

# **CATIE**

## **IMPLEMENTING THE RESEARCH: EDUCATION: DEVELOPMENT STRATEGY**

**A Progress Report  
(May, 1988)**



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### I. INTRODUCTION

CATIE's Board of Directors recently approved a ten-year strategic development plan. The objective of this plan is the generation and dissemination of knowledge aimed at accelerating and sustaining agricultural production and development in the region.

To meet the above mentioned objective, a systems approach will be used within a framework of integrated regional development directed at the benefit of the peasant rural family. The ten year strategic development plan must be performed in conjunction with the national institutions and programs. It is therefore aimed at complementing their activities and at strengthening them. It also considers complementing activities with the international and regional programs (IARCS) operating in the region (Central America and Dominican Republic).

The plan identifies priorities and actions as well as the minimum and desirable critical mass required to implement the described actions. Such critical mass covers the basic core activity of the Center; however, because the strategy is directed at complementing activities with other institutions, it is expected that within such concerted effort, a shared as well as a more rational use of the resources of the participating institutions will be achieved.

The strategy of concertation and integration of multidisciplinary efforts among CATIE and other national and regional institutions, as well as the suggested mechanisms for its implementation and funding is described here.

There is a possibility that additional financial resources, other than those specified in the plan, will be required. This is so because the implementation of the strategic development plan depends on the magnitude of the research and education activities to be conducted in the development-oriented pilot areas located in each of the seven member countries of CATIE, as will be described later. CATIE's financial possibilities (core budget) as well as the level of action and resources allocation of the participating institutions will determine the amount of additional funds needed, via, perhaps, special projects to be conducted within the above-mentioned pilot areas or, if not directly related with such areas, within the framework of CATIE's strategic development plan.

## II. RESEARCH AND EDUCATION ON CRITICAL AREAS: The integrated regional approach.

The major strategic elements of the plan are:

1. To develop and transfer technological innovations that would contribute to the modernization of the region's agriculture. Research should be oriented to increase and sustain productivity within a regional scope, therefore giving proper consideration to the integrated management of natural resources. It also intends to reduce production costs by finding ways of utilizing more efficiently the natural resource base (i.e. through appropriate biotechnology). On the other hand, CATIE's educational programs are oriented so as to make possible the training of the scientifically qualified human resources required to spur the modernization of the region's agriculture.
2. To maximize the use of a system's approach to agricultural growth and development by emphasizing research on critical areas (i.e. plant protection, biology and genetics, socio-economics, etc.) and their integration into highly-productive technological packages. Proper consideration to an integrated management of natural resources will be given as well as to the development of improved production systems. Institutional links will be established to bring about the perspectives of planning, research, education and development.

The efficiency of the integrated action can be improved and the impact of the expected results can be more meaningful if areas of concentrated efforts are established. A few development-focused pilot areas in different geographical locations of CATIE's member countries will be selected. In these areas, CATIE intends to integrate multidisciplinary research and education activities along with development actions. This will be done by using a regional perspective for the development of technological packages for agricultural production and the integrated management of natural resources.

At the same time these areas of concentration will enhance horizontal cooperation mechanisms with different institutions related to research, education and development in agriculture.

3. To strengthen horizontal institutional cooperation mechanisms aimed at establishing a Regional Agricultural Research and Education System. This is expected to give a new dimension to agricultural research and education in Central America and the Caribbean by integrating the activities of CATIE with

those of national, regional and international institutions operating in the region. While this approach might prove to be difficult to implement, CATIE has already taken some very successful steps. One is the establishment of the Regional Cooperative Network for Education in Agriculture and Renewable Natural Resources (REDCA). This regional network was established in June 1986, with the participation of more than 25 Universities, Ministries of Agriculture, and Agricultural Research Institutions. The network constitutes the essence of the new dimension of CATIE's higher educational programs.

### III. THE REGIONAL SYSTEM

In order to implement the strategy of concertation and integration of multidisciplinary efforts among CATIE and other national and regional institutions, it is proposed to establish a regional, development-oriented agricultural research and education system. It should be noted that in order to make a research and educational system effective in agricultural development it must establish proper coordination links with the policy making and the agricultural planning process, as well as the overall development process. As can be seen in Fig. 1, such development-oriented agricultural research and education system can be easily conceptualized.

However, when we consider the institutions involved and their relationship within the system as well as the activities, inputs, processes, outputs and interactions generated among the different elements, we must realize that it is not a simple system to organize. Such system is more precisely defined and graphically represented in Fig. 2. On the left side of the chart, the components of the system are:

1. Planning
2. Research
3. Education
4. Development

These components entail several activities, as indicated. It is necessary to point out the particularly important role of the national programs (Planning and Development, Natural Resources, Education, Research-Extension), regional organizations, international programs and private industrial sector that participate in the regional action at different stages and as multilinked components of the system. This type of collective participation is also true for the extra-regional universities, academic institutions and research centers whose

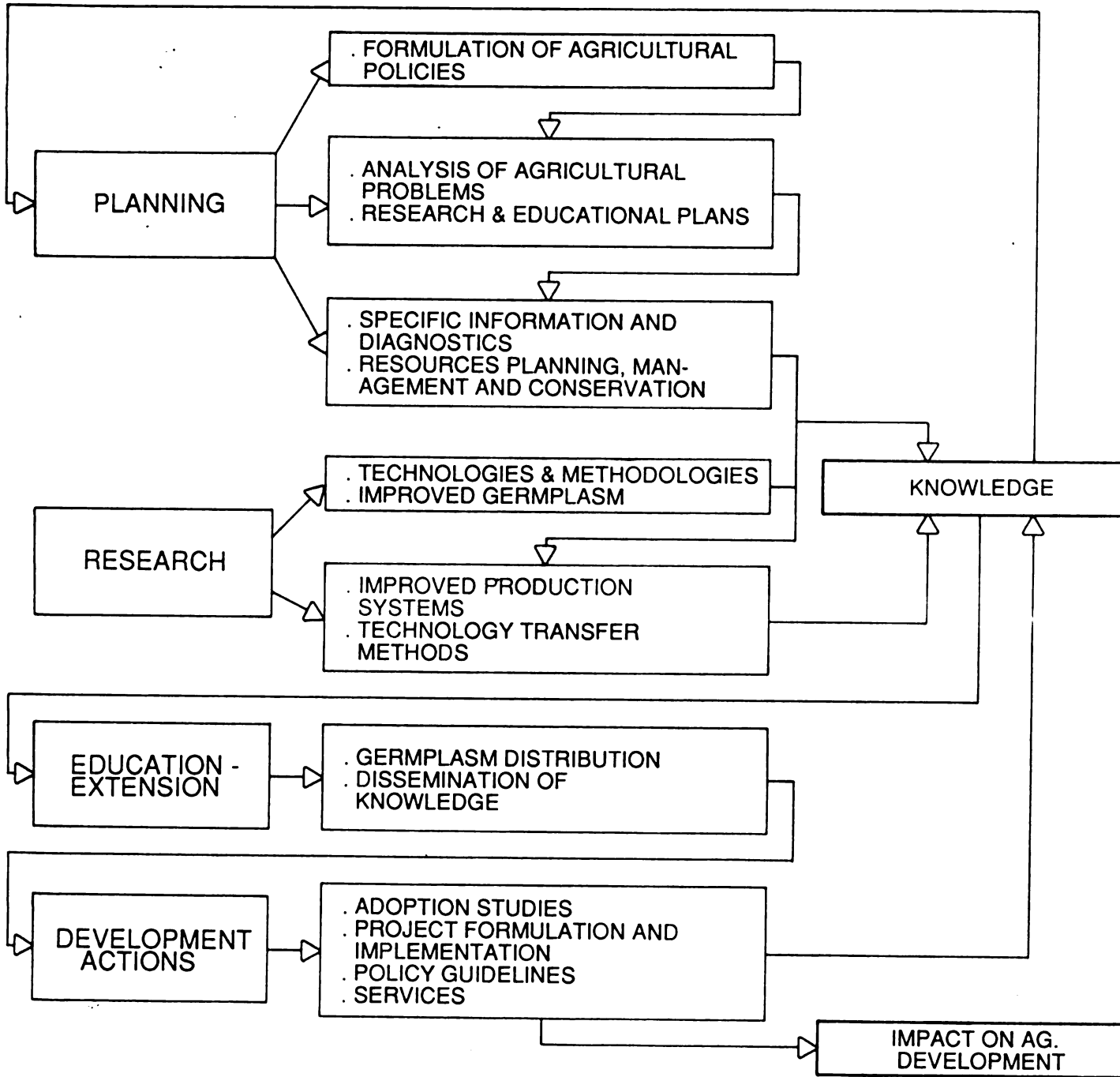


Fig. 1. A development-oriented agricultural research and education system.

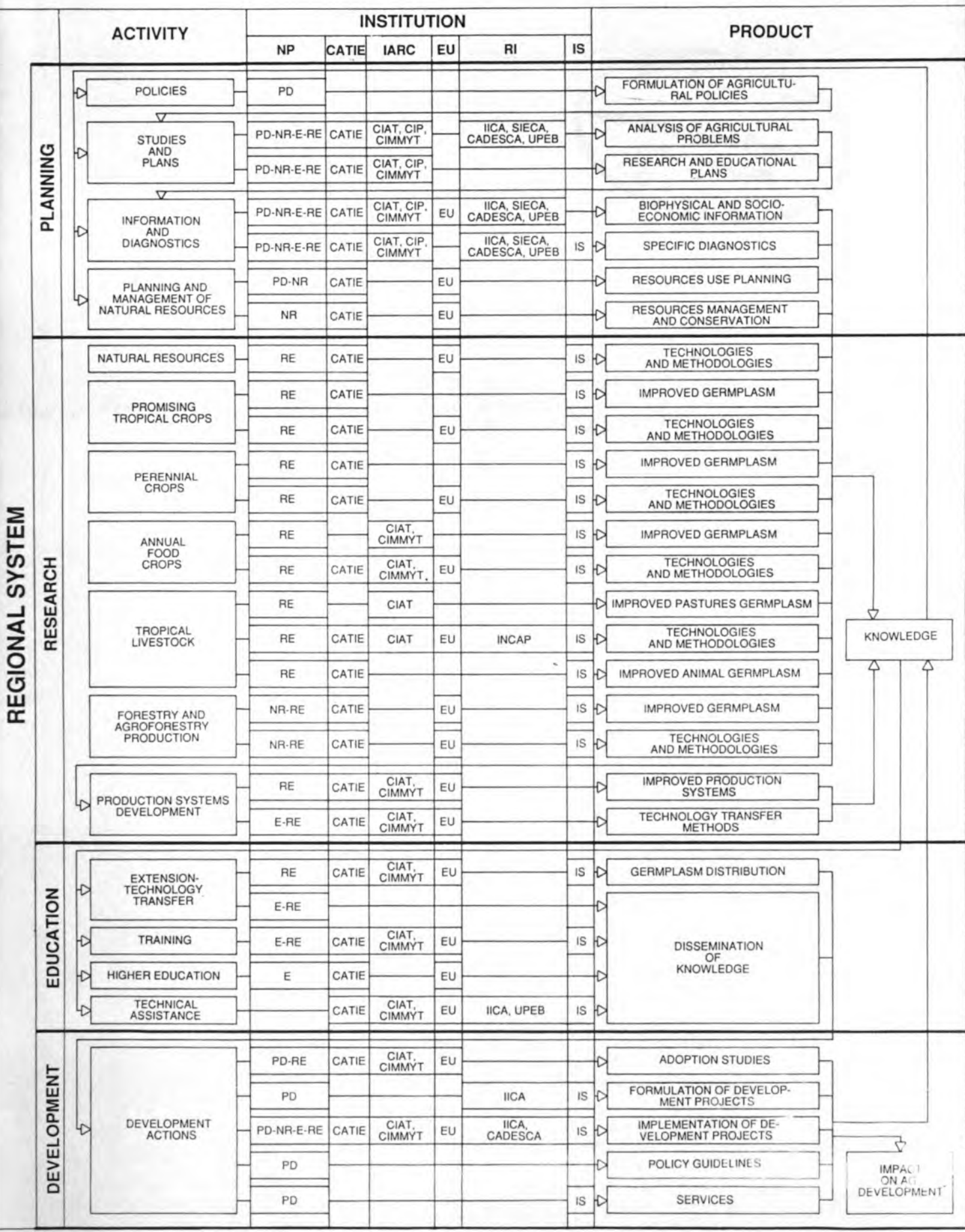


Fig. 2. Institutional participation in a regional, development oriented agricultural research and education system.



(Cont...)

DESCRIPTION OF SYMBOLS (Fig. 2)

NP = NATIONAL PROGRAM

PD = Planning and Development

NR = Natural Resources

E = Education

RE = Research Extension

IARC = INT. AGRICULTURAL RESEARCH CENTER

EU = EXTRA-REGIONAL UNIVERSITY

RI = REGIONAL INSTITUTION

IS = INDUSTRIAL SECTOR

important contributions generate specific results within the system.

The logic of the system could be summarized as follows:

In agreement with the existing agricultural policies, the planning component provides a product composed basically of socioeconomic information and diagnostic studies necessary to formulate specific research and educational plans to be executed in a given country.

These inputs provide the necessary information required to establish the research component of the regional system. A relevant policy on use, conservation and management of natural resources gives the basis for an Agricultural Research Plan in a given country that can be ideally executed by the national programs with a complementary support of regional and international organizations present in the area. CATIE is, of course, one of these entities and, as indicated in the diagram, its participation is multiple-choice, particularly in the program areas of research which have been clearly defined in the Ten Year Strategic Plan. These research areas are:

- 1- natural resources management,
- 2- promising tropical crops,
- 3- perennial crops,
- 4- annual food crops,
- 5- tropical livestock,
- 6- forestry and agroforestry, and
- 7- production systems development.

The component approach of the regional system would generate a specific product that could be referred to as KNOWLEDGE. This basic output is the means to establish and strongly support the education (and extension) component of the regional system.

The purpose of the education component is to provide the necessary human resource force to insure proper execution of plans, projects and actions of the rural sector in the region. The educational component deals with a wide range of activities that go from non-formal education, technical assistance and on-farm training courses, to the formal education at the graduate level. All of this provides the region with the specialists and trained farmers needed to foster agricultural development.

The knowledge disseminated is used to formulate and implement development actions. If all pieces are properly



articulated, an impact on agricultural development should be achieved.

The coordinated and integrated participation of the institutions involved are fundamental to the system. This might seem difficult to accomplish due to the number of participating institutions and the apparent complexity of linking the whole process. However, we must bear in mind that the organization of such regional, development-oriented agricultural research and education system has had a good start with the establishment of the Regional Cooperative Network for Education in Agriculture and Renewable Natural Resources (REDCA). Established in 1986 with the participation of more than 25 Universities, Ministries of Agriculture, and Agricultural Research Institutions, REDCA constitutes the essence of the new dimension of CATIE's higher educational programs.

Figure 3 shows the relationship between the regional system and some of the most important networks and cooperative programs existing in the region. As can be observed, REDCA already covers the research and education component of the system but only as far as the participation of CATIE and the national programs is concerned. The participation of some extra-regional universities is being considered as well as the participation of related activities with some of the international research centers operating in the region. The establishment of the above mentioned links as well as the appropriate relationship with the planning and development components is required for the successful operation of the system.

No matter how easy or difficult it might be, the implementation of the regional system requires an appropriate mechanism to facilitate the necessary coordination and integration. This mechanism is explained below.

#### IV. EXPRESSION OF THE REGIONAL SYSTEM IN DEVELOPMENT-FOCUSED PILOT AREAS

The establishment of development-focused pilot areas, centered on agricultural research and education activities, has been considered as an appropriate mechanism for the implementation of the Regional Agricultural Research and Education System.

Area-focused research is not a new concept. It has been difficult to implement, especially when integrated multidisciplinary activities are to be carried out, because the selection of an area by itself does not guarantee integration. However, it could be effective as a mechanism to put into operation the Regional System. This mechanism should not be confused with that of integrated rural development projects. In what we call DEVELOPMENT-FOCUSED PILOT AREAS, the institutional

**REGIONAL SYSTEM**

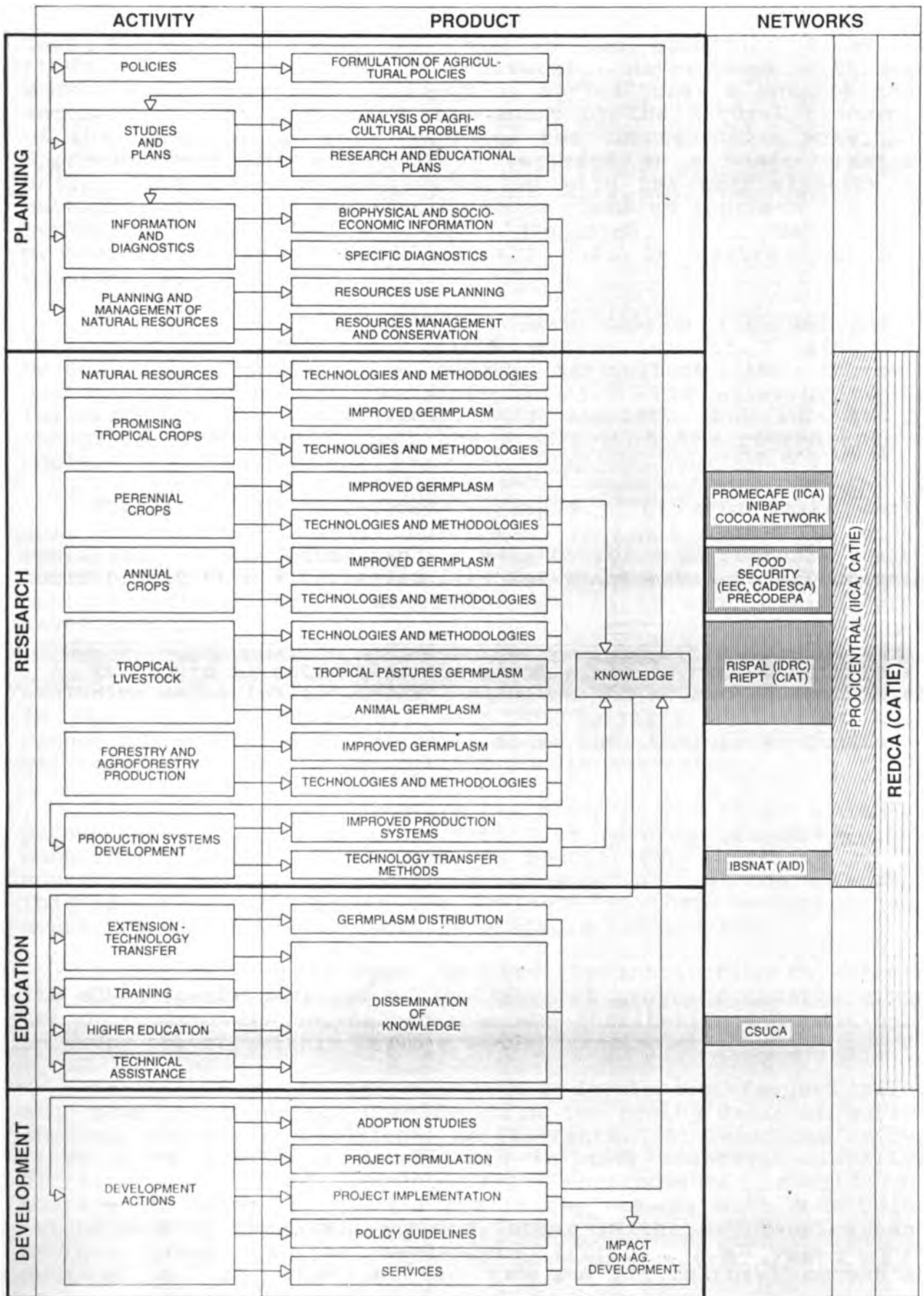


Fig. 3. Networking and a regional, development-oriented agricultural research and education system.

integration is centered on research and education aimed at producing impact on agricultural development through modernization and sustainability of agriculture, a concept that incorporates the integrated management of the natural resources of the area, using, when feasible, the comprehensive watershed approach where the watershed is regarded as a basic planning unit. They are therefore conceived with the participation of multiple disciplines and institutions. Such an approach has been lacking in practice in most integrated rural development projects, which has resulted in the past in severe technical constraints.

A development-oriented Pilot Area can be regarded as an integrated and coordinated field action project. Its main objective is to enhance modern agriculture and increase sustainable production and productivity. The strategy to be followed has an inter-disciplinary approach and intends to integrate other institutions and programs in the region into a whole.

Therefore, the development-focused pilot areas make sense only inasmuch as a well coordinated regional system is under operation. On the other hand, a well coordinated regional system could profit from a mechanism like the pilot areas to effectively integrate the different components needed to spur agricultural development.

It should be noted that the pilot areas do not constitute an excluding mechanism for CATIE's research and education activities in the region. There are many disciplinary activities that cannot be restricted to the pilot areas and, therefore, should be performed wherever the appropriate conditions exist.

Since pilot areas integrate the perspectives of agricultural production with that of conservation of natural resources, they cannot be confined within precised boundaries. Research and/or educational activities need to be conducted both at the watershed (highlands) as well as in the lowlands so that production and conservation activities could be properly integrated.

A project of this type enables the institution to execute its educational, development and research programs under a given set of ecological, socioeconomical and institutional conditions, in every country within CATIE's mandate region.

Criteria for the selection of a development-focused pilot area needs to take into consideration the ecological, the socio-economic and the institutional environments. At least one or two pilot areas should be established in each country. Ideally, different ecosystems (ecological environment) should be represented among the pilot areas in the region, with some being established in the humid tropics, other in the dry tropics, and another group in the semi-humid tropics. Climate, soil degradation, deforestation, forestry and agricultural potential

are some of the most important considerations in relation to the ecological environment.

The criteria to select an area within the socio-economic environment are specially important. The number of small farmers, sustainability of production, productivity, income level and distribution of benefits from the agricultural activities should be taken in consideration. Of equal importance is the institutional environment since the level of participation of national programs is high and essential. Therefore, the degree of development and commitment of national institutions of research and extension, education, natural resources, and planning need to be well assessed if success is going to be achieved.

The selection process of a pilot area should be done in close consultation with the national programs. The idea is well accepted by the member countries of CATIE. An informal consultation in 1986 about this possibility resulted in a preliminary selection of pilot areas in several countries. A formal consultation meeting with the member countries would take place within the year provided that required funding is obtained. This meeting would discuss implementation of the regional system as well as the proposed pilot areas mechanism.

To promote CATIE's educational, development and research activities in these Pilot Areas, an Interdisciplinary Working Group, ideally formed by local staff (national programs) coordinated, when necessary, by CATIE's senior staff members, will be established. This group will be responsible for organizing and executing the different types of actions programmed for each Pilot Area. It will also be responsible for the transfer of technology generated in those institutions working in the area.

The activities to be conducted in the Pilot Areas will follow an operational plan which has to be defined taking into consideration the Minimum Integrated Module Concept.

In these modules, (Fig. 4, Table 1) CATIE's basic research programs, Program I (Tropical Crops Improvement), Program II (Sustainable Agricultural Production and Development), and Program III (Integrated Natural Resources Management) will be participating in varied ways in the above-mentioned selected modules, depending on the characteristics and potential of the pilot areas.

For practical purposes, five minimum integrated modules have been identified, all of them including the participation of Program III (Integrated Natural Resources Management) and the Production Systems Development Area of Program II. The other program areas: promising tropical crops (Program I), perennial crops (Program I), annual food crops (Program II), tropical livestock (Program II) and forestry and agroforestry production

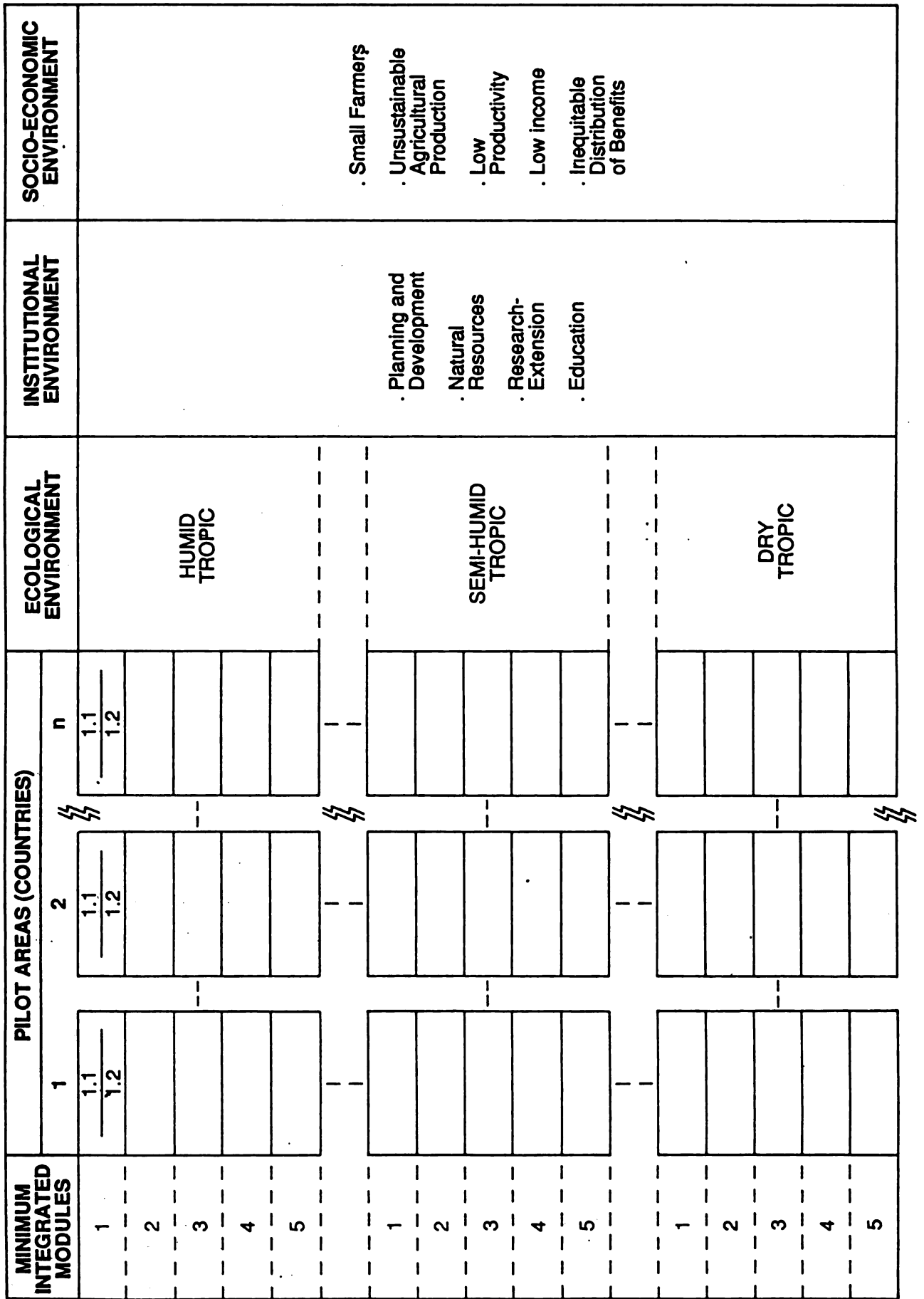


Fig. 4. Illustration of the development-focused pilot areas, their modular arrangement, and their relationship to the environment.

- . Small Farmers
- . Unsustainable Agricultural Production
- . Low Productivity
- . Low income
- . Inequitable Distribution of Benefits

- . Planning and Development
- . Natural Resources
- . Research-Extension
- . Education

**TABLE 1. MINIMUM INTEGRATED MODULES**

Module No.	Description	Program
1	Integrated Natural Resources Management Production Systems Development Promising Tropical Crops	III II I
2	Integrated Natural Resources Management Production Systems Development Perennial Crops (coffee, cacao and/or plantain)	III II I
3	Integrated Natural Resources Management Production Systems Development Annual Food Crops (rice, beans, corn and/or sorghum)	III II II
4	Integrated Natural Resources Management Production Systems Development Tropical Livestock	III II II
5	Integrated Natural Resources Management Production Systems Development Forestry and Agroforestry Production	III II II

(Program II) will each be assigned to one of the modules, depending on the predominant type of activity to be conducted. All of the modules will also have an education and development component. This can constitute a sub-module within each module, to be implemented only if other sources of funding could account for the research and development component that would constitute another sub-module within the same module.

The continuous action of one or a combination of two or more modules within a pilot area will be expected to produce relevant results on increase of production and/or productivity, better income level and equitable distribution of benefits, and sustainability.

In the process of establishment of the pilot areas, CATIE along with the institutions involved will participate in a monitoring and on-going evaluation system. Impact studies, ex-ante and ex-post evaluations have to be done in order to keep abreast with the evolutionary process of technology generation and transfer.

A schematic view of this entire process is presented in Fig. 5.

## V. FINANCING

A total estimated cost for a Pilot Area is US\$367,000.00 per year (see Table 2). This amount includes all the research-education-development components as if the five minimum integrated modules were fully operating in the area. Each category of cost for the different components has been estimated also.

The cost of a minimum integrated module is estimated in US\$263,000.00, as can be seen in Table 3. As explained before each minimum module involves Program III (Integrated Natural Resources Management) and the Production Systems Development Area of Program II plus one out of five areas belonging to Program II. The cost of the first two components, common to all modules, is estimated in US\$237,000.00. As one component is added to the minimum integrated module, the cost will be increased by US\$26,000.00 up to a total of \$367,000.00.

The modular arrangement has several advantages:

- 1) It allows donors and CATIE itself to complement contributions of any kind, magnitude and size in a puzzle building process, by adding up whole units with specific activities. Nevertheless, CATIE expects not only an additive effect but rather a real interaction effect that would enhance local and regional development.

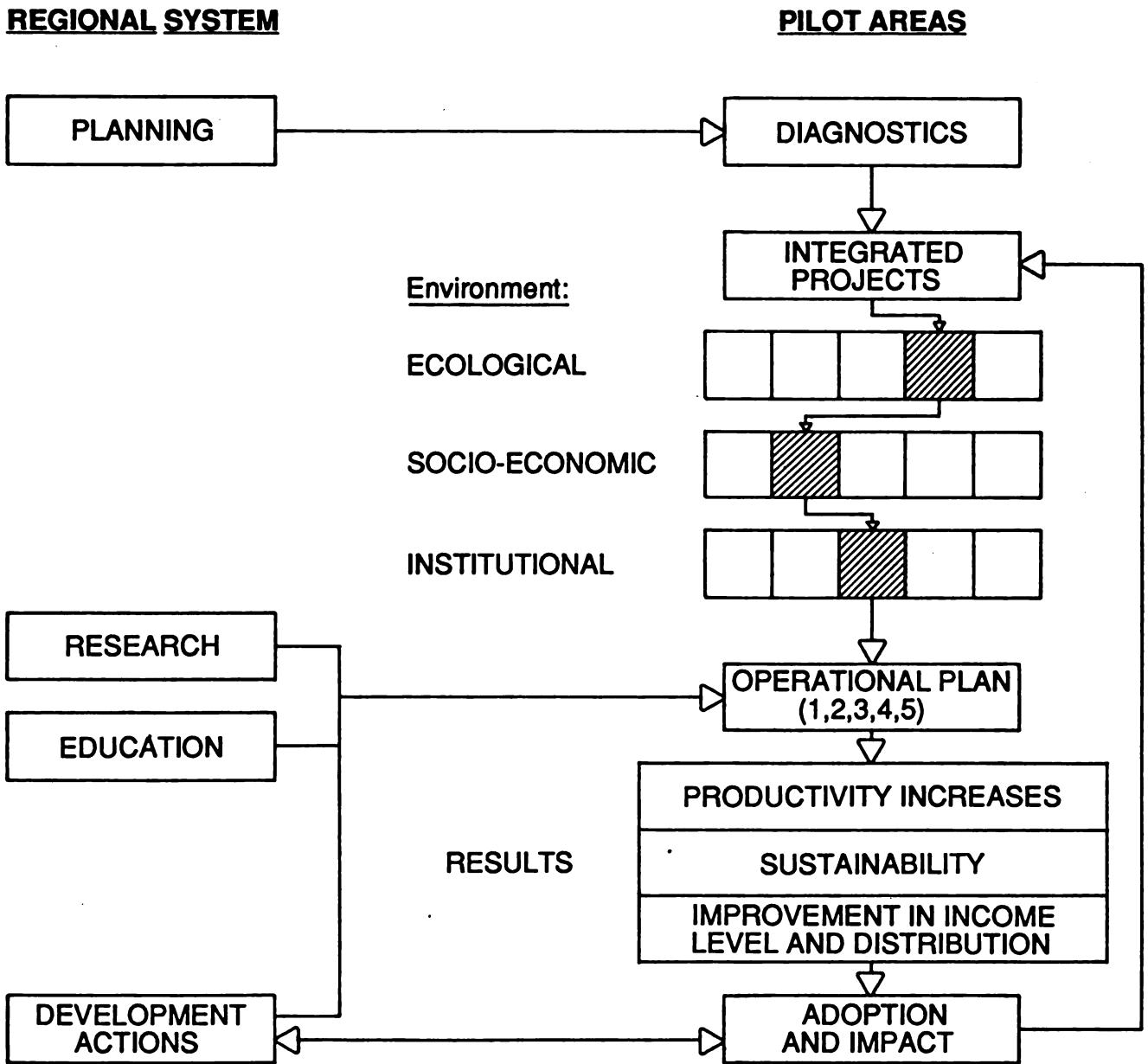


Fig. 5. Expression of the Regional System in development-focused pilot areas.



TABLE 2

## PILOT AREA

ANNUAL BUDGET BY CATEGORY AND BY COMPONENT  
( '000 US\$)

CATEGORY	I T E M	PROGRAM III					PROGRAM II				PROGRAM I		TOTAL
		INTEGRATED NATURAL RESOURCES MANAGEMENT	PRODUCTION SYSTEMS DEVELOPMENT	ANNUAL FOOD CROPS	TROPICAL LIVESTOCK	FORESTRY AND AGROFORESTRY	PERENNIAL CROPS	PROMISING TROPICAL CROPS					
PERSONNEL	Principal staff	3	30	5	5	5	5	5	5	58			
	Junior staff	-	8	1	1	1	1	1	1	13			
	Support personnel	-	8	-	-	-	-	-	-	8			
	Secretary	-	7	-	-	-	-	-	-	7			
	Field workers	-	3	2	2	2	2	2	2	13			
	One 4 WD	-	17	-	-	-	-	-	-	-	17		
VEHICLES	One motorcycle	-	3	-	-	-	-	-	-	3			
	Regional (Per diem)	2	20	4	4	4	4	4	4	42			
TRAVEL	National (Per diem)	-	10	-	-	-	-	-	-	10			
	Tickets	1	5	1	1	0.5	0.5	0.5	0.5	10			
SUPPLIES AND SERVICES		-	25	-	-	-	-	-	-	25			
VALIDATION AND TRANSFER		-	25	5	5	5	5	5	5	50			
TRAINING		2	10	2	2	2	2	2	2	22			
OTHER EXPENSES		1.76	37.62	4.4	4.4	4.4	4.4	4.4	4.29	61.16			
		0.8	17.1	2	2	2	2	2	1.95	27.8			
TOTAL		10.56	225.72	26.4	26.4	26.4	26.4	26.4	25.74	366.96			

TABLE 3

ESTIMATED ANNUAL BUDGET FOR AN ADDITIVE  
MODULAR ARRANGEMENT OF PILOT AREAS  
( '000 US\$)

	PROGRAM III	PROGRAM II					PROGRAM I	
	INTEGRATED NATURAL RESOURCES MANAGEMENT	PRODUCTION SYSTEMS DEVELOPMENT	ANNUAL FOOD CROPS	TROPICAL LIVESTOCK	FORESTRY AND AGROFORESTRY	PERENNIAL CROPS	PROMISING TROPICAL CROPS	
	11	226	26	26	26	26	26	
COMMON AREAS TO ALL MODULES	237							
COMMON AREAS + 1 (MINIMUM INTEGRATED MODULE)	263							
COMMON AREAS + 2	289							
COMMON AREAS + 3	315							
COMMON AREAS + 4	341							
COMMON AREAS + 5	367							

- 2) This arrangement stimulates the joint financing of activities within the area of donor's interest in Agricultural Research, Education and Development.
- 3) It has the advantage of allowing integration of technical cooperation (as is usually done by some donor agencies) with financial cooperation, in the context of joint financing.

Besides, the operation of the pilot areas in each of the member countries permits the utilization of a mechanism to channel bilateral support, depending on the particular interest of the country and/or donor agency.

It must be indicated at this stage that under the actual financial structure of CATIE (75% special projects, 25% core budget) the possibility of allocating resources to activities of pilot areas will depend upon the flexibility of the existing projects, which at present are being coordinated in order to implement the proposed strategy. However, if the financial structure is changed in the near future in order to assure long term funding for activities defined in CATIE's ten-year strategic development plan, at least one pilot area per country could be funded by CATIE's budget. It must be noted that the contributions from other institutions participating in the pilot area scheme will increase the magnitude of the activities that could take place in any pilot area.

## VI. CONCLUDING REMARK

The proposed organization of an agricultural research and education system which emphasizes activities within pilot areas offers enormous advantages. Such mechanism is expected among other things to:

- more effectively contribute to the strengthening of national programs
- significantly contribute to the sustainability of priority programs in benefit of the rural family.
- integrate the perspectives of technology generation and transfer with those of policies and services.
- permit a better utilization of research efforts oriented at producing impact on agricultural development.
- to integrate projects, otherwise formulated and conducted in isolation and with lack of coordination, into a meaningful research and development effort.

- take advantage of the new tools now available to produce and disseminate technological innovations aimed at modernizing the region's agriculture (i.e. biotechnology, computer simulation for agrotechnology transfer).
- encourage national programs towards the dissemination and widespread use of an integrated strategy for agricultural development.
- provide donors with the opportunity to jointly support more meaningful, development-oriented agricultural research and education projects.