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VIA FARMERS OBJECTIVES TO A FARMER TYPOLOGY
Design of a farmer typology in the Atlantic Zone of Costa Rica with special regard to the role of trees

H.W. Schreppers

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CENTRO AGRONOMICO TROPICAL DE INVESTIGACION Y ENSEÑANZA (CATIE)

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The Research Program on Sustainability in Agriculture (REPOSA) is a cooperation between Wageningen Agricultural University (WAU), the Center for Research and Education in Tropical Agriculture (CATIE), and the Costa Rican Ministry of Agriculture and Livestock (MAG). In addition, REPOSA has signed memoranda of understanding with numerous academic, governmental, international, and non-governmental organizations in Costa Rica.
The overall objective of REPOSA is the development of an interdisciplinary methodology for land use evaluation at various levels of aggregation. The methodology, based on a modular approach to the integration of different models and data bases, is denominated *USTED* (*Uso Sostenible de Tierras En el Desarrollo*; Sustainable Land Use in Development).
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REPOSA es financiado por la UAW bajo su Programa del Uso Sostenible de la Tierra en los Areas Trópicos. La sede de REPOSA está ubicada en la Estación Experimental Los Diamantes del MAG en Guápiles.

PREFACE

This reports presents a major subject of 5 months for which was supposed to spend more or less one month on preparation in the Netherlands, three and a half months on field work in Costa Rica and one month on the writing of the report. Unfortunately it took some more time to finish the report. After having graduated "on concept" at the Wageningen Agricultural University the author started to work for the Volunteers Organisation "Agromisa". A heavy workload prevented the author to finish this report quickly.

In Costa Rica, a practical period of 3 months served for an ideal preparation for the field work in the research. During the practical period the view was strengthened that consideration of objectives of farmers is not only indispensable to arrive at adjusted land use planning, it is also just from a humane and ethical point of view.

The following persons I would like to thank. Arthur van Leeuwen for his patience and for the supervision of the research in Costa Rica and in the Netherlands. Freerk Wiersum for supervision during the writing phase. Nicole for her support during the entire research. Peter and Erik for English corrections in some parts of the report. Magreet for the Spanish summary. The farmers in the research sample for their willingness to respond to the interviews and for their hospitality. And of course Ulises (Pipi) Gómez Hernandez for his very useful help as interpreter during the interviews and for his friendship. Muchas gracias Pipi!

Harrie Schreppers

SUMMARY

Many currently applied methods of farm classification are not satisfying because of a lack of attention for the human factor in land use. As opposed to this, the farm classification as will be developed in the Atlantic Zone Programme will include sociological aspects. As part of this farm classification, a farmer typology with direct attention for farm-objectives is presented in this report.

The study area consists of three research areas, i.e. Río Jiménez, Cocorí and Neguev. The research areas are considered representative for the northern part of the Atlantic Zone of Costa Rica. The studied farmers are part of a research sample which has been selected at random in a previous study (35 farmers per research area). In this study 21 farmers from Río Jiménez, 17 from Cocorí and 22 from Neguev cooperated.

Because objectives of people are very personal and come forth from a combination of full knowledge besides subconsciousness, describing of objectives is very difficult. Therefore has been chosen to study the objectives of farmers by means of deriving them from other phenomena, like the dependence on the farm and the dependence on off-farm work as perceived by the farmer.

The scope of activities which farmers undertake to derive an income is called the livelihood system. To achieve livelihood goals farmers follow a livelihood strategy. The farm can be considered as one of the components in this strategy. Other components can be summarized with the term off-farm work. The function of the farm corresponds with the farm-objective.

To decide on farm-objectives of farmers in the research areas the following criteria were used:
- the importance of the farm regarding income-earning;
- the importance of off-farm work regarding income-earning.

With the application of these criteria in the farmer typology procedure a farmer typology has been developed with the following farmer types: "Basic needs farmer", "Living standard improvement farmer", "Investor", "Farmer with necessary off-farm income", "Farmer with farm as future alternative" and "Full-time off-farm employee". The farm-objectives are, respectively, to produce enough for basic needs fulfilment, to improve the living standard, to earn as much as possible without large changes in land use, to accumulate capital by means of an investment, to make a living with the farm in the future and to grow some crops for home consumption.

Off-farm activities have a big influence on the attitude of lots of farmers in the research areas towards their farms and are important ways for lots of farmers to earn a significant part of the needed income.

Because farmers consider trees and forests as a rest factor in land use, it proved not to be possible to make a detailed typology about related objectives. Besides, intentions and activities regarding trees and forests differ in such a way between farmers that the design of typology based on details about objectives is not feasible. Therefore was chosen to work with a global approach of grouping farmers based on similar activities regarding trees and forests. This resulted in a tree-activity grouping with the groups: "No activities", "Activities" and "Interested in activities".

The conclusion from the combining of the farmer typology and the tree-activity grouping shows that the farmer typology does not overlap clearly with the tree-activity grouping. Nevertheless, some farmer types seem to contain more farmers with the same activities regarding trees than other farmer types do. The promotion of tree activities in land use planning would probably be most effective when this promotion is aimed at the target groups "Basic needs farmer", "Living standard improvement farmer", "Investor" and "Farmer with farm as future alternative".

It showed that farmers are getting more and more interested in trees, forests, nature conservation etc. This gives opportunities to enlarge the role of the tree- and forest component in the farming system by means of extension and training.

RESUMEN

Muchos métodos actualmente usados para la clasificación de fincas ("farm classification") no satisfacen porque no toman en cuenta el factor humano en el uso de la tierra. En cambio, la clasificación de fincas que se desarrolla en el Programa Zona Atlántica de Costa Rica incluyará aspectos sociológicos. Parcialmente la clasificación de fincas consiste en una tipología de productores basada en sus objectivos en cuanto al uso de la tierra. La tipología se presenta en este informe.

El área de investigación comprende tres subregiones, a saber Río Jiménez, Cocorí y Neguev. Las subregiones se consideran representativas para la parte del norte de la Zona Atlántica de Costa Rica. Los productores estudiados corresponden con los que han sido seleccionados de manera arbitraria en previos estudios (35 productores por subregión). En este estudio cooperan 21 productores en Río Jiménez, 17 en Cocorí y 22 en Neguev.

El alcance de los hechos realizados por los productores para obtener ingresos se llama "sistema de sustento". Para complir las metas de sustento productores siguen una estrategia de sustento. La finca se puede considerar como úno de los componentes de dicha estrategia. Otros componentes pueden ser cualificados con el término "trabajo fuera de la finca".

Para distinguir los objetivos de los productores en cuanto al uso de la tierra en las tres subregiones de estudio nos servimos de los criterios siguientes:
* la importancia de la finca en términos financieros (ingresos obtenidos); y
* la importancia del trabajo fuera de la finca en términos financieros (ingresos obtenidos).

Con la aplicación de estos dos criterios se desarrolló la siguiente tipología de productores: "Productor que produce para necesidades básicas", "Productor que produce para mejorarse el nivel de vida", "Inversionista", "Productor con ingresos esenciales de fuera de la finca", "Productor con la finca como futura alternativa" y "Obrero que sólo trabaja fuera de la finca". Los objetivos en cuanto al uso de la tierra son, respectivamente, producir (apenas) suficiente para satisfacer las necesidades básicas, mejorarse el nivel de vida, obtener lo más ingresos que posible sin hacer grandes cambios en el uso de la tierra, acumular capital por inversiones, vivir de la finca en el futuro, y cultivar algunos cultivos para autoconsumo.

Actividades hechas fuera de la finca tienen una gran influencia en la actitud de muchos productores de los subregiones en cuanto a su finca. Además, para muchos productores dichas actividades forman un parte significante de los ingresos necesarios.

No era posible desarrollar una tipología detallada de los objetivos de los productores en cuanto a los árboles y bosques, puesto que los productores consideran árboles y bosques como un factor secundario. Además, hay tantas diferentes intentaciones y

actividades en cuanto a los árboles y bosques que el diseño de una tipología basado en esos objetivos no is fiable. Por esa razón se tomó un enfoque global para agrupar productores según sus actividades en torno a los árboles y bosques. Esto resultó en un agrupamiento de actividades arbóreos con los grupos: "Sin actividades", "Actividades", y "Con interés por actividades".

Esto agrupamiento de actividades arbóreos fue comparacido con la tipología de productores, de lo que resultó que estos dos agrupamientos no corresponden claramente. Sin embargo, algunos grupos de productores parecen contener más productores que hacen actividades similares que otros grupos de productores. Por esa razón, la promoción de actividades arbóreas en el planeamiento del uso de la tierra sería probablemente más eficaz cuando la promoción se enfoca en los grupos mencionados anteriormente, a saber "Productor que produce para necesidades básicas", "Productor que produce para mejorarse el nivel de vida", "Inversionista", y "Productor con la finca como futura alternativa".

También resultó que el interés de los productores por árboles, bosques, conservación de la naturaleza, etc., crece constantamente. Esto puede dar oportunidades para ampliar el papel del componente arbóreo y boscoso en el sistema de producción por medio de divulgación (extensión) y entrenamiento.

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1. INTRODUCTION

In this chapter, the research will be introduced by a presentation of the problem analysis, the research context, the research objectives and the research questions. Also the used methods will be described.

1.1 Problem analysis

One of the conclusions of the UNCED conference held in Rio de Janeiro in 1992 as indicated in "Agenda 21", was that the socio-economic discipline needs strengthening in development research (Verhoef, 1993). It is also stated in "Agenda 21" that the perception of researchers and extension workers about what farmers want, know and are able to do could be "the key to success" in rural development planning (Joldersma, 1993). Rural development planning should be adjusted to the themes farmers themselves perceive important (Haverkort, 1993).

If the above mentioned opinions are considered, a lot of approaches in rural development are not satisfying because of lack of serious considering sociological data in development planning (see e.g. Sutherland, 1987; Chambers et al., 1989a). One of the tools used in the process of rural development planning in which sociological aspects are overlooked is farm classification. In this report, the above mentioned aspects will be brought into discussion by a contribution to the search for adaptations in the methods of farm classification.

The farm classification procedure is often an important tool in regional land use planning (März, 1990; Wossink, 1993). During the process of regional land use planning has to be dealt with a considerable number of farms, which cannot all separately be described and analysed to propose development actions. To come to a workable amount of cases, farm-models are used which represent the different kinds of farms that occur in the region (März, 1990).

In currently applied farm classifications, only quantitative methods and quantitative data are used (see e.g. März, 1990; Wossink 1993). But if an accurate description of farms is required as one of the instruments to come to deliberate regional land use planning, qualitative aspects are indispensable. A very important factor for the way farmers manage their undertakings is the range of objectives the farmers have with regard to their farm, which can hardly be represented by only quantitative data. These objectives will be indicated in this report as farm-objectives. Farm-objectives are important qualitative factors in decision-making about agricultural practices (see e.g. Tempel & van Giesen, 1992; Huijsman, 1986).

By use of only quantitative methods and data, a lack of attention for farm-objectives in current farm classification procedures occurs. Since farm-objectives are important in decision-making and farm classification for regional land use planning aims at grouping farms with similar land use decisions, a lack of attention for objectives leads to inappropriate farm classification procedures. If so, farm classification will be an inappropriate tool in regional land use planning.

To overcome the above outlined problem, in this research special attention will be given to the fitting in of qualitative methods in the farm classification procedure. As a case to develop and to demonstrate new methods with special focus on farm-objectives in farm classification, part of the study area of the Atlantic Zone Programme of Costa Rica (see e.g. Anon., 1992) will be considered. The Atlantic Zone Programme has, as "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" (Anon., 1992). Within the programme, a farm classification is being developed in which, among other aspects, attention is paid to objectives of farmers (Alfaro et al., 1994).

Since farmers translate farm-objectives into farm-strategies to arrive at farm practices (Reijntjes et al., 1992), not only farm-objectives have to be studied in farm classification but also the relation between farm-objectives and the associated farm-strategies.

1.2 Research context

The Atlantic Zone of Costa Rica is, like many regions in the tropical world, being confronted with a rapid conversion of forest into agricultural land. The deforestation began with the colonisation of the region by the first immigrants, which started the last century and accelerated strongly in the past thirty years (van Leeuwen, 1992). The colonists originate mostly from other parts of Costa Rica with totally different physical circumstances and where different location specific land use practices are applied. The land use practices, which are introduced by the immigrants in the Atlantic Zone, are not always suitable for the local conditions, and therefore cause environmental problems. Unsuitable land use practices not only cause problems of soil degradation, they also cause a diminishing amount of trees and forests and a subsequent loss of the positive role of trees in land use.

Trees and forests can be important components in land use all over the world. They play an important role by providing products like firewood, fodder, food and also by providing services like shade, soil and water conservation. The disappearance of trees and forests often results in degradation of soils and a decrease of possibilities to harvest tree and forest products like wood and minor forest products such as fruits and meat from forest animals (Anon., 1989).

In 1986, the Wageningen Agricultural University (WAU) started to search for approaches to develop land use planning in the Atlantic Zone. The activities in the first phase of the research (1986 - 1990) were focused on problems of structural transformation of agricultural development in the Atlantic Zone (Anon., 1992). Initially, data were gathered for development of a model for planning agricultural development. In 1991 a new phase started named: "A methodology for planning of sustainable land use: a case study in Costa Rica". In this phase an integrated land use planning methodology is being developed to evaluate the effects of specific measures (van Leeuwen, 1992).

The decline of ecological functions of trees and forests caused by deforestation is one of the problems which have to be tackled by this land use planning methodology. In this respect attention has to be paid to the role of trees and forests on farms. In order to improve the provision of services and products from trees and forests, the use of them

should form part of land use practices which are going to be proposed in the Atlantic Zone Programme. In order to stimulate farmers to plant and maintain trees on their farms, knowledge about the perception of farmers about forests and nature is an important factor to include in the analysis of current practices and future possibilities (Nygren, 1993).

In the analysis of farms in regional land use planning, farm classification can be an important tool to arrive at a workable amount of farms. In the farm classification as being developed by van Leeuwen (1992), first, farmer types, in which farmers are grouped with similar farm-objectives, will be distinguished. Second these farmer types will be divided in farm types, in which farms are grouped with similar physical possibilities. Combination of the two leads to farm classes in the farm classification (Alfaro et al., 1994).

This research will be focused on the development of a farmer typology, which will be a typology based on "farm-objectives" of farmers. Special attention will be given to farm-objectives with regard to tree growing and forest management. The farmer typology will be developed by research in a study area composed of three research areas in the Atlantic Zone, which will be referred to by the names Río Jiménez, Neguev and Cocorí. The farmer typology has to be extrapolated by further research in the Atlantic Zone Programme to come to a farmer typology for the northern part of the Atlantic Zone.

1.3 Research objectives and research questions

The research as presented in this report has to contribute to a solution for the problem as outlined in the problem analysis.

Research objectives:

The aim of this research is to get insight in the objectives and decisions of farmers with respect to land use; in particular land use with a tree-component. This information will be used to develop a typology of various farmer types based on farm-objectives in a study area in the Atlantic Zone of Costa Rica. Besides, an attempt will be made to decide on farmer type specific tree- and forest objectives.

The direct objectives of this research are:
- to develop a farmer typology based on farm-objectives for the study area in the Atlantic Zone of Costa Rica;
- to describe land use strategies within each "farmer type" in the study area;
- to develop a grouping of farmers based on objectives regarding the tree- and forest component on the farms;
- to evaluate the relations between the farmer typology based on farm-objectives and the grouping based on objectives regarding the tree- and forest component on the farm.

Based on the research objectives the following research questions have been formulated:
- How can farm-objectives and farm-strategies be identified and described?
- How can objectives with regard to the tree- and forest-component on farms be identified and described?
- How can useful aspects of the currently applied farm classification be of use for the development of a farm classification in which attention is paid to farm-objectives?

- What kind of methodology can be used to develop a farmer typology in which farmers are grouped according to similar objectives regarding the farm?
- How can farmers be grouped according to similar objectives towards the tree- and forest-component on farms?
- How can the relation between farmer types and tree/forest-objective groups be determined?
- Which farmer types can be distinguished in the study area?
- What are the farm-strategies per farmer type?
- Which tree/forest objective groups can be distinguished in the study area?
- What is the relation between the identified farmer types and tree/forest objective groups?

1.4 Research methodology

Because this research is a contribution to the research by van Leeuwen (1992) in the Atlantic Zone of Costa Rica, the study area was been determined before this research started. The study area consist of three research areas, which are considered to be representative for the northern Atlantic Zone of Costa Rica (see van Sluys et al., 1987). The research areas will be described in chapter 4 by use of programme documents of the Atlantic Zone Programme.

This research focuses on objectives of farmers. The term farmer will be used to indicate the decision-making person(s) within a farm household (see Appendix I). Because the research takes place within the context of the research of van Leeuwen, the research sample of this research should at least be part of the research sample as considered by van Leeuwen. The farm population in the research areas Río Jiménez, Cocorí and Neguev counted in 1992 respectively 424, 142 and 311 farms (Hulsebosch, 1992). For the research sample of van Leeuwen, from each research area 35 farms were selected at a random basis (see Hulsebosch, 1992).
In the underlying research it was tried to visit each farm from the research sample. Due to the time constraint and due to the fact that some farmers proved to be absent several times, in the end 21 farmers in Río Jiménez, 17 farmers in Cocorí and 22 farmers in Neguev were interviewed.

A literature study served to describe farm-objectives as an important factor in shaping a farm. To illustrate farm-objectives in their context of decision-making a model has been developed, based on literature. Besides literature, this model was used to develop a method to identify and describe farm-objectives.

To identify useful aspects for arriving at a farmer typology based on farm-objectives, literature about currently applied farm classifications was studied.

In order to design a methodology which can be used to develop a farmer typology, the above mentioned literature study on farm classifications and farm-objectives was considered. Besides, the insight regarding objectives of farmers in the study area gained in interviews was used too.

To gather data for the design of the farmer typology and to assign farmers to farmer types, unstructured interviews were used. Chosen was to work with unstructured interviews because personal aspects of farmers are object of the research. Unstructured interviews are described by Anon. (1983) as interviews in which no use is made of any list of questions, but a checklist of themes can be used. During the research the list of themes was changed slightly based on experience from the first interviews. Most of the data which are used to come to the farmer typology are statements by the farmers during the interview phase.

Because an attempt was made to pay special attention to objectives with regard to the tree- and forest-component on farms, literature was studied to find a way to identify and describe these objectives. However, during the interview phase in the study area, it proved not to be possible to describe these objectives because farmers hardly have any concrete objectives regarding the tree- and forest component on the farm. Nevertheless, it proved to be possible to study occurring activities of farmers regarding the tree- and forest-component on farms. Therefore the research switched from the study on tree- and forest objectives to the study on occurring tree- and forest activities. Farmers with similar activities are assigned to groups in what will be called a "tree-activity grouping".

At the end the farmer typology has been compared with the tree-activity grouping to decide on farmer type specific tree-activities. Due to an insufficient number of farmers per farmer type and per tree-activity group, a statistic evaluation proved to be impossible. Therefore the typology and the grouping are compared in a table.

1.5 Outline of the report

In chapter 2, a literature study about objectives of farmers with regard to farming will be presented. Farm-objectives will be described in the context of decision-making. Attention will be paid to the role of off-farm work and income, as well as to objectives regarding the tree- and forest-component on farms.

In chapter 3, a literature study about some currently applied farm classifications will be presented. These farm classification procedures are examined on usefulness in the development of a farmer typology based on farm-objectives. Analysis of existing farm classification procedures in combination with the findings about farm-objectives will lead to a methodology for a farmer typology.

In chapter 4, a description will be given of the research area, for which the farmer typology will be developed.

In chapter 5, a method will be developed to identify and describe farm-objectives and farm-strategies in practice. Also a way to assign farmers to farmer types will be described. At the end of the chapter a method to describe farmer type specific tree-activities will be presented.

In chapter 6, the method as developed in chapter 5 will be used to come to a farmer typology for the research areas. After having designed the farmer typology, a study has

been done to distinguish activities of farmers regarding trees and forests. At the end of the chapter, the farmer typology and tree-activity grouping are combined to describe farmer type-specific activities of farmers regarding the tree-and forest-component on farms.

In chapter 7, a discussion about the research results and about the applied methodology will be presented. Besides, recommendations for further research will be given.

In chapter 8, conclusions will be drawn on the research results. Answers to the research questions will be discussed.

2. OBJECTIVES OF FARMERS

In this chapter, a literature study about the objectives of farmers with respect to their farm will be presented. Farm-objectives and farm-strategies will be discussed in the context of the decision-making process on the farm. Special attention will be paid to the tree- and forest-component on farms.

2.1 The farm

The term farm is used in this document to indicate an agrarian undertaking as has been described by Tempel & van Giesen (1992) as an independent organisation that aims at the growing of crops and/or animals with the purpose to fulfil the needs of the labourers and family associated with the undertaking, by exchange or by consumption of the forthcoming produce.

It is obvious that not all farms are alike. Each farm differs from other farms because of certain differences between farm households, between farming conditions and consequently between possibilities for farming (de Bruin & van der Ploeg, 1991). The decisions made by the farm household members determine the actual actions, activities and consequently the output of a farm. Household decisions are influenced by household needs and goals as well as by the resources available to the household and constraints imposed by the environment (Huijsman, 1986). External factors in decision making are the biophysical characteristics of the farm, the availability and the quality of external inputs and services, and the socio-economic and cultural processes within the community (Reijntjes et al., 1992). The way a farm household makes its management decisions depends also on the characteristics of the household, e.g. the number of man, women and children; their age, state of health, abilities, desires, needs, farming experience, knowledge and skills; the relations between the farm household members (Reijntjes et al., 1992).

According to Tempel & van Giesen (1992), the actual appearance of an agrarian undertaking or farm depends on four sets of factors:
- the natural environment,
- the social framework,
- economic factors,
- the objectives of the farmer.

The natural environment consists of factors like climate, soil type, altitude and the water-balance which have a considerable influence on the appearance of a farm. The farm manager has to choose between a range of possibilities from total adjustment to the environment to a far going creation of an artificial environment (Tempel & van Giesen, 1992).
The social framework tells something about the level of development and professional knowledge of the farm household members, their ambitions, their personal and family cir-

cumstances, the traditions in the region and also factors like laws, land tenure and so on (Tempel & van Giesen, 1992).

Relevant economic factors which influence the appearance of a farm are e.g. the economic system, the general level of wealth, the agrarian policy, the distances to the markets, the technical and economic infrastructure, the level of production technic and the price ratios (Tempel & van Giesen, 1992). A very important economic factor is the range of opportunities to work off-farm. Many farmers do not solely depend on farming to gain a livelihood (Reijntjes et al., 1992). For many farms the long run viability of the farm depends on income earning opportunities outside agriculture (Huijsman, 1986). Alfaro (1993) indirectly stresses the importance of off-farm income in the Atlantic Zone of Costa Rica by use of a method in which identification of the farm-objective is reached by consideration of the dependence by the farmer on the farm and on off-farm income.

Farm-objectives are central to decision-making about farming (Reijntjes et al., 1992). The decisions depend on the objectives which the farm household wants to achieve with the farm. For the management of a farm, objectives are of essential importance. Every farmer will, in the taking of decisions, wittingly or unwittingly depend on certain objectives (Tempel & van Giesen, 1992).

The four above mentioned sets of factors which determine the actual appearance of a farm will be discussed in chapter 4 and 6 regarding farms from the study area. In the next sections farm-objectives and farm-strategies will be discussed.

2.2 The farm-objective

All humans share a common hierarchy of objectives. At the basis of the hierarchy are the most basic objectives like biological survival, upwards follow security, love, status, etc. Humans will only concern themselves with an objective higher in the hierarchy when the lower objective is reached (Maslow, 1954). This hierarchy in objectives provides for a division between reasonable objectives and imaginary objectives. Reasonable objectives are the objectives which a person considers attainable. According to Nooij (1993) farmers, generally do not work with unattainable objectives. Besides, farmers will only undertake actions when convinced of appropriateness (Broekhuyse, 1991). In this research only the farm-objectives as considered reasonable by farmers will be studied.

Farm households have differing needs and desires. However, groups of farmers may have various objectives with respect to the farm in common (Reijntjes et al., 1992). In studying farm-objectives Reijntjes et al. (1992) propose a division of the objectives in four categories: productivity, security, continuity and identity. The productivity of the farm is the output per unit of land, labour, capital, time or other input. To strive after security means trying to minimise the risks of farm-production or farm-income losses resulting from variations in ecological, economic or social processes. For smallholder farmers, security in production of subsistence goods or income is vital. Continuity is strived after by maintaining the potential of the farm. The continuity is important for the future of the farmer, but even more for the

future of the farm children, if they desire to stay and work on the farm. The capacity to adapt to changing situations ultimately determines the continuity and sustainability of a farm. Identity can be seen as the extent to which the farm system harmonises with the local culture and the people's vision of their place within nature. Identity plays an important role in the theory of "styles of farming" (e.g. van der Ploeg, 1991), in which farmers are considered to have an own idea about the right way of farming in their situation.

The objective-categories can be used to identify the needs of farm families for support in developing their farm systems. The extent to which these objectives are being attained indicate the main interests and current problems of the concerning family (Reijntjes et al., 1992).

Although Reijntjes et al. (1992) mention the importance of off-farm income in the livelihood system of the farm household, they do not incorporate off-farm income in the study of objectives because of the expected complexity.

However, for many farmers all over the world off-farm activities are of such importance that they cannot be neglected. Prominent research about the importance of off-farm income for farmers in Europe has been done by Gasson (1986) and by Gasson & Errington (1993). It is shown that off-farm income for many farmers provides for an important part of the total income of the farm household.

Chambers et al. (1989b) state that farmers often piece together a living through many different activities and enterprises. The concept "livelihood thinking" is used to indicate the importance of attention for "the stock and flow of cash and food for the household and its members throughout the year, and the means to meet contingencies" .

Alfaro (1993) studied the objectives and strategies in land use of farmers in the Agrimaga settlement in the Atlantic Zone of Costa Rica, which is a small settlement near one of the research areas. In his report, Alfaro defines six types of farmers: investor, investor/farmer, trader of personal skills, non-capitalist farmer which hires labour, farmer/day labourer and farmer with off-farm job. In his typology, as can be seen from the names of the farmer types, much attention is paid to off-farm work and income. Alfaro (1993) considers the farm-objectives by focusing on the importance of and the dependence on the farm for the farmer.

To include off-farm work and income in the analysis of farm-objectives, the objective-categories from Reijntjes et al. (1992), as described above, have to be considered at livelihood level. The concepts of the livelihood goal, livelihood strategy, farm-objective and farm-strategy will be discussed in the next section.

2.3 Farm-objectives and the livelihood system

As described by Chambers et al. (1989b) and in accordance with Alfaro (1993), the farm has to be considered as a component in the total livelihood system of a (farm) household. The livelihood system consists of the whole scope of income-earning activities of a farm house-

hold, including off-farm work and the production of farm products which are used for home consumption (for an exact definition of different terms see Appendix I).

The reasonable goals which a farmer expects to attain with the livelihood system will be indicated in this report by the term livelihood goals. To attain these livelihood goals a livelihood strategy is employed in which different components of the livelihood system have certain functions. The components can be divided in farm activities and off-farm activities. The farm activities, as a component of the livelihood strategy, have a function in attaining the livelihood goals. This function of the farm, as perceived by the farmer, will be considered as the farm-objective in this report.

To attain the farm-objective, in its turn, a farm-strategy is applied (Reijntjes et al., 1992). Reijntjes et al. (1992) define the farm-strategy as the combination of different techniques by a farmer to meet the farm-objective in the best possible way. By considering the way a farmer tries to attain the objectives from the objective-categories at farm level the farm-strategy in the field can be identified.

For the purpose of this study to describe livelihood strategies as well, the objective categories of Reijntjes et al. (1992) ought to be defined at livelihood level. By considering the way a farmer tries to attain the objectives from the objective-categories at livelihood level the livelihood strategy can be identified:

* Productivity (at livelihood level): To strive after productivity in the livelihood system means making a living with the farm and with off-farm work.
* Security (at livelihood level): To strive after security means trying to minimise the risk of income losses in the livelihood system.
* Continuity (at livelihood level): To strive after continuity in the livelihood system means the strive after the maintaining of the potential of the livelihood income sources.
* Identity (at livelihood level): The social status which is related with the possession of a farm or any other job.

After determination of the livelihood strategy, the farm-objective can be identified. The function of the farm in the livelihood strategy corresponds with the goal a farmer wants to reach with his farm. Therefore, to identify the farm-objective the function of the farm in the livelihood has to be studied. Also, according to Alfaro (1993), the function of the farm can be determined by focusing on the dependence on the farm as perceived by the farmer (see section 2.2).

2.4 Analysing the role of objectives in decision making

The outcome of the farm classification as will be developed by van Leeuwen (1992) will be groups of farmers which are expected to take more or less similar decisions in land use. Farm-objectives are central to decision-making in farming (Ruthenberg, 1980). In this report, the part of the farm classification concerning farm-objectives will be developed (see 1.2). To

provide for the context in which farm-objectives emerge, a model for analysing decision-making on farms will be developed.

To come to a model for the description of decision making on farm level the model constructed by Umans (1993) for studying indigenous forest management on community level, appears to offer a useful frame. The model is composed of different levels, starting from world values via rules, and action to the final outcome (see fig. 1; for a specific description see Umans, 1993). Although the model is open for discussion, it is useful for it shows a method to work with different hierarchic levels which interact and wherein the interactions are influenced by contextual factors.

In order to arrive at a suitable model in the context of this research the model of Umans has been adapted by insights which are mainly derived from Reijntjes et al. (1992), Chambers et al. (1989b), Alfaro (1993) and from Tempel & van Giesen (1992), as discussed in sections 2.1, 2.2 and 2.3.

The first adaptation which has to be made is the change of focus from decision-making regarding indigenous forest management at society level to a focus on decision-making of individual farmers regarding farming and related to their livelihood system.

The level composed of values, world view, ethics and knowledge on community level is strongly related to the similar aspects for each individual in a community. Therefore a similar concept has to be considered at the individual level.

The second adaptation comes forth from criticism on the model of Umans (Wiersum, personal comment). Umans considers the ecological and societal context as subordinated to human aspects, however, this context has to be considered equally important and has to be considered likewise in every level and interaction in the model. The changes are presented in fig. 2.

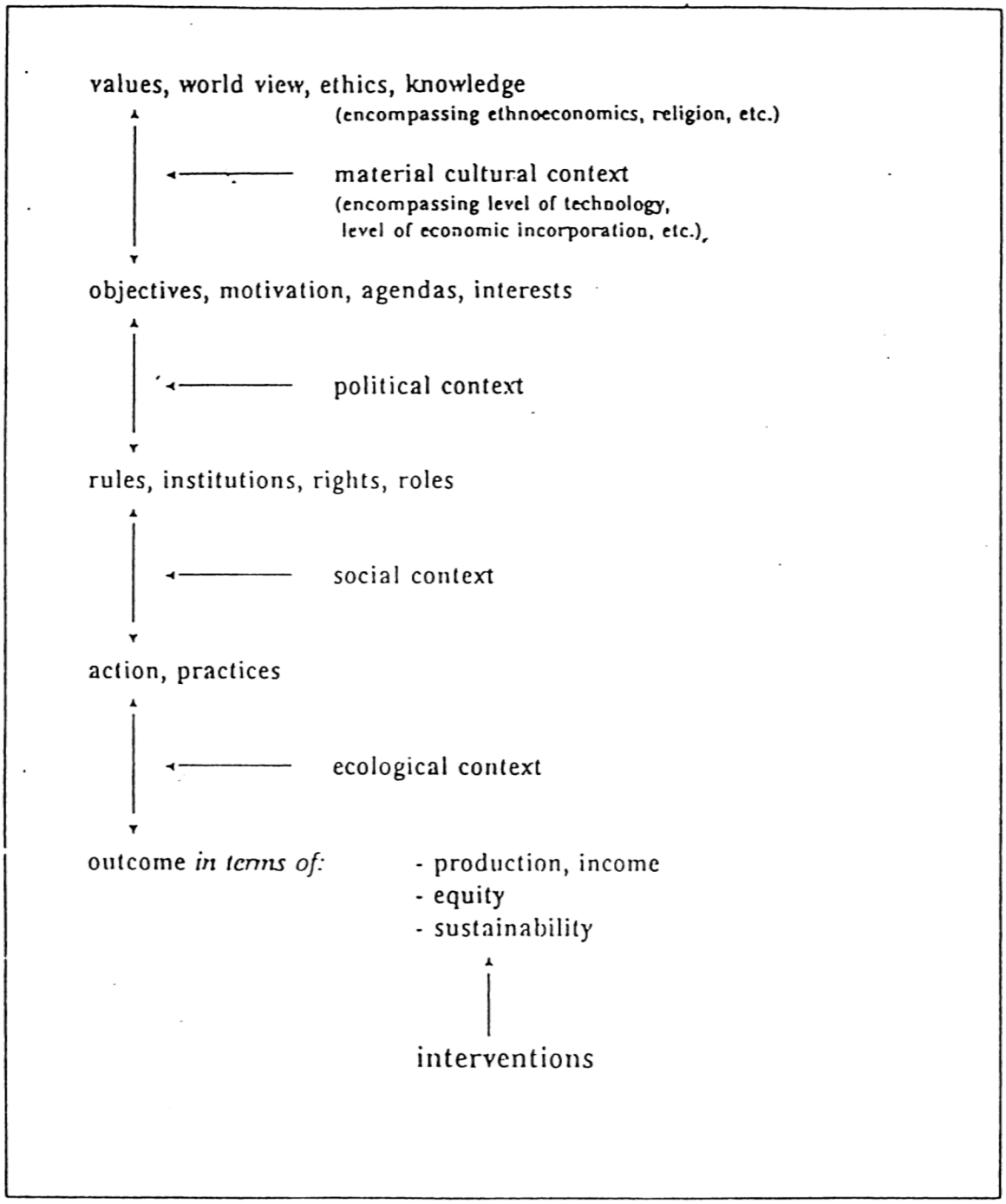


Figure 1: Model for studying indigenous forest management.
Source: Umans, 1993:20.

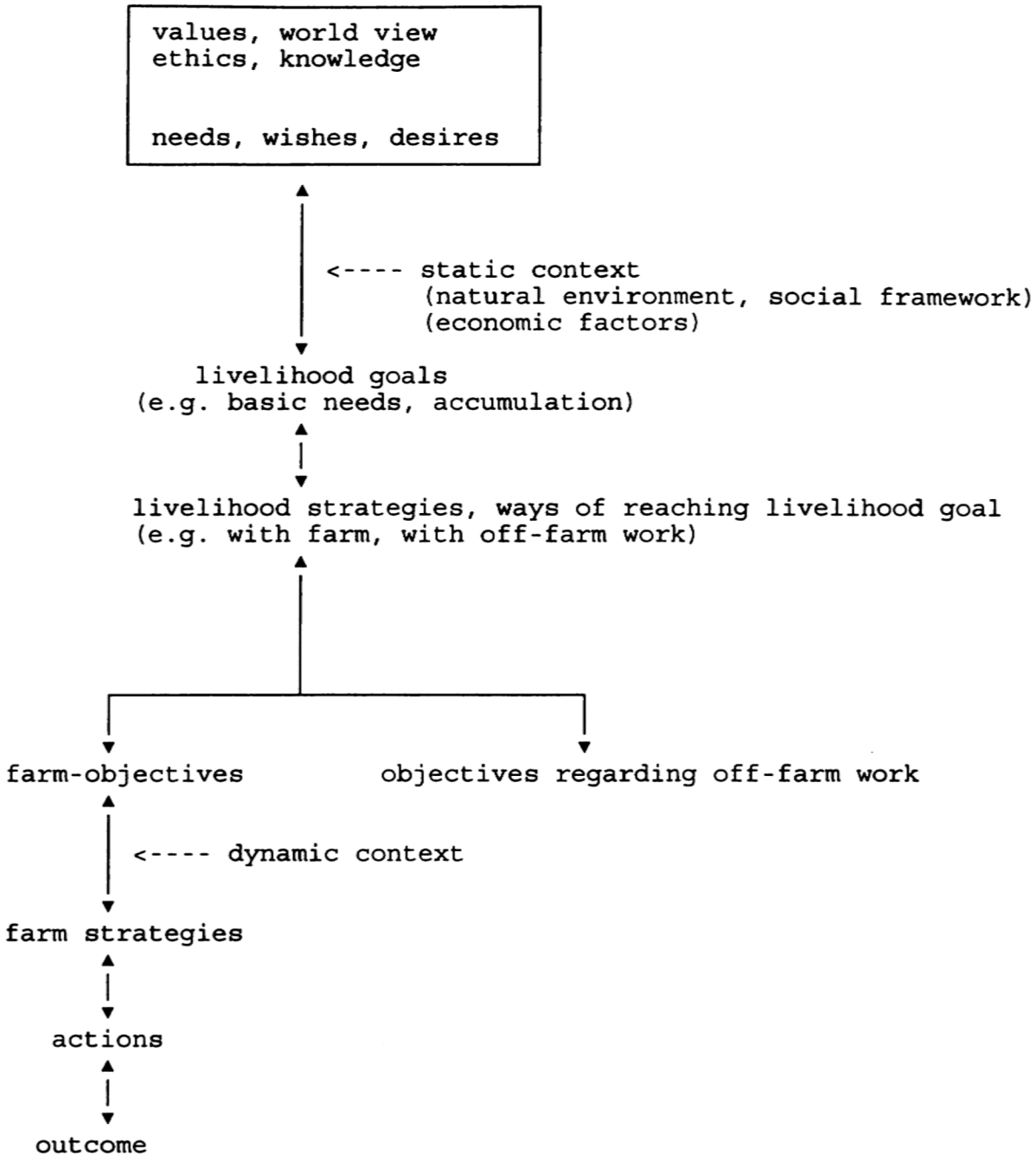


Figure 2: Model for analysing decision-making of farmers

Figure 2 shows the model for analysing decision-making of farmers as derived from adjustments in the model of Umans (see fig. 1). The discussion of the model starts at the most abstract level at the top of the model. This level represents a more or less unchanging state of the farm household with respect to world values, knowledge, etc. Besides, this level consists of related normative needs, desires and wishes of the household.

The world view/needs level is influenced by the static context, representing external conditions which generally do not change drastically over a longer period, like topography, soil conditions, climate and the road system. The static context can hardly be changed by the farmer himself. Within this context livelihood goals are defined. The livelihood goals are for example basic needs fulfilment and accumulation of capital. The goals with regard to the livelihood system are determined by the possibilities which a farmer perceives reasonable to derive an income from and the preferences of the farmer regarding certain kinds of work and (labour) time spending. The possibilities to derive an income from the farm, as perceived by the farmer, are determined by for instance farm size, soil type, occurring of forest, land use by the former owner, capital, farm labour, climate and infrastructure.

The livelihood strategies are the actual applied ways to attain the livelihood goals. In deciding on strategies the farmer has to choose between devoting his available time to work on his farm or to work off-farm. Also different combinations of these two are possible, which then form one livelihood strategy. In the livelihood strategy is determined to what extent time is spent on the farm and on off-farm work.

The livelihood strategy indicates the function of the farm and with that the attitude of the farmer towards the farm and the farm-objectives. For example, a farm can function to fulfil basic needs, it can serve as a weekend house, a farm can be used as an investment, it can serve as a place to live and it can serve to generate extra income (additional to the main source of income).

The farm-objectives and farm-strategies and the link between them is of special interest for this research. Each farmer has a farm-objective. The farm-objective can be defined as what a farmer wants to reach with his farm as a contribution to the total range of making a living. To reach the farm-objective a farm-strategy will be developed in practice. The farm-strategy determines the farming-actions which lead to a farm-outcome.

Aspects of the dynamic context, like prices of farm inputs and outputs, experience of the farmer, availability of inputs and composition of farm household can change within one growing season. These changes can force the farmer to adjust the farm-strategy. When the changes are very drastic it is possible that the farm cannot fulfil its function in the livelihood strategy anymore. In that case, the farmer can feel himself forced to change the farm-objective.

2.5 Objectives regarding the tree- and forest-component on farms

"Whatever the climatical and ecological conditions, most people are well aware of the benefits from trees. What varies is their attitude to growing them." (Kerkhof, 1990).

Woody species (trees and shrubs) can contribute to a farm system in many ways. They do not only fulfil important productive functions (e.g. yielding of food, fodder, fuel, fibre, timber, medicine and pesticides), but also have protective (e.g. protection against soil degradation and erosion) and social functions (Reijntjes et al., 1992; Arnold, 1987).

Many examples exist of farmers planting trees for various reasons like provision of wood, fruit, animal fodder or for establishment of windbreaks, fences, shade or for other benefits. In other cases, when farmers do not plant trees themselves they often protect and manage certain natural growing trees for their fodder, fruit or other products (Foley & Barnard, 1985).

Johanson (1991) signals in a part of Tanzania the following reasons for local people to grow trees: for provision of timber and building poles for own construction, for securing land tenure, to function as savings, for provision of fuelwood, for improving the home environment, as windshelter for other crops, to provide shade for coffee, to prevent soil erosion, for land reclamation, for climatical improvement and to improve the soil fertility.

Nevertheless, many farmers in different regions do not consider trees as an important factor within the farm system. Especially the very poor farmer will have problems with integrating trees in his way of farming due to a lack of farm land to grow both subsistence crops and trees. Other constraints for farmers to work with trees are for example the price of planting stock, available labour time, the relative long production circle and absence of legal ownership rights. Also the attitudes of farmers towards trees and forests may not be consistent with the changes of the availability of natural resources, combined with lack of necessary skills and experience which are needed for working with trees (Arnold, 1984). Perceptions and attitudes of farmers all over the tropical world are changing rapidly as a result of a decrease in availability of tree products such as fuelwood (Arnold, 1984). It has been noted that differences in the perception about trees and forests occur between different generations. People who lived in an epoch with an abundant tree reserve have another view than people who only experienced a growing shortage of wood and other tree products and who attend environmental lessons at school (Nygren, 1993).

Trees and forests can play an important role in farm-strategies applied to reach farm-objectives. Below, the tree- and forest-component on farms will be considered using the objective-categories at farm level (see section 2.2). The aim is to come to a description about how the tree- and forest-component can play a role to attain the farm-objective.

With regard to the productivity of the farm, individual trees and forests can play an important role, because of the possibility to harvest many useful products. To fulfil needs of the farm household, products of woody species can be used for home consumption or can be

exchanged for other consumption goods. Besides, trees can have positive effects on crop and livestock production (Reijntjes et al., 1992).

With regard to the security of the farm production, trees and forests can play a role in lowering ecological risks for example as means of erosion control tools or in lowering economic risks for example as means of savings for bad times (Chambers, 1988; Chambers et al., 1989b).

With regard to continuity of the farm, trees and forests can be of use to maintain or raise the potential of the farm. The potential of the farm can for example be influenced by maintenance of the soil fertility and prevention of soil erosion. With the planting of trees a future harvest of products can be expected. A farm with trees (in the form of dispersed trees, living fences, homegardens or forest) has a higher value in use (Reijntjes et al., 1992).

In general, the identity of farmers does not depend much on trees and forests. But times are changing; nature conservation and environmental protection are becoming more and more important for farmers. Examples exist of farmers who get interested in trees and forests for giving them a "nature lover" image. Farmers can even get interested in being an example for the neighbours as far as to nature conservation and planting of trees.

As shown above, objectives regarding the tree- and forest component can be identified by considering the objective-categories at farm level. In doing so it has to be determined which functions farmers attach to trees and forests on their farm lands.

3. EVALUATION OF GENERAL APPLIED FARM CLASSIFICATIONS

As discussed in chapter 2 the farm-objective is an important factor in decision-making on the farm. Also the direct influence of off-farm work and off-farm income on farm-objectives has been discussed in chapter 2. To make a contribution to the development of a farm classification in which attention is paid to farm-objectives these aspects ought to be included.

In this chapter, some currently applied farm classifications will be described and evaluated on the consideration of farm-objectives and off-farm income-earning activities.

3.1 Definition and use of farm classification

The farm classification procedure has been defined by März (1990) as a method to provide a solution to the problem in regional land use planning of dealing with a big number of farms which all differ from each other. The gathered information about the farms is usually very heterogeneous. In the farm classification procedure resembling farms are grouped in order to make use of the heterogeneous data and to come to a workable amount of representative farms. In farm classes farms are presented which are relatively similar in their organisation, management, actual economic performance and also their constraints and problems (März, 1990).

According to Jackson (undated) a classification procedure serves to allocate individuals to pre-determined classes, with the maximum of similarity within classes and the maximum of dissimilarity between classes. Each individual has to be assignable to a class and each individual can only belong to one specific class. The purpose and use of a farm classification determine the required characteristics of the groups, therefore they also determine the required criteria to distinguish between classes. Criteria for the farm classification procedure can be: enterprises (e.g. crops), input, output, natural phenomena, location, institutional characteristics and personal characteristics of the farmer (Jackson, undated).

Wossink (1993) describes the use of the farm classification procedure as a method to represent the behaviour of all farms in a population. The population is broken down into a number of categories of farms. Resembling farms are grouped and represented by a representative farm type for each category, in order to reduce the number of cases to be described and to be dealt with in land use policies (Wossink, 1993).

Kuperus (1975) states that farm classification should be designed and used as a tool to reach a specific goal and never be a goal in itself. It should serve the purposes of providing a more accurate description of the farm sector and offering a wider scoop for research (Kuperus, 1975).

Names given to classes in the farm classification should be titles which describe the farms in a brief manner. Recognizable titles serve the researchers, the planners and the farmers to work with the classes and use them in a logical way (Kuperus, 1975).

The use of farm classification within the context of regional land use planning is described by Alfaro et al. (1994) as a tool to reduce the number of farms to be modelled. Also by using farm classification the gap between farm level research and modelling and regional level planning can be bridged (Alfaro et al., 1994).

3.2 Currently applied methods to arrive at a farm classification

According to März (1990), in general, two different methods or classification procedures are available: the univariate (simple) classification and the multivariate classification (cluster analysis). The univariate classification uses one, two or three criteria, the multivariate uses at least three criteria. These criteria are selected according to their relevance and importance for the purpose of analysis (März, 1990). An example of a univariate classification is the Dutch farm classification as described by Kuperus (1975). The Dutch scheme is basically an economic classification and its basis is the economic value of farm produce. The same goes for the German classification system and the former EEC (now called European Union) classification which also have a quantitative, economic basis in the form of the gross output of the farm (Kuperus, 1975).

To arrive at a farm classification for a region in Northern Syria März (1990) uses cluster analysis. Wossink (1993) has described cluster analysis as a method with the purpose "to group and distinguish comparable units, and to separate them from differing units. In cluster analysis a matrix is computed of N objects and V quantitative variables which is arranged into a number of groups of objects based on the similarity or dissimilarity of their scores on the variables. The resulting clusters (groups) are characterized by maximum internal homogeneity and maximum external heterogeneity for the variables used in the cluster procedure." The (N) objects in farm classification are the farms and examples of the (V) quantitative variables are the variables as used by Wossink (1993) like age of the farm manager, labour contributed by the different workers on the farm, whether or not the farmer has an additional job, the livestock state, the cropping state and the total farm hectares.

Wossink (1993) uses cluster analysis to arrive at a farm classification for the North East Polder in the Netherlands. Although some attention is paid to the fact whether or not a farmer has an additional job, off-farm income is not considered in detail. Also März (1990) mentions the importance of off-farm income regarding the goals of the farmer, but does not consider it in the applied method. However, as shown in Chapter 2, off-farm income can be very important when studying the farm and related farm-objective. In this study, in order to arrive at a farmer typology, the influence of off-farm work and income on the farm-objective will be studied. The farm and off-farm work will be considered as different instruments to reach the livelihood goal (see section 2.3).

März (1990) states that, for the farm classification procedure a decision-making approach should be applied. However he fails in his attempt by using only cluster analysis without any use of sociological data about decision-making. In the conclusion of the report of März the shortcoming of overlooking the decision-making aspect of farming in this method is acknowledged.

Wossink (1993) also uses cluster analysis to make a farm classification in the Netherlands. In the discussion about used methods Wossink states that in order to arrive at "realistic modelling at farm level the entities need to be distinguished in terms of their financial and technical status as well as in terms of management objectives". The "concept of styles farming" is mentioned as useful for distinguishing management objectives. Nevertheless, this concept has not been integrated in the method as used by Wossink.

According to Chambers et al. (1989a), to arrive at a satisfying classification of the rural population in order to come to relevant research, understanding of farm family priorities with respect to operating their farming systems has to be reached. Therefore, understanding decisions on allocation of resources to deal with the natural and economic circumstances has to be reached. Researchers, scientists and extension-workers often tend to consider and value the needs and desires of farm households in an inadequate way. Wrong description of the priorities leads to wrong focus in the research, wrong kind of proposed solutions and therefore wrong kind of extension and rural development-strategies (Chambers et al., 1989a). On the contrary, when the priorities of the farm household are described accurate, innovations can be proposed which might be adapted by the farm household and which might lead to solutions of the really felt problems (Chambers et al., 1989a).

Similarly, Lint (1993) states that farm classifications only have validity when the actors and their objectives are included. Although several scientists have thus plead for the inclusion of sociological information in methodologies for farm classification, attempts to put this inclusion into practice are not easy to be found. In general, sociological input in farm classification procedures is neglected. According to Lint (1993) an attempt in the right direction is the concept of "styles of farming".

The "styles of farming" concept has been introduced by a group of scientists to make a division of farms based on conceptions and actions of farmers instead of a certain amount of simple characteristics of the farm (see e.g. de Bruin & van der Ploeg, 1991; van der Ploeg et al., 1992). A "style of farming" has been defined as the total range of connected conceptions that are shared by groups of farmers about the organisation of the production and the development of the undertaking (de Bruin & van der Ploeg, 1991). Hofstee formulated a style of farming as a way of arranging and managing the farm which is generally accepted in a certain group (van der Ploeg, 1991 & 1993). How the relations between producers, labourers and means are arranged is considered, at least by the concerning farmers, as an adequate means for making a living (van der Ploeg, 1990). The styles of farming do not represent static units but show a certain level of dynamics (van der Ploeg, 1991). Although farmers within one style share the same opinions about "how to farm", in practice differences in farming can and

will occur. Differences in farming are caused by differences in the circumstances each farmer has to deal with (van der Ploeg, 1991).

For describing styles of farming generally accepted views of farmers in certain groups about how to farm are indicated. Baltussen (1993) criticizes this method because of the subjectivity of a division made by farmers themselves.

It should be noted that conceptions about "how to farm" usually are not well developed in areas which are recently colonized like the Atlantic Zone of Costa Rica (see section 1.2). Moreover, especially in individualistic societies, lacking a well developed infrastructure and lacking sufficient contacts between the local people, it is not likely to find a good image among farmers about the different styles of farming which occur in the region. Therefore in certain regions the "styles of farming" concept does not seem to be directly applicable (See also Gerritsen, 1995).

3.3 Conclusions on currently applied farm classifications

All methods as described in the section above are focused on farm activities. This results in an insufficient consideration of off-farm income for regions where off-farm income is important for farmers. In the farmer typology, which is being developed in this research, off-farm work will be given attention. The farm will be studied as part of the livelihood system.

As indicated in section 3.2 many farm classifications tend to have a technical and/or an economic basis and use quantitative criteria. Because the methods are developed to deal with quantitative data, they are not useful to make a farm classification in which attention is paid to farm-objectives. Farm-objectives can hardly be expressed in quantitative parameters.

From the above mentioned methods, only the "styles of farming" concept pays considerable attention to the human factor on farms. This method may be used for a farm classification which is based on farm-objectives. In the "styles of farming" concept, general shared opinions of farmers about "how to farm" are identified (van der Ploeg, 1991). However, it can be expected that no clear overall accepted ideas about "how to farm" occur in the study area, because the development of the research area started recently. Nevertheless, it may be possible to identify styles of farmers by describing the styles based on observations from outsiders instead of following the view of the farmers themselves. In that case, styles of farms have to be considered as the result of different patterns of farm development reproduced through time (van der Ploeg, 1990). Outsiders can identify opinions of individual farmers about "adequate means for making a living". Farmers with more or less similar opinions can then be grouped.

It has to be noted that in the concept of "styles of farming" the farm is considered as the only instrument for making a living. Therefore, items as "adequate means of making a living" and "how to farm" correspond with farm-strategies as described in section 2.3. However, in this research not only the farm-strategy needs attention but also the livelihood strategy, in

which production on the farm is combined with off-farm work. Therefore, the "styles of farming" concept does not directly provide for a method which can be used to arrive at a farm classification on the basis of farm-objectives. The concept can be used, when in stead of similar opinions about "how to farm" on farm level, similar opinions about "adequate means for making a living" at livelihood level are taken as criterion.

To arrive at a farmer typology based on farm-objectives, similar opinions of farmers about the farm-objective have to be grouped. How the farm-objective can be identified will be described in Chapter 5.

4. THE RESEARCH AREAS IN THE ATLANTIC ZONE OF COSTA RICA

In this chapter a brief introduction to the Atlantic Zone, with special attention for the study area, will be presented. The region considered in this research has been described in detail in many research documents of the Atlantic Zone Programme (for a description of Cocorí see Wielemaker, 1990; for a description of Neguev see de Oñoro, 1990; for a description of Río Jiménez see Waaijenberg, 1990; for a description of the Atlantic Zone see van Sluys et al., 1987; van Leeuwen & Hofstede, 1995). Therefore the study area will not be dealt with into length.

4.1 Introduction

The research areas (Cocorí, Río Jiménez and Neguev) are part of the Limón province in the Atlantic Zone of Costa Rica. Cocorí is situated in the northeast of Costa Rica, Río Jiménez and Neguev are situated northeast of the highway San José-Limón, near Guácimo (see map 1). These research areas are chosen because they are considered to be more or less representative for the different types of regions in the Atlantic Zone (see van Sluys et al., 1987).

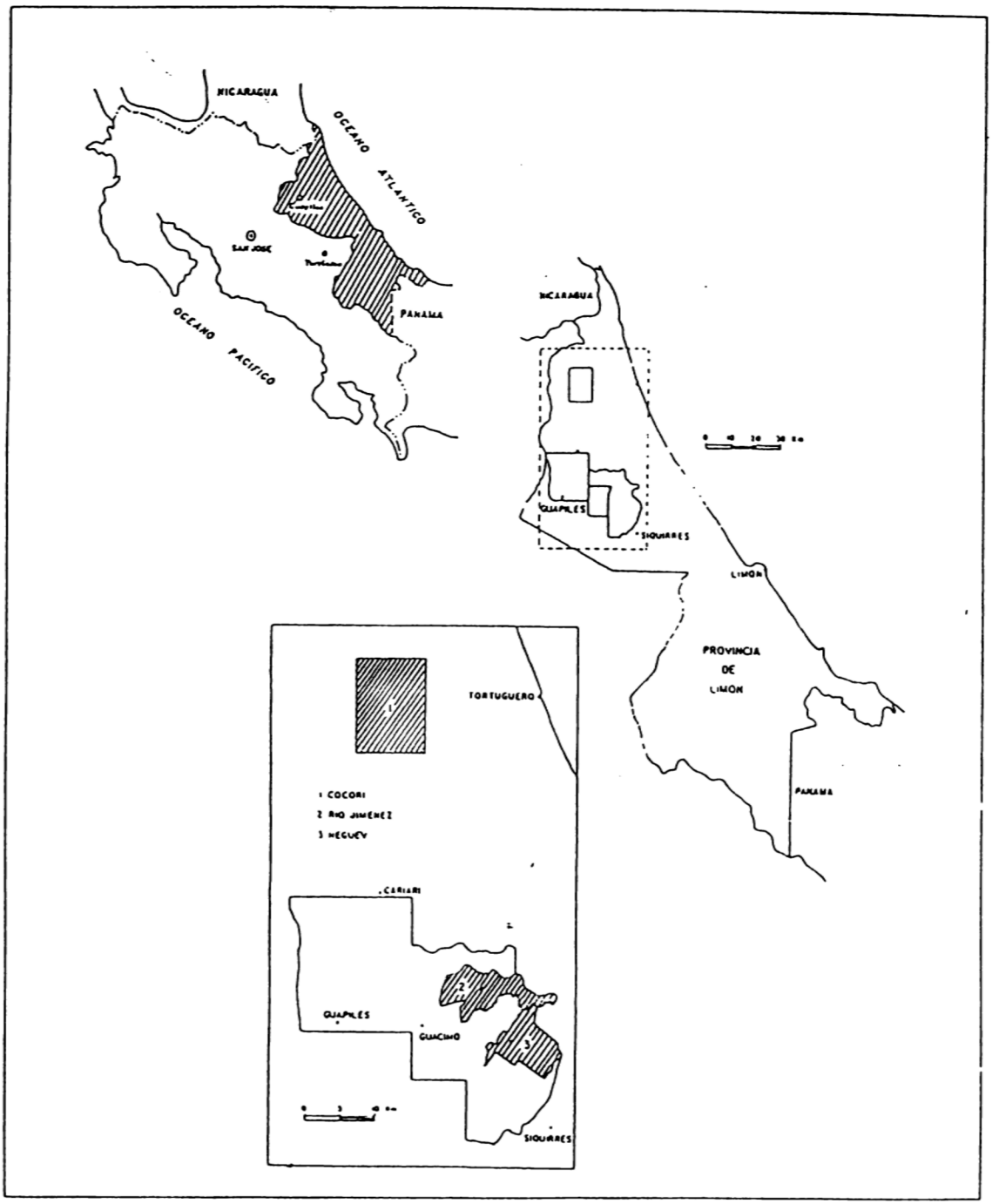
The Atlantic Zone has a humid tropical climate with a rainfall between 3,000 mm and 6,000 mm, spread over all months of the year (Anon., 1992). The average annual temperature is above 24 °C (van Sluys et al., 1987). The soils are of volcanic origin. Recent history is marked by colonization of the region which resulted in a rapid deforestation (Anon., 1992). Most of the people in the Atlantic Zone are migrated Costa Ricans from other parts of the country who came to the Zone for a new start. The rest of the population consists of Indians (mainly in the south), Jamaican descendants (mainly near the coast) and immigrated Nicaraguans (van Leeuwen & Hofstede, 1995).

4.2 The research areas

Río Jiménez (see map 1) has a superficie of about 11,300 ha. and counts over 4,000 habitants. The development of Río Jiménez started at the end of the nineteenth century (Waaijenberg, 1990).

Neguev has a superficie of about 5,240 ha. The area of Neguev was in possession of a big land owner, but an invasion by farmers in 1979 led to a division of the large ownership into 311 small parcels (of 10, 15 and 17 ha.) for small farmers (de Oñoro, 1990).

Cocorí has a superficie of about 12,000 ha., with approximately 150 farms. Cocorí was mostly covered with tropical forest, but in the last 30 years a lot of forest vanished due to deforestation. The deforestation started with the opening up of the region by large timber companies, followed by small farmer pioneers. The actual land use is principally cattle ranching (Wielemaker, 1990).



map 1: The research areas situated in the Atlantic Zone of Costa Rica. Source: Anon., 1987.

4.2.1 Factors which influence farmers' decisions in the research areas

In section 2.1 an agrarian undertaking or farm was stated to be determined by physical and socio-economic factors. For the Atlantic Zone these factors will described below.

The natural environment: In spite of the rapid deforestation in Cocorí still vast areas of forest occur. In 1987 on almost all farms big patches of forest occurred which in some cases covered over hundred hectares. In Neguev on more than half of the farms patches of a few hectares of forest occurred. In Río Jiménez, which is the oldest colonized research area, on about one third of the farms a few hectares of forests occurred (Zambon, 1987). The climate and soils have been discussed above.

The social framework: Because most of the farmers do not originate from the research areas, farming in the research areas does not have a long tradition. The farmers can be experienced farmers in their region of origin, but the circumstances in the Atlantic Zone are totally new for them, because of differences in climate, soil conditions, infrastructure etc. Nevertheless, a lot of farmers are learning, by experimentations and through extension, how to deal with the new circumstances.
In the research areas several small villages occur which are connected with each other by dirt roads. Most of the villages consist of some houses, some grocery stores, a church and a primary school.

Economic factors: Several big banana farms from international fruit companies occur in or near the research areas, which offer employment to members of many farm households. Other companies that provide employment are e.g. wood companies and a cardboard factory near Neguev. In contrast with Neguev and Río Jiménez, which are situated not far from the highway "San José-Limón", Cocorí is a remote area.

4.2.2 Land use by small private farmers in the research areas

The major kinds of land use on farms in the research areas are agriculture, pastures for cattle farming, tree plantations and forests.

Agriculture has been defined in this research as the cultivation of annual crops and perennial crops. Maize and cassava are the most important annual crops, besides these crops farmers grow e.g. peppers, rice, beans. The cultivated perennial crops are mainly: bananas, ornamental plants, coconut palms, papaya and palmheart (Waaijenberg, 1990; de Oñoro, 1990; Wielemaker, 1990).

Many farmers depend on cattle ranching in one way or another. Pastures occur on almost all farms (Waaijenberg, 1990; de Oñoro, 1990; Wielemaker, 1990).

The three most important Land Use Types (LUT's) on farms in the research areas containing a tree component are natural forests, tree plantations and sylvopastoral systems. These have been described by Schinkel (1994), Brouwershaven (1993) and Paap (1993) respectively.

In the LUT "natural forests" are included the virgin forests, exploited forests and secondary forests. The way farmers are currently using their forests does not depend so much on the potentials of these forests as well as on their needs, objectives and knowledge of the forests. Objectives of farmers with respect to their farm forest are to exploit it, either to sell the timber or to use it for home consumption, or to keep it as a source of land for agriculture or animal husbandry (van Leeuwen & Hofstede, 1995).

A tree plantation can be defined as a forest crop or stand raised artificially, either by sowing or by planting (Evans, 1982). The LUT "tree plantations" occurring in the research areas are very young, most of them are not older than five years. Farmers in the research areas establish tree plantations with the aim to receive government subsidies or as an investment for the future (van Leeuwen & Hofstede, 1995).

The LUT "sylvopastoral system" consists mainly of trees, shrubs, pastures, livestock together with the environmental factors of climate, soils and land forms. The trees in this system are of value for the farmers as timber, fruit and shade trees or as components in living fences (van Leeuwen & Hofstede, 1995).

5. METHODOLOGY FOR THE FARMER TYPOLOGY

In chapter 2 the importance of livelihood goals and farm-objectives in decision-making were discussed. In chapter 3 some currently applied farm classifications have been described and evaluated. It has been shown that these farm classifications lack sufficient attention for farm-objectives and for off-farm work. Based on the theory, in this chapter a methodology will be presented to arrive at a farmer typology based on farm-objectives. Also a method to identify farm-strategies will be developed. At the end of the chapter a method will be presented to look for farmer type specific activities regarding the tree- and forest-component on farms.

5.1 A methodology to identify farm-objectives and farm-strategies

The farm-objective corresponds with the function of the farm in the livelihood strategy (see Chapter 2.). Therefore, to identify the farm-objective first the livelihood strategy has to be determined. In its turn, to determine the livelihood strategy, the livelihood goals have to be described. However, because the research is mainly focused on farm-objectives and farm-strategies, livelihood goals and strategies will not be dealt with into length.

Based on the findings of Alfaro (1993), interview questions about livelihood goals will be focused on the fact if the farmer manages to satisfy basic needs, if the farmers manage to raise the living standard and if the farmer manages to accumulate capital. The livelihood strategy will be determined by consideration of the objective-categories productivity, security, continuity and identity at livelihood level (see section 2.3).

The function of the farm in the livelihood strategy will be identified by questioning farmers about dependence on the farm for making a living, for securing income, for continuing income and for achieving a satisfying identity. After the first interviews, it proved that the function of the farm can be derived from statements of farmers about dependence on farm work and farm production and statements about the dependence on off-farm work and off-farm income. The use of labour, therefore, is an important indicator to decide on dependence on the farm. It finds expression in the time invested by the farmer working on the farm, the hired labour and the off-farm work done by the farmer.

To gather data about objectives of farmers and related aspects, unstructured interviews seem to offer the best possibility because of the personal aspects of the research (see section 1.4). In Appendix II a translation of the Spanish questionnaire is listed. The data collection in the interview phase will be executed to get insight in farm-objectives, to get information to describe the farmers from different farmer types more into detail (including information about activities regarding trees and forests) and to get insight in farm-strategies.

During the interview phase, an iterative process led to 4 criteria for distinguishing different farm-objectives. The criteria, as emerged from study on earlier research (Alfaro, 1993) and from the interviews, are:
- indispensableness of the farm for basic needs satisfaction,
- farm as means to come to improvement of the living standard,

- farm as investment to accumulate capital,
- farm as future alternative for the current off-farm occupation.

During this iterative process it was experienced that the criteria lead to 6 differing farm-objectives and consequently to 6 differing farmer types. The 4 criteria have been used for assigning farmers to farmer types.

By using criteria as questions to be answered by yes or no, the farmer types cannot overlap. Besides, the criteria exclude the possibility that certain farmers cannot be assigned to a farmer type because for all farmers the criteria-questions can be answered. The precondition (see section 3.1) that all farmers from the research areas have to be assignable to a farmer type and each farmer can be assigned to only one farmer type is satisfied.

Although farmers in the same farmer type have the same farm-objective, they can follow different farm-strategies. To determine farm-strategies, linked with each farmer type, the objective-categories productivity, security, continuity and identity (see section 2.2) have to be studied at farm level.

To get a complete as possible picture of the farm enterprise farmers have to be questioned about land use, the farm family, the history of the farm, etc.

5.2 Type-specific activities of farmers regarding trees and forests

Besides developing a farmer typology based on farm-objectives, a study is done to distinguish type-specific objectives of farmers towards the tree- and forest-component on the farm. Objectives of farmers regarding the tree- and forest component can be studied while considering the function of trees and forests within the farm-strategy (see section 2.5).

However, during the interview-phase it proved not to be possible to get sufficient data about functions of trees and forests as perceived by farmers (see section 6.4). Therefore it was decided not to study objectives but to focus on actual activities regarding trees and forests.

After having assigned farmers to different farmer types, farmer type specific activities concerning trees and forests can be studied by two logical approaches. The first approach is a search for resembling activities within each farmer type.
The second approach can be divided in two steps. First, a grouping of farmers with similar activities regarding trees and forests is created. Second, the farmer typology and the tree-activity grouping are compared to look for resemblance.
Chosen was to work with the second approach because it offers a more independent method. The activities of farmers regarding trees and forests are studied independently from the farmer type to which the farmer is assigned.

6. FARMER TYPES IN THE NORTHERN ATLANTIC ZONE

In this chapter the results of the farmer typology will be presented. Also farm-strategies per farmer type will be described and discussed and the findings about activities of farmers regarding the tree- and forest-component on farms will be presented. At the end of the chapter the farmer type-specific activities regarding trees and forests will be assessed by combining the farmer typology with a tree- and forest activity grouping.

6.1 The farm-objectives and farmer types

During the interview-phase was found that the goals regarding the livelihood system differ a lot between certain farm households in the research areas. Nevertheless, three general livelihood goals could be recognized:
- basic needs satisfaction,
- improvement of living standard,
- accumulation of capital.

Different livelihood strategies are followed by farmers in the research areas to pursue these livelihood goals. The goal to satisfy basic needs is pursued by certain farmers by means of only the farm, by means of income-earning from full-time off-farm work or by means of the farm production in combination with income from off-farm work. The goal to improve the living standard is pursued by certain farmers by means of only the farm, by means of the farm and off-farm work together, by means of only off-farm work or by means of the farm functioning to fulfil basic needs and off-farm work functioning to improve the living standard. The goal to accumulate capital is pursued by certain farmers with various projects, including the farm.

In each livelihood strategy the farm has a certain function. In farmer types, farmers are grouped with the same function of the farm c.q. the farm-objective. Farmers from different farmer types can strive after the same goals regarding income-earning. The farmer types can be distinguished from each other because of differences between the ways the farm functions in the livelihood strategy.

The interview phase resulted in identification of the occurring farmer types: **Basic needs farmer**, **Living standard improvement farmer**, **Investor**, **Farmer with necessary off-farm income**, **Farmer with farm as future alternative** and **Full-time off-farm employee.**

The application of the criteria defined in section 5.1 for assigning farmers to farmer types leads to the scheme as shown in figure 3. In this scheme the criteria are applied to come to six farmer types. The scheme corresponds with the part of the decision-making model concerning the livelihood strategy (see section 2.4).

In step 1 it should be determined if the farm is necessary for basic needs fulfilment. Whether or not the farmer considers the farm as indispensable in basic needs fulfilment can be derived from the statements of the farmer about his dependence on the farm, and if fulfilment of basic needs can be attained without the farm.

When the farm is considered necessary for basic needs fulfilment, in step 2a has to be determined if off-farm work is perceived as indispensable for the farm family. Whether the farmer considers the off-farm income as indispensable to come to basic needs fulfilment can be derived from statements about the necessity of off-farm income and about the possibilities to fulfil basic needs fulfilment with the farm alone. If so, the concerning farmer is assigned to the farmer type **Farmer with necessary off-farm income**. When off-farm work is not considered indispensable, in step 3a is decided on the perceived possibilities to fulfil basic needs with the farm. Whether the farm is considered to produce just enough for basic needs fulfilment can be derived from statements about if the farmer manages to fulfil basic needs and if the farmer manages to improve the living standard. If the farm-production just meets basic needs the concerning farmer is assigned to the farmer type **Basic needs farmer**. If not, the farmer is assigned to the farmer type **Improvement of living standard farmer**.

When the farm is not considered necessary for basic needs fulfilment, it has to be decided in step 2b if the farm is considered as an investment. Whether the farm is considered as an investment project can be derived from the statements of the farmer about the farm serving to accumulate capital and/or to have a reserve for the future. If so, the concerning farmer is assigned to the farmer type **Investor**. If not, it has to be decided in step 3b if the farm is considered necessary for future household needs. Whether the farm is considered as future alternative for the current occupation can be derived from the statements of the farmer about plans to invest in the farm. Further, it has to be investigated if the investments in the farm are stated to be done with the aim to make the farm profitable in the future to come to basic needs fulfilment and maybe even to come to improvement of the living standard. If so, the farmer is assigned to the farmer type **Farmer with farm as future alternative**. If not, the farmer is assigned to the farmer type **Full-time off-farm employee**.

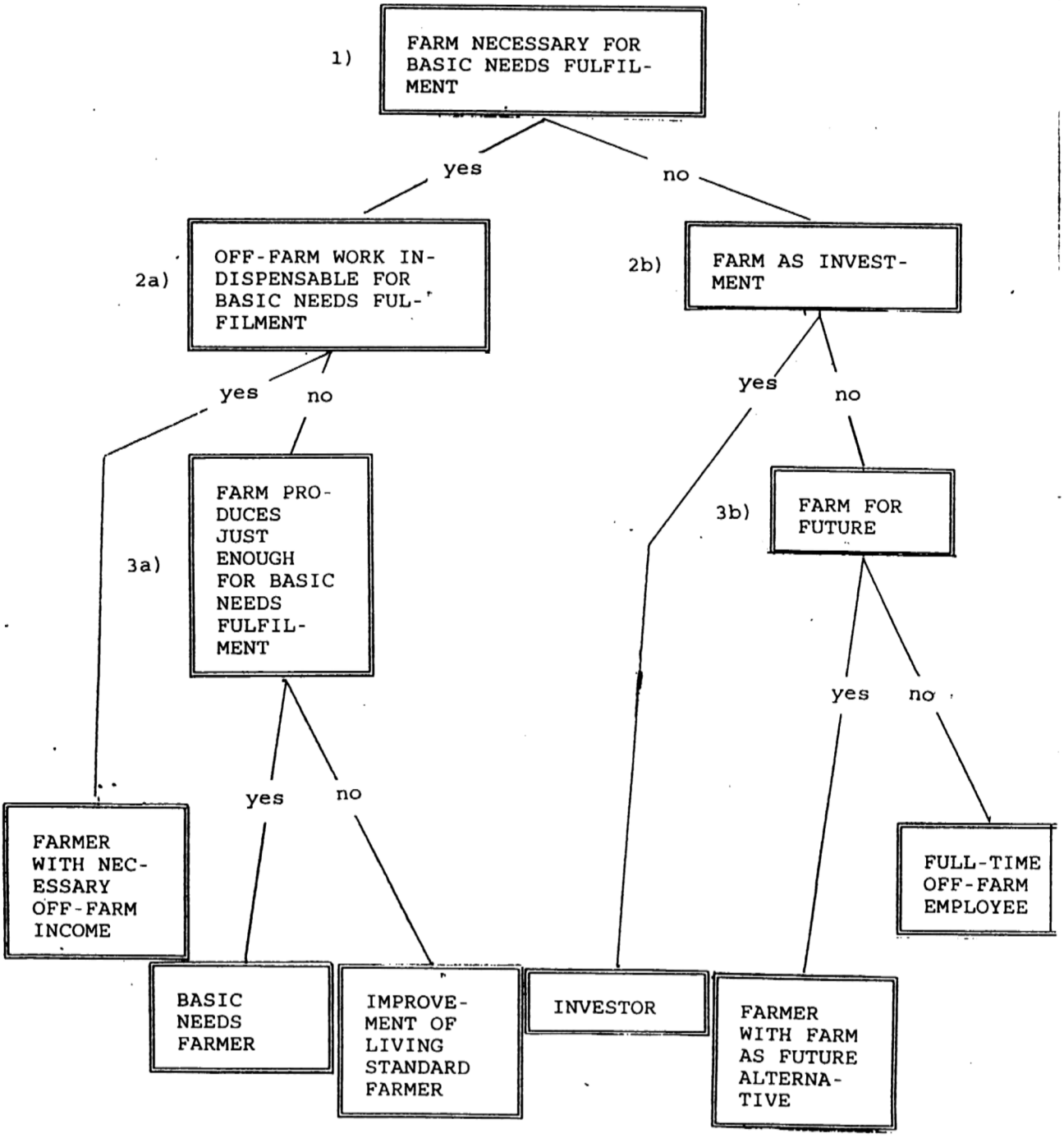


Figure 3: Application of the criteria to arrive at different farmer types.

In the next paragraph a more detailed description of each farmer type will be given. Special attention will be paid to the farm-objective and farm-strategy. Data used to assign farmers to the farmer types will be presented. Besides, findings about activities regarding trees and forests will be presented. In Appendix III complementary data per individual farmer can be found.

6.2 Description of the farmer types

In this section the farmer types as introduced in 6.1 will be presented with the focus on several items which are of importance to get insight about the farmer types and which are needed when the farmer typology will be applied in future research to come to a farm classification in the Atlantic Zone Programme of Costa Rica (see chapter 1.)

At the end of the paragraph a table will be presented in which the number of farmers from the research sample assigned to the different farmer types will be given.

A) Basic needs farmer

The farmers that can be assigned to this farmer type pursue satisfaction of basic needs as their livelihood goal. The farm serves as the main instrument in the livelihood strategy to attain this goal. Therefore the farm-objective can be formulated as the pursuit of a farm production which provides for the basic needs of the farm family. Basic needs satisfaction is obtained through income generation by sale of farm-products and/or by production for home consumption.

From the selection of 60 farmers in the study area 16 farmers are assigned to this farmer type. The average size of the farms is about 35 ha. At least nine farmers perceive possibilities for agriculture as an important source of income. The most grown cash crops are: plantain, palmheart and maize. For home consumption are grown mostly black beans, maize and cassava. Four farmers state that they prefer to work with cattle over agriculture, because they are of the opinion that agriculture holds no future. Consequently, they convert agricultural land into pasture. Two of the farmers lease out their pastures to be sure of an income. These farmers are involved in the maintenance of the pastures, the income from the rent is considered as farm income.

All farmers, assigned to this type, mention that trees are important for their farm. Most of them only mention wood production as function of trees. Some mention the provision of shade and the importance of trees for the future. Nine farmers mention planting trees on their farm land. Two of these have established tree plantations. From the 7 who do not plant trees only one farmer seems to be motivated to start with tree planting. Eight farmers posses patches of forest, only one farmer applies management activities in the forest. From ten farmers it is known that they maintain living fences. It is unknown whether or not the six remaining farmers maintain living fences.

Twelve farmers mention that they do not depend on off-farm work for the satisfaction of basic needs and only depend on the farm. Four farmers were assigned to this type in spite of the fact that they rely on received off-farm income. In two of the latter cases it is stated that off-farm income sometimes is necessary because of the occurrence of seasons with low market prices for their farm products. But according to these farmers such seasons do not occur often and in general the farm yields enough to come to basic needs satisfaction. One farmer stated that he bought the farm not long ago and just started to make the farm profitable. This farmer expects that the farm will provide in the basic needs of the farm household in a few years and that the off-farm income from his sons will no longer be necessary. One farmer grows most of the needed products himself but the basic needs satisfaction requires additional money from his pension. This last case represents another dilemma in the assignment: although off-farm income is required this income does not originate from actual off-farm work.

The absence of structural dependence on off-farm income is one characteristic of this farmer type. The second characteristic is the farmers' opinion that the farm production is sufficient to fulfil basic needs, but can never become high enough to improve the living standard.

The objective-categories (as introduced in 2.2) will be considered for the farmer type under discussion.
- productivity: To produce enough for fulfilment of basic needs of the farm family (by sale of farm products and by growing crops for own use). No off-farm income is needed.
- continuity: In 10 cases, the farmer expects that the farm household will stay on the farm for many years. Only 1 farmer is considering to sell the farm. Although about 5 farmers data are lacking, it can be expected that in general the "Basic needs farmer" will continue to depend on the farm. Therefore it is important for the farmers to maintain the production capacity of the farm and the continuity plays an important role in the management of the farm.
- security: Although all farmers are concerned with the security regarding income from the farm, three varieties regarding security occur due to different farm-strategies.
The first strategy consists of well-considered management and arrangement of crops (spatial and temporal) to minimise production and income losses resulting from e.g. low prices and diseases. In four cases this is done in combination with cattle farming.
The second strategy is the rearing of cattle, which seems to be the only secure way of income earning with the farm for these farmers. The risks of income losses are considered far less with cattle than with agricultural crops. Medicines and vaccines of good quality are available, therefore the risk to loose a big part of the cattle stock is considered very low. The farmer states that the market price shall never lower very much, and the possibility exists for the farmers to wait with selling of cattle till the prices have risen again.
The third strategy is the renting out of farm-land and seems to provide enough security for the farmer.
- identity: In some cases the farmers state that they enjoy to be hard working farmers with clever management. Data to give an overall view are lacking.

A sub-division in this farmer type is made when considering the farm-strategy (as already shown in the presentation of the objective-category security):
1) "Basic needs farmer" with changes of land use linked to market possibilities. This farm-strategy is practised by 9 farmers, who state that they have to look for the agricultural products with the best market possibilities. In most cases the growing of crops is combined with cattle-farming.

From the above presented data follows the assumption that this kind of farmer will probably change his land use when impulses from outside to certain changes occur.
Example of a farmer with this strategy: The owner of a small farm of about 6 ha. mentions that he can satisfy the basic needs only with his farm because of good management and consequently a good arrangement of the crops. The farmer changes his crops and cropping pattern when changes of prices in the market occur.

2) "Basic needs farmer" without changes of land use
This farm-strategy is practised by 4 farmers, who consider cattle-farming as only possible source of income for their farm and who do not want to switch to another kind of land use. The area of pasture land lies between 30 ha. and 70 ha., the amount of animals ranges from 10 to 175 heads. Although 175 heads of cattle seem to be enough to arrive at improvement of living standard, the concerned farmer claims that he only is able to fulfil basic needs of the farm household. The only change some farmers mention to have in mind is the conversion of agricultural land into pasture land.

From the data above follows the assumption that this kind of farmer will probably not change his land use of cattle-farming into crop-farming easily when impulses from outside the farm occur.
Example: A farmer mentions that he does not see any possibilities to make a living with agricultural crops, therefore he works mainly with cattle. He says that fulfilment of basic needs is possible with the farm, but for improvement of the living standard lacks the needed capital. The only change regarding land use he wants to make is the transformation of a palmheart plot into pasture.

3) Renting out of a considerable part of farm-land is mentioned as farm-strategy by 2 farmers in this farmer type.

Assumptions about changes of land use as imposed by impulses from outside cannot be made for this kind of farmer because of lack of data.

B) Living standard improvement farmer

The farmers which are included in this farmer type strive after the improvement of the standard of living of the farm household. In the livelihood strategy functions the farm as the only instrument. Therefore the farm-objective can be formulated as the striving after, besides the fulfilment of basic needs, improvement of the living standard.

From the selection of 60 farmers in the study area 11 farmers are assigned to this farmer type. The total surface of their farm-land is about 870 ha., so the average size per farm is about 80 ha. The main land use for nine farmers is cattle-farming. The average surface of pastures of these farmers is about 50 ha. per farm and the average amount of cattle is about 100 heads per farm. These farmers have only a small piece of land reserved for agricultural crops which yield mainly products for home consumption like plantain, maize and black beans.
Two farmers practise agriculture as their main source of income and do not have more than 20 animals of cattle. One of them has a coconut plantation of 10 hectares, the other one has 5 hectares reserved to grow crops of which he expects to have good market possibilities (the actual cropping, watermelon, will be changed to the growing of cucumber and red peppers). The two farmers possess respectively 11 heads of cattle on 20 hectares of pasture and 20 heads of cattle on 10 hectares of pasture.

All farmers mention that trees are important for the farmer because of several functions like wood provision for own use and sale, water-conservation, provision of shade, nature conservation. Nine farmers mention to plant trees on their farms, three of them have established tree plantations. Nine farmers possess parcels of forest, two of them seriously consider to arrange a management plan for their forest. Eight farmers are known to maintain living fences.

Most farmers expect the farm family to continue living on the farm for a long time. Most farmers expected that the farm will stay in hands of the family through succession by one of the children, so improvement of the farm is very important. Most farmers do not consider the growing of agricultural crops as a profitable land use practice, therefore it might be expected that these farmers would not eagerly convert the land use from cattle breeding to the growing of agricultural crops.

With regard to the assigning of farmers to this farmer type, three farmers mention to have some off-farm income. For two of them off-farm income is neither necessary in the fulfilment of the basic needs nor in the improvement of the living standard. The third farmer just bought the farm and expects that the off-farm income only is needed during the first years when the farmer is working to make the farm profitable. Therefore the off-farm income can be considered in the future as dispensable with regard to the attaining of the farm-objective, i.e. basic needs fulfilment and improvement of the living standard.
All other farmers mention not only to be able to fulfil basic needs of the family with the farm, but also mention to have opportunities to improve the living standard of the farm family.

From all farmers of the sample of the study area only the farmers from this farmer type and from the farmer type "Basic needs farmer" depend mainly on the farm. These two types can be distinguished from each other because opposed to the "Basic needs farmer" this farmer mentions to be able to improve the living standard with the farm production.

The objective-categories (as introduced in 2.2) will be considered for the farmer type under discussion.
- productivity: To produce enough to fulfil basic needs and to be able to improve the living standard.
- continuity: To improve the living standard by means of the farm, stabilization or even improvement of the production capacity of the farm is very important. All farmers mention activities which are related with improving the farm. For example trees are planted, equipment is bought, roads are maintained and corals are build.
- security: The security is important and is pursued by the breeding of cattle (less risks than with crops), in some cases in combination with the growing of different kind of crops.
- identity: Because of lack of data this item cannot be discussed.

Farm-strategy: Most farmers work almost only with cattle because they claim that, in stead of agricultural crops, cattle does yield. These farmers are satisfied with the cattle production and therefore do not expect major changes in the future of the farm land use. Nevertheless, two farmers work mainly with agriculture.

Example: A farmer who works hard to make a living and also to improve the production capacity of the farm. The farmer establishes tree plantations for, among other things, future harvest of wood and thinks about improving the pastures by sowing of improved grass species. He works to improve the living standard and for that purpose he considers to buy another farm.

C) **Investor**

Besides basic needs fulfilment and improvement of living standard, this farmer strives after accumulation of capital as livelihood goals. The farm serves as one of the instruments the farmer applies in the livelihood strategy. The farm functions as an investment, therefore the farm-objective can be formulated as the strive after accumulation of capital.

From the selection of 60 farmers in the study area 6 farmers are assigned to this farmer type. The size of the farms, where the interviews were held, lies between 10 and 185 ha. Most farmers possess more farms. The average amount of farm land per farmer is about 85 ha. On all farms care-takers are permanently employed to execute most of required management and work on the farm.

The main land use on three farms is cattle-ranging. Two other farmers seem to be managing their farm with the focus on wood production, one of them has 60 ha. of forest and 60 ha. of tree plantation, the other one tries to exploit the more than 100 ha. of natural forests on the farm. Another farmer rents out most of his farm land with the aim to get income and to keep the farm clean and well-maintained. Agricultural crops are not important for income-earning. Some crops are grown by the care-taker for home consumption.

All farmers in this type mention that the trees on their farms have important functions, like production of wood for farm use and sale, production of fruits and for the conservation of nature and water. Except one, all farmers plant trees. Four farmers have established tree plantations. Four farmers have forest, one of them has a management plan for the forest. It is known that on three farms living fences are maintained.

The farm is not the main source of income for these farmers. The farm is considered as an investment by all farmers.

The objective-categories (as introduced in 2.2) will be considered for the farmer type under discussion.
- productivity: The farm serves as an investment to earn extra money with very little labour input by the owner.
- continuity: The farmer wants to keep up the extra income flow from his investment i.e the farm. Therefore continuity is important; the farm capacity is being maintained and improved.
- security: The earning of extra income and accumulation of capital is important for the farmer. Three "Investors" practise on their farm cattle rearing as main source of income or at least as an important source of income. Cattle farming gives far less economic and ecologic risks then the growing of agricultural crops.
- identity: Because the farmer comes only to his farm in the weekends or even less, the identity in being a farmer conform the culture and the views of the farmers in the neighbourhood is not very important. However, the identity related to owning a farm with a high amount of cattle might be important for the farmer regarding social life in the city where he lives.

Farm-strategy: In most cases the land use consists of extensive cattle-breeding. Most of these farmers state that they want to accumulate capital without much labour input of their own and without many risks regarding income losses.

Future expectations: In case of cattle breeding as main land use, it can be expected that the land use will not change rapidly. The two farmers who are mainly working with forests and tree plantations expect to increase the tree activities in the future.

Example: A farmer who comes almost every weekend to the farm to escape the big city with his busy occupation. His farm serves as an investment, with the proceeds of the selling of cattle the farmer enlarges his capital. The income is used to improve the farm, to buy a car or even to buy another farm.

D) Farmer with necessary off-farm income

The livelihood goal of the farmers in this farmer type can be described as striving after satisfaction of basic needs. The livelihood-strategy consists of a combination of income generated at the farm and income generated with off-farm work. No big changes are expected by the farmer with respect to the land use and with respect to off-farm work. No possibilities

and/or intention to raise the living standard are considered by the farmer. The function of the farm in the livelihood strategy leads to the farm-objective: To gain as much as possible without putting too much efforts.

In the sample of 60 farmers in the study area 20 farmers occur which can be assigned to this farmer type. Most of the farmers in this type have less than 25 ha., two farmers have more than 70 ha. Fifteen farmers possess cattle, the average amount of cattle is about 17 heads per farm. Nine farmers still practise agriculture to sell the products in spite of the low market prices. These nine farmers grow cash crops like maize, cassava and palmheart. For home consumption mainly crops like maize and black beans are grown. Thirteen farmers mention that it is not possible any more to make a living with agriculture and see cattle farming as the only alternative but do not have enough money and/or farm land to convert the land use to cattle ranching. Only one farmer tries to look for agricultural crops with the best market possibilities. Not from all farmers data, regarding the perceived possibilities for agriculture, are available, nevertheless the impression exists that far out most farmers in this type consider agricultural as not profitable.

Future expectations: The farmer expects that the production capacity of the farm can never be sufficient to fulfil the needs because the characteristics of the farm. The farmer does not expect that the situation will change because he does not see or expect possibilities for change. Also farmers occur who want to live quietly on the farm and therefore do not put many efforts in trying to raise the production capacity, they prefer to work off-farm to complement the income.

All most all farmers mention that trees have positive functions for the farm, most of the farmers mention only wood provision. Twelve farmers plant trees, six of them work with tree plantations. Nine farmers possess a parcel of forest land, but only one farmer executes management activities in the forest. One farmer is considering to work with a management plan for the forest. Three farmers do not work with living fences. From two farmers data about living fences are lacking.

All farmers mention that at least one member of the farm family has to work off-farm because it is not possible to sustain the farm family with the farm alone. Still all farmers state that the farm is indispensable to fulfil the basic needs of the farm family.

Like for the farmers in two other farmer types ("Basic needs farmer" and "Living standard improvement farmer") the farmers in this type need the income from the farm to sustain the farm family. But as opposed to these other two types this farmer also depends on off-farm income.

The objective-categories (as introduced in 2.2) will be considered for the farmer type under discussion.
- productivity: In sustaining the farm household is strived after an as high as possible production with the actual land use. In practice the income from the farm production is not enough to fulfil the needs of the family.
- continuity: Intention to change the land use doesn't occur because the felt lack of alternatives for the actual land use. Improvement of the farm is not very important.
- security: Income is, besides farm production, for an important part earned through work for others. Therefore minimising risks of income losses is not only of interest for the farm production but is also for an important part pursued by a search to secure the possibilities to work off-farm. In many cases it is even stated that income losses on farm production e.g. as result of low market prices can be levelled by day-labour work.
- identity: The farmers go on with agriculture and most of them like to be regarded as real farmers even though they work a lot of time as day-labourer and/or get important income from other sources. For them, the identity of being a farmer is important.

Farm-strategy: The farmer cannot or does not want to change the land use. He and/or other family member(s) keep(s) on working outside the farm as (a) day-labourer(s), therefore not much time can be spent on the farm. Because of the income earned as day-labourer improving the farm is not very important.

Four farmers are getting old and want to live quietly on the farm. These farmers do not want to change the land use they always practised, even when the actual produce is badly paid for on the market. Income is secured by their children.

Example: A farmer assigned to this type mentioned that the farm has importance for him as a way of earning income, but he cannot succeed in fulfilling the basic needs with his farm. To complete the income a son works off-farm. If this son moves to another village and/or quits with the off-farm work, another son will start to supply income by going to work off-farm. The farmer has four sons and therefore he feels secure about the future. Besides the fact that always another son can start working off-farm, children who move away will not have to be sustained any more by the farmer.

E) **Farmer with farm as future alternative**

The farmers in this farmer type strive after the improvement of the living standard and to raise the farm potential to a profitable level as livelihood strategy. At the moment, the livelihood strategy to come to basic needs satisfaction and improvement of the living standard finds expression by off-farm work. In the future, the farmer wants to sustain the farm family and to improve the living standard only by means of the farm.
Therefore the current farm-objective can be formulated as the provision of some crops for home consumption, but when the farmer realizes his future plans the farm will be expected to provide the only source of income.

In the sample of the study area 4 farmers occur which can be assigned to this farmer type. The average size of the farms is about 20 ha. The farm land is mainly used to grow some crops for home consumption by the farm family. Two farmers do not have cattle, the other two have respectively 8 and 40 heads of cattle. One of the farmers has rented out the biggest part of his farm land.

All four state that trees are important, all four are interested in trees and all four plant trees. For two of them trees play an important role in the future plans of the farm. Three farmers are known to maintain living fences.

For all farmers off-farm work is indispensable to sustain the farm family. Three of the farmers have their own business (respectively by working with a chainsaw, with a tractor and with a taxi). One farmer works with his two sons on a big banana farm.
All four do not use the farm as an investment, nor depend on the farm for basic needs fulfilment. All four have plans to raise the potential of the farm to be able in the future to fulfil the needs of the farm family only with the farm.

The only two farmer types in which the farmers almost do not have any income from the farm are the "Farmer with farm as future alternative" and the "Full-time off-farm employee". The difference between the two is that the farmers in the former type have the intention to raise the farm potential to be able to sustain the family in the future with the farm and the farmers in the latter type do not have that intention.

The objective-categories (as introduced in 2.2) will be considered for the farmer type under discussion.
- productivity: At the moment, the productivity is not very important because income is earned mainly by off-farm work. The farm production consists only of a small quantity of products and/or income from cattle-ranching.
- continuity: In the future the farm is expected to produce enough for basis needs and for improving the living standard. Therefore time and money is being, or is going to be, invested in the farm to enlarge the production capacity.
- security: The security regarding farm income will be important in the future when the farm will be the only or main source of income.
- identity: The farmer does not yet expose the identity of being a farmer, probably the farmer identity will be of importance for the farmer in the future.

Farm-strategy: To raise the production capacity of the farm in the future. A part of the income from the off-farm work is being or will be invested in the farm.

Future expectations: The farmer has plans to create a situation in the future in which the farm will produce enough to come to basic needs fulfilment and to come to improvement of the living standard. When the production on the farm is sufficient, the farmer can stop with the off-farm work. If a good possibility of land use for the farm occurs, it can be expected that

these farmers will be interested in it. Probably, when the project regarding the farm is realized the farm-objective will become striving after improvement of living standard.

Example: One farmer mentions that he now makes a living with his business as cargo-taxi driver and that he slowly invests in the farm to be able to make a living with the farm in the future. The farmer considers his project for the future necessary because the current source of income may dry out, as result of a fast growing competition in the cargo-trade. At the moment only some crops are grown on the farm for home consumption and part of the farm land is rented out.

F) **Full-time off-farm employee**

The farmers assigned to this farmer type strive after satisfaction of basic needs as their livelihood goal. In the livelihood strategy off-farm work is almost the only component. The farm only functions as a place to live and to grow some crops for home consumption.

In the sample of the study area 3 farmers are assigned to this farmer type. The sizes of the three farms are about 11, 26 and 19 ha. The farm land is used for growing some crops and for cattle grazing (respectively 1, 5 and 10 heads). Crops like maize, bananas and beans are grown for family consumption.

All three farmers mention some important functions of trees, but none of them plants trees. Two farmers are known to work with trees in living fences.

Off-farm work is indispensable to the farmer for fulfilment of basic needs. The farm is not used as an investment nor is the farm regarded as a future alternative to make a living. All three farmers mention that the farm does not produce enough to sustain the family, therefore at least one member of the family works full-time off-farm.

The two types in the farmer typology in which farmers almost do not have any income from the farm are the farmers from the type "Farmer with farm as future alternative" and the farmers from the type "Full-time off-farm employee". The difference between the two is that the farmers from the former type have intention to raise the farm potential to be able to sustain the family in the future with the farm and the farmers from the latter type do not have that intention.

The objective-categories (as introduced in 2.2) will be considered for the farmer type under discussion.
- productivity: The farm serves mainly as a place to live, the production is very low, only a few crops are grown for own use.
- continuity: Because of a low importance of the production of the farm for the farm family the continuity is not important.
- security: Risks of income losses as result of production losses on the farm are negligible, therefore the interest in minimising these risks is also negligible.

- identity: These farmers work most of the time off-farm and are not much concerned with farming and therefore do not consider themselves so much as farmers.

Farm-strategy: A clear strategy does not exist, only the growing of some crops for family use can be mentioned as strategy.

Future expectations: The farmer does not see any possibilities to make a living with only the farm, because of the bad soil, small farm size or the lack of capital. Therefore the farmer does not expect that the farm will produce an important part of the income in the future and the off-farm work will stay very important.

Example: A farmer says that he absolutely cannot fulfil basic needs with only his farm. He and two of his children work on banana farms in the neighbourhood to make a living. The farmer mentions that after eight years of hard work as a labourer on a cattle farm he was able to buy a small farm with a little house. Before he and his family lived under poor conditions in a small cabin on the cattle farm. The farm serves as a place of his own where some crops can be grown for home consumption.

6.3 Reflections on the farmer types

Presented above is the farmer typology as a part of the farm classification which is going to be designed for the northern Atlantic Zone of Costa Rica. Further research has to look for methods to integrate the farmer typology with the methodology of the farm classification.

In this research as criteria for assigning farmers to farmer types are taken the function of the farm in making a living as perceived by the farmers. The functions are investigated and evaluated by considering what the farmers state about the total way of making a living, the possibilities to fulfil basic needs by means of the farm, the future of the farm, the expected changes in land use, the future of the execution of off-farm work by family members. The research resulted in a distribution of investigated farmers from research areas over farmer types as presented in table 1.

As can be noticed from table 1, not all farmer types are present in each research area. From table 1 can be concluded that off-farm work is an important aspect in all three research areas. From the 60 farmers in the research sample 33 farmers do significantly depend on off-farm income. With regard to the number of farmers the farmer types "Basic needs farmer", "Living standard improvement farmer" and "Farmer with necessary off-farm income" are of major importance. In Neguev most farmers are assigned to the farmer types "Basic needs farmer" and "Farmer with necessary off-farm income". This in accordance with the fact that in Neguev only small farmers occur (see section 4.2). No other evident regularities can be found in the table.

Table 1: The 60 farmers of the research sample from the three research areas assigned to farmer types

	Río Jiménez	Cocorí	Neguev	Total
Basic needs farmer	7	3	6	16
Living standard improvement farmer	4	5	2	11
Investor	2	3	1	6
Farmer with necessary off-farm income	7	4	9	20
Farmer with farm as future alternative	-	1	3	4
Full-time off-farm employee	1	1	1	3
Total	21	17	22	60

6.4 Grouping of farmers according to similar activities regarding trees and forests on farms

Trees display a big range of potential possibilities of practical use for farmers (see 2.5). Farmers in the research sample mentioned production as well as service functions of trees and forests on their farm lands. Production functions like the provision of timber, firewood, fruits and fencing are mentioned. Service functions like protection of riversides and the conservation of nature and water are mentioned.

Nevertheless, trees are (unconsciously) considered by farmers in the study area as a rest factor in farming, which is expressed in the percentage of labour time spent on trees, income earning, interests and valuation of tree functions (van Leeuwen & Hofstede, 1995). As a result, farmers do not elaborate about the management of forests and about their opinion over trees, when asking them. Besides, most farmers do not remember a lot about former activities with trees. Tree and forest related aspects proved to be sensitive subjects in the Atlantic Zone, because of the stringent forest laws and the fear for the forest service. Because of the above outlined situation, it proved not to be possible to obtain much information about these aspects. Therefore it was not possible to make a detailed classification about the objectives of farmers towards trees.

However, some data about tree related activities could be obtained by interviews (Appendix II gives the questionnaire used in the interviews). It was chosen to make a division based on "simple" criteria. The farmers are grouped according to tree and forest activities as found in the interview phase. The result cannot be called a classification but is just a simple grouping.

The point of view about trees does differ between farmers in the study area in a wide range, from farmers who almost do not spend any time on or think about trees to farmers who are very active in thinking and working with trees.

The resulted groups are farmers (with):
a) no activities,
b) activities,
c) interested in activities,

ad a) The group of farmers with "no activities" consists of farmers who do not show any interest in planting of trees or management of forests or plantations. In this group the farmers are included who cut a tree now and then, use shade and fruit trees and work with living fences. In most cases the corresponding farm is small and/or without forest.

ad b) The group of farmers with "activities" do for instance plant trees, work with plantations, manage their forests, perceive a lot of positive functions of trees and forests or establish a small tree nursery.

ad c) On the borderline of the two above mentioned groups occur some difficulties, like farmers who are interested and thinking about possibilities to work with trees but who are not yet actively working with trees. However, only a few of these cases occur.

In the part of the interview phase (see appendix II), focused at the activities of farmers regarding trees and forests, only the questions about tree planting and management of forests proved to provide sufficient and accurate data. These aspects are taken as the most important and decisive criteria for assigning farmers to the tree activity groups. In the description of the tree activity groups, the farmers' point of view regarding forests as having the function of nature and water conservation is not considered because of the very abstract appearance of this attitude and because of difficulties in checking this attitude. Also excluded are the activities with living fences because they occur very general and are in many cases forced solutions to replace poles because of the scarcity and high prices of dead poles. Data about activities with living fences are not discriminative because of the general application of living fences. In spite of the fact that these activities are important for the farmers and in many cases the first experience with tree planting, these activities cannot be taken into account for the tree-activity grouping.
In table 2 the farmers are assigned to tree-activity groups based on the data presented in 6.2 and Appendix III.

Table 2: Number of farmers from the 60 farmers of the research sample per tree-activity group.

	Río Jiménez	Cocorí	Neguev	Total
a) No activities	9	2	6	17
b) Activities	11	14	14	39
c) Interested in activities	1	1	2	4
Total	21	17	22	60

From table 2 can be concluded that most of the farmers from the research sample are interested in and actively working with trees. Although trees are a rest factor in land use, as stated above, still farmers devote time to trees and forests. Some small differences between the groups of farmers from different research areas can be noticed. In Cocorí almost all farmers claim to be actively working with trees, what can be explained by the still occurring big areas of forest, in which the farmers, according to the interviews, are getting more and more interested and for which forest laws require management plans. For Neguev the relatively high number of farmers which is not interested in trees can be explained by the small farm size, which does not allow much space for tree growing. It might be that the relatively high number of farmers which is not interested in trees in Neguev and Río Jiménez can be explained by a lack of knowledge about and experience with trees of farmers. This explanation could be looked upon in further research.

As compared to a few years ago, a lot of farmers are getting interested in working with trees. Below some examples of farmers who not only plant trees but who also express a keen interest in trees will be presented. It has to be noted that most farmers in these examples are or will be able to spend relatively much time on trees because their income situation allows it.

- A farmer in Neguev wants to start an eco-tourism project. His farm parcel is situated at a riverside, where he wants to plant some native tree species. The farmer expects tourists who are passing the river to stop at his tourist location to enjoy "nature".
- A farmer in Neguev has more or less the same idea, besides that he wants to manage his forest parcel and to plant trees to arrive at nature conservation activities which could be attractive for tourists. Another idea this farmer has is to cover his whole farm with tree plantations. The farmer wants to start a business of wood workmanship for which the tree plantations can then provide the needed wood.
- A farmer in Neguev claims that he wants to cover his whole farm with wood plantations with the aim to be able in the future to sustain his family with the selling of wood.
- A farmer in Neguev mentioned to have attended a course in which the future situation of the disappearing of forests and the diminishing availability of wood is elaborated up on. Based on that knowledge the farmer started to plant trees.

- In Río Jiménez a farmer has the intention to cover the entire farm with trees with the aim to help the environment. He thinks that maybe in the future he will be able to earn some income with the plantation.
- A farmer in Río Jiménez started promoting activities with trees. Once in a while he gives lessons on a primary school about environmental issues with special attention for tree planting. Connected with that he wants to start a tree nursery at the school with an educational goal.
- A farmer in Cocorí is very active with trees. He manages his forest and transplants valuable trees. He even has a demonstration parcel to show the neighbouring farmers how to work with trees.

During the interviews, some farmers asked for advise about the management of forests, some farmers mentioned the importance of planting trees because of the disappearing of forests and some farmers mentioned the increase of value of the farm when the amount of trees is raised.

6.5 Type-specific activities of farmers regarding the tree- and forest-component on farms.

To study farmer type specific activities of farmers regarding trees and forests, the farmer types and to the tree-activity groups will be compared (see table 3).

Table 3: Distribution of farmers from the 60 farmers of the research sample to the same farmer type and the same tree-activity group

	No activities (nr. of farmers)	Activities (nr. of farmers)	Interested (nr. farmers)	
Basic needs farmer	5	9	2	16
Living standard improvement farmer	2	9	-	11
Investor	1	5	-	6
Farmer with necessary off-farm income	6	12	2	20
Farmer with farm as future alternative	-	4	-	4
Full time off-farm employee	3	-	-	3
Total	17	39	4	60

Analysis of the combination of the farmer typology and the tree-activity grouping shows no regularities. All farmers of a particular farmer type do not fall automatically in the same tree

activity group. Not all farmers in the same farmer type show the same behaviour regarding practising tree and forest activities. Still some general observations about the table 3 can be made. Most actively interested farmers can be found in the farmer types "basic needs farmer", "living standard improvement farmer", "investor" and "farmer with farm as future alternative". The farmers in the first two mentioned types are most concerned with the potential of their farm because the farm is the only source of income. In the two last mentioned types, the (future) value of the farm is very important and is related to the amount of trees on the farm. Some "Investors" use the farm as weekend retreat, in these cases trees are important for their aesthetic values. Farmers in the farmer type "full time off-farm" do not have time or space to work with trees.

7. DISCUSSION

In this chapter a discussion will be presented about the research results and about the methodology as applied in this research. Besides, recommendations for further research related to regional land use planning in the Atlantic Zone of Costa Rica will be presented.

7.1 The research results

In assigning farmers to farmer types it has to be kept in mind that farms and farm families undergo changes caused by influences from outside. Therefore, farmers are not static tied to a farmer type but can move from one type to another. The dependence of farmers on their surroundings is described by Barlett (1980) by pointing at the fact that choices made by farmers, how to allocate the resources available to them, depend on the cultural and institutional environment in which they are located. All farmers have to make these choices and all farmers face the vagaries of weather, health and prices. During the research it was found that several farmers were considering changes in land use or even in the function of the farm in the livelihood strategy because of several causes. Also it was found that new ideas with regard to tree-growing are emerging.

The study area is still in a very dynamic situation caused by immigration and emigration. Therefore the assignment of farmers to farmer types as presented in this report may already be outdated in due time, nevertheless, the general overview the results give is useful for further research in the study area.

It is unsure whether all occurring farm-objectives, in the study area have been identified. But after analysis of the possibilities as they emerge from combining the criteria (see section 5.1), it is expected that the described farmer types represent all important occurring farm-objectives. Besides, from the general overview about the study area and from discussion with researchers in the study area, it can be concluded that the distinguished types are the most important types and probably the only ones, considering the proposed methods. If other farm-objectives are present, it can be expected that they are of minor importance. However, they could be found during further research in the Atlantic Zone Programme, when all farmers are assigned to the farm classes in the farm classification.

7.2 The methodology

Most of the data used to come to the farmer typology and the tree-activity grouping are directly derived from statements by farmers. Therefore it could be questioned to what extent these data are reliable. This is inevitable because the research is aimed at personal objectives of farmers. Nevertheless, considering the gained confidence of farmers in the interview

situations, it can be expected that the statements of farmers are valuable and, therefore, the research results are valuable.

An explanation for the fact that no obvious type-specific activities of farmers towards trees and forest have been found might be that, in the research, different intensities in working with trees and forests were not taken into account. Maybe further research can put emphasis on this aspect.

The strive of a farmer after an satisfying identity (see section 2.2) can considerably influence the management of a farm. However, in many cases it proved not to be possible to get a grasp about this objective-category during the interview phase. Nevertheless, in describing farmers in regional land use planning it seems necessary to develop a method for identification of the identity of farmers.

Based on earlier research by van Leeuwen (see for a description: 1992) it was decided to presuppose that the three research areas present a sequence of different stages regarding the development of the whole area. All three were presupposed to follow more or less the same development path and were therefore be considered as a more or less homogenous study area regarding expected farm-objectives. Because of the different stages of development in which the research areas had been found, it was expected that the same kind of farm-objectives could be found within the three research areas. Differences regarding the number of farmers with a particular farm-objective were expected, when the different research areas are considered. At the end of the research, considering the research results, this supposition proved to be right.

The missing of certain data regarding some farmers can be explained by several reasons. First, the knowledge gained during the first phase of the interviews led to adjustment of the questionnaire. Because of the time constraint, data from interviews which were held in the beginning could not be completed. Second, the missing of data is caused by the fact that in some cases it proved not to be possible to make all questions understandable for the farmers. Thirdly, it appeared that in some cases farmers where reluctant to answer certain questions.

7.3 Recommendations

Further research has to develop a farm classification procedure for the study area. A start of this research is made by van Leeuwen (van Leeuwen, 1992; Alfaro et al., 1994). For assigning farmers to farmer types, this research proposes to look at the way farmers consider their farm as potential to make a living.

Off-farm activities are important for many farmers in the study area. Therefore, besides efforts to adapt the farm classification to arrive at more effective methods of land use planning, another theme of interest for the development of the study area could be the range of secondary activities of farmers. This corresponds with one of the conclusions on the "65'th

Dutch Tropical Agricultural day" (Anon, 1993) about the practical implications for rural development of the UNCED conference at Rio de Janeiro. It was concluded that for small marginal farms secondary activities outside farming can be very important. Development of alternatives for agriculture is, therefore, at least as important as the development of "sustainable" agriculture.

It was found that farmers are getting more and more interested in trees, forests, nature conservation, etc. This gives opportunities to enlarge the role of the tree- and forest component in the farming system by means of extension and training.

Some farmers are trying to be an example to neighbouring farmers about working with trees. One farmer gives lessons on secondary schools about the environment and about trees and forest in particular. Farmers like him, can be of great importance in land use planning to promote management of the tree-component on farms. Some farmers could possibly work as extension workers in rural development.

Many farmers mention the lack of starting capital as a barrier to develop their farm. They are forced to work off-farm to sustain the farm household. To support them, an item in regional rural development could be the accessibility of credit.

8. CONCLUSIONS

In this research a contribution is made to the development of a farm classification (see Alfaro, 1994) in which attention is paid to farm-objectives. This is done by the development of a farmer typology based on farm-objectives. After examination of currently applied farm classifications, the general applied structure of these classifications proved to be the only useful aspect. Most methods of currently applied farm classifications do not consider the human factor in land use in a satisfactory way and, therefore, are not suitable for the development of a farm classification in which attention is paid to farm-objectives. However, in the "styles of farming" theory some useful concepts are presented. In this theory "general accepted ideas about adequate means of making a living and about how to farm" are examined. These items have been used in this report to identify the farm-strategy on farms.

The farmer typology which has been developed consists of the following six farmer types: "Basic needs farmer", "Living standard improvement farmer", "Investor", "Farmer with necessary off-farm income", "Farmer with farm as future alternative" and "Full-time off-farm employee". The farm-objectives are, respectively, to produce enough for basic needs fulfilment, to improve the living standard, to earn as much as possible without large changes in land use, to accumulate capital by means of an investment, to make a living with the farm in the future and to grow some crops for home consumption.

From the 60 farmers in the research sample 16 farmers were assigned to the farmer type "Basic needs farmer", 11 farmers to "Living standard improvement", 6 farmers to "Investor", 20 farmers to "Farmer with necessary off-farm income", 4 farmers to "Farmer with farm as future alternative" and 3 farmers to "Full-time off-farm employee". The farmer types "Basic needs farmer", "Living standard improvement farmer" and "Farmer with necessary off-farm income" are of major importance regarding the amount of farmers and can, therefore, be of major importance in regional land use planning. However, the appointment of target groups depends on the goals in rural development.

The tree- and forest-component on the farm is one of the farm-components in the farm-strategy which function to attain the farm-objective. To identify objectives regarding trees and forests it was proposed to consider the four objective-categories at farm level.
However, in the study area, it proved not to be possible to make a detailed classification about the objectives of farmers towards the tree- and forest-component. Therefore it was decided to design a "simple" tree-activity grouping. In the tree-activity grouping farmers are grouped according to the fact whether or not they plant trees and whether or not they actively manage their farm forests. The groups that emerged were: "No activities", "Activities" and "Interested in activities".

From the 60 farmers in the research sample 17 farmers were assigned to the tree-activity group "No activities", 39 farmers to "Activities " and 4 farmers to "Interested in activities".

It was further observed that tree-activities are subject to change; an increasing interest with respect to tree-growing and forest management seems to be emerging.

The relation between the farmer typology and the tree-activity grouping has been determined by a comparison of the farmer typology and the tree-activity grouping by placing them in one table. It was concluded that no general overlap occurs. However, most farmers actively working with trees were found in the farmer types "Basic needs farmer", "Living standard improvement farmer", "Investor" and "Farmer with farm as future alternative".

Therefore can be concluded that promotion of tree activities in land use planning would probably have the most effect when these farmer types function as target groups. It depends on the goals in regional development which farmer types will be considered.

From the interviews and the general overview of the region has to be concluded that farmers, compared to a few years ago, are getting more and more consciously aware of the value and the importance of the tree element in the farming system. This raised interest and changing of view-points is a reaction on the changing situation on the wood market, the changing farm situation and changes in the environment. It is also a result of extension, courses attended by farmers and lessons followed on school by farm children.

It can be expected that in the future the consciousness of farmers with regard to the functions of trees and forests will raise more and more. That will give opportunities for enlargement of the positive role of trees in farming systems, for example in rural development activities.

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APPENDIX I

Definitions

Accumulation: Capital formation (see Andriessen, 1980). The capital can be stored in capital goods (e.g. a farm) or can be spared to have a reserve for the future.

Agriculture: The cultivation of annual and perennial plants to yield products desired for human consumption or processing (Reijntjes et al., 1992).

Basic needs: The products that people need to stay alive, according to prevailing values. According to Hopkins & van der Hoeven (1983) in any core set of basic needs should the following list of items be included: food, drinking water, shelter, clothing, health and education.

Farm: In this report the term farm is used as the term "farm system" as defined by Reijntjes et al. (1992) as "All components within a given farm boundary which interact as a system, including people, crops, other vegetation, livestock, wild-life, and the social, economic and ecological interactions between them and the environment.

Farmer: The person(s) that take(s) decisions in land use on the farm, so with farmer only the household head can be meant or more household members e.g. the whole household.

Farm-objective: The function of the farm in the livelihood strategy, as perceived by the farmer.

Farm-strategy: The way a farmer seeks to attain the farm-objectives.

Full time off-farm work: A regular job, usually under contract.

Improvement of the living standard: Parallel to the hierarchy of human goals as described by Conner (1993), the pursue of living standard improvement starts when the basic needs of the household are secured.

Livelihood system: The whole range of income earning activities with the aim to satisfy the household needs (see Chambers et al., 1989b). The livelihood system may include cropping, tree growing, animal keeping, fishing, hunting, gathering, processing, trading, paid employment and a wide variety of other non-farm activities (Reijntjes et al., 1992). With the livelihood system a livelihood goal is strived after.

Livelihood strategy: The way a farmer tries to attain the livelihood goal.

Living standard: The level of wealth; in a material and immaterial meaning.

Off-farm work: Paid employment outside the farm.

APPENDIX II

The questionnaire

The design for the interviews was based on insight about the farmers in the research areas gained from different researches as summarized in different programme documents (e.g. Zambon, 1987; Paap, 1993; Brouwershaven, 1993) and by considering the research of Alfaro (1993) about strategies of farmers in "the Agrimaga settlement".

Besides the programme documents other literature was considered for insight about objectives of farmers. Reijntjes et al. (1992) appeared to offer a useful outline of objective-categories which need to be considered in research about objectives (see 2.2). After the literature study, a monitoring phase let to a concrete checklist for the interviews.

In the interviews farmers were indirectly questioned about the way they experience the importance of the farm and their dependence on the farm with regard to making a living. Therefore the farmers were questioned with the focus on the objective-categories productivity, security, continuity and identity. So the interviews were mainly aimed at the description of the total livelihood system of the farmers. Later the data were analysed to come to farmer types.

Summarizing, the interviews were held with several aims:
a) to get insight in the farm-objectives and to distinguish criteria to decide on dependence on the farm.
b) to get information to describe the farmers from different farmer types more into detail; in this description also attention is paid to activities of farmers regarding the tree- and forest-component on the farm.
c) to get insight in the farm-strategies.

ad a) The data which were collected by the interviews with the aim to get insight in the farm-objectives are answers of the respondents about the following question-categories:
- Whether off-farm income is generated,
- The importance of off-farm income,
- Whether the farmer is able to come to basic needs satisfaction with the farm alone,
- Whether the farmer considers it possible to improve the living standard with the farm and whether improving of the living standard is strived after,
- Whether the farmer tries to make a living as much as possible with the farm alone or as much as possible with off-farm work,
- How the farmer considers the importance of the farm for the farm household,
- How the farmer considers the dependence on the farm by the farm household,

ad b) The data which were collected by the interviews with the aim to get information to describe the farmers in different farmer types (including activities regarding trees and forests) are answers of the respondents about the following question-categories:
- Whether farm children work on the farm and/or off-farm,
- How much time the owner spends on the farm,
- How the farmer considers the tree- and forest-component on the farm,
- Whether maintenance or even enlargement of the farm potential is strived after,
- How the farmer thinks to cope with risks in production losses,
- How the farmer thinks to cope with times of bad prices for his products,
- How the farmer considers the future with respect to staying on the farm and with regard to succession by off-spring,
- If the farmer likes to be a farmer,
- If the farmer has problems in farming,

ad c) The data which were collected by the interviews with the aim to get insight in the farm-strategies are answers of the respondents about the following question-categories:
- The actual cropping pattern, former cropping pattern and expected future cropping pattern and the reasons for these crops and potential changes,
- Whether the farmer has possibilities to change the cropping pattern,

- What part of the production is produced for own use and what part for sale.

Based on earlier research (for example Paap, 1993; Brouwershaven, 1993; Zambon, 1987) the part of the checklist for the interviews about practices concerning trees was developed, The checklist will be discussed per land use type containing a tree component.

Practices concerning trees within the sylvo-pastoral system:
- whether trees are regarded as having a neutral, a positive or a negative effect on the pasture,
- whether trees are used as shade and/or fruit trees,
- whether dispersed trees are being cut,
- whether trees are planted,
- whether trees are left and protected in the pasture.

Practices concerning trees within tree plantations:
- whether a plantation has been or will be established,
- whether the plantation is seen as an investment for the future of the children,
- whether the plantation gets attention and is maintained,
- whether possibilities are seen to grow crops or keep cattle in the plantation.

Practices concerning trees within natural forests:
- whether the forest is important for the farm family,
- whether the forest is considered important as a source of nature conservation and/or water conservation,
- whether the forest is considered as a potential natural resource for several future uses by the farm off-spring,
- whether the forest has aesthetic values for the farm family,
- whether trees are being cut,
- whether management of the forest occurs,
- whether the forest will be converted into pasture,
- whether cows graze in the forest area.

APPENDIX III

Tables with research data

Below, data collected in the interviews will be presented per farmer type. In the field it proved not possible to obtain all required data (see chapter 8). When possible the data from this research have been completed by data from research by van Leeuwen in the Atlantic Zone Programme (see for a description van Leeuwen, 1992).

medias = an agreement about the rent of pasture land
rent out = the renting out of land
technic = the increase of technical equipment in farming

farm strategy 1 = the search for and planting out of agricultural crops with the best market possibilities
farm strategy 2 = to exploit the farm only by cattle-farming
farm strategy 3 = to rent out an important part of the farm

all figures are in hectares (execpt the number of cattle)

** = no data
( ) = data from research of van Leeuwen

Abbreviations in the tables:

agr = agriculture
agr not = agriculture does not work
anu = annuals
ay = ayote (local name)
ba = banana (Musa cvs)
be = black beans (Phaseolus spp.)
bn = basic needs
c = chili (red pepper) (Capsicum spp.)
ca = cacao (Theobroma cacao)
child suc = succession by children
co = (coconutpalm) Cocos nucifera)
combi = combination
cons = conservation
cu = cucumber (Momordica charantia)
env = environment
for = forest
fr = fruits
fut = future
fw = fuelwood
ha = hectare
imp = importance
impr = improvement
inbio: a Costa Rican ecological research institute
lf = living fences
l fences = living fences
ls = living standard
lu = land use
ma = maize (Zea Mais)
main = maintenance
man = management
med = medicines
nat = nature

nec = necessary
ni = taro (Colocasia esculenta)
not rel = not relevant
o = own use
off inc = off-farm income
pa = palmheart
past = pasture
pe = peyibaje (Bactris gasipides)
pi = pineapple (Ananas comosus)
pl = plantain (Musa cvs)
planta = plantation
pp = papaya (Carica papaya)
pr = protection
pt = potato (Solanum tuberosum)
r = rice (Oryza sativa)
rc = reclaim
s = sell
sh = shade
stay long = farmer expects to remain on the farm for a long time
su = sugarcane (Saccharun officinarum)
t = ch = tannia Xanthosoma sagittifolium
ti = tiqisque (local name)
veg = vegetables
vit = vitamins
w = watermelon (Citrullus lanatus)
wat = water
wo = wood
yu = cassava (Manihot esculenta)

BASIC NEEDS FARMER	OFF-INC	sustain family with farm	OFF-INC NEC FOR SIN	LS IMPH	FARM SIZE	CASH CROPS	CROPS O	PASTURE	CATTLE	PLANT TREE	L FENCES	AGR NOT	CHILD SUC	STAY LONG
RJ1	yes	yes	no	no	6	pl	co/pe	no	no	no	(yes)	no	**	yes
RJ3	no	yes	not rel	no	(35)	routation: pl1&pp3	**	(26)	67	no, maybe	**	**	**	**
RJ4	no	yes	not rel	no	(95)	ma3	**	48	10	no	(yes)	**	**	yes
RJ7	yes	sometimes not	no	no	(47)	pa4	pl/r/yu/be	30	10	yes	(yes)	yes	maybe	yes
RJ8	yes	yes	sometimes	no	5.5	ca0 5,c0 25,pl	pl/yu/ni	no	no	yes	(yes)	no	**	**
RJ9	no	yes	not rel	no	23	c2_pl,su,ma,yu	**	21	12	(yes)	(yes)	no	**	**
RJ11	no	yes	not rel	no	70	pl5	**	85	140	yes	(yes)	yes	**	yes
C1	yes	not without pensioen	yes, pensioen	no	(10)	no	ma/be/ba/yu	(1,5)	no	yes	(yes)	**	no	yes
C7	no	yes	not rel	no	114	ma8	ma	50	78	(no)	**	yes	no	no
C17	yes, inbio	yes	no, is impr	yes with off -inc	82	no	**	30	35	no, transplants	yes	**	**	yes
N2	no	yes	nor rel	no	(10)	pa3	**	8	21	(yes)	**	no	**	**
N5	no	yes	nor rel	no	11	p1 5/pa1 5	**	(7)	18	yes	(yes)	no	**	yes
N10	no	yes	nor rel	no	(10)	pa8/anu	**	**	2	no	**	no	**	**
N11	no	yes	not rel	no	(18)	ca2/c1/co	**	(1 5)	(6)	yes	**	maybe	**	yes
N16	yes	sometimes not	sometimes	no	17.5	yu 1 5/ma0 75	be	(6)	10	yes	**	no	**	yes
N17	yes	no, till farm is profitable	yes,till farm is profitable	no	34	no	**	32	40	no	(yes)	yes	**	yes

	SECURITY	CHANGE	FOREST	PLANTATION	RENT	IMP TREES	IMP FOR	MAN FOR	IMPR FARM	farm strategy 1	farm strategy 2	farm strategy 3
RJ1	pl=stable crop&price	depends on market prices	no	no	no	sh for pl	not rel	not rel	**	yes	no	no
RJ3	**	**	1	no	no	wo/fut	not rel	no	**	yes&cattle	**	no
RJ4	rent out	no	30	no	48 ha	wo o&s	we	no	main past	no	no	yes
RJ7	pa contract&rent out	pa --> pasture	no	no	30 ha	he/ we o&s	not rel	not rel	plant trees	no	if agr prices stay	yes
RJ8	sometimes off farm	ca-->other crops	no	no	no	wo o&s	not rel	not rel	change lu	yes	no	no
RJ9	**	c-->ma&pl	2	no	no	wo o&s/fr	we o&s	no	change lu	yes	no	no
RJ11	cattle	pl-->pasture	no	no	no	wo o/fr	not rel	not rel	pl --> past	**	yes	no
C1	self-subsistence	no	no	no	**	wo o	not rel	not rel	no	**	**	no
C7	cattle/different crops	ma-->past/1ha crops o	14	no	**	wo o&s	we	no	ma-->past/1ha-->crops o	**	yes	no
C17	**	**	30	no	**	wo/nat.cons	wo/nat.cons	yes	impr cattle&past	**	**	no
N2	pa contract	depends on market prices	1	no	no	wo o&s/sh	wo o&s/sh	no	**	yes &cattle	no	no
N5	pa&cattle	maybe pa-->pasture	no	no	no	wo o/sh/fr	not rel	not rel	**	yes &cattle	no	no
N10	**	no	no	yes	no	wo/fr	not rel	not rel	**	yes	no	no
N11	**	yes,doesnot know which crops	no	yes	no	wo/fr	not rel	not rel	maybe eco tourism	yes	no	no
N16	cattle&different crops	ma-->cu&other crops	6	no	**	we	we	no	more cattle	yes&cattle	no	no
N17	cattle	no	2	no	no	wo o/fut	wo/fut	no	impr of cattle	no	yes	no

LIVING STANDARD IMPROVEMENT FARMER	OFF-INC	OFF-INC NEC	FARM NEC	LS IMPR	SUSTAIN FAMILY WITH FARM	FARM SIZE	CASH CROPS	CROPS O	PASTURE	CATTLE	PLANT TREE	L FENCES
RJ10	NO	not rel	YES	YES	yes	(68)	PL + 1	**	60	175	YES	(YES)
RJ12	NO	not rel	YES	YES	yes	50=75	NO	**	50=77	220	(NO)	(YES)
RJ15	NO	not rel	YES	YES	yes	85	PA6/PL3	YU/PL	87	110	YES	(YES)
RJ18	NO	not rel	YES	YES	yes	220	YU/2	**	100	100	(YES)	(YES)
C5	YES	NO	YES	YES	yes	**	NO	PUT	40	80	YES	**
C8	YES	YES	YES	YES	not yet	(72)	**	BE,MA	40	150	(YES)	YES
C10	YES	NO	YES	YES	yes	30	CO10	MAYBE	20	11	YES	**
C12	NO	not rel	YES	YES	yes	68	**	BAPUCOMBE	65	150	YES	(YES)
C18	NO	not rel	YES	YES	yes	148	**	YU,BE,T	110	100	YES	YES
N18	NO	not rel	YES	YES	yes	22	PI2/CAMA	PL,YU	10	70	YES	(YES)
N20	NO	not rel	YES	YES	yes	15	WO	**	10	20	NO	**

	AGR NOT	CHILD SUC	STAY LONG	SECURITY	CHANGE	RENT	PLANTA	FOREST	IMP TREES	IMP FOR	MAN FOR	IMPR FARM	MAIN INCOME SOURCE
RJ10	NO	**	YES	COMBI CATTLE & CROPS	MORE TREE PLANTATION	NO	4 HA	NO	WO O&S/ ENV	not rel	not rel	MPR PAST/ MORE PLANTA	CATTLE
RJ12	YES	**	**	CATTLE	FOREST-->PAST	0 HA	NO	(2HA)	WO O&S/CONS	WAT CONS	NO	MORE TECHNO/FOREST-->PAST	CATTLE
RJ15	NO	YES	YES	CATTLE & PALMITO	MORE TREE PLANTATION	NO	2 HA	2 HA	WO O&S/ NAT./FUT	**	NO	MORE PLANTA	CATTLE
RJ18	YES	**	YES	CATTLE & FOREST	NO	NO	NO	100 HA	WO O&S/WH	WO O&S/WAT FOR PAST/FRESH/PW	YES	IMPR PAST	CATTLE
C5	YES	MAYBE	**	VITAMED CATTLE, START WITH CROPS	MORE OWN USE PRODUCTS	NO	NO	YES(3)	WO/CONS WAT/ PR	WAT CONS/RC	NO	CLEAN PAST	CATTLE
C8	YES	YES	**	CATTLE	NO	NO	**	YES(30)	WO/CONS WAT	WO O	MAYBE	BUSH RECLAIM	CATTLE
C10	NO	YES	YES	OTHER PROJECT WITH CATTLE	MORE CO TREES, MORE OWN USE CROP	NO	NO	1 HA	WO O	**	NO	MORE TREES&CO4/CROPS O	CO TREES
C12	YES	MAYBE	YES	CATTLE	NO	NO	0.35 HA	15 HA	WO O4&S/FR/CONS	**	NO	MORE TECHNIC	CATTLE
C18	YES	**	YES	CATTLE & GOOD PASTURE	NO	NO	NO	35 HA	WO O4&S/ CONS	**	NO	IMPR PAST&F	CATTLE
N18	YES	YES	YES	CATTLE	PO-->AGRO S&PAST	NO	NO	NO	WO O4&S	not rel	not rel	DEVELOPMENT&MORE CATTLE	CATTLE
N20	NO	YES	YES	CATTLE&TWO KINDS OF CROPS	W --> CU1 + C1	NO	NO	YES	WO O/SH	**	NO	ACTIVE MAINTENANCE	AGRA/CATTLE

INVESTOR	OFF-INC NEC	IMPORTANCE FARM	FARM SIZE	CASH CROPS	CROPS O	PASTURE	CATTLE	PLANT TREE	L FENCES	CARE TAKER	VISIT FARM
RJ19	yes	investment	(75)	pa10	**	no	no	(no)	(yes)	yes	seldom
RJ20	yes	investment/weekends	22 + 15	no	**	21	90 + 35	yes	yes	yes	often in weekends
C2	yes	investment	(183)	no	**	50	yes	yes	**	yes	**
C4	yes	investment	(136)	trees	**	**	no	yes	**	yes	once per 4 months
C14	yes	save for future	(70)	yu0.5/ma3	yu/t/pa	60	65	yes	**	yes	often
N13	yes	investment	10	no	yu1/pl/ma	8	30	yes	(yes)	yes	often in weekends

	AGR NOT	CHILD SUC	STAY LONG	SECURITY	LU CHANGE	FOREST	PLANTA	RENT	IMP TREES	IMP FOR	MAN FOR	IMPR FARM
RJ19	no	**	**	rent	no	(8)	(no)	big part	fr	**	no	**
RJ20	yes	**	**	cattle	no	no	(no)	no	fr	not rel	not rel	lf, more trees
C2	**	**	**	**	more trees	(108)	(25)	no	wo s	wo s	no	more trees
C4	maybe	**	**	**	no	60	60	no	wo s/na cons	wo s	yes	more trees
C14	yes	may be	yes	cattle	no	10	(yes)	no	wo/sh/fut	wo o&s/wat cons	no	yes
N13	yes	**	**	cattle	no	(no)	1	no	wo/cons	not rel	not rel	plant trees

FARMER WITH NEC OFF INCOME	OFF-INC	OFF-INC NEC	FARM NEC	SUSTAIN FAMILY WITH FRAM	FARM SIZE	CASH CROPS	CROPS O	PASTURE	CATTLE	PLANT TREE	L FENCES
RJ2	yes	yes	yes	no	(7)	yu/ma	**	(2)	(10)	wants to	(yes)
RJ6	yes	yes	yes	no	9	pa2	be/ma	6	19	yes	(yes)
RJ13	yes	yes	yes	no	100+6	no	**	40+6	60	(yes)	(yes)
RJ14	yes	yes	yes	no	77	no	1=be&veg	76	(50)	no	(yes)
RJ16	yes	yes	yes	no	9	pa1.5	yu/ma/pl	no	no	yes	(no)
RJ17	yes	yes	yes	no	10	no	ma/r/be	(9)	15	yes	(yes)
RJ22	yes	yes	??	no	5	ma1.5	**	no	no	no	(yes)
C11	yes	yes	yes	no	**	no	**	7	6	wants to	(no)
C13	yes	yes	yes	no	20	no	be0.25	19	30	yes	(yes)
C15	yes	yes	??	no	12	no	**	8	medias	yes	yes
C16	yes	yes	yes	no	(20)	no	always some	12	16	yes	(no)
N1	yes	yes	yes	no	(17)	pa2	**	(6)	no	yes	**
N3	yes	yes	yes	no	(17)	pa1.5	**	(16)	(32)	(yes)	(yes)
N4	yes	yes	yes	no	10	no	ma/be	(9)	28	(no)	yes
N6	yes	yes	yes	no	(10)	no	fr	(10)	(25)	yes	yes
N8	yes	yes	yes	no	17	ca1	**	(2)	6	wants to	(yes)
N12	yes	yes	yes	no	17	pa1	l/pt/pa	(4)	no	yes	yes
N15	yes	yes	yes	no	(10)	tree plantation	**	(1.5)	no	yes	yes
N21	yes	yes	yes	no	16	no	pa	16	27	no	yes
N22	yes	yes	yes	no	21	yu5/pa1.5	**	12	9	no	**

	AGR NOT	CHILD SUC	STAY LONG	SECURITY	LU CHANGE	PLANTA	FOREST	IMP TREES	IMP FOR	MAN FOR	IMPR FARM	QUIET LIVE
RJ2	yes	no	no, wants to s	off inc	no,quiet	no	no	fr	not rel	not rel	no	yes
RJ6	yes	**	yes	cattle/pa contract	bush-->pa,crops o	no	0.25	(wo o&s)	wo o	no	rc of bush	no
RJ13	yes	**	**	**	no	2	40	(wo o&s/sh)	fut wo s	wants to	**	no
RJ14	yes	**	**	**	no	no	1.5	wo (o&s)	**	no	**	no
RJ16	yes	**	yes	off inc	more trees&ma	3	no	wo (o&s)/nat	not rel	not rel	more ma/2 cows	no
RJ17	yes	maybe	yes	off inc	no	no	no	wo (o)/fr	not rel	not rel	plant fr trees	yes
RJ22	yes	maybe	yes	off inc	no	no	no	**	not rel	not rel	no	yes
C11	yes	maybe	yes	cattle	bush-->pasture	no	5	only wo	wo	no	bush-->past	no
C13	yes	yes	yes	cattle	no	no	no	wo o	not rel	not rel	no	no
C15	yes	**	yes	**	no	yes	no	wo/sh/fr	not rel	not rel		no
C16	yes	**	yes	**	more cattle&crops o	no	5	wo (o)/water	wo/nat cons	no	when possible	no
N1	**	**	**	off inc	when trees are big more cattle	5	7	wo (s&o)/fut	**	**	more cattle	no
N3	no	**	**	off inc	no	no	no	wo/sh	not rel	not rel	trees in past	no
N4	**	**	yes	off inc	no	no	no	wo/sh	not rel	not rel	**	no
N6	**	**	yes	**	no	no	no	wo/fr	**	not rel	invest in farm	no
N8	**	**	**	**	no	no	1	cons/fut	**	no	**	yes
N12	**	**	yes	**	cut ca	5	yes	wo o&s/cons/fut	**	**	**	no
N15	yes	**	yes	off inc	more trees	yes	1	wo/eco	not rel	yes	more planta	no
N21	yes	**	maybe sell	cattle/off inc	no	no	no	wo o/cons	not rel	not rel	more cattle	no
N22	no	**	yes	off inc	depends on market	(no)	(no)	wo	not rel	not rel	no	**

FARM AS FUTURE ALTERNATIVE FARME	OFF INC	OFF-INC NEC FOR BN	SUSTAIN FAMILY WITH FARM	LS IMPR	FARM SIZE	CASH CROPS	CROPS O	PASTURE	CATTLE	PLANT TREE	L FENCES	CHILD SUC	STAY LC
C9	yes	yes	not yet	fut	(25)	no	agr 0.25	8	8	yes	(yes)	yes	yes
N14	yes	yes	no	**	17	ma0.5	be/sl/yu/pl/ay/ma	(2)	no	yes	yes	**	yes
N9	yes	yes	no	yes	(15)	no	some crops	10	no	yes	**	**	yes
N19	yes	yes	**	yes	15	no	some crops	15	40	yes	yes	**	yes

	SECURITY	CHANGE	RENT	PLANTATION	FOREST	IMP TREES	IMP FOR	MAN FOR	IMPR FARM	FARM AS FUT ALTERNATIVE	IMPORTANCE OF FARM
C9	project	project with pigs/yu	no	no	5	wo o	fut wo o	wants to	yes	yes	part of inc/fut project
N14	project	all farm with trees	1.5	5	0.5	wo o/project	nat/eco-tourism	more or less	yes	yes	crops o/fut project
N9	project	project with ornamentals	10	no	2.5	wo o/project	wo o/project	more or less	yes	yes	reserve for future
N19	fut-->farm	more cattle	**	no	no	wo	**	not rel	yes	yes	reserve for future

FULL-TIME OFF-FARM EMPLOYE	OFF INC	OFF-INC NEC FOR BN	LS IMP	FARM SIZE	CASH CROPS	CROPS O	PASTURE	CATTLE	PLANT TREE	L FENCES	AGR NOT	CHILD SUC	STAY LO
RJ5	yes	yes	no	(26)	no	**	(15)	(5)	(no)	(yes)	**	yes	yes
C6	yes	yes	no	19	no	ma0.25/yu/pl	6	10	(no)	(yes)	yes	no	no, wants to
N7	yes	yes	no	(11)	no	no	(10)	1	no	**	**	**	**

	SECURITY	CHANGE	RENT	PLANTATION	FOREST	IMP TREES	IMP FOR	MAN FOR	IMPR FARM	FARM AS FUT ALTERNATIVE	SUSTAIN FAMILY WITH FARM	IMPORTANCE OF FARM
RJ5	off inc	maybe for children	no	no	no	wo o	not rel	not rel	no	no	no	maybe fut child/to live
C6	no risks with crops o &cattle	no	no	no	6	wo o	no value	no	no	no	no	not much/to live
N7	off inc	no	no	no	(no)	wo o/sh/cons	not rel	not rel	no	no	no	not much/to live