TROPICAL AGRICULTURAL RESEARCH AND TRAINING CENTER

(CATIE)

"PRODUCTION AND UTILIZATION OF WOODFUEL"

Working Document

Turrialba, Costa Rica

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PROJECT PAPER

1. Face sheet data.
2. General description of actual situation.

   Detailed description of project which emerges from it.
3. Methodology covering following topics:
   a. Economy
   b. Social beneficiary
   c. Technical feasibility
   d. Administrative feasibility
   e. Environmental concerns
4. Financial plan.
5. Implementation Plan.
6. Evaluation Plan.
7. Special conditions.
8. Annexes -

CHAPTER II

2.1. General description of the actual situation

The actual situation of forestry activities in the countries Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama is difficult to assess with accuracy due to the complexity of the subject and differences between individual countries. Forestry statistics, if already available, reflect to some extent the national situation as far as production and consumption of forest products is concerned but comparisons between the countries are difficult due to different norms employed in data gathering. Probably the most reliable statistical data readily available are provided by FAO, in its 1977 Yearbook of Forest Products and the following tables are extracted from this publication. Figures of Production, imports and exports of forest products over a twelve year period (1966-1977) show some tendencies in production and consumption patterns.

In Table 1 it shoud be emphasized, first of all, that some data (indicated with F) are FAO estimates. Furthermore the production of roundwood should be regarded in relation with the total area under forest cover per country. The increase in roundwood production is highest in Costa Rica but at the same time this country may possess the highest area under forest (as percentage of total country area). More remarkable is the 41.4% increase in roundwood production in El Salvador over the period 1966-1977, since this country has a very small area under forest cover. In absolute figures Guatemala has the highest roundwood production, increasing with 34.4% over the same 12 year period. Honduras has a

Table 1. Roundwood production (in 1000 m^3)

Country	1966	1967	1969	1971	1973	1975	1977	Increase over 12 yr. period % of 1966
Costa Rica	2221	2333	2548	2938	3310	3528	3805	71.3
El Salvador	2140	2218	2373	2528	2683	2846	3026	41.4
Guatemala	4170	4146	4518	4631	5015	5666	5606	34.4
Honduras	3855	3770	4115	4230	4434	3868	4175	8.3
Nicaragua	2249	2284	2255	2471	2750[F]	3015	3015[F]	34.1
Panama	1302	1320	1390	1491[F]	1529	1520	1520[F]	16.7

F = estimated

fairly constant roundwood production. The figures for Nicaragua show a low production as compared to the total land area but available figures are estimates. Roundwood production in Panamá is lowest of all the Central American countries and even shows a low 16.7% increase over the 1967-1977 period.

Table 2. Imports of forest products (in values $1000)

Country	1967	1972	1977
Costa Rica	10627	24425	35051
El Salvador	10315	12945	34575
Guatemala	7513	14758	24611
Honduras	12881	15283	14159
Nicaragua	4003	3921	12229[F]
Panama	10877	15257	19158

As can be seen from Table 2, Costa Rica, El Salvador and Guatemala have the highest imports of forest products in monetary terms, with a value that has more than triplicated during the period 1967-1977. The increase in imported value in El Salvador was extremely sharp from 1972 onwards. Imports in Panamá have doubled over a ten year period, whilst imports in Honduras virtually remained the same.

FAO estimated a sharp rise in import of forest products in [illegible] during the period 1972-1977 but overall figures are still fairly low as compared to other Central American countries.

As far as exports are concerned only one country, Honduras, is exporting far more than the value of the imports (see Table 3). Still countries like Guatemala and Nicaragua appear to have substantial exports, although not big enough to balance the imports. Panama, Costa Rica, and El Salvador had negative export-import saldos in 1977, ranging from $19 million to nearly $34 million respectively.

Table 3. Import-export balance of foret products (in value $1000).

Country	1967	1972	1977
Costa Rica	- 9300	-21265	-32571
El Salvador	-10182	-12538	-33802
Guatemala	- 5161	- 8372	-14606
Honduras	- 726	+11779	+31938
Nicaragua	- 1237	+ 1292	- 4642
Panamá	-10728	-14987	-19007

These figures illustrate the need for forest products in Central America. Since the mayor part of the imported forest products is in the form of paper, newsprint, and paperboard which these developing countries are not able to produce yet, the negative import-export balance will remain for the near future if export of sawlogs and/or sawn timber is not increased. This increase depends merely on availability of appropriate timber and on nacional forest policy, and in the actual situation this

increase is not likely to take place.

For the national timber market FAO presents surprisingly high figures for fuelwood and charcoal production. Strange enough, despite of the importance of this forest product, the majority of the figures presented in Table 4 are FAO estimates. Apparently no practical mechanism has been developed to determine periodically with certain precision on the production of firewood and charcoal. The reason for this or that, normally the production and consumption sites are very close together and that the product hardly enters in the normal commercial process from which statistical data could be derived. It seems unrealistic to include fuelwood and charcoal production in the figure for total roundwood production, the main reason being that the sources of production are likely to be different: Roundwood is a forest product, fuelwood and charcoal may also be produced from roadside trees, coffee prunings, old fruit trees or even old construction timber and sawmill residues. It also seems unrealistic to present fuelwood and charcoal data in volume unit , the dry-weight unit should give better information. The constant increase in fuelwood and charcoal production seems merely related with population increase. Even the oil crises has, apparently, not changed the fuelwood production pattern in Central America.

According to FAO, the figures of Table 4 have been included in Table 1. This means that in El Salvador 97.5% of all the timber produced is used for fuelwood and charcoal. In Guatemala the percentage will be 91,3, in Panama an estimated 92%, in Honduras 71.8%, in Nicaragua 70,8% and in Costa Rica 62.4%. This is doubtful. In the case of Costa Rica, it has been determined that annually some 60.000 hectares of forest are

Table 4. Estimated firewood and charcoal production (in 1000 m^3)

Country	1967	1969	1971	1973	1975	1977	
Costa Rica	1770[F]	1900[F]	2050[F]	2130[F]	2193[F]	2371[F]	-
El Salvador	2139	2294	2449	2604[F]	2768[F]	2947[F]	< 1% de coníferas
Guatemala	3700	4000	4100	4500	5120[F]	5120[F]	80% de coníferas
Honduras	3000	3200	3300	3100[F]	3000[F]	3000[F]	33% de coníferas
Nicaragua	1950	1900	1800	2000[F]	2135	2135[F]	22% de coníferas
Panama	1150	1250	1350[F]	1400[F]	1400	1400[F]	-

F = FAO estimates

felled. Assuming an (conservatively) average gross standing volume of 160 m^3/ha, the annual cut brings down to earth a total volume of 9.600.000 m^3, more than double the figure given in Table 1, even including the firewood and charcoal production. It is thought, therefore, that a substantial percentage of the felled volume is left to rot or burnt in situ without being utilized. This may not be the case in areas with high demographic pressure and hence the need for cheap energy sources. Normally the pattern of energy source utilization is the following:

	rural people	- firewood
Slightly developed	- rural people and lower income groups - rural villages	charcoal & firewood
Developed	- lower income groups in villages and towns	- kerosene & charcoal
Well developed	- Some families in small villages and major towns	- electricity gas

This pattern is confirmed by data presented by SIECA[1/] although the report does not specify whether the sample analized was representative for the country or not.

1/ Cita: SIECA

Table 5. Energy sources for cooking purposes in Central America.

Country	No. of houses sampled	Types of fuelwood (%)	Cooking electr. (%)	Energy kerosine gas (%)	No. reply
Guatemala	801	88	1	8	1
El Salvador	654	77	2	16	5
Honduras	463	81	3	15	1
Nicaragua	302	75	1	19	5
Costa Rica	231	66	25	5	4
TOTAL	2451	80	3	13	4

Source: SIECA

The same census indicated that 47.9% of the families use kerosine for illumination, 29.9% electricity and 4.2% use fuelwood. The use of fuelwood for light seems common only in Honduras where 19.6% of the houses sampled used acote (pine firewood) for illumination.

In this context it is relevant to present the expected rural population in 1980 per country:

Table 6. Demographic data of Central American countries.

Country	Total area (km^2)	Total population (est. 1980)	Population density (est. 1980)	Rural population (est. 1980)	% of total
Costa Rica	50699	2286 x 10^3	45	1680 x 10^3	73
El Salvador	20935	4813	230	3591	75
Guatemala	108889	6940	64	5304	76
Honduras	112088	3595	32	2879	80
Nicaragua	139000 1/	2669	20	1621	61
Panamá	75650	2115	28	?	?

1/ Includes Lake Nicaragua and Managua, approx. area 11.000 km^2

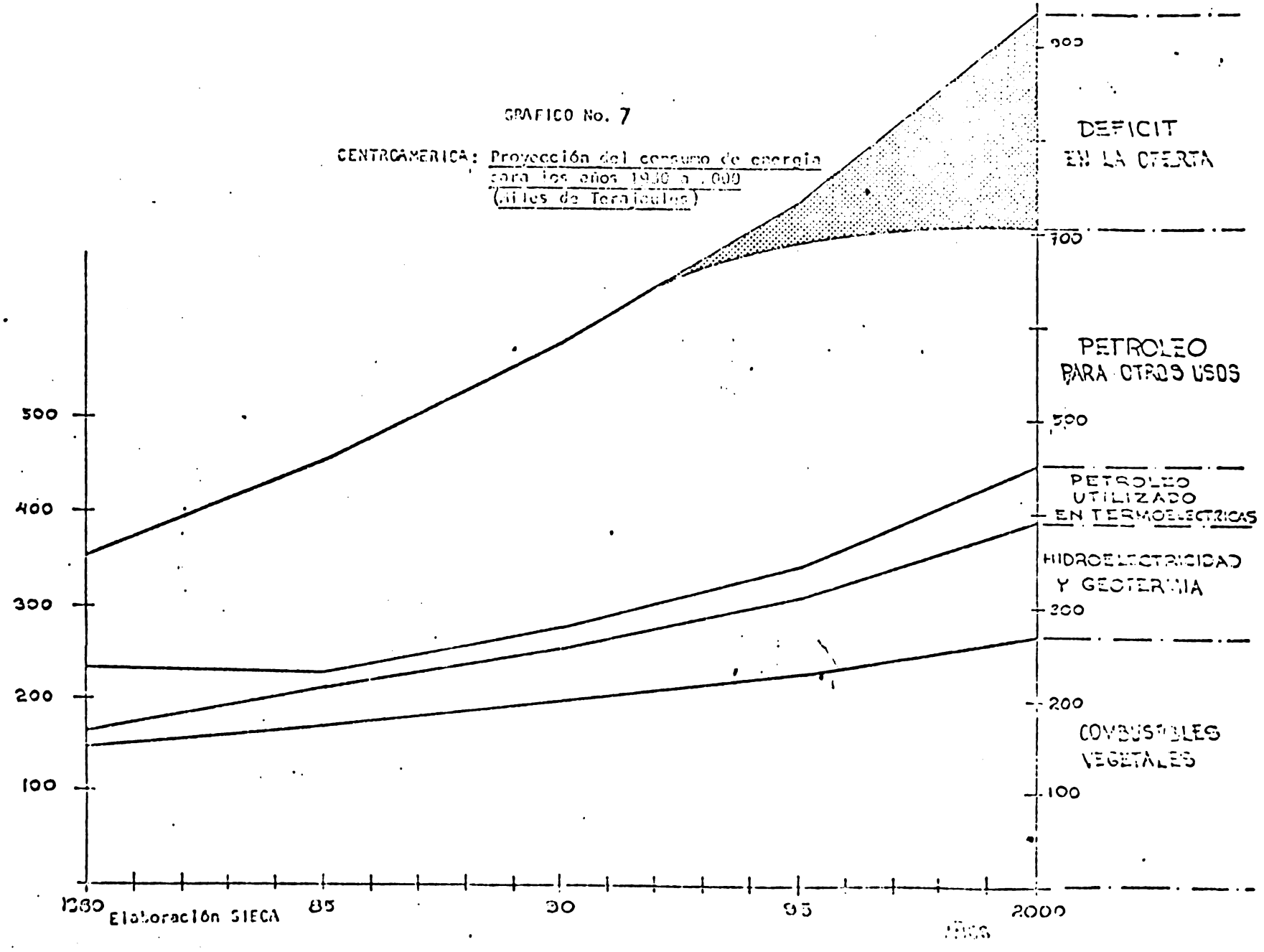
Table 6 shows a relative decrease in rural population as compared to 1970 when 73% of the population lived outsides cities and towns of 10.000 and more inhabitants (definition rural population). This is a far higher rural proportion than found in practically all other Latin American countries. However it is certain that a part of the urban population depends and will depend on fuelwood and charcoal, especially the lower income groups. Rural population will increase with approx. 30% in the next decade but urban population will rise with approx. 50%. A high number of new jobs should be created; estimates reach a startling total of 379.000 new jobs required annually for the five countries. No figures are available concerning actual consumption of wood based fuel and future trends. It seems realistic however that future needs will increase more than the increase in rural population, despite of improved accessibility and extension of electric systems. A major increase is foreseen especially for the lower income groups of the urban population.

It is not known precisely how the rural population supplies itself of fuelwood and charcoal. In most cases the fuelwood source may still be close to where it is consumed but in some densely populated rural areas in El Salvador, Guatemala and Western Honduras the fuelwood sources are dwindling thus increasing the distance between the site of production and the place of consumption.

Moreover, the actual trend of rising oil prices will increase the cost of fuel derived from it (kerosine, liquid gas, and electricity produced from hydrocarbons). According to SIECA studies, from 1990 onwards there might be deficit in the supply of energy which has to be filled by employing other fuel sources.

GRAFICO No. 7

CENTROAMERICA: Proyección del consumo de energía para los años 1980 a 2000 (Miles de Terajoules)



Elaboración SIECA

Very little is known about actual utilization of forest products in Central America. Apart from the global figures already presented in Tables 1-4, a study carried out by OFIPLAN - Costa Rica shows that in this country a high proportion of the timber cut is not utilized at all.

Table 7. Utilization breakdown of annual timber cut in Costa Rica.

	million m^3	%
Forest volume cut annually	9.4	100 (60,000 ha)
Round wood extracted (sawlogs and veneer))	1.2	12,8
Fuelwood and charcoal	3.5*	37.2
Burnt or left to rot	4.7	50.0

* Accuracy of this figure is doubtful, compare Table 4 fuelwood/charcoal production C.R. 2,37 million (FAO estimate) and exceeds the widely adopted figure of 1 m^3/caput/yr.

The fact, that 5 of the 6 countries import forest derived products and that in some of these countries large volumes of wood are burnt or left to rot seems contradictory. The reason is that the countries are not (yet) able to produce the desired products and that the transport costs of the heterogeneous raw material to the wood processing industry are too high to make the operation economically attractive. A portable wood procesing industry, upgrading the raw material, might be a possible solution in some cases.

It is most likely that patterns, similar to the one presented for Costa Rica, occur in Panamá and part of Nicaragua. The wood utilization may be different in El Salvador, Honduras and Guatemala due to different

vegetative cover (type and total area), high demographic pressure and different levels of development. Critical areas, as far as fuelwood supply is concerned, do already exist in parts of Guatemala, El Salvador and Honduras, and it is supposed that potential critical areas may be found in Nicaragua, Costa Rica and Panama, especially in those areas where natural forest cover has been removed nearly completely to give way to other agricultural uses.

Critical areas are those areas where the population spends more than 15% of their net income for the purchase of wood based fuel.

Potential critical areas could be defined as those where future fuel requirements cannot be met by the supply of fuelwood from traditional sources, but where expenditure on purchase of fuel is less than 15% of their net income.

Lacking the necessary data which enable us to draw exact lines as to where critical and potential critical areas can be found, steps should be undertaken to obtain these data. From existing experience the following areas can be indicated tentatively.

Map Central America. Indicating partial and potential critical areas for firewood supply.

Guatemala (Eastern part?)	Pot. Crit.?
Honduras (Sta. Rosa de Copán)	Crit.
El Salvador (Tejutla and Morazán area)	Crit.
Nicaragua (Pacific side, Cotton area and Colonization area Nueva Guinea)	Crit.
Costa Rica (Nicoya, S. Isidro banana area)	Pot. Crit.
Panama (Pacific side, cattle grazing area)	Pot. Crit.

2.2 Detailed project description

Phase 1. Survey and analog data gathering:

As has been mentioned before, statistics on production and consumption of firewood and charcoal are scarce in Central America and the existing information should be used with care. Thus, the first phase of this project should try to clarify actual production practices, quantify and qualify them; simultaneously data on consumption rates and preferences should be gathered and analized. Similar investigation techniques may be used as described in literature for some African Countries (Kenya, Tanzania and Uganda). A preliminary survey should be carried out covering as good as possible the whole of Central America. Based on the results of this preliminary survey, the position of (potential) critical areas should be confirmed or redefined accordingly. The areas of interest established, an in-depth survey should be carried out to provide additional data on firewood and charcoal consumption, future trends, and consumption of other forest products such as fence posts, construction roundwood, planks and other products of rural use. Analysis of these data should provide an overall view of utilization and requirements of forest products in rural areas; this overall view is needed for planning of forestry plantations in these areas.

Several national institutions and international technical cooperation projects have started and sometimes conluded trials with fast growing species. Trials of this kind are rather time consuming and, unfortunately, it is fairly common that forest trials are lost due to lack of original files, proper maintenance of the experimental plots, and periodic examination. It is also common that results (even preliminary)

of species trials are not distributed adequately, thus impeding the flow of knowledge from the investigator to the consumer. Exchange of experiences, new techniques and results between technicians of different Central American countries is mere opportunistic and depends on personal contacts. A complete new series of trials could be started, but the first conclusive results of these may not be expected before the fourth growing season. It is thought, that, facing the growing need for fuelwood in critical areas in the very near future, this type of project only is not appropriate. It is very probable that an analysis of the already concluded trials and the experiments under way will provide enough knowledge about adaptation of fast growing species to certain ecological zones as to justify the implementation of pilot fuelwood plantations. Therefore a survey should be carried out in which existing knowledge about fast growing species in Central America is gathered. The objective is to collect data on existing experiments with fast growing (forest) species in Central America analize these systematically per ecological zone, and publish the results so that they may be applied in similar ecological zones in other Central American countries. Not only native species should be covered but an extensive review should be carried out of all the species introduction trials, under way or concluded, which may give valuable data for future fast growing forest plantations. Existing trial plots should be re-examined and protected, seed should be collected, processed and stored in order to conserve useful genetic material.

All the local institutions which may have conducted, or which are conducting experiments with fast growing species should be contacted. Information about plot localization, original planting data, maintenance methods and intermediate measurements should be collected. The plots

should be visited and if necessary re-measured and analized. In this process contacts should be established with institutions indicated in Appendix 1.

It should be emphasized that the term fast growing (forest) species has been chosen deliberately since many of these could be considered also as fuel species. Apart from that it will give a wider range of uses to this publication; e.g. other reforestation projects, not specifically for firewood production, in Central America and similar climatic zones.

Phase 2. Implementation, research and training:

When the survey phase is concluded it should be determined in which of the (potential) critical areas actual field activities could be started. This second phase of the project has several components.

I. Production of fuelwood and specific research on plantation forestry.

a. In critical areas with sufficient knowledge available from similar ecological zones.

1. Pilot (fuelwood) plantations on different levels (depending on local situation):

- individual farm woodlots
- village woodlots
- plantations for supply to small rural industry. (bakery, tile ovens, traditional sugar mills, chalk ovens)

2. Management of existing natural fuelwood sources

b. In critical areas with lack of knowledge about behaviour of fast growing species under these specific ecological conditions.

1. Establishment of species trials
2. Management of existing fuelwood sources
3. Study of existing and implementation of new (if any) agro-forestry techniques suited to the local conditions.

c. In potentially critical areas the implementation of demonstration plots will have a high priority in zones for which adequate species are known. The demonstration plots are smaller in size than the pilot plantations.

In case no adequate species are known the project will start new species trials.

In all cases guidelines will be given for protection of existing fuelwood sources and its proper management; sound agro silvicultural practices will receive attention.

A first appraisal of research results may be realized two years after planting, thus allowing a transfer of the promising species from the experimental to the excecution phase for further bigger scale testing.

II Training

There is a definite need for training on different levels for most of the Central American countries.

- At post-graduate level CATIE provides facilities for training for a relatively small number of students (preferably from Central America). It is not to be expected that, in the near future, the training capacity offered by CATIE will be increased.

The project should provide scholarships for additional high level

training outside Central America. Contacts should be laid with United Nations University for exchange of experiences and, if possible exchange of students, so that advantage can be taken from techniques applied in other densely populated areas in similar climates (tropical Africa, S.E. Asia, Philippines and Indonesia).

- At university level. The project should stimulate and, if necessary, support through scholarships, the training of foresters at university level in the different countries in Central America.

In countries where no forestry training at university level exists, students could be transferred to other Central American countries which offer these facilities or special crash courses could be given at CATIE to train agronomists or biologists (with university degree) in the field of forestry.

- At technical level. Full advantage should be taken from the existing training facilities in Central America. Students interested in forestry with fast growing species should be offered special preparatory courses at CATIE. Contacts should be established with other training institutes to study the possibility of attracting more medium level technicians from Central American countries to participate actively in CATIE preparatory courses. Students with adequate capabilities should be offered the possibility of receiving "in-service training" within the project.

- Additional training facilities at lower levels should be set up nationally to accelerate transfer of technology.

Study tours shoud be organized for post graduate and graduate levels in the form of a mobile seminar, to take place annually and covering interesting sites in several countries of Central America. Study trips should be organized for students of technician level; sites of interest should be visited in the home-country, and in case these do not exist, slide shows should be prepared showing sites of interest in other Central American countries.

The forest documentation project recently started at CATIE could supply a useful link between the professionals and technicians working in the field of this regional project. A periodical newsletter could be edited and copies of relevant publications could be provided. Even more, special technical problems could be addressed to the documentation project of CATIE which might then supply necessary information to solve this problem, as part of technical backstopping.

III Implementation of and research on agro-forestry techniques

The role of trees in farming systems should be studied, qualified and quantified.

The social-economic firewood survey will, hopefully, supply knowledge about existing functional agro-forestry techniques in (potential) critical areas. These traditional agro-forestry techniques frequently are closely linked to firewood production.

In the implementation phase of the project these techniques should be tested for their usefulness and improved if possible. The techniques could be introduced in other critical areas with similar ecological characteristics where these techniques do not exist.

Other agro-forestry techniques, not yet familiar in Central America but proven in other similar climatic zones in the world, should be introduced and tested on experimental basis. In areas where erosion and hydrologic instability threaten agriculture the lands could be stabilized with strips of permanent vegetation with multi-purpose characteristics. In arid and semi-arid zones particularly wind-breaks of multi-purpose species could be planted. Whereverfeasible, the forestry plantations should be planted under taungya-system; this is cultivation of food crops together with the tree crop. Several studies have shown that with this technique better survival and growth of trees is obtained at a lower cost compared to planting of trees only.

CHAPTER III

Methodology

a. Economy

As has been pointed out in Chapter II, the sharp increase in oil prices makes it necessary to seek and develop alternative energy sources. The lower income groups of the rural population are not much affected directly by the increased cost of products derived from oil, since they only use a small amount of these products anyway. However, increased oil prices have their repercussion on the cost of living, thus indirectly affecting the rural population.

It is beyond the scope of this project to alleviate the cost of living; but the project could improve the supply of low cost wood fuel energy to the rural population, thus making them less dependent on oil derived energy products.

At the other hand improved management of existing forest based on the principle of multiple use and reforestation of marginal lands aimed at the production of firewood, fence posts and construction roundwood will have a positive effect on soil conservation and improvement of the hydrological balance. Also agro-forestry techniques will be characterized by these same beneficial side-effects.

A more constant flow in rivers or streams with clearer water is an asset which improves quality of life greatly.

b. Target group

By preliminary definition the (potential) critical areas are populated by rural communities of lower income groups. The fact that the purchased firewood or charcoal consumes a major share of their time or budget classifies them in the lowest category of the social structure. The beneficial effects of the project will not be limited to the improved supply of low cost energy and improved quality of life, but also improve employment opportunities in the rural areas. Forestry activities are normally quite labour intensive, especially on steep marginal sites where mechanization is difficult and uneconomical. A lot of care should be given to the plantations growing under these marginal conditions. Employing taungya systems even increases sharply the need for manpower, and through this system excellent forestry plantations can be obtained at low cost since the food crop produced simultaneously will yield tangible economic gains.

c. Technical feasibility

Projects related with forestry could only yield positive results if enough time is provided to implement experiments, evaluate the results, test improved techniques and transfer the proven technology. If started from zero, a reasonable minimum length of project duration may be 10 years. It is hoped that in this specific project the survey phase will provide enough knowledge so that positive results may be expected after a project period of five years. Success will largely depend on the capacity of response of the national institutions through which the projects activities will be channelled.

The choice of species depends on local (regional) experience with fast growing species suited for fuel-wood production and on a throrough study of experiences in this field in other countries in the world with similar climatical conditions.

In the first phase of the project the experience and results of trials with fast growing species will be determined and conclusions may be drawn as to which species are suitable for pilot fuel plantations. The advantage of this procedure is that already in the second year of the project a start could be made with the first pilot plantations. Other promising species that have not been introduced in Central America should be tested first, before planted on a wider scale. This testing will take a minimum of 2 to 3 years.

Pilot fuel plantations as well as experiments with new species should be located preferably on sites visible from roads or should have easy access. Especially during the first years, acceptance of new techniques by rural population depends largerly on demonstration. It is the responsibility of government institutions to make these areas available to the project.

d) Administrative feasibility

The regional organization best suited to carry out the project is CATIE. This institute has, based on its 37 year history, established excellent contacts with all the Ministries of Agriculture of the Central American countries. Its Program of National Renewable Resources has been, or is actively working in Panama, Costa Rica, Nicaragua, El Salvador, Honduras and, to a lesser degree, Guatemala. This Program will be able

to select the best possible national partner(s), for example the forest services or natural renewable resources departments of the Ministries of Agriculture, and other specialized institutes.

Also, the Program of Natural Renewable Resources of CATIE has good contacts with research centers, Universities and other forestry-related scientists throughout the world. In the first phase of the project relations with national institutions should be strengthened. The institutions which offer the most appropriate infrastructure through which project activities could be channelled will be selected for future cooperation in the implementation phase. A regional committee should be chosen to institutionalize the contacts between national governments and the project.

CHAPTER IV

Financial Plan

On of the major differences between research in agriculture and research in forestry is the time required to complete the experiments. Throughout the duration of trials in forestry land, staff and capital should be available in order to obtain optimum results from the experiments. Virtually all the Central American countries encounter difficulties with these three factors, and it is hoped that a well planned project with clearly defined objectives, will offer a framework through which the necessary resources could be channelled efficiently. The anticipated sources for financing are:

a) Local institutions

b) CATIE

c) ROCAP

The local institutions will supply the land, the salaries of staff at technical and executive levels, and transport, up to a reasonable level and as required for an adequate functioning of the project.

CATIE will administer the project and supply the technical back-stopping. Furthermore CATIE will supply some of the staff members and offers the infrastructure available (library, training facilities, data processing facilities, seedbank). CATIE offers the basic equipment necessary for aerial photo interpretation: Wild Stereoscopes, Old Delft Scanning Stereoscope, Slotted Template Apparatus, etc. ROCAP will supply funds for the remaining staff members, operational funds, transport,

additional labour costs, secretarial assistance, contingencies, and other costs of infrastructure. ROCAP will also finance the expenses incurred by CATIE to administer the project.

The estimated costs and the financial plan are summarized in Table 8.

Table 8. Summary cost estimate and financial plan.

CHAPTER V

The Implementation Plan

1. Administration and Coordination Activities	1979	1980	1981	1982	1983	1984
Draft CATIE/ROCAP Project Agreement	—					
Writing memoranda of understanding with Central American countries and Panama	—					
Signing initial Proj. Agreement CATIE/ROCAP	—					
Development of arrangements with staffs of national institutions		—				
Preliminary work with national and regional committees		—				
Formal agreement with Central American countries and Panama finalized		—				
Construct administrative framework to implement technical plan						
Coordination of technical activities and fund administration						
Contact for personnel selection						
Selection and travel personnel						
Purchase equipment and vehicles						
Semiannual Progress Reports		—	—	—	—	—
Annual Regional Committee Meeting			—	—		
Annual Report				—	—	
Final Report						—
Project Monitoring by ROCAP						
Annual ROCAP obligation of Funds		—	—	—	—	—

	1979	1980	1981	1982	1983	1984
Final Project Evaluation by ROCAP						
Demobilization of Staff						
2. Data Collection - wood fuel protection and consumption						
a) Gathering of census, socio-economic data						
Gathering of soil data						
Gathering of climatological data						
Gathering of data on firewood (from secondary sources)						
Survey on actual wood fuel consumption and prod. techniques (baseline study)						
Preparation of survey results						
Refinement of criteria for selection (potentially) critical areas						
Final report on baseline study indicating (pot.) critical areas						
b) Data collection - tree species field trials carried out or under way						
Gathering of climatol. data						
Gathering of soil analog data						
Search for info. of concluded trials						
Reexamine concluded trials						
Search for trials under way						
Analyzing trials under way						
Seed collection, processing and storage						

	1979	1980	1981	1982	1983	1984
Gathering data fast growing fuel species in analogue areas						
Selection new species and purchase of seeds						
Receive seed and store						
Selection of nurseries						
Start production of plants						
3. Implementation of pilot plantations and research plots						
Production of plant material						
Selection of sites						
Site preparation						
Pitting and planting						
Survival evaluation and replanting						
Clearing						
Evaluation						
4. Research tree component in farming systems (in (potentially) critical areas						
Gathering data about role of trees influencing existing farming systems						
Classify data						
Draw conclusions						
Select sites for agro-forestry trials.						
Prepare plant material						
Implementation of (improved) traditional techniques						

	1979	1980	1981	1982	1983	19
Select new techniques from secondary sources						
Prepare new plant material						
Implement new techniques						
Preliminary evaluation						
Final preliminary evaluation						
Transfer preliminary results to national institutions						
5. Training						
Divulgation of availability of scholarships to national instit.						
Reception of admission applications to graduate schools						
Final selection of candidates						
First group undertake grad.courses						
Second group undertake grad. courses						
Third group undertake grad. courses						
First group conduct and complete thesis work						
Second group conduct and complete thesis work						
Third group conduct and complete thesis work						
Short courses on silviculture fast growing species						
Short courses on agro-forestry						
Short courses on information transfer						

CHAPTER VI

Evaluation

General: Three major evaluations by external experts are scheduled over the life of the project, in addition to periodic in-house reviews and evaluations by ROCAP.

1. Major evaluations after year 1 (survey phase)
   year 3 (implementation first part)
   year 5 (results and transfer)

Concentrate on:

Year 1.
a) Socio-economic implications of fuelwood shortage on rural population.

b) Ad hoc situation of existing experience with fast growing species in general, in Central America in particular.

c) Planning soundness of next phases of the project.

Year 3.
a) Technical soundness of silvicultural practices applied and species trials under way.

b) Farmer recommendations Agro-forestry.
Analyze methodology of experiments with traditional and new systems.

c) Information transfer and utilization. Information flows, assess training activities.

Year 5.
a) Technical aspects: Silvìculture
ecology

b) Sociological aspects: Farmers acceptation
quality of life

c) Training (Technical Transfer) at all levels.

APPENDIX 1

In Panama : MIDA Dir. RENARE Panamá, special emphasis shoud be given to plots established by the MIDA-FAO Project and analized by Howell. New MIDA-RENARE plots should be visited and analized.

Results of interest to this project should be sought in Summit Botanical Gardens, Canal Zone.

In Costa Rica : Trials conducted by MAG-FAO Project should be re-examined. Recent MAG trials should be located and analized (a.o. Los Diamantes, Palmar Norte, Buenos Aires)

Summarized results of numerous CATIE trials in Turrialba, and sites in Costa Rica should be quoted.

Trials conducted in AID/MAG restauration project in the Upper Reventado watershed should be re-examined. Other institutions and private companies should be scanned for possible useful information on fast growing species (for a.o. Instituto Costarricense de Electricidad, Instituto de Tierras y Colonización, JAPDEVA, Banana Companies).

In Nicaragua : The trials established under MAG/ODM Project should be re-examined; other MAG trials have to be visited and analized. Banana Companies (Chinandega) have interesting small commercial plantations of fast growing trees for banana props.

In Nicaragua : Other institutions and private companies should be scanned for possible useful information.

In Honduras : COHDEFOR information on species trials
Lancetilla Botanical Gardens should be screened for fast growing species.
Results should be sought from FAO-Project near San Pedro Sula (Tschinked).
Important information can be provided by Banana Companies that possess commercial banana prop. plantations in a dry valley south of La Ceiba.
Some additional information could be supplied by ECA, Zamorano, ESNACIFOR Siguatepeque and the forestry school at La Ceiba. Other information sources should be sought.

In El Salvador : MAG could provide interesting details concerning experiences near Sta. Ana, near CENTA offices, and from results with fast growing trees in plantations of ISTA. Results FAO-Project Metapán. Furthermore, small trials in areas should be visited and if possible re-analized. Other information sources should be sought.

In Guatemala : MAG and INAFOR could indicate localization of species trials (if any). Ex FAO or bilat. project? Other information sources should be sought (a.o. Banana Companies, FYDEP, Electricity Company)

traje entre dos ciudades se encuentra en la abajo en el punto de intersección de la línea tical de la primera ciudad con la línea horizontal de la segunda. El número correspondiente indica la distancia en kilómetros entre las dos ciudades.

...LTENANGO GUATEMALA	SAN ISIDRO COSTA RICA	SAN JOSÉ COSTA RICA	SAN MIGUEL EL SALVADOR	SAN PEDRO SULA HONDURAS	SAN SALVADOR EL SALVADOR	SANTA ANA EL SALVADOR	SANTIAGO PANAMÁ	SONSONATE EL SALVADOR	TAPACHULA MÉXICO	TEGUCIGALPA HONDURAS
136										
1026	907									
1297	1173	495								
1164	1010	138	633							
1228	1104	202	697	64						
453	577	1479	1750	1617	1681					
1727	1103	201	696	63	85	1680				
1784	1660	758	1253	620	556	2237	641			
1011	887	209	786	347	411	1464	410	967		
1395	1271	593	98	731	795	1848	294	1351	384	
1618	1494	592	1087	454	390	2071	475	166	801	1185

TELA HONDURAS · TOTONICAPÁN GUATEMALA

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M E X I C O
Mar Caribe
Golfo de Honduras
HONDURAS BRITÁNICA (BELICE)
GUATEMALA
HONDURAS
EL SALVADOR
NICARAGUA
Océano
Lago de Nicaragua
Belice
Puerto Cortés
Puerto Barrios
Livingston
Tela
La Ceiba
San Pedro Sula
Progreso
Tegucigalpa
Comayagüela
Siguatepeque
Santa Rosa de Copán
Copán
Zacapa
Cobán
Guatemala
Antigua Guatemala
Escuintla
Quezaltenango
Huehuetenango
Tapachula
Chichicastenango
Santa Ana
San Salvador
Nueva San Salvador
San Miguel
San Vicente
Usulután
Sonsonate
Choluteca
S. Marcos de Colón
Chinandega
León
Managua
Masaya
Granada
Matagalpa
Estelí
Islas de la Bahía
Comitán