of substance have been conducted on aspects relevant to the overall development of Limon Province. Therefore, the team was handicapped by a lack of data.

Also, at that point in time, the team was unable to identify existence of a national development policy or plan for the country. Without the broad guidelines of national goals, independent development policies for each region might not receive the national attention that is essential to implement such policies. Independent development programs for different regions of the country can also be counterproductive and even wasteful on a national basis. The current approach of developing one region at a time might overlook opportunities for coordination and cooperation among regions of the country. Under the present approach, regions like Limon Province that are in dire need of development might have to wait their turn. It is not clear whether this "series" approach to regional development serves the interest of the region and the country.

The important first step is to organize and coordinate efforts so that an infrastructure exists to formulate policies and plans for development of Limon Province.

In the past, development programs for Limon Province were handicapped by several national institutions claiming jurisdiction over such programs. The overlap in functions of the institutions led to misunderstanding and a lack of coordination among institutions.

Now that JAPDEVA, by law, is responsible for the regional development of the Atlantic Zone (Limon Province), it is seeking a rational and efficient approach to carry out its functions. One approach might be for JAPDEVA to rely on the technical competence which already exists within several national institutions. There would be savings in time and money if JAPDEVA looked to the autonomous institutions within the country to provide this support. JAPDEVA could take on the administrative role, seeking the assistance of appropriate institutions within the country to carry out specific tasks. Aggressive regional offices of autonomous institutions in Limon Province with adequate funds, full time personnel, and programs are essential. Except for the Ministry of Agriculture (MAG), the group was unable to identify enterprising regional offices of autonomous institutions. In the case of the MAG regional office, part of the funds and a number of extension agents assigned to the region were transferred to support activities in other regions.

The municipalities in the region need to articulate local views and concerns regarding development, but they have been relatively passive in this respect. IFAM's commitment to strengthen municipalities in the region to play this vital role is essential to active local participation in formulating and implementing policies and plans for the region.

4. A CONCURRENT STUDY AT UNIVERSITY OF COSTA RICA

The main focus of any national science and technology policy for a developing nation is to build indigenous capabilities to make informed choices among known technologies, to be knowledgeable of current practices and existing capabilities within the country, so that available foreign technologies can be adapted to local conditions. The need is also for gradually developing indigenous human resource competence so that the country might become less dependent on external sources of technology and be able to utilize technologies with increasing effectiveness to complement broad national development goals.

In this context, the educational training that a student in science and engineering receives at the institutions of higher learning in Costa Rica is of vital importance. Also, the availability of such training to the citizens at large is crucial if the country is to build a national

science and technology base that would facilitate assimilation of modern practices from abroad, disseminate the information to a broad group of appropriate users and enable the users to adapt it to their particular needs.

4A. Objectives

It was clear from the start of the Limon study that there was a noticeable brain drain from Limon Province to the metropolitan areas of the Central Valley. This migration of talent from the Province has resulted in an obvious dependence on other Provinces for technical experts and financial support. JAPDEVA has started a scholarship program for students from the Province with an assurance of employment in the Province on successful completion of their educational training. Although this scholarship program is unique for Costa Rica, the problem needs to be attacked on a national level, as well.

Therefore, a simultaneous effort was mounted to understand the scientific and technological educational system in Costa Rica so that suggestions might be put forward for plans to gear the educational training to meet the particular needs of non-metropolitan areas. The study was conducted in a multidisciplinary mode by the Office of Planning, University of Costa Rica. Through questionnaires and personal interviews, the multidisciplinary team sought the opinions of the ministries and staff members from the University of Costa Rica regarding the following:

--the relation between the current science and engineering educational programs and the manpower needs for national development;

--the degree of coordination that exists among the institutions of higher learning in science and engineering (University of Costa Rica, the National University at Heredia and Institute of Technology at Centago);

--the nature of the research (applied and basic) conducted by staff members at the University;

--the support that exists for creating an applied research institute affiliated with the University. The institute might provide an opportunity to relate the educational programs to the development needs of the country. An applied research institute might also be looked upon as a mechanism for

researchers, who are staff members at the University, to earn additional income. Because of the low faculty salaries, qualified and competent educators are entering the ministries or the private sector instead of the universities.

--the need for a meaningful faculty development program that not only encourages higher scholastic achievements but also promotes reforms in faculty salary structure, faculty promotion, benefits, etc.;

--the advisability of establishing regional centers or junior colleges to better distribute the opportunities for higher education to Costa Rican citizens; and

--the need for seeking viable alternatives to the current trend of establishing graduate programs in each of the CACM countries.

The findings of this study¹⁴ were published by the University of Costa Rica.

4B. Problems of Higher Education

The current trend in developing countries and among international agencies supporting education in developing countries is an obvious shift in favor of primary education. The emphasis on primary education is in keeping with cost-benefit analyses which show that in developing countries expenditures for education at the lower levels result in a higher social rate of return than expenditures for higher education.

Yet the demand for higher education has risen to levels that are taxing the very limits of existing institutions. Enrollment figures at the University of Costa Rica and its affiliates are typical of the increasing number of students seeking higher education in developing countries. (See Table 6)

The dilemma that University administrators and LDC governments face is complex and does not yield to easy solutions. Admission could be restricted by means of competitive examinations, but such a policy might be vulnerable to attack as unrealistic and undemocratic. Additional allocations from national funds would provide relief, but the likelihood that this will be possible is remote. Without much hope for a dramatic increase in government allocations for higher education, universities in the less developed countries might find

it necessary to seek approaches to decreasing costs, while improving the quality and relevance of educational programs.

Table 6
ENROLLMENTS AT THE UNIVERSITY OF COSTA RICA

	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>
San Jose Campus	9,189	11,000	12,528	14,606	15,724	18,257
San Ramon (Regional Center)	188	310	384	413	714	924
Turrialba (Regional Center)	--	--	--	117	221	355
Liberia (Regional Center)	--	--	--	--	204	255

Source: O. Torres Padilla, Situacion Socioeconomica de los Estudiantes de la Universidad de Costa Rica. (Oficina de Planificacion, Universidad de Costa Rica, 1974.)

Most universities in LDCs are located in metropolitan areas with the result that university education is not easily accessible to students from the rural areas of the country. The demographic distribution of students at the University of Costa Rica illustrates the disparities in student enrollment from the urban and rural areas.

Table 7

<u>Province</u>	<u>Percent of Total Enrollment</u>	<u>Percent of National Population</u>
San Jose	64.2	35.6
Alajuela	11.6	17.7
Cartago	7.6	11.3
Heredia	7.8	6.2
Guanacaste	1.9	11.0
Puntarenas	3.0	12.2
Limon	1.0	5.1

Source: Estadisticas universitarias y direccion general de estadistica y censos.

4C. Decentralization and Regional Centers

The need, therefore, is for the University of Costa Rica to decentralize its activities so that its services are equally accessible to all the citizens. This might be accomplished by expanding the practice of establishing regional centers in the various provinces. Initially, these could be organized as junior colleges offering the first two years of instruction, which could be followed by two years at the main campus in San Jose. Later, the junior colleges might become full-fledged universities linked to the University of Costa Rica in San Jose. In addition to providing more of the rural people with access to higher education, regionalization offers several other advantages. It might help stem the brain drain that is now occurring in rural areas such as Limon Province; students who move out of their home provinces to seek higher education rarely return. It would also relieve, at least temporarily, the pressure of a rapidly expanding student enrollment at the San Jose campus. And, it would give the University the opportunity to plan and offer study programs and short courses that are appropriate to the needs of particular regions.

If the regional centers in the provinces are to become cost effective and attractive centers of learning, then the disparity in the quality of instruction and student performance between the regional centers and the metropolitan areas need to be evened out.

Due to a host of understandable reasons, the staff members at the University of Costa Rica are reluctant to live in the provinces and teach at the regional centers. Therefore, relatively inexperienced teaching assistants now carry the bulk of the teaching responsibilities at the regional centers. Further, the few experienced and dedicated teachers at the main campus are involved in teaching increasing numbers of students who are registered each semester for the basic course in Physics. Thus experienced teachers may find it difficult to visit the regional centers for even short periods. Consequently, the level of instruction at the regional centers suffers and students from the provinces tend to migrate to the metropolitan universities in search of better education.

A pilot effort at the regional center in Limon City has been proposed to demonstrate an approach to strengthen the educational program. Through discussions with the Department of Physics, University of Costa

Rica, and others, the basic course in Physics offered by a UCR professor will be used as a means to test the approach to improving the quality of education at the regional center in Limon City. The professor identified by the Department of Physics, UCR, is recognized by the faculty and students as an outstanding teacher who has greatly motivated students who had registered for his course. Also, he has written a textbook for the basic course in Physics. The pilot project will enable the regional center at Limon City to benefit from such an experienced teacher.

The professor has organized a set comprising 40 one-hour lectures in Spanish that covers instruction for the basic course in Physics offered at UCR. PPSTDN and the University of Costa Rica plan to utilize the TV instructional facilities available at Cornell to enable the professor to videotape the entire set of lectures in Spanish.

While at Cornell, he will review and may build into his lectures appropriate film strips from the catalog of films produced by Centro Regional de Ayuda Tecnica, AID, Mexico, in support of his lectures. The series of videotaped lectures will be offered on an experimental basis at the regional center in Limon City. The potential students at the regional center will be screened to ascertain whether or not they need preparatory instruction to enable them to take advantage of the program. Weekly short tests will be part of the program to have an on-going evaluation of the pilot program.

A teaching assistant will be assigned to the project during the semester and the professor will visit Limon regularly for informal discussions with the students and teaching assistant.

An evaluation of the project will be carried out at the end of the semester to ascertain the effectiveness of the pilot effort as an approach to enhance the quality of instruction at the regional centers in Costa Rica.

5. A MODIFIED BUBBLE-UP APPROACH (THE VACUUM COFFEE-MAKER ANALOGY)

A small developing nation is characterized by a network of small, closely-knit provinces. Citizens are likely to cross provincial borders more frequently than in a large country. In spite of such features that promote national integration, not all provinces are at the same level of development. By design or circumstances, development in some

provinces has lagged behind others. Talent from the depressed provinces often migrate to other areas where better opportunities exist. Thus the depressed provinces rely on other provinces and the government for technical assistance, services and financial support.

Since a national science and technology policy is designed to bring about development of the nation, a focus on narrowing the disparities in the level of development among the provinces was considered a relevant objective.

The bubble-up approach to policy formulation and implementation is an effort to bring about development by the citizens of a depressed province. As discussed earlier, although the process is initiated at the appropriate level, it lacks political realism.

Some modifications are necessary to facilitate the process. A refined bubble-up approach was attempted in Limon Province. The essential features are:

- Initiating the process in Limon Province where the impact of science and technology policies need to be felt;

- Featuring local participants at all stage of the process;

- Establishing linkages between the province and the center to facilitate implementation of policies and plans;

- Utilizing a multidisciplinary team approach to formulate and implement science and technology policies; and

- Including experts from ministries, research centers, autonomous institutions, universities, etc. to form the multidisciplinary team.

The Limon report¹⁵ not only defined the role of science and technology for development of the province but it also suggested means to carry out the recommendation. The immediate need was the creation of a regional development council to coordinate efforts and formulate policies and plans for regional development.

The recognition of the Limon report by the Ministry of the Presidency attests to the success of this approach (appendix (c)).

It is possible to use an analogy that illustrates the refined bubble-up approach for integrating science and technology considerations into policies and plans for development. This analogy was presented at several meetings in Costa Rica and it greatly facilitated the conceptualization of the modified bubble-up approach. Since coffee is the

principal agricultural export of Costa Rica, and good coffee-making is a discussion topic at informal gatherings, the analogy was considered relevant to Costa Rica.

The conventional bubble-up approach is analogous in many respects to the operation of an electric percolator for making coffee. The heating element (refer diagram) creates a localized hot spot in the water and a shot of steam and hot water is forced up the tube to the top. Then, under the action of gravity, the hot water trickles through the ground coffee and droplets of coffee solution fall at random onto the water below. The cycle needs to be repeated several times before coffee of uniform consistency is produced. This analogy emphasizes the following features:

--The definition and identification of the needs in a region are highly localized. It might be generated by speculators or self-interested groups within the region. Broad participation by citizens of the region in defining regional needs and establishing priorities is often overlooked. This leads to a breakdown of horizontal linkages within a region.

--Even if broad participation by local citizens is achieved, it lacks political realism. Regional representatives of government institutions, or experts from the Central Government need to participate in the process.

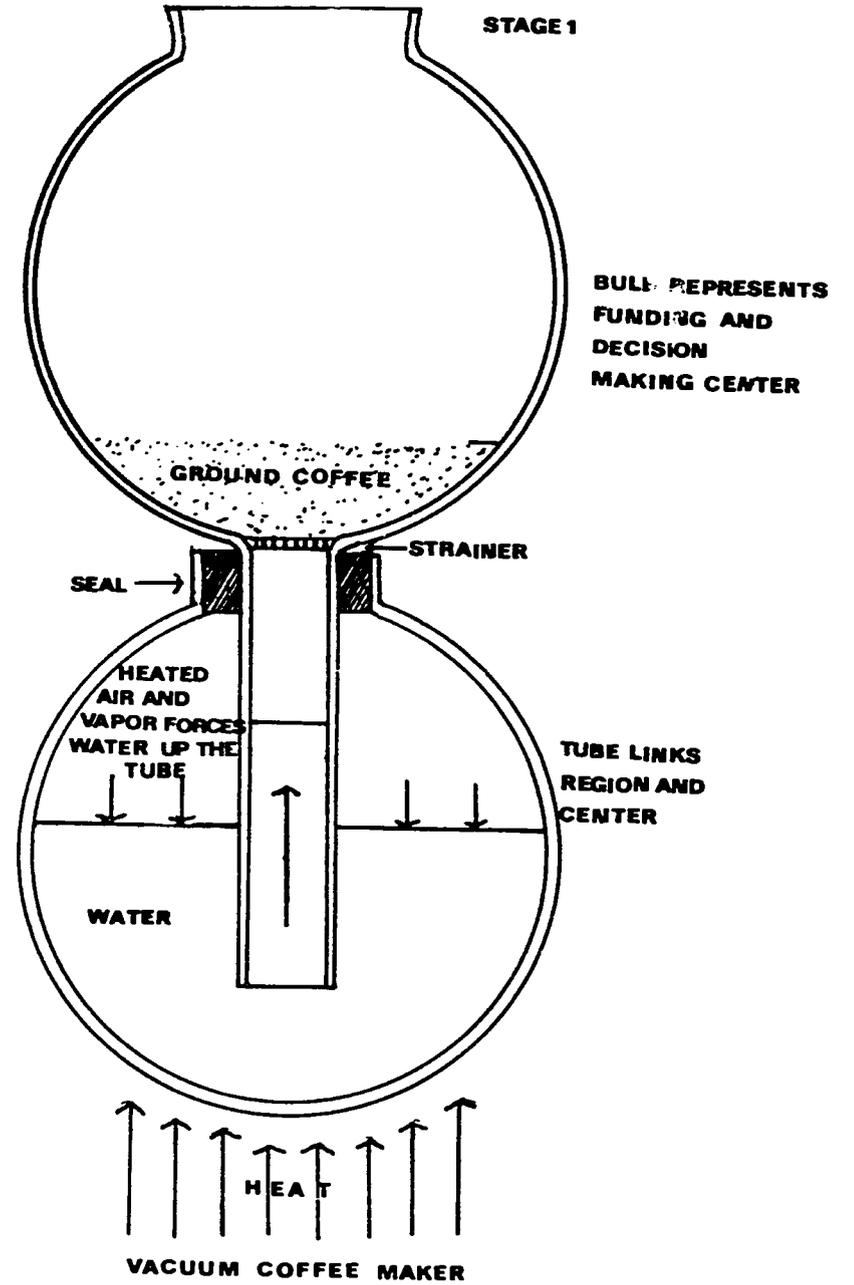
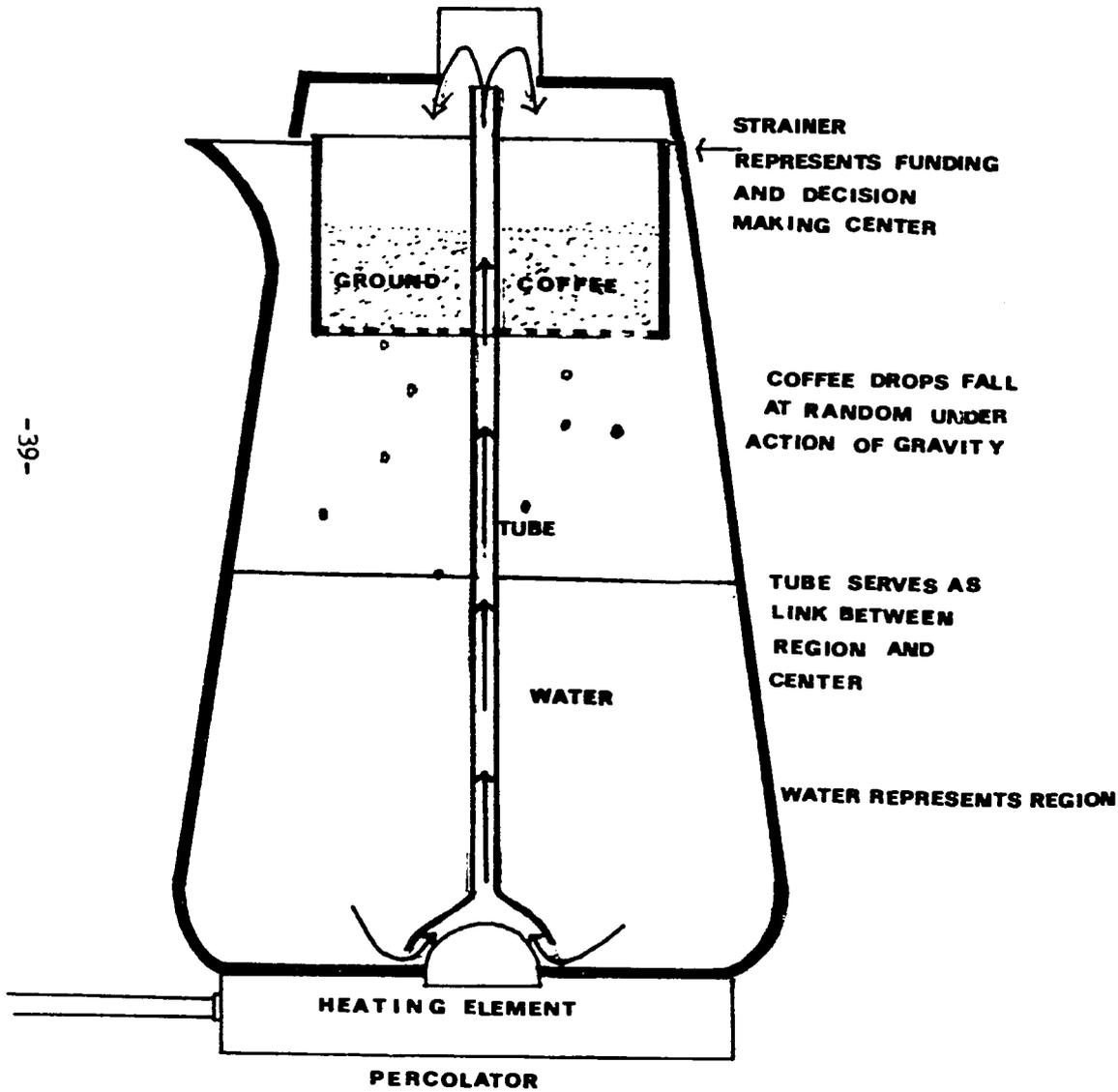
--The communication link from the region to the decision-making level is not utilized when decisions affecting the future of the region is channeled back to the region. (Note that the water, after passing through the ground coffee, does not flow back through the tube, but drops indiscriminately on the water below.) The bypassing of established lines of communication makes implementation of policies more difficult.

The citizens of a region who will be affected by policy decisions are often uninformed about plans for the region. This feature lessens the enthusiastic citizen support that is essential for the implementation of development plans.

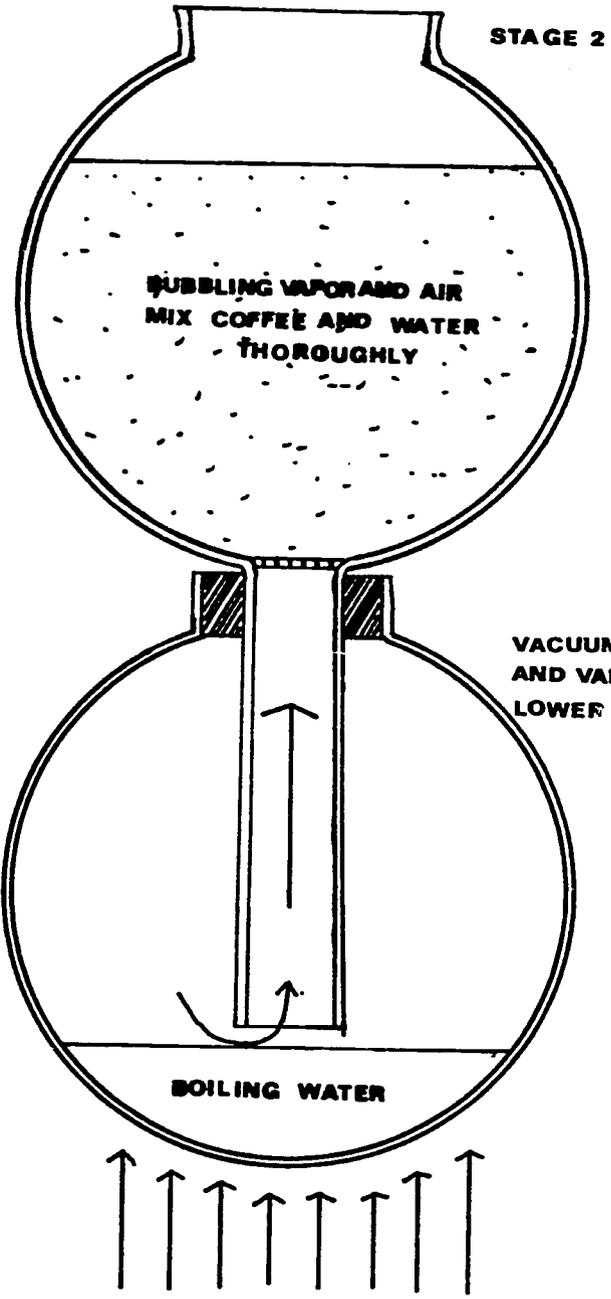
--The process needs to be repeated several times before coffee making is complete. This implies an inherent inefficiency in operation since a longer time and repeated efforts are needed to formulate and implement the development plans.

Contrast this with the proposed Vacuum Coffee Maker (a refinement of the bubble-up approach) analogy. The even heating of the water in the lower bulb raises the temperature of the water almost uniformly. Since the lower bulb is sealed from the upper bulb, with the addition of heat,

-39-

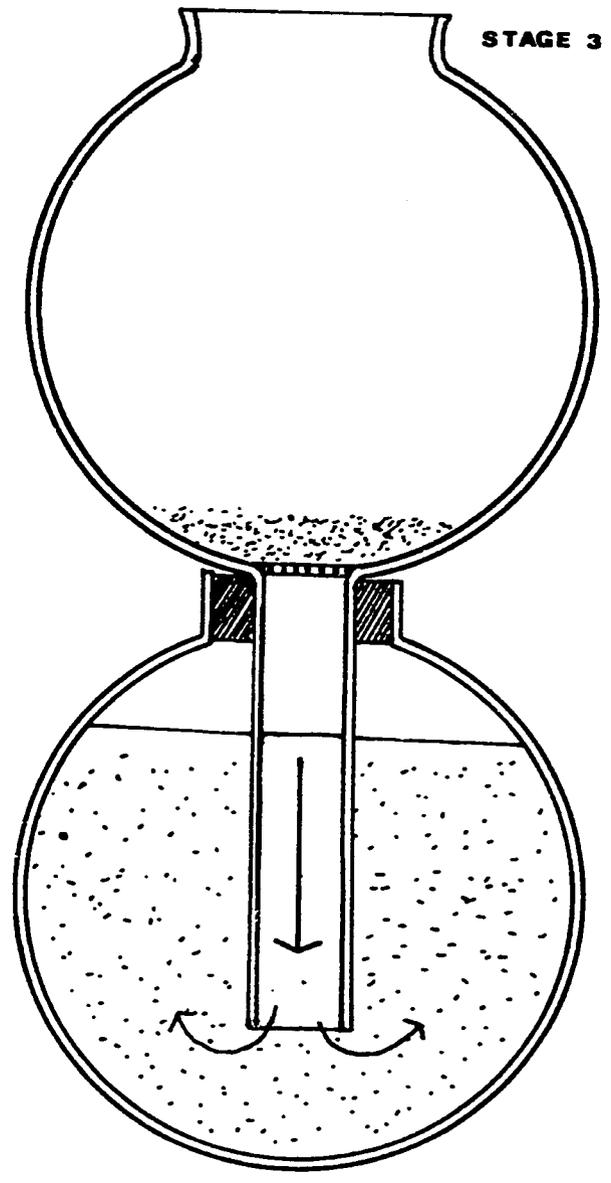


-01-



**VACUUM CREATED WHEN AIR
AND VAPOR ESCAPES
LOWER BULB**

**AS WATER COOLS
VACUUM DRAWS
COFFEE CONCENTRATE
THROUGH
TUBE INTO LOWER
BULB**



the heated air and water vapor in the lower bulb forces the hot water up the tube where it mixes with the ground coffee in the upper bulb. When the level of water in the lower bulb drops below the bottom of the tube, air and steam escape through the tube into the upper bulb. While bubbling through, the coffee grains and hot water are thoroughly mixed. As the coffee maker is allowed to cool, a vacuum is created in the lower bulb which draws the coffee concentrate back into the lower bulb through the same tube. Coffee is produced in a single cycle. The proof of this analogy is in the taste of the coffee.

The vacuum coffee maker demonstrates several features that are essential for a practical approach to policy formulation and implementation that highlights the relevant role of science and technology for development:

- The citizens of the region and regional representatives of government institutions need to participate from the initial stages of information dissemination and definition of their particular needs. The almost uniform rise in temperature in the lower bulb indicates horizontal linkages among different areas within the region.
- There is a continuous flow from the region to the decision-making level. This type of regional representation to the decision-making level also creates a climate (the vacuum in the lower bulb) for action that is better for effective policy formulation and implementation.
- Since the established communication link from the region to the center for defining regional needs is also utilized for action from the center to the region, the vertical link establishes a healthy exchange between the region and the center.

The pilot effort in Limon Province closely followed the stages described in this analogy. The effort has generated considerable enthusiasm within the Province and at the highest levels of government. The Ministry of the Presidency has carried out some of the recommendations of the study; it is preparing to use the Limon experience as a pilot effort to mount similar studies in other regions of the country. Aspects of science and technology considerations that are common to the regional efforts will lead to a national policy for science and technology in Costa Rica.

6. ACTIVITIES IN COSTA RICA SUBSEQUENT TO THE LIMON STUDY

1. The National Council of Scientific and Technological Investigation (CONICIT) was created by Costa Rican Law No. 5048 and began functioning on August 1, 1973. CONICIT is an autonomous institution and a government decision-making body. It coordinates its functions with those of national planning institutions. CONICIT is responsible for formulating a national policy for science and technology that will be reflected in the national plans for the socioeconomic development of the country.

The President, members of the Board of Directors and the Executive Secretary at one time or the other, either participated in or cooperated with PPSTDN efforts in Costa Rica.

2. PPSTDN, CONICIT and IFAM (an autonomous Costa Rican institution responsible for working through the municipalities for local participation in regional development) conducted a seminar in Limon City to disseminate the information contained in the Limon report to representatives from the Province and to officials of the Government of Costa Rica.

3. PPSTDN cooperated with IFAM and CONICIT to organize the Regional Council for the Development of Limon Province. Appendix (d) lists the members of the Council and the organization chart for the Council. In August 1974 Dr. Carlos Manuel Castillo, Vice President of the Government of Costa Rica, inaugurated the Council. During the inaugural address, the Vice President stated that he had been instructed by President Oduber to inform the Citizens of Limon Province that Limon Province would receive top priority for regional development in the country.

4. The Government of Costa Rica has organized in San Jose, a separate coordinating body comprising decision-makers from the ministries, autonomous agencies, etc. to respond to the requests and recommendation of the Regional Development Council in Limon. Ing. Max Sittenfeld Roger has been appointed by Vice President Castillo to head the coordinating body in San Jose.

5. On September 20, 1974, three members of the Regional Council visited Cornell seeking PPSTDN's assistance in establishing a loosely structured regional center for Limon Province (one of the recommendations of the Limon study).

6. Later, Ing. Max Sittenfeld and representatives from JAPDEVA and IFAM visited Cornell with a request that PPSTDN assist the Government of

Costa Rica in continuing with the effort it had started in Limon.

A translation of the proposal is included in Appendix (c).

7. The Regional Development Council for Limon Province met on January 10, 1974, and voted to seek PPSTDN's assistance to carry out the recommendations of the Limon Report. PPSTDN has received a formal request (Appendix (e)) from Sr. Mario Castro Perez, Executive Director of the Council, seeking the Program's assistance.

8. In support of the decision by the Regional Development Council, IFAM is willing to pay for the living expenses for a technical expert from PPSTDN to be stationed in Limon for up to two years (Appendix (f)).

9. PPSTDN and CONICIT have cooperated in conducting a study that seeks alternate strategies for the squatter settlement problem in Limon City.

The list of activities that have taken place since completing the Limon study is indicative of the commitment and continued enthusiasm that exist for the development process in Limon Province.

7. CONCLUSIONS

Small developing nations are characterized by small population, under utilized natural resources, limited domestic markets, a restricted educational base especially in science and technology and an embryonic yet growing indigenous industrial sector. With a network of small and closely-knit provinces it might appear that all provinces within a small developing nation are at the same level of development. This was not the case in Costa Rica; and may not be the case in other small countries either.

Since the ultimate objective of a national science and technology policy is to bring about development of the nation, a focus on the disparities in the level of development among provinces was considered a relevant goal. It is also a practical goal in a small country since citizens are likely to cross provincial boundaries more frequently than in a large country. This feature not only brings about an awareness of the problem but also helps in the integration of the provinces.

A modified bubble-up approach (the Vacuum Coffee-Maker analogy) to science and technology policy formulation and implementation was started in a depressed province of Costa Rica. The essential features of the approach are:

- Initiating the process in the region where implementation of national development policies is most needed;
- Requiring local participation at all stages of the process;
- Emphasizing the implementation phase of the process;
- Adopting a multidisciplinary team approach to integrate science and technology opportunities to development of the region;
- Encouraging regional representatives of government institutes, ministries, etc. to participate in the multidisciplinary team effort;
- Establishing linkages within the region and linkages from the region to the decision-making bodies of the government. Healthy linkages facilitate science and technology policy formulation and implementation.

If parallel projects are mounted in other provinces of the country, aspects of science and technology considerations that are common to the development of each province will point to a national policy for science and technology in a small developing country.

From the flurry of follow-on activities taking place in Limon Province and at the government level, there is evidence that the modified bubble-up approach to science and technology policy formulation and implementation is working in Costa Rica.

The enthusiasm for regional development that exists in Limon Province offers AID a unique opportunity to utilize PPSTDN's competence, experience and contacts in Costa Rica to great advantage. With modest additional investment it should be possible for AID to demonstrate an approach to rural development of Limon Province that features the appropriate role of science and technology for development. Furthermore, Limon Province is typical of the Atlantic coastal areas of the CACM countries. The pilot effort in Limon will be valuable to ROCAP's efforts in the Atlantic region of CACM countries. The small population of Limon Province would give quick visibility to the impact of science and technology on regional development.

If the approach initiated in Costa Rica can be tried out in typical small developing nations of Africa and Asia, the comparative data from such efforts would provide valuable information to understand and develop a broad global strategy for formulating and implementing science and technology policies for small developing countries.

Appendix (a)
The Cornell-Costa Rica Team

1. Costa Rican Consultants

<u>Name</u>	<u>Background and Training</u>	<u>Remarks</u>
Oscar Padilla	Economist	Costa Rican Coordinator of Project; He will be leading IFAM's participation in the regional development of Limon Province.
Juan Castro Chamberlain	Agricultural Economist	Professor, Department of Agronomy, University of Costa Rica; General Manager, Xerox de Costa Rica, S.A.
Garrett Britton	Agricultural Engineer	Regional Director for Agriculture, Limon Province, Ministry of Agriculture, Government of Costa Rica.
Felix del Barco	Food Technologist	Professor, Food Technology Department, University of Costa Rica.
Rodolfo G. Madrigal	Geologist	Professor, Department of Geology, University of Costa Rica.
Guido Rodriguez	Transportation and Port Engineer	Department of Ports, Ministry of Transport and Public Works, Government of Costa Rica.
Joseph Tosi	Geographer and Forester	Tropical Science Center, San Jose, Costa Rica.

2. Cornell Staff and Students

<u>Name</u>	<u>Background and Training</u>	<u>Areas Investigated for the Study</u>
<u>Cornell Staff</u>		
Franklin J. Ahimaz	Assistant Director, PPSTDN	Principal Investigator of Project; Assistant Dean of Engineering
Howard E. Conklin	Agricultural Economist	Professor, Agricultural Economics
Edmund T. Cranch	Director, PPSTDN	Dean of Engineering
Ta Liang	Aerial Photograph Interpretation	Professor, Civil and Environmental Engineering
James A. Liggett	Water Resources	Professor, Civil and Environmental Engineering
<u>Cornell Students and Graduates</u>		
Marlene Ahimaz (U.S.)	Business Administration	A voluntary participant in the program; studied opportunities for an industrial park at Limon City
Jose E. Bonilla (Costa Rican)	Agriculture	Livestock
Jorge de la Guardia (Panama)	Water Resources	Sedimentation in rivers.
Fernando Nasmyth (U.S., formerly from Limon)	Government	Institutions and human resources
Martin Raine (U.S., residing in Costa Rica)	Agriculture	Agricultural crops
Guillermo Ramirez (Costa Rican)	Food Technology	Agro-industries
Federico Rojas (Costa Rican)	Agricultural Economics	Transportation and agricultural economics

EXCERPTS FROM THE TICO TIMES

Friday, June 6, 1975

FORESTS IN DANGER IN TORTUGUERO

The Caribbean Conservation Corporation (CCC) charged this week that U.S. businessmen are destroying large forest areas in the Tortuguero Canal area.

Guillermo Cruz of the CCC, who showed a group of representatives of the National Scientific Investigations Council (CONICIT), the University of Costa Rica and the Organization of American States around the area last weekend, explained that the massive exploitation of trees will seriously affect the ecological balance in the area and result in the death of many animals.

The foreign timber industrialists have contracts to exploit the area, which are presently under fire by concerned conservationists.

Friday, June 13, 1975

FOREIGN BOATS STEALING TURTLES

Minister of Agriculture Hernan Garron announced this week that foreign boats are still entering Costa Rican waters in the Atlantic Tortuguero region and capturing the green turtles that nest there.

Garron said the problem has become very serious in the light of Costa Rica's lack of resources to deal with it.

Officials believe that the turtles are captured by Nicaraguan boats which deliver them to a plant which processes the meat for sale in that country.

Garron added the green turtle, which is near extinction, is further plagued by stray dogs that feed on their eggs and bartenders who offer the eggs as "bocas". He said Rural Guards in the Tortuguero area have killed up to 400 stray dogs a month found feeding on the eggs, and numerous bars have been closed.

He announced that a project to breed the turtles in tanks in Cahuita National Park on the southern Atlantic coast is presently under way.

Friday, June 13, 1975

\$20 MILLION PROJECT STARTING NEAR LIMON

A NEW \$20 million dollar development, Playa del Sol, is under way at Boca de Martina, just north of Limon.

The Canadian-financed project will consist of 2500 houses, 10 hotels, golf courses, tennis courts, and all the facilities necessary to service a city of this size and type.

The development site is in the process of being cleared and surveyed. Joe Slyomovics, principal Canadian backer, feels that it will be at least five years before the project is completed.

IT WAS stressed that the community would be open to everyone, with no fences, gates, ID cards or closed beaches. The developers hope to avoid the tense situations that have occurred at some of the tourist areas in Guanacaste.

The official announcement of the Playa del Sol project was made in Limon at the Cabinas Getsemani, a popular tourist resort. On hand were representatives of the Costa Rican Tourist Institute, (ICT), the Banco Credito de Cartago, INVU, and JAPDEVA.

The speaker's list was headed by Carlos Lara, executive president of ICT, who said he welcomed investments of this type, because Costa Rica needs more foreign capital and initiative. Lara added that most pensionados and other foreigners here represent a very positive influence for Costa Rica.

AN undertaking of this magnitude is expected to give a tremendous boost to the sluggish economy in the province.

Officials estimate that approximately 25,000 people in the area will benefit directly from Playa del Sol.

Appendix (c)

MINISTRY OF THE PRESIDENCY

April 5, 1975

Dr. F. J. Ahimaz
Assistant Dean of Engineering
Cornell University
Ithaca, New York
U.S.A.

Dear Dr. Ahimaz:

May this letter serve, on my behalf, and on behalf of the Government of Costa Rica, as a testimony to you, and through you to the other directors of your worthy institution of higher learning, our appreciation and acknowledgement for the repeating help and cooperation we received towards the improvement of our country and our institutions. The interest demonstrated by your technicians in seeking to find the best methodology for optimizing the application of science and technology to the development of our country is a factor well recognized and received by our officials.

I would also like to take this opportunity to express, having as a base the various documents that have been exchanged between you and officials of various Costa Rican national institutions, the preliminary agreements that have been reached as a result of a series of conversations with members of our organizations and taking into consideration the high spirit of cooperation demonstrated up to this date, the desire of our Government that Cornell University would continue to participate with us on the broad as well as specific short and medium term projects of national and regional interest that are planned to be developed for the country.

These projects are of transcendental and prioritarian importance and have the complete backing of the responsible Costa Rican institutions, and our Government.

In the continuing pages I have tried to summarize the projects which each institution would like to develop with the type of guidance and cooperation that is being sought from PPSTDN and from Cornell University. What is needed is an approach to integrate these individual interests into policy, plans and a methodology for regional development of Limon Province.

JAPDEVA

This institution would like to carry out the realization of the following projects:

1.1 International Industrial Park, National Industrial Park and a Free Zone

JAPDEVA as the entity responsible for the Economic Development of the Atlantic Slope, would like to achieve through implementation of this project and through the port installations that are being constructed now, the opportunity to stimulate and create new sources of employment.

It is hoped that during the first stage 4,000 employment positions will be created.

Recently, a bill was proposed to the Costa Rican Legislative Assembly which seeks to give JAPDEVA the authorization to develop and administer the program. The Commission of Governmental Affairs of the Legislative Assembly is currently studying the proposed legislation which would provide JAPDEVA with the required land (estimated at 2,000 hectares) exclusively for the industrial park.

In addition to these steps, JAPDEVA has received from foreign consulting firms proposals to design the port complex.

Given the importance of this project to the country, and especially Limon, taking into consideration the implications that the development of a project of this type has on other areas, such as environmental pollution and ecological imbalance, availability of human resources, transportation, tourism, housing, etc., and admitting the scarcity of national know-how in the specific area of industrial parks, its design and administration, it would result in a great benefit for the country to be able to count on a high level guidance and cooperation that Cornell University could provide in the following areas:

- a. Revision of the terms of reference of contracting with the consulting firms.
- b. General guidance during the development of the studies and designs.
- c. Evaluation, revision and recommendations on the specifications, final plans and contracting documents.

1.2 Mariculture and Other Aquatic Fauna

Studies have been realized which have proven that the protein deficiency of a certain sector of the population can be attacked through the utilization of the resources of the sea and the intensive and technical development of certain varieties of aquatic fauna, such as shrimp, lobster, crawfish, green turtle, manatee, etc.

In addition to the nutritious value which is part of a formula to combat the protein deficiency that these products have, not of any lesser importance is the income they could also generate. These products constitute a very appreciated cuisine which is used by the most demanding gourmets for which they normally command high prices.

The Atlantic Zone and in particular the Province of Limon have the necessary conditions for this type of development and its possible industrialization.

However, it will be necessary to undertake a series of basic studies in order to establish the varieties or species common to the area that could be raised with the highest yield, and at the same time identify measures that should be taken to conserve or improve the environmental and ecological conditions that would guarantee a continued development.

The type of cooperation that Cornell University could provide us with in this undertaking would be one of great importance and value.

The details as to the exact nature and character of the guidance sought can be derived from the attached report prepared by JAPDEVA.

1.3 Cultivation and Industrialization of Coconut and of Other Agricultural Products

As it was correctly suggested in the document prepared by Cornell University under the title: "The Natural Resources Potential for the Regional Development of the Province of Limon: A Preliminary Study" and subsequently emphasized by Dr. Ahimaz in a letter dated December 9, 1974, addressed to Lic. Mariano Ramirez, Executive Secretary of CONICIT, the cultivation of coconut offers great attractions in various areas in the agro-industrial activity.

This crop is of great significance, as 2/3 of the approximately 3,000 hectares that are cultivated in the country is located in Limon Province, in its great majority along the coast line.

Unfortunately, the agricultural as well as the industrial exploitation of this crop is still very rudimentary and inefficient. The technology of this product in the country is still virtually unknown in Costa Rica.

JAPDEVA has prepared a document that could serve as a base in attempting to achieve the definition of a program of general and specific supervision on the part of Cornell University. This document is attached.

Other agricultural products exist that could be included in a program of study, As long as they are aimed at aiding the agricultural diversification which is so necessary to a zone where primarily one crop has been prevalent. Among these agricultural products the following could be identified: African palm, black pepper, etc.

1.4 Inventory of Natural Resources

Recently an interinstitutional cooperation accord was reached for the implementation of a system of Regional Urban Planning between OFIPLAN, INVU, and IFAM on the one side, and the OAS on the other.

This accord is divided in four phases, which are outlined below:

First Phase:

Structure and compatibility of urban development plan: three months duration (of national character).

Second Phase:

Formulation of the National System of Urban and Regional Planning: nine months duration.

Third Phase:

Elaboration of a Plan for Integral Development for the Atlantic Slope: eighteen months duration--beginning in April 1976.

Fourth Phase:

Evaluation of the results and adjustments of the methodologies of work for its application in other regions of the country: six months duration (1977-1978).

As coordinator of this effort and Director of this project, the institutions agreed to name on a full time basis, Ing. Leonardo Silva King, who is also the regional planner and an experienced official of OFIPLAN.

As you will note, the third phase of the agreement foresees the creation of an integral development plan for the Atlantic region, beginning in April 1976.

Whatever plan that is formulated will necessarily have to begin with a program of inventory of all the natural resources, with the objective of being able to identify according to its character the best use and optimum protection of the same.

According to these observations, it is of prioritarian importance to establish systems of analysis and the execution of the program of Natural Resources Inventory. This is where the assistance of Cornell University is considered to be of utmost importance, so that this effort can be carried out in anticipation of the beginning of the third phase.

We consider this effort to be one of transcendental importance to the region and the country. The application of modern technology in the field of aerial photography interpretation, which is unknown in the country, could result to be of great value. These technologies parallel to other orthodox procedures could provide us in a short period with a potential outlook with which in reality we can count on.

It is possible that the study, due to its magnitude and depth, will require to be divided in smaller areas but this is an aspect of subsequent analysis.

In a meeting held with Arq. Silva and Dr. Osvaldo Bedini, Assistant Director of the Program of Urban Development of OAS, the importance that the participation of Cornell University could have in the execution of the third phase of the mentioned agreement was emphasized, not only in the inventory aspect of it, but in the formulation of the Plan for Integral Development of the Atlantic Slope as well.

In this same vein, the officer of the OAS previously named, made it known that the participation of Cornell University would present no possible interference with the agreement; instead the participation of Cornell University would complement and be beneficial to the program.

In a program of such an important magnitude such as this one it would not be possible to count only with the resources that at the moment are available in JAPDEVA, and the remaining institutions that are involved, but it will be necessary to count with other national organizations as well, such as the universities, the Institute of Agricultural Sciences at Turrialba (OEA) and national private consulting firms for specific projects, the ones that could eventually be contracted with through the pre-investment funds that the OFIPLAN administers.

The personnel and equipment which JAPDEVA would count with for all the studies is as follows:

Technical Personnel of JAPDEVA

Planning

- 3. Civil Engineers
- 1. Electrical Engineers
- 1. Mechanical Engineers

Development

- 2. Agricultural Engineers
- 2. Forestry Engineers
- 1. Technician in
- 1. Technician in

Equipment:

Vehicles

- 2. Double Traction Pick Up Trucks
- 6. Small Boats with Outboard Motor

Others:

Means of Transportation

The railroad can be used to and from San Jose and Limon

Other Personnel

All the secretarial work that is needed
Office space

Living Quarters

1 house to be provided compliments of JAPDEVA

Food

To be provided compliments of JAPDEVA

2. Costa Rican Institute of Tourism

This institution which has the responsibility for the tourist development of the country, has become aware of the great problem which results from the lack of sufficient qualified personnel for the industry of hotel administration activity.

It is essential that the country have sufficient numbers of qualified personnel in this field if it wants to mount a serious attack on the problems related to national as well as foreign tourism.

To that effect, the I.C.T. has elaborated a program for the creation of a Hotel School that could also serve the purposes of Central America.

The prestige that Cornell University has in this field is known worldwide, and nothing would be more advantageous to this program than to court with the assistance--general and specific--from a group of specialized individuals from this learning institution.

To that effect and according to our preliminary conversations, the personnel in charge of this project at I.C.T. have prepared bases of reference for the possible cooperation of Cornell University in this area. (For the relevant document please refer to the attached reports.)

3. Department of Physics--University of Costa Rica

Through a recent visit made to this institution by Professor Neville Clark, Director of the Department of Physics--U.C.R., you will have become aware of the research programs for which the cooperation of Cornell University is sought.

At the present moment the Rector of the University of Costa Rica--Dr. Claudio Gutierrez, is studying the physical layout of the Department of Physics. In any event, this is an aspect which can be dealt with directly between the universities without requiring our intervention, unless our cooperation is considered necessary.

Listed are the programs for which cooperation has already been requested:

- a. Technology of Teaching. Methods of Mass Instruction at the University level.
- b. Application of Nuclear Physics for the identification and control of environmental pollution.
- c. Identification of potential sources of geo-thermal energy by means of photography by satellite.

It is noteworthy to mention that programs (a) and (b) could be of certain degree of utility in the other projects listed previously for the Atlantic Slope.

I recognize that it is difficult to define in greater detail the depth and possible extent of the cooperation that is possible for us to eventually receive for these projects from your outstanding institution. I hope, however, that through our visit to your University, we can reach some agreement that satisfies our mutual interest in applying the Science and Technology, to maximize the opportunities for the immediate development of our resources.

Cordially,

Ing. Max Sittenfeld R.

Appendix (d)

CONSEJO REGIONAL DE DESARROLLO DE LA PROVINCIA DE LIMON

I. JUNTA DIRECTIVA (8)

JAPDEVA - Presidente	Mario Pérez	Vice-Pres. JAPDEVA
Municip. de Limón - Secretario	Víctor Contreras Molina	Pres. Municipal
Supl.	Alfredo Quesada Rodgers	Vice-Pres. Municipal
Municip. de Pococí - 1 ^o Vice-Pres.	Enrique Alfaro Vargas	Pres. Municipal
Supl.	Modesto Campos Lobo	Regidor
Municip. de Siquirres - 2 ^o Vice-Pres.	Rafael César Mena Salgado	Pres. Municipal
Supl.	Rodolfo Jarrett Marston	Regidor
Municip. de Matina - Fiscal	Lorens Norman Colphan B.	Regidor
Supl.	Misael Sánchez López	Ejecutivo Municipal
Municip. de Guácimo - Fiscal	Alcibíades Jara Solís	Pres. Municipal
Supl.		
Municip. de Talamanca - Tesorero	Jerbert Michelson McKenzie	Regidor
Supl.	Manuel León Salazar	Regidor
IFAM - Ejecutivo, Coordinator	Oscar Padilla Sellen	Asesor, IFAM
JAPDEVA, Ejecutivo, Coordinator	León Laprade Fonseca	Jefe, Dpto. Desarrollo JAPDEVA

II. REPRESENTANTES SECTOR PUBLICO (21)

Sector político - Gobernador	Asís Esna Miguel	Gobernador de Limón
Sector educación - Universidades	María Eugenia Dengo de Vargas	Vice-Rectora Acción Social, U.de C.R.
- Junta de Educación de Limón	Ernesto Lincoln Sawyers	Pres. Junta Ed. de Limón
Sector agropecuario - MAG	Edgar Cordero Madrigal	Director Centro Agr. Regional
- CNP	Eduardo Déspedes Fonseca	Director CNP Limón
- ITCO	Jorge Garita Hernández	Rep. ITCO Limón

Sector formación prof. y technol.

- Instit. Tec.

- INA

Sector bancario - Bco. de C.R.

- Bco. Nal de C.R.

- Bco. Anglo Cost.

- Bco. Popular

- CODESA

Supl.

Sector transportes y obras públicas

- INVU

- IMAS

Asociaciones de la comunidad

Sector instituciones de servicios

- ICE

- SNAA

Supl.

- ICT

Supl.

Gerardo Bogantes Hidalgo

Rodolfo Patino Gutiérrez

Leonardo Ingianna Rosito

Luis E. Valerio Lobo

Víctor Hugo Miranda Calderón

Fernando Monterosa Cabar

Ernesto Macaya

Arnoldo Valverde

Vice-Rector, ITN

Gte. BCR, Limón

Gte. BNCR, Limón

Gte. BAC, Limón

Gte. BPDC, Limón

Dir. Dpto. Técnico

Otto Fernández

Javier Rolanos

Jefe Of. MOPT Limón

Arq. INVU

Jefe OF. IMAS

Pres. 24 Millas

Pres. Cariari-Pococí

Salvador Mayorga

Joaquin G. Picado Z.

Fernando Araya

Claudio Donato Sauteriano

Gte. ICE Limón

Dept. Planificación

SNAA

Desiderio Arias Guerrero

Alvaro Castro

Guillermo Barrantes Guerrero

Gte. SNAA Limón

Arq. ICT Detp. Planif.

Sec. Oficina Turismo
de Limón

III. REPRESENTANTES SECTOR PRIVADO (13)

Sector agropecuario

- Agricultor gra.

- Ganadero

- Bananero, cámara

- Bananero, empresa

- Otro

Alpheos Buchanan Palmer

Carlos Rojas López

Francisco Cordero

Robert C. Fuller

Ejecutivo Mun. Talamanca

Pres. Cámara Ganaderos
del Atlántico

Gte. Cámara Nal. de
Gananeros

Standard

Sector industrial - Agroindustria
- Ind. corrientes

Sector comercio
Sector insti. cívico sociales
- Sindicatos

- Inst. Cívicas

Guillermo Ramírez
Tobías Kader

Rogelio Pardo

Osbaldo Munoz Díaz

Osman Frew Davidson

Gilbert Brown

Rómulo Salas

Jephtbah Grant

Técnico alimentos
Comerciante,
industrial

Sec. Gral. Sind. de
Trabajadores Ferr.
Nal. al Atlántico .
Sec. Gral. Unión de
Trabajadores de
Bananeros del
Atlántico (UTBA)
Sec. Gral. Sind. de
Trabajadores
Petroquímicos
y Afines
(CINTRAPEQUIA)
As. Cívico para el
Des. de Limón
Comité Cívico de
Limón
Centro de Formación y
Recreación Juvenil

IV. REPRESENTANTE DEL OBISPADO (1)



JUNTA DE ADMINISTRACION PORTUARIA Y DE DESARROLLO ECONOMICO DE LA VERTIENTE ATLANTICA
ADMINISTRACION DE DESARROLLO

Teléfonos: San José, 21-66-01 - Limón, 06-09-28 - Apartado: 1 - Cable: JAPDEVA

CONSEJO REGIONAL DE DESARROLLO DE LA PROVINCIA DE LIMON

Limón, 8 de mayo de 1975

Nº CL-52-75

Ref: 50-26-05

Señor
Dr. Franklin Ahimaz
Program On Policies for Science
And Technology in Development Nations
Cornell II University
180- Uris Hall
Ithaca - New York 14850
U.S.A.

Muy estimado Doctor:

En Sesión Nº 5 del 10 de enero de 1975 celebrada por el Consejo Regional de Desarrollo de la Provincia de Limón, se conoció y fue aprobada la siguiente moción que a continuación le transcribo:

- d) Rómulo Salas G: Con el objeto de acelerar planes para el desarrollo de la Provincia de Limón. El Consejo Regional de Desarrollo solicita a la Universidad de Cornell asistencia en la definición, organización y la ejecución de las siguientes áreas de estudio en cooperación con el Consejo Regional de Desarrollo y sus comisiones. El objeto es realizar estudios en las áreas enmarcadas definiendo la metodología para llevar a cabo los proyectos que serán presentados al Consejo para su consideración y ejecución.
- 1) El establecimiento de un Centro de Educación Superior de gran flexibilidad y adaptada a las diversas necesidades de la región que ofrezca cursos de Ingeniería forestal, topografía, estudios generales, escuela naval y otras, en cooperación con la Comisión de Educación y Formación Profesional y Tecnológica.
- 2) Creación de granjas demostrativas en cooperación con JAPDEVA, MAG, INA y la Universidad de Costa Rica; de técnicas nuevas para intensificar cultivos "SISTEMA PORTUARIO DE LIMON BRAULIO CARRILLO COLINA"

./.



JUNTA DE ADMINISTRACION PORTUARIA Y DE DESARROLLO ECONOMICO DE LA VERTIENTE ATLANTICA
ADMINISTRACION DE DESARROLLO

Teléfonos: San José, 21-66-01 - Limón, 58-00-88

Apertado: T

Cable: JAPDEVA

CONSEJO REGIONAL DE DESARROLLO DE LA PROVINCIA DE LIMON

Señor

Dr. Franklin Ahimaz

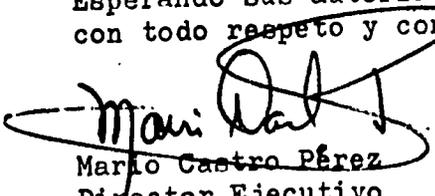
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Limón, 8 de mayo de 1975

existentes, cultivos múltiples y la diversificación agrícola.

- 3) Plan piloto en cooperación con la Comisión de Viviendas de bajo costo rural y urbanas usando materiales nativos de la zona, juntamente, una explotación vertical del coco y sus derivados, entre ellos, láminas de construcción hecha con la fibra del coco, aceite concentrado animal y otros.
- 4) Planificación con la Comisión de Turismo y la Comisión Industrial, del equilibrio óptimo entre la Industria turística y las fábricas dañinas al medio ambiente, entendiendo que el turismo tiende a preservar el ambiente natural de la zona.
- 5) Solicitar una reimpresión del estudio Costa Rica - Cornell. "El potencial de los Recursos Naturales para el Desarrollo Regional la Provincia de Limón: Un Estudio Preliminar" que ha servido a las entidades gubernamentales y a la Comunidad de Limón en la comprensión de los problemas de la Provincia de una manera multidisciplinaria y ha servido como una ayuda en la planificación y programación en el desarrollo de Limón.

Esperando sus autorizadas noticias al respecto, soy de Ud. con todo respeto y consideración.


Mario Castro Pérez
Director Ejecutivo
C.R.D.P.L

MCP/icr

Cc: archivo

"SISTEMA PORTUARIO DE LIMON BRAULIO CARRILLO COLINA"

APPENDIX (e)

TRANSLATION

Council for Regional Development of Limon Province

Limon

No. CL-52-75
Ref. 50-26-05

May 8, 1975

Dr. F.J. Ahimaz
PPSTDN
Cornell University
180 Uris Hall
Ithaca, New York 14853
U.S.A.

My Dear Doctor:

In Session #5 on January 10, 1975, convened by the Regional Council for Development of Limon Province, the following motion was approved:

d) Romalo Salas G: with the object of accelerating plans for the development of Limon Province. The Council for Regional Development requests Cornell University for assistance in defining, organizing and executing the following areas of study in cooperation with the Council for Regional Development and its commissions. The objective is to fulfill studies in the areas in charge of defining methodology to carry out the projects that will be presented to the Council for its consideration and execution.

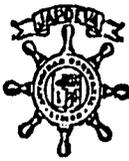
1) The establishment of a Center for Higher Education with great flexibility and adaptable to the different needs of the region that offers engineering courses, topography, general studies, naval school, in cooperation with the Commission for Education and Professional and Technological Growth.

2) Creation of demonstrative farms in cooperation with JAPDEVA, MAG, INA, and the University of Costa Rica of new technicians to intensify existing cultivation, multiple cultivation and agricultural diversification.

3) Pilot plan in cooperation with the Low-Cost Housing Commission using native zone materials together with the vertical exploitation of cocoa and its derivatives, plates for construction made with cocoa fiber, animal oil concentrate and others.

4) Planning with the Tourist Commission and the Commission for Industry, of optimum equilibrium between the tourist industry and the harmful factories in the environment, understanding that tourism has to preserve a natural atmosphere of the zone.

5) Request a reprint of the Costa Rican-Cornell Study. The Natural Resource Potential for Regional Development of Limon Province: A Preliminary Survey that has served the government groups and the community of Limon in the comprehension of the problems of the Province from a multi-disciplinary approach and has served as an aid in planning and programming in the development of Limon.



JUNTA DE ADMINISTRACION PORTUARIA Y DE DESARROLLO ECONOMICO DE LA VERTIENTE ATLANTICA
ADMINISTRACION DE DESARROLLO

Teléfonos: San José, 21-66-01 - Limón, 58-09-88

Apartado: T

Cable: JAPDEVA

Limón, 4 de julio de 1975

Nº CL-122-75
Ref: 50-26-05

Señor
Dr. Franklin J. Ahimaz
Assistant Deam Of Engineering
And Assistant Program Director
Program on Policies for Science and
Technology in Developine Nations.
Cornell University
180 - Uris Hall
ITHACA - New York - 14853
U.S.A.

Muy estimado Doctor:

Reciba un afectuoso saludo de sus amigos de Costa Rica y del Consejo Regional de Desarrollo de la Provincia de Limón.

Por medio de la presente acuso recibo de su atenta carta de fecha 9 de junio de 1975 y de la documentación adjunta que estamos estudiando, y de la cual recibirá periódicamente nuestros comentarios.

Nuestra presente comunicación obedece al hecho de haber reestructurado la Comisión de Vivienda y Urbanismo para su trabajo y ratificarle su nombramiento como ASESOR ESPECIAL de la misma.

Es para nosotros un gran honor que Ud. Dr; integre en calidad de asesor nuestro Consejo Regional y estamos seguros que nos brindara su asesoria y conocimientos profesionales cuando la

"SISTEMA PORTUARIO DE LIMON BRAULIO CARRILLO COLINA" o/s



JUNTA DE ADMINISTRACION PORTUARIA Y DE DESARROLLO ECONOMICO DE LA VERTIENTE ATLANTICA
ADMINISTRACION DE DESARROLLO

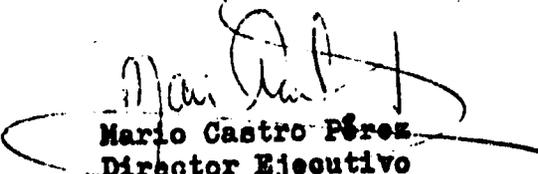
Teléfonos: San José, 21-86-81 - Limón, 88-09-88 - Apartado: T - Cable: JAPDEVA

Señor - 2 - Limón, 4 de julio de 1975
Dr. Franklin J. Ahinaz
U. S. A.

Comisión así lo considere necesario.

Sin otro particular por el momento soy de Ud.

Atentamente,


Mario Castro Pérez
Director Ejecutivo
C.R.D.P.L.

MCP/icr
Cc: archivo

CONSEJO REGIONAL DE DESARROLLO DE LA PROVINCIA DE LIMON

Tel. 58-09-88

-0-

Apartado T
Limón

COMISION DE VIVIENDA Y URBANISMO

Comisión Nº 1

- | | | |
|-----|--------------------------------|--|
| 1. | Sr. José Andrés Carrillo Calvo | <u>PRESIDENTE DE LA COMISION</u> - INVU.
Apartado San José |
| 2. | Sr. Rolando Coward Lord | INVU. - Limón. |
| 3. | Sr. Antonio Soria Soria | IMAS. - Limón. |
| 4. | Sr. Desiderio Arias Guerrero | SNAA. - Limón. |
| 5. | Sr. Luis Mondol Venegas | ICE . - Limón. |
| 6. | Sr. Eduardo Vega Vilchez | JAPDEVA - Oficina Vivienda - Limón. |
| 7. | Sr. Ing. Claudio Donato | SNAA - Departamento Planificación . |
| 8. | Sr. Ing. Edgar Herrera | UNIVERSIDAD DE COSTA RICA - San José.
Laboratorio de Maderas. |
| 9. | Sr. Roberto Villalobos | UNIVERSIDAD NACIONAL DE HEREDIA. |
| 10. | Sr. Dr. Franklin Ahimaz | UNIVERSIDAD DE CORNELL - U.S.A.
Asesor de la Comisión. |
| 11. | Sr. Bernardo Archer Moore | SINTRAJAP - Sindicato - Limón. |
| 12. | Sr. Rodolfo Johnson Bethune | COPEJABA - Gerente Cooperativa. Limón. |
| 13. | Sr. Claudio Zuñiga Luna | COPEJABA - Presidente. Limón. |
| 14. | Ejecutivos Municipales | Municipalidades Provincia de Limón. |

Appendix (e)

TRANSLATION

Council for Regional Development of Limon Province

Limon

No. CL-122-75

Ref. 50-26-05

July 4, 1975

Dr. Franklin J. Ahimaz
Assistant Dean of Engineering,
Assistant Program Director, PPSTDN
Cornell University
180 Uris Hall
Ithaca, New York 14853
U.S.A.

My dear doctor:

Greetings.

I am in receipt of your letter dated June 9, 1975 and the documentation attached that we are studying and you will receive our comments periodically.

Our present communication follows the fact of having restructured the Commission of Housing and Urbanism for your work and to confirm your being named as Special Advisor to the above Commission.

It is a great honor for us to have in the capacity of advisor of our Regional Council, and we are sure that you will offer your advice and professional knowledge when the Commission so considers it necessary.

I remain,

Sincerely,

Mario Castro Pérez
Executive Director
C. R. D. P. L.

MCP/icr
Cc: Archive



APPENDIX (f)

APDO. 10.187 - TELEF. 23-37-77

SAN JOSE, COSTA RICA
25-75 DP

14 January, 1975

Directors
Program on Policies for Science and Technology
in Developing Countries
Cornell University
Ithaca, New York

Dear Sirs:

In view of the interest Cornell University has repeatedly demonstrated at attempting to resolve Costa Rica's, and in particular, Limon Province's problems in an organized, scientifically planned methodology, and of the necessity of a permanent aid in devising investigations in the role of science and technology in the formulation of policies for regional development as well as, in an advisory cooperative capacity, of the direction and control in the implementation of specific plans and projects to carry out these broad-scoped policies, the Instituto de Fomento y Asesoría Municipal (Municipal Advisory and Development Institute) request of Cornell University, and in particular reference, the Program on Policies for Science and Technology in Developing Countries, the following:

1. The extended presence (6 months - 2 years) of an advisor (Dr. Franklin Ahimaz) in regional planning to form part of the technical=advisory planning board of the Regional Development Council of the Province of Limón, and in an advisory capacity, the formulation of a Comprehensive Development Plan for the Province through direction and control of investigation and experimentation leading to the implementation of the Plan through specific projects.
2. Our interest in training citizens and public officers in regional planning from the region in question is one of our highest priorities, Dr. Ahimaz has mentioned a short-term (4-6 weeks) study training period at Cornell University with particular reference to the plan the University has in rural New York, the Regional Councils of New York, the role of the municipalities, in these similar development plans, methodology and experience in other developing countries, tropical agricultural investigation, and so on, for approximately 10 persons.

We would like to take the opportunity to recognize the invaluable contributions Dr. Ahimaz has made in our unending quest to resolve this nation's problems, and particularly his courage to attack the problems of the area of the country with the most profound sociological and developmental problems. We feel his contributions and future contributions Cornell University can ma



APDO. 10.187 - TELEF. 23-37-77
SAN JOSE, COSTA RICA

-68-

- 2 -

ke through its experience and dedication will be a great aid to Costa Rica.

To cover the expenses in Costa Rica for the Cornellian and the expenses for the training program, IFAM will contact JAPDEVA and OFIPLAN and shall be in contact with you soon. We anticipate no problem in providing financing.

Sincerely yours,


Oscar Padilla Sellen
Head, Planning Division

OPS/vam

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