

ATLANTIC ZONE PROGRAMME

**Report No. 21
Working Document 20**

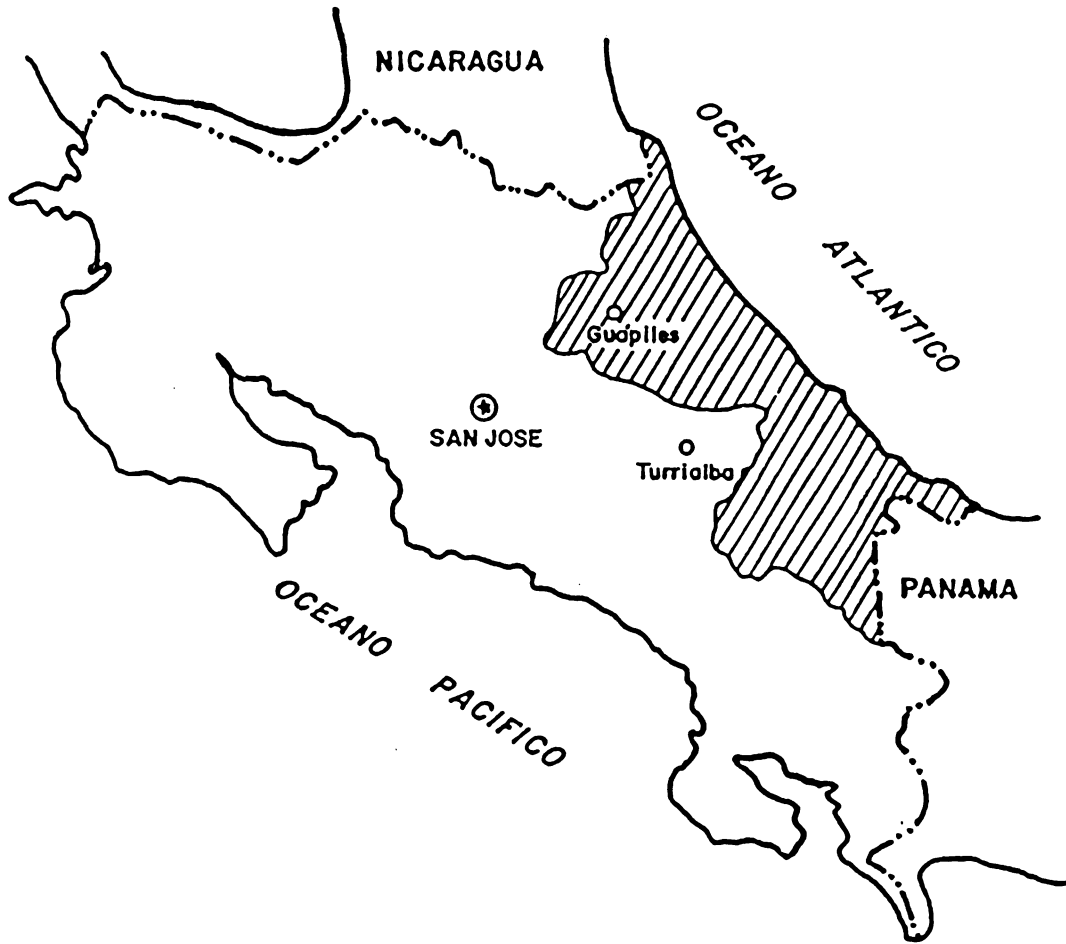
// ANNUAL REPORT FOR THE YEAR 1991

**October 1992
Turrialba**

**CENTRO AGRONOMOICO TROPICAL DE
INVESTIGACION Y ENSEÑANZA - CATIE**

**UNIVERSIDAD AGRICOLA DE
WAGENINGEN - UAW**

**MINISTERIO DE AGRICULTURA Y
GANADERIA DE COSTA RICA - MAG**



Location of the study area.

PREFACE

General description of the research programme on sustainable Landuse.

The research programme is based on the document "elaboration of the VF research programme in Costa Rica" prepared by the Working Group Costa Rica (WCR) in 1990. The document can be summarized as follows:

To develop a methodology to analyze ecologically sustainable and economically feasible land use, three hierarchical levels of analysis can be distinguished.

1. The Land Use System (LUS) analyses the relations between soil type and crops as well as technology and yield.
2. The Farm System (FS) analyses the decisions made at the farm household regarding the generation of income and on farm activities.
3. The Regional System (RS) analyses the agroecological and socio-economic boundary conditions and the incentives presented by development oriented activities.

Ecological aspects of the analysis comprise comparison of the effects of different crops and production techniques on the soil as ecological resource. For this comparison the chemical and physical qualities of the soil are examined as well as the pollution by agrochemicals. Evaluation of the groundwater condition is included in the ecological approach. Criteria for sustainability have a relative character. The question of what is in time a more sustainable land use will be answered on the three different levels for three major soil groups and nine important land use types.

Combinations of crops and soils

	Maiz	Yuca	Platano	Piña	Palmito	Pasto	Forestal I II III
Soil I	.x	x	x		x	x	x
Soil II						x	x
Soil III	x			x	x	x	x

As landuse is realized in the socio-economic context of the farm or region, feasibility criteria at corresponding levels are to be taken in consideration. MGP models on farm scale and regional scale are developed to evaluate the different ecological criteria in economical terms or visa-versa.

Different scenarios will be tested in close cooperation with the counter parts.

The Atlantic Zone Programme (CATIE-AUW-MAG) is the result of an agreement for technical cooperation between the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), the Agricultural University Wageningen (AUW). The Netherlands and the Ministerio de Agricultura y Ganadería (MAG) of Costa Rica. The Programme, that was started in April 1986, has a long-term objective multidisciplinary research aimed at rational use of the natural resources in the Atlantic Zone of Costa Rica with emphasis on the small landowner.

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SUMMARY

The Annual Report of the year 1991 gives a brief summary of the Workplan 1991-1993 and explains the activities developed to reach the objectives of this programme.

1. INTRODUCTION

1.1 Programme background

This annual report discusses the progress made in the second phase of the Atlantic Zone Programme (PZA). The Atlantic Zone Programme is the main activity of the Support Station (Steunpunt) of the Agricultural University of Wageningen in Costa Rica.

The Second Phase of the programme started in 1991 and will continue till 1993. Similar to the first phase, between 1987 till 1990, the activities are realized within the framework of an agreement between the cooperating parties: Centro Agronomica Tropical de Investigacion y Ensenanza (CATIE), the Ministry of Agriculture (MAG) and the Agricultural University of Wageningen (UAW). The agreement was signed in 1986 and forms the basis for AUV activities in Costa Rica.

Typical features of the area of Costa Rica in which the PZA activities take place comprise the following:

- A humid tropical climate with a rainfall surplus over evaporation of about 2500 mm, spread over all 12 months of the year.
- Soils of volcanic origin
- Recent and ongoing colonization and related rapid deforestation.
- Strong influence of (multi) national companies oriented towards export of bananas and other agricultural products.

The location of the study area is presented in Figure 1.

The central component of the programme of the Second Phase forms the research on:

A methodology for analysis and planning of sustainable land use, a case study in Costa Rica. The research programme was approved in Wageningen for financing for 3 years (VF programme) and was agreed on by the cooperating parties in 1990. Apart from realizing the research programme the activities of the Support Station are oriented towards education and development.

1.2 OBJECTIVES OF THE SUPPORT STATION,

- a) To execute a multidisciplinary research programme;**
- b) To provide education for students from the Netherlands, Costa Rica and other countries;**
- c) To disseminate research results to the broadest possible audience and support agricultural development activities in the study region.**

On the basis of the approved research programme the following immediate objectives are formulated:

1.2.1 Research

- Development of a methodology for the analysis and planning of ecological and economical sustainable land use.**
- Formulations of alternative scenarios for (sub) regions of the Atlantic Zone in Costa Rica.**

Main tools of the methodology to be developed and tested are a combination of modelling, experimentation and multiple goal planning, resulting in alternative scenarios and computer generated thematic maps.

By its nature, this research implies a multi and interdisciplinary approach.

1.2.2 Education

- The research component will be supported by PhD and MSc studies, realized by students from the Netherlands (15/year), from CATIE (5/year) and from Costa Rica (5/year), using facilities of the research station Los Diamantes (MAG) in Guápiles and of CATIE in Turrialba. Furthermore, visiting staff members of the Wageningen University present specific courses and presentations related to the research programme.

1.2.3 Development support

Working relations with development activities in the area are ensured by means of "letters of intent" and informal agreements with the participating agencies.

A number of staff members of MAG and CATIE participate in research activities.

Working relations will not only be maintained with Costa Rican institutions, but also with some Agricultural Research Institutes in the Netherlands (DLO), engaged in the same problemacy. (research programme on sustainable land use and food production DLV).

1.3 Target groups

As the research programme is oriented towards economically feasible and ecologically sustainable land use, both on small scale and larger regional scale, the audience that can make use of the results is found at corresponding levels.

- At the farm level the target group is found in individual farmers, entrepreneurs specialized in specific crops as well as farmers groups.

- At (sub) regional level the target group consists of national, regional and private organizations engaged in agricultural development.

Regarding the contract partners: CATIE has a shown interest in the multidisciplinary approach towards sustainability as it is also a main objective of its programme II. Specially regarding the integration of forestry systems in the farm operation and land use systems, a main research activity of CATIE, mutual participation is being developed.

Together with the research department of MAG expert systems are to be developed for a number of relevant crops. Existing knowledge at the research station "Los Diamantes" complemented with joint field research will provide the basis for this systems to be used by the extension service of MAG.

2. THE RESEARCH PROGRAMME:

2.1 General description

PREFACE

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Ecological aspects of the analysis comprise comparison of the effects of different crops and production techniques on the soil as ecological resource. For this comparison the chemical and physical qualities of the soil are examined as well as the pollution by agrochemicals. Evaluation of the groundwater condition is included in the ecological approach. Criteria for sustainability have a relative character. The question of what is in time a more sustainable land use will be answered on the three different levels. In this criteria, aspects of time are evaluated by means of crop simulation procedures for three major soil groups and 9 land use types.

Figure 2. Combinations of crops and soils

	Maiz	Yuca	Plátano	Pina	Palmito	Pasto	Forestal		
							I	II	III
Soil I*	x	x	x		x	x			x
Soil II*						x			x
Soil III*	x			x	x	x			x

* See 3.1.1

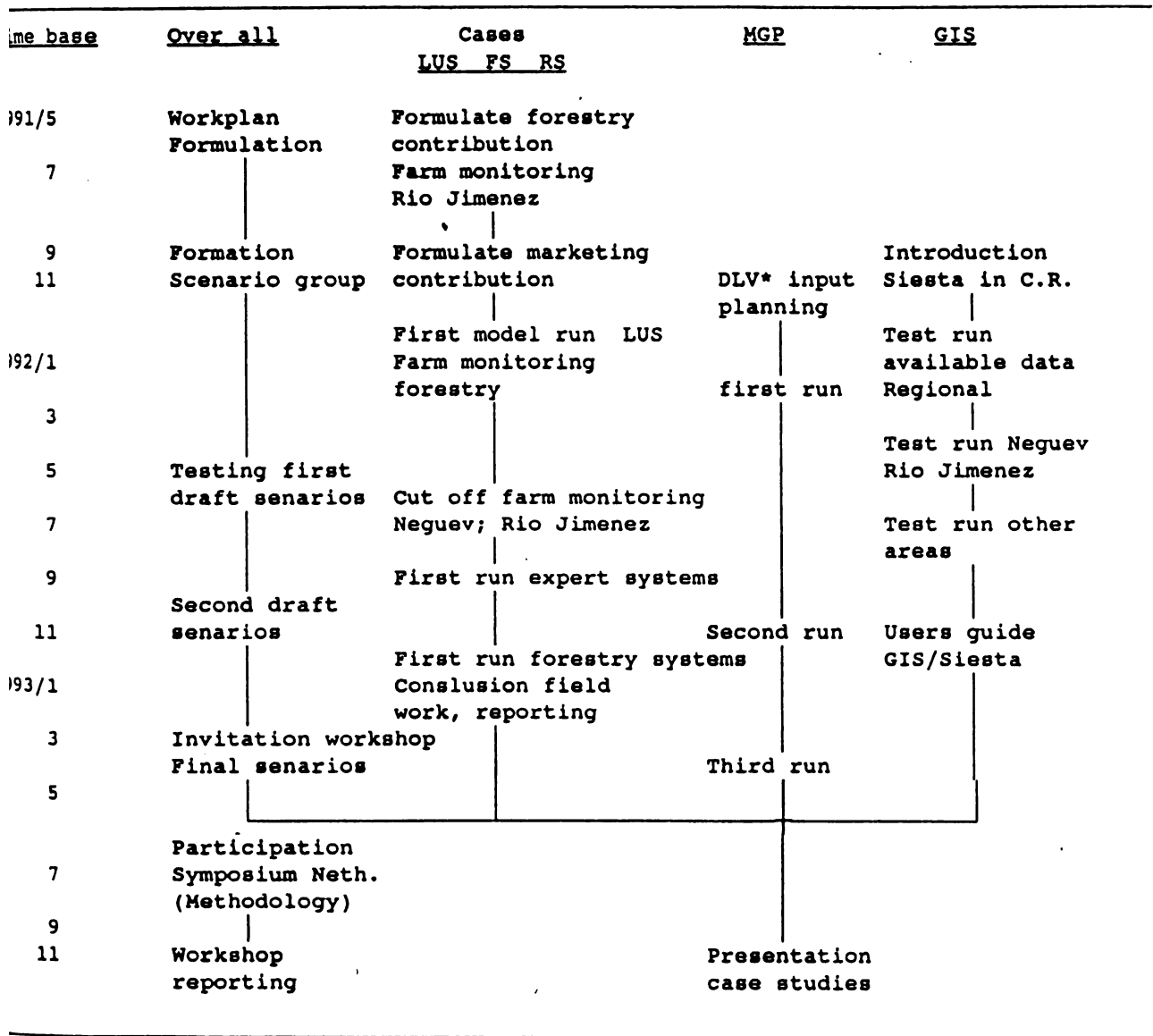
As land use is realized in the socio-economic context of the farm or region, feasibility criteria at corresponding levels are to be taken in consideration. MGP models on farm scale and regional scale are developed to evaluate the different ecological criteria in economical terms or visa-versa.

Different scenarios will be tested in close cooperation with the counter parts.

2.2 Time schedule of the research programme

In Figure 3a an overall time schedule of the research programme is presented. Figures 3b, c and d show the planning of activities at the three levels of analysis.

Figure 3a. Time schedule (general)
Phase II Atlantic Zone Programme



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- LUS = Land Use System
- FS = Farm System
- RS = Regional System
- MGP = Multiple Goal Programming
- GIS = Geographic Information System
- DLV = Research programme on sustainable land use and food production (Netherlands)

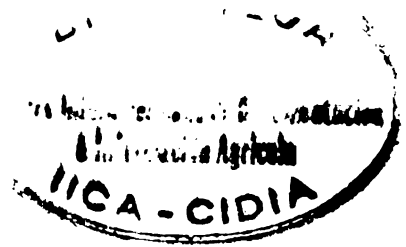


Figure 3b. Time schedule soil-plant group I (LUS)
 (---|---|---) connection points for MGP see 3a)

Dead line
 Field work

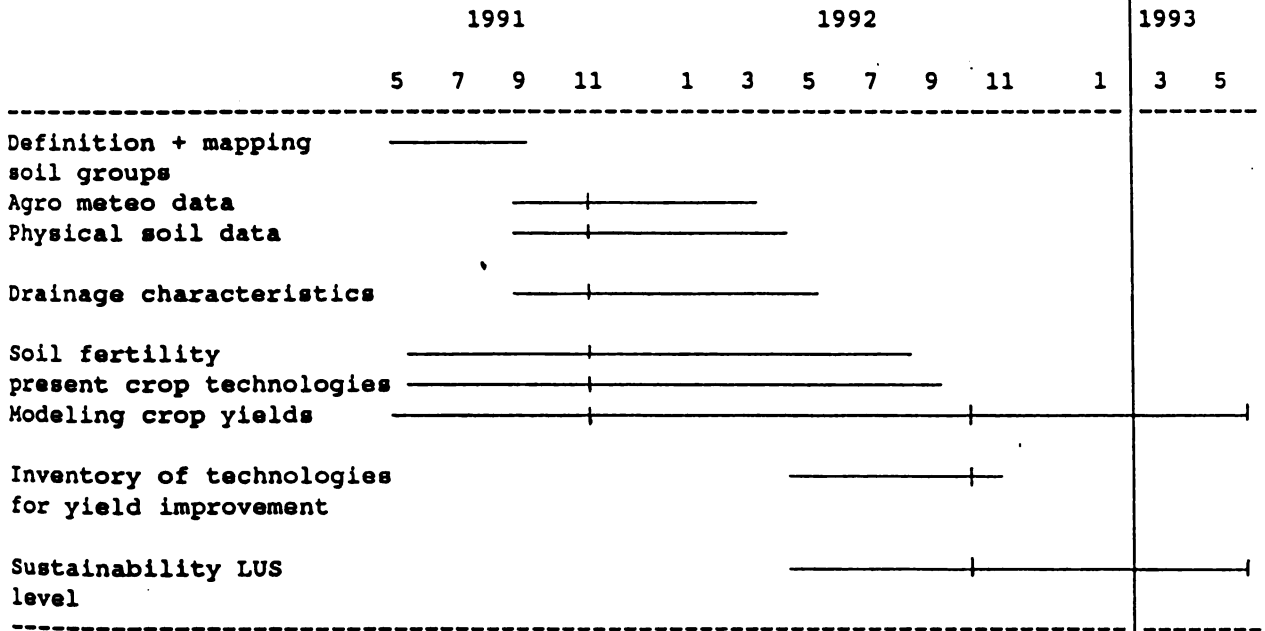


Figure 3c. Time schedule Farm - Systems. Group II (F.S)

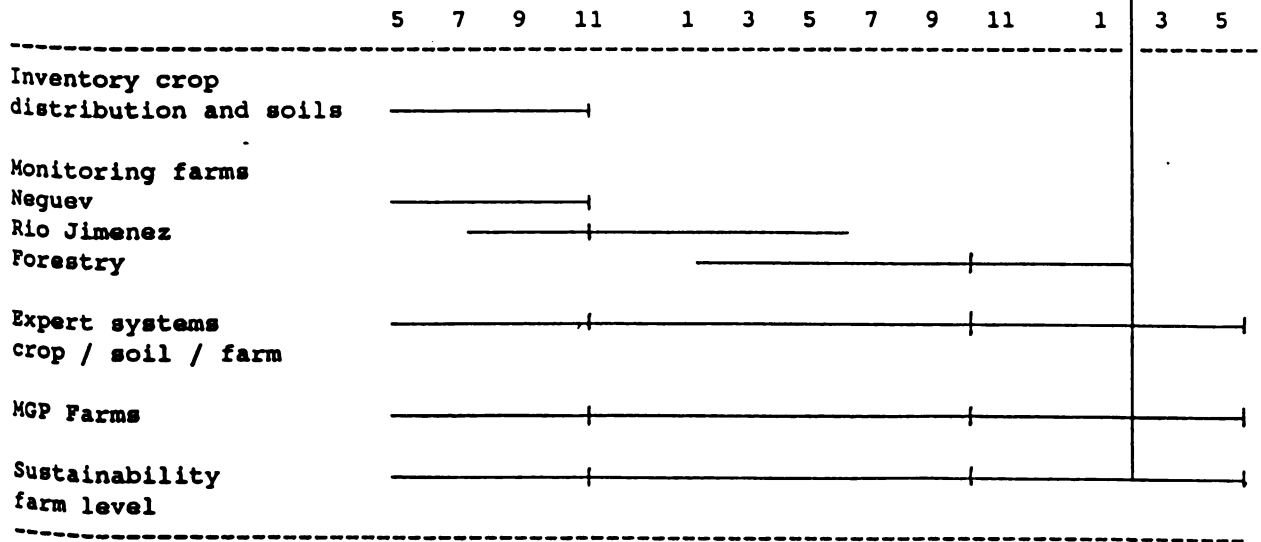
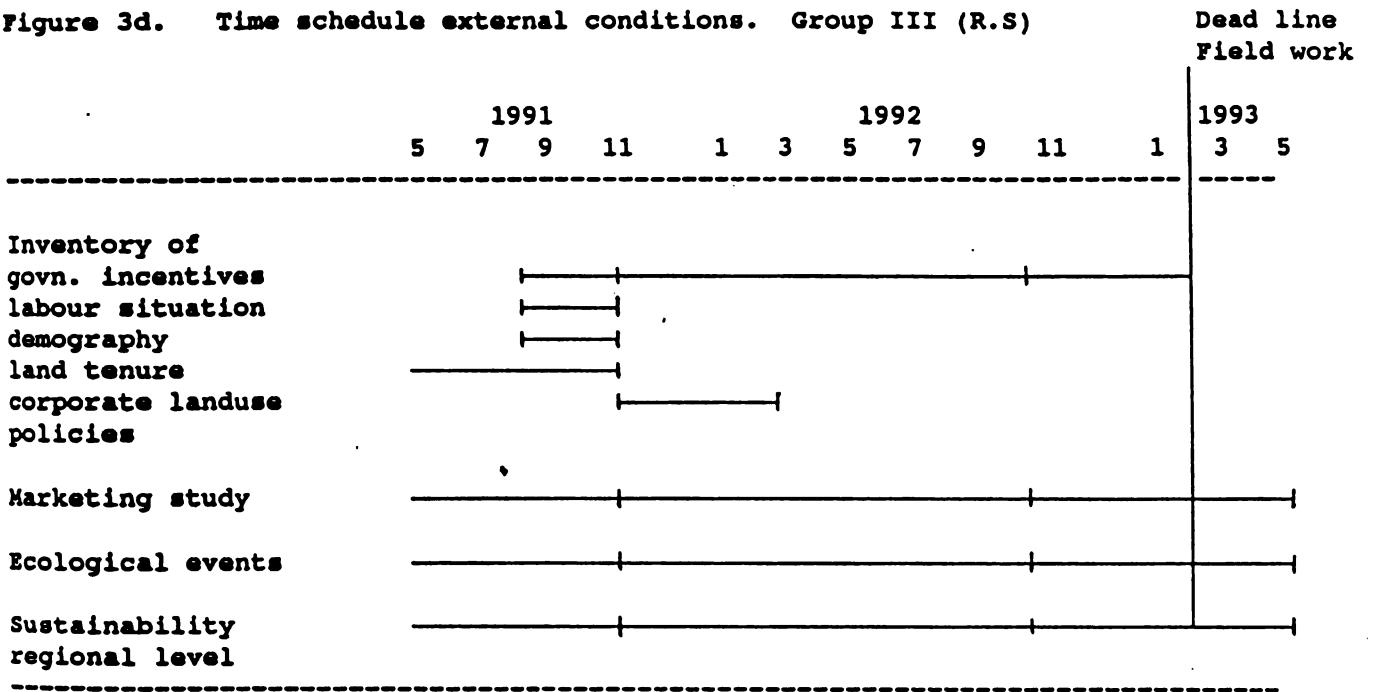


Figure 3d. Time schedule external conditions. Group III (R.S)



3. RESEARCH ACTIVITIES 1991

3.1 The realized activities in 1991 will briefly be discussed in the same order as presented in the time schedule:

3.1.1 Activities in Group I: Plant -soil research (Schedule 3b)

- Definition + mapping of soil groups.

During the WCR visit in April it was decided that the soil groups for the LUT matrix will consist of:-

I : fertile well drained soils (of holocene origen)
II : fertile poorly drained soils (of holocene origen)
III: soils of poor fertility (of pre-holocene origen)

This grouping of soils was proposed by André Nieuwenhuyse, AIO working on the subject of geology and landscape genesis, and was approved by the WCR representatives and the field team. In September, during the mission of W. Wielemakers the mapping units of the available soil maps, prepared during Phase I (1987-1990), were ordered accordingly. Regarding the mapping unit of badly drained soils (permanent swamps) the option was opened to consider them as a fourth group or as a sub group II. The decision was postponed after more insight is obtained regarding "drainage characteristics".

- Agrometeo data.

An inventory was made of the stations that can be used for crop simulation modelling. Difficulties exist regarding copying data from tape, while copying from hand written files is an enormous work. In 1992 a solution will be found.

- Physical soil data

On two of the three soils groups the physical soil data are being collected on sites selected by Ed Veldkamp and Don Jansen. Data are being collected using the "One Step Outlow" method and "Crust" method. Analysis for the first method are realized with the newly installed laboratory equipment in Guapiles.

The results obtained by Antje Weitz, temporarily contracted by the programme, look promising. A report is expected in 1992. For the soil group II (poorly drained soils) other methods will be applied in 1992.

- Drainage characteristics

Leaching of nutrients in the present conditions of high annual rainfall and very permeable soils is considered an important

factor in the assessment of the fertility aspects of sustainable land use.

A first attempt of evaluating the leaching in a well drained banana plantation showed that about 30% of applied fertilizers are leached to the ground water. (Field report 33). The drainage characteristics of the different soil groups will be further evaluated on the basis of field observations, physical characteristics and modeling (1992). The activities are being supervised by Robert Sevenhuysen and are conducted in cooperation with Ministry of Agriculture (MAG).

- Soil fertility

Fertility status of the soils, one of the important aspects of sustainability assessments of different landuses, is analysed on the basis of the Quefts methodology. (Introduced to the programme in '91 by Theo Guiking). Data collected during the first phase of research proved to be not complete therefore two new experiments were set up on relevant soil groups: one for maize (annual crop) and one for palmito (palm heart), perennial crop. In 1992 another experiment will be realized for pasture.

The maize experiment was completed in 1991. On the soils of low fertility, however, the results seem not to be conclusive, due to large heterogeneity. In 1992 a solution has to be found to bring this aspect into proper perspective.

The experiment with palmito will continue in 1992.

The data are of utmost importance for the crop growth simulation activity conducted by Donatus Jansen.

- Present crop technologies

Inventory of the farmers production methods were realized for the crops of maize, yuca, pina, palmito and pasto. A start was made on forestry. In 1992 all the crops of the "matrix" will be covered. Inventories were supervised by Donatus Jansen as they form an input in the crop simulation activity. Back stopping was provided by Theo Guiking (Tropical Crop Science), and Muhammad Ibrahim who is conducting research on grassland improvement by means of the introduction of legumes (Sandwich Fellowship with Prof. L.'t Mannelje).

3.1.2 Group II Farm systems research (Schedule 3c)

Inventory of crop distribution and soils -

On the basis of the existing soil maps (Phase I) of the Neguev and Rio Jimemez, aerial photographs and interviews, a inventory system was developed and realized. Activities were supervised by Donatus Jansen.

For the other sample area, Cocori, the inventory will be realized in 1992, within the scheduled forestry activity of Arthur van Leeuwen, AIO Forestry Department. Arthur van Leeuwen visited the project for an orientation together with Dr. B. Filius in October.

The workplan for Arthur van Leeuwen's participation was drafted during an intensive visit of Dr. F. Staudt and Dr. B. Filius earlier in 1991.

- Monitoring of farms (Nequev, Rio Jimenez)

Under supervision of Rob Schipper, who visited the project for three extended periods, the monitoring of farms took shape. Farm activities in both areas will be linked with crop production and soil types to provide the basic information for the Multiple Goal Programming. The activity will continue in 1992.

- Expert Systems

The information collected in the farm monitoring together with literature information and available knowledge in services of the Ministry of Agriculture (MAG), are being included in the expert systems under development by Jose Arze of CATIE. The programme has provided Jose Arze with a full-time assistant who organizes bi-weekly meetings with officials of MAG.

- MGP - Farms

During 1991 a large number of field and secondary data were collected to implement the MGP activity conducted by Rob Schipper.

In accordance with A. van Leeuwen and Rob Schipper, a computer programme was procured to develop the MGP. The activity will take shape in 1992.

- Sustainability at farm level

In early 1991 the basis was laid for the study of Rodrigo Alfaro to compare farmers attitudes towards sustainability and their actual field activities. Prof. Long together with Louise Fresco were found willing to supervise the study in the frame work of a PhD Sandwich Fellowship. Rodrigo stayed in Holland between August and December to prepare his workplan and participate in a number of courses.

3.1.3 Group III the Regional System (Schedule 3d)

- Inventory of Government incentives

In 1992, IUCN (International Union for the Conservation of Nature), started an important development in the study region of the Atlantic Zone. The area influenced by this plans cover about 1/3 of the PZA study region. The proposed development includes a corridor between existing national parks and the creation of a bufferzone with limited land use.

On a formal request of IUCN for data and support, an agreement for mutual information sharing was made (convenio). Active participation of André Nieuwenhuys (AIO Soil Science and Geology) was arranged. Extensive use was also made of the information collected by Jeroen Huising. Members of the programme (Willemien Brooijmans and others) visited the IUCN meetings).

- Labour situation

The programme sponsored the MSc. thesis of Roland Rivera (University of Costa Rica) on an inventory of labour relations in the banana farms. The banana farms offer an important opportunity for off-farm labour in the Atlantic Zone. The extensive study needs to be summarized during the next year.

- Demography

The demographic study is postponed until 1992.

- Land Tenure

W. Brooijmans, (OIO on the relations between land tenure and land use in recent colonized areas), visited the Netherlands between September and December.

As agricultural credit facilities are strongly related to land tenure conditions, viable information for development scenarios will become available from this activity.

- Marketing study

During the visit of Dr. Aad van Tilburg a research programme for this subject was drafted to be implemented in 1992. In the Netherlands students and a supervisor were identified to arrive in the first half of 1992. The study will analyse the position of the farmers, the traders and the markets for the most important products of the Atlantic Zone.

- Ecological events

With the UNA (National University in Heredia), one of the two leading Universities of Costa Rica, a programme was drafted

by Salle Kronenberg to analyze the recurrence and impact of inundations, volcanic eruptions and earthquakes. The study will be carried out by students of the UNA as an MSc. thesis (1992) and will be supervised jointly by André Nieuwenhuyse and Dr. Vahrson of the Department of Earth Sciences (UNA).

- Sustainability on regional level

Louise Fresco prepared the terms of reference for the study of farm system analysis on regional level to be implemented by an AIO study during the years 1992-1996.

Emphasis will be on ecological sustainability aspect of farm systems with bearing to the regional situation and developments.

The economic aspects of sustainable land use at regional level will be included in the DLV contribution (To start in 1992).

- Geographic Information System

Jetse Stoorvogel obtained the assignment of staff researcher to realize the Geographic Information System and the data base required to analyse scenarios for sustainable landuse.

He visited the programme on an orientation mission together with the WCR representatives in October.

3.2 EDUCATION ACTIVITIES 1991

3.2.1 Regarding the educational objective, to provide guidance and support for student research, the following MSc and PhD students from Costa Rica and CATIE participated in the programme:-

Rolando Rivera - Labour relations in banana
David Cruz - Cacao
Carlos Aragon - Pasture improvement
Muhammad Ibrahim - Pasture improvement (PhD)

Also participated in the preparation of a PhD study, be it not as students:

Rodrigo Alfaro - Sociology (PhD)
José Arze - Expert System Analysis (PhD)

From the Netherlands, mostly Wageningen, the following MSc students realized research subjects:

Paul Verschoor - Geology
Annemaria Bouma - Plant Production
Jochem Finnema - Plant Production/economy
Gert Jan Weerts - Soils
Bjorn Veltman - Plant Production
Alexander Mucher - Plant Production

Raymond Jongschaap	- Plant Production
Steve Chin-Fo-Sieeuw	- Plant Production
Amos Coats	- Plant Production
Karin Hoojschuur	- Farm systems (Deventer)
Paul V. de Berg	- Development Economics
Roald Droog	- Development Economics
Frank Ruitenbergh	- Geology (Amsterdam)
Robert van Seeters	- Geology (Wageningen)
Jorg-Johan Tonjes	- Plant Production

PhD students from Wageningen:

Ed Veldkamp	- Organic matter and land use
André Nieuwenhuys	- Geology and Landscape genesis
Willemien Brooijmans	- Land tenure and land use

3.2.2 Visiting members of the Wageningen University on research support and coordination missions:

- Prof. van Breemen; Dr. Jongmans; Dr. Guiking 2 x; Dr. de Graaf; Dr. Kaufman 2 x (ISRIC); Prof. Kroonenberg 2 x; Prof. Bouma 2 x; Prof. Fresco 2 x; Ir. Schipper 3 x; Dr. Filius; Ir. Staudt; Ir. Boerrigter; Prof. 't Mannetje 2 x; Prof. Rabbinge; Dr. Wielemaker and Dr. van Tilburg.

3.3 Development Oriented Activities:

- A one week course on soil fertility evaluation, by means of the Quefts approach, was presented by Dr. T. Guiking. Fifteen students and staff members of CATIE and MAG participated. The course was well received and in 1992 a follow up can be considered specially with the MAG participants.

- A course on the development of expert systems was organized by José Arze (bi-weekly one day). Officials of MAG services participated, The course will continue in 1992 and will provide materials to be incorporated in the final expert systems for the programme.

- Four joint meetings with the staff of MAG were organized to exchange results of ongoing research items of mutual interest.

- A workshop and field day was organized on pasture improvements with participants of CATIE, MAG, Staff members of UNA and cooperatives working in milk production. Prof. L't Mannetje was the key note speaker.

- A field day with farmers was organized to explain the results of the economic farm survey. Some 15 farmers participated. The farmers that completed the one year budget monitoring were treated a lunch and a memory present.

- CATIE and MAG officials on coordination or research mission visiting Wageningen in 1991: Rafael Celis (CATIE), Jose Galindo (CATIE) and Lois Alberto Arrillo (MAG).

- Prof. Rabbinge presented a key note address during the CATIE/REDCA conference in Panama. Sevenhuysen and Jansen also participated in this regional meeting (Centro America).

- Participation of Donatus Jansen in a workshop on Palmito production (Peru, November) Don Jansen presented a paper explaining the research approach on Palmito in the PZA Programme (Simulation of growth and field experimentation).

3.4 Miscellaneous: Convenios (Letters of intent)

For the realization of the PZA research programme a large number of data are required that are available at Costa Rican Institutes:- land tenure, demography, consumption of products and many others. Also laboratory facilities for leaf analysis and specific chemical analysis are required.

The valuable informations capacities in many occasions, are not offered for free but on the basis of exchange of qualities and information the programme can provide.

In 1991 Convenios (Letters of Intend) are prepared and signed with the following institutions:

IUCN - regarding exchange of information collected by both parties on land use in the Atlantic Zone.

Catastro - regarding land tenure in the Atlantic Zone

Corbana - regarding laboratory facilities, and information on crop production and education of staff.

Consultancies:

- On request of the World Bank Jeroen Huizing was contracted to analyse forest depletion in specific areas on the basis of satellite images.

- Field work and soil mapping was contracted by IUCN with Andres Nieuwenhuysse.

Complementing Research proposals:

Together with CATIE (agroforestry projects) and the University of Freiburg (Germany) a proposal for the STD3 programme (EC) was prepared and submitted regarding research activities to arrive at expert systems for agroforestry development in the humid tropics of Central America. CATIE will be the leading partner if the research is awarded.

ISRIC:

On the request of Isric and CATIE the programme assisted in the preparation of monolites for the Central America collection to be displayed in CATIE and in ISRIC Wageningen.

A first five year jubilee.

The Atlantic Zone Programme celebrated the first five years Anniversary in October in presence of some hundred invitees from CATIE, MAG and other Institutes participating in the present activities and in the previous years. The celebration had a social character.

4. Organization, Infrastructure in Costa Rica, Publications

4.1 - Steering Committee

The research programme is supervised by the Steering Committee in which representatives of the research partners are meeting each other 2 times per year.

CATIE is represented by the Director of Programme II; MAG is represented by the Director of the Department of Investigations and LUW is represented by the chairman of the working group Costa Rica WCR.

4.2 - Field team

The programme is realized by the field staff. In 1991 the field staff comprised of two scientist from Wageningen; an administrative staff, a technical staff and laboratory analysts of in total 17 persons.

It is the task of the field team to coordinate, support and participate in the research activities that are carried out by a number of PhD and MSc students from the Netherlands and Costa Rica (PhD students - 6; MSc students - 18 in 1991). The field team reports monthly to the WCR and the Steering Committee.

4.3 - Consultancy group

As advisors to the Steering Committee and the field team the LUW consultancy group (WCR) is engaged. The group consists of representatives of the LUW departments that participate in the research and a representative of the Foreign Office. Members of the group visit the programme once or twice per year.

4.4 - Temporary staff

For research activities in the programme for which no students are available contracts of short duration are awarded (4 short contracts in 1991).

4.5 - Facilities

The facilities of the field team consist of offices at CATIE in Turrialba and offices, guest house, a laboratory and store house in Guapiles.

Most field research is carried out in farmers fields, some activities take place at the Experimental Station of Los Diamantes.

4.6 Publications:

Apart from scientific publications prepared by the consultancy group and the PhD researchers all students prepare a report of their activities. A draft report is left on their departure and finalized at the University. For this purpose a serie "Sustainable Land Use" is maintained (Appendix I).

In the serie the following types of reports are included:-

- Field reports prepared by students;
- Work documents prepared by staff members, PhD researchers and consultants;
- Conference papers, and presentations in workshops.

5.. Work budget of Support Station 1991

Item	Subject	1991
2241.3	Personel (Costa Rica)	(NF) 145.000
2241.4	Travel expenses	10.000
2420.0	Office inventory	10.000
2430.0	Vehicles (1000)	20.000
2510.0	Office rent	20.000
2520.0	Office equipment	20.000
2530.0	Transport running cost	40.000
2540.0	Office running costs	23.000
2550.0	Research materials	31.000
2590.0	Other running costs (lab.)	63.500
2212.0	Ticket costs field team	5.000
2215.5	Travel expenses field team	5.000
2213.3	Ticket cost missions	55.000
2215.1	Travel expenses missions	27.000
2260.0	Work contracted out (CR)	7.500
2216.1	Printing costs (maps, reports)	55.000
2612.0	Ticket costs fellowships	5.000
2613.0	Travel costs fellowships	6.000
2650.0	Courses	<u>10.000</u>
		558.000
2690.0	Contingency of exchange rates 10%	56.000

6. Perspectives for 1992

Research activities at the Support Station will follow closely the time schedule as presented in Figures 3a -d.

With the arrival of the Geographic Information System (GIS) expert, closer cooperation will be realized with the departments of MAG (SENACSA and SEPSA) that are engaged in regional planning. There exist a strong interest in this activity and the first step to this cooperation was made by the visit of Lois Alberto Arrollo in December 1991.

As regarding the subjects of soil conservation and land drainage, contacts will be strengthened with the FAO after the programme is approved.

Subjects for which no researchers can be found from the Wageningen University or from CATIE, will be contracted in Costa Rica. Closer contacts with the Costa Rican Universities will be developed for this purpose.

Cooperation with the Departments of the Agricultural University and the WCR will remain strong; on specific aspects like preparation of the expert system and soil fertility evaluation much more inputs are hoped for.

Student participation in the fields of plant production and economy looks problematic at present.

Annex I
Sustainable Landuse Reports (1991)

Work Plan 1991-1993 - A methodology for analysis and planning of sustainable land use, a case study in Costa Rica.

Practical technologies for the improvement of Pastures in Central América (L. 't Mannetje).

Deforestation, colonization and utilization of land resources in the Atlantic Zone of Costa Rica (Fred R. van Sluys; Willem G. Wielemaker; Jan F. Wienk).

Soil hydraulic conductivity on two tropical soil types under forest and a 25 years old pastures (G.J.Weerts).

Geomorphology and soils of the area limon - Cahuita, Atlantic Zone of Costa Rica (F. Luijckx; W. Zonnenberg).

Investigation about the farm activities of women and the importance of their activities for the family income in El Indio (K. Hooijschuur).

Farm systems in the Neguev settlement (J.M. Finnema).

Diagnóstico sobre el manejo del cultivo y compatibilidad del cacao en la Zona Atlántica de Costa Rica (D. Cruz Choque; J. Morera).

A study on the spatial distribution of land use in the settlement Neguev (C.A. Mucher).

Pérdidas de cosecha del plátano; un estudio exploratorio en el Valle de Sixaola, Costa Rica (A.T.M. Bouma; H. Waaijenberg).

Estudio detallado de suelos de la finca experimental Los Diamantes (Luis Guillermo Valverde - Asesorado por Dr. Willem G. Wielemaker).

Estudio del posible riesgo de deslizamientos y procesos aliados en la cuenca del Río Toro Amarillo (Margriet W. Hartman).

World food production through sustainable agriculture (R. Rabbing).

Estudio detallado de los suelos del Asentamiento Neguev (Styze de Bruin).

Sistemas de producción bovina en la Zona Atlántica de Costa Rica con énfasis en los cantones de Pococí y Guácimo (Carlos Aragón).