ARTI-WAGENINGEN UNIVERSITY

RESEARCH PROJECT IN AGRICULTURAL PLANNING

A demonstration of resource based socio economic planning in Matara district

Report No 1

in

REGIONAL PLANNING FOR AGRICULTURAL DEVELOPMENT IN SRI LANKA

Research Study No. 47

January 1982

AGRARIAN RESEARCH AND TRAINING INSTITUTE
COLOMBO SRI LANKA

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Agrarian Research and Training Institute
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FOREWORD

Since 1979 the Agrarian Research and Training Institute and the Department of Development Economics of the Agricultural University of Wageningen in the Netherlands have collaborated in a joint research project on 'Regional planning for agricultural development in Sri Lanka'. In the general framework of this project several studies have been carried out. This report is the first to be published in the series. Several social scientists from the Netherlands as well as from Sri Lanka took part in the research effort. The authors of the present document are Dr. F.J. Polman, Mr. M. Samad ahd Dr. K.S. Thio.

The relevancy of a regional approach to agricultural development in Sri Lanka was recognised by researchers from the outset. The wide variety of ecological conditions, agrarian institutions and farming systems prevailing throughout the country calls for location specific analysis. The government policy of decentralisation of administration to district level was a decisive factor in the researchers' choice of the district as the unit of planning and implementation.

While some problems can be studied and analysed within the confines of a district, there are others which go beyond the scope of this territorial unit. There are also other problems which have to be treated as subjects on their own along sectoral lines. Macro planning, sectoral planning and district planning therefore necessarily complement each other.

The special function of district planning is to synthesise the gamut of subsectoral activities within an internally consistent regional framework which also dovetails with national policies and constraints. In the present study the main focus is on the agricultural sector Matara district. The non-agricultural sectors are treated as boundary conditions for agricultural development.

Comprehensive district-based agricultural planning as described above had hitherto not been attempted in Sri Lanka. It can therefore be maintained that the present study is the first of its kind in this country. It moulds a range of methods and techniques from various disciplines into a coherent analytical framework. Some of the techniques used are: land-use classification, land suitability evaluation, assessment of agronomic potentials and constraints, input-output analysis of crops, analysis of

farming systems, demographic projections, employment and income analysis, demand projections, shadow pricing and cost-benefit analysis. These techniques are not new, but their applicability had to be assessed in the context of a district in Sri Lanka. This has proved to be successful.

Most of the data needed to formulate such a plan does already exist at district level. But weaknesses were identified in two main areas. Firstly, up-to-date land suitability maps are generally not available. For this study the project had therefore, to commission the Land Use Division of the Irrigation Department to undertake special research on land suitability. If this approach is to be followed in the preparation of district development plans a nationwide programme of land evaluation would be a beneficial investment. The second weakness observed was the preoccupation of agricultural statistics with single crops and pure stands. This data may satisfy the needs of subsectoral analysis but for a regional approach planners should be able to build up an integral picture of farm types in order to come to grips with the interdependencies of subsectors at farm level.

The present study is to be seen as a demonstration of a procedure of resource based socio-economic plan formulation. Replication in other districts is worthwhile considering. Further applied research is however needed into the possibilities of reducing the planning effort and of obtaining economies of scale in data gathering and analysis. I hope that this report will help to improve the agricultural planning procedures in our country and that its important policy implications will be given due consideration by all ministries concerned.

I wish to thank the research team, the authors of this report and all others who contributed to making this publication possible.

T.B. Subasinghe
Director

ACKNOWLEDGEMENTS

The present report only shows the final result of an elaborate and animated planning exercise. It does not reveal the continuous process of thinking and rethinking which has taken place in the preparatory phase. The conclusions and value judgements expressed in this study have gradually taken shape through an accumulation of numerous field observations and discussions with various kinds of informants.

First of all we should mention the farmers in Matara district, both wealthy and poor, who have been extremely hospitable and co-operative to us. It is certain that their opinions and motivations have weighed heavily in all our assessments.

The keen interest shown by district officials of different ranks was most encouraging. Among them prominently figured the District Minister Matara, Hon. Keerthi Abeywickrema, the former G.A. Matara, Mr. N.V.K.K. Weeragoda, the present G.A. Mr. S. Sivananthan and the Project Director of the Matara IRDP, Mr. D.P. Adikari. But also the other kachcheri staff, the A.G.A.'s, Planning Officers and Grama Sevaka's have been indispensable in conducting the studies.

Technical advice was obtained from Heads of Departments, Boards, Authorities and Corporations both at the central level and at the district level and from national agricultural research stations.

We very much appreciated the continuous interest in our work shown by Mr. K.P.G.M. Perera, Director, Regional Development Division of the Ministry of Plan Implementation, and his efforts to bring our project proposals to the attention of potential financiers.

For certain specialised studies we have successfully drawn on the expertise of local consultants. Messrs. S. Dimantha, L.D. Jinadasa and K.S. Fernando for land evaluation and land use mapping, Prof. H.M.W. Herath for cinnamon production and marketing and Messrs. U.V.H. Perera, M.J.M.H. de Silva and L. Ranbanda for coconut processing.

A constructive criticism on the contents of the report was delivered by Prof. F.P. Jansen and Dr. E.P. Riezebos from the Department of Development Economics of Wageningen University. Their comments based on large experience in development planning have substantially improved the study.

Two students from Wageningen University, Miss Dj. Hindori and Mr. J. Van Renselaar, have usefully assisted in conducting partial studies on the agricultural supporting services and the estate sector.

We owe many thanks to the ARTI investigators for the arduous task they have cheerfully fulfilled with us in the field. In spite of the hardships this was perhaps the most enjoyable part of the study.

This voluminous report would never have been produced without the hard and dedicated work of two skillful secretaries; Miss Imara Perera who typed the first draft and Miss Anne Fernando who prepared the final script for publication.

F.J.P.
M.S.
K.S.T.

CONTENTS

WEIGHTS AND MEASURES

1 Acre	-	4,047 square metres (sq.m. or m^2)
	-	0.4047 hectare (ha)
1 Square Mile	-	2.590 square kilometres (sq.km. or m^2)
	-	0.02832 cubic metre (cu.m. or m^3)
1 Cubic Yard	-	0.7645 cubic metre
1 Acre Foot	-	1,233.5 cubic metres
1 Cubic Foot/Second	-	0.02832 cubic metre per second (cu.m/s. or m^3/s)
1 Pound	-	0.4536 kilogramme (kg)
1 Hundred-weight	-	50.80 kilogrammes
1 Bushel of paddy	-	0.2041 quintal (qt)
1 Bushel/Acre	-	0.5044 quintal per hectare (qt/ha).

ABBREVIATIONS AND ACRONYMS

ADA	-	Agricultural Development Authority
AI	-	Agricultural Instructor
AIB	-	Agricultural Insurance Board
AO	-	Agricultural Officer
ASD	-	Agrarian Services Department
CAS	-	Cinnamon Advisory Service
CCB	-	Coconut Cultivation Board
CDA	-	Coconut Development Authority
CRI	-	Coconut Research Institute
DA	-	Department of Agriculture
DAPH	-	Department of Animal Production and Health
DCB	-	Decentralized Budget
DMEC(or MEC)	-	Department of Minor Export Crops
EO	-	Extension Officer
GERSAR	-	Groupment Detudes et de realisations der Societes de management regional
IRDP	-	Intergrated Rural Development Project
IRR	-	Internal Rate of Return
IITA	-	International Institute of Tropical Agriculture
KVS	-	Kushikarma Viyapthi Sevaka (Village level Extension Officer)

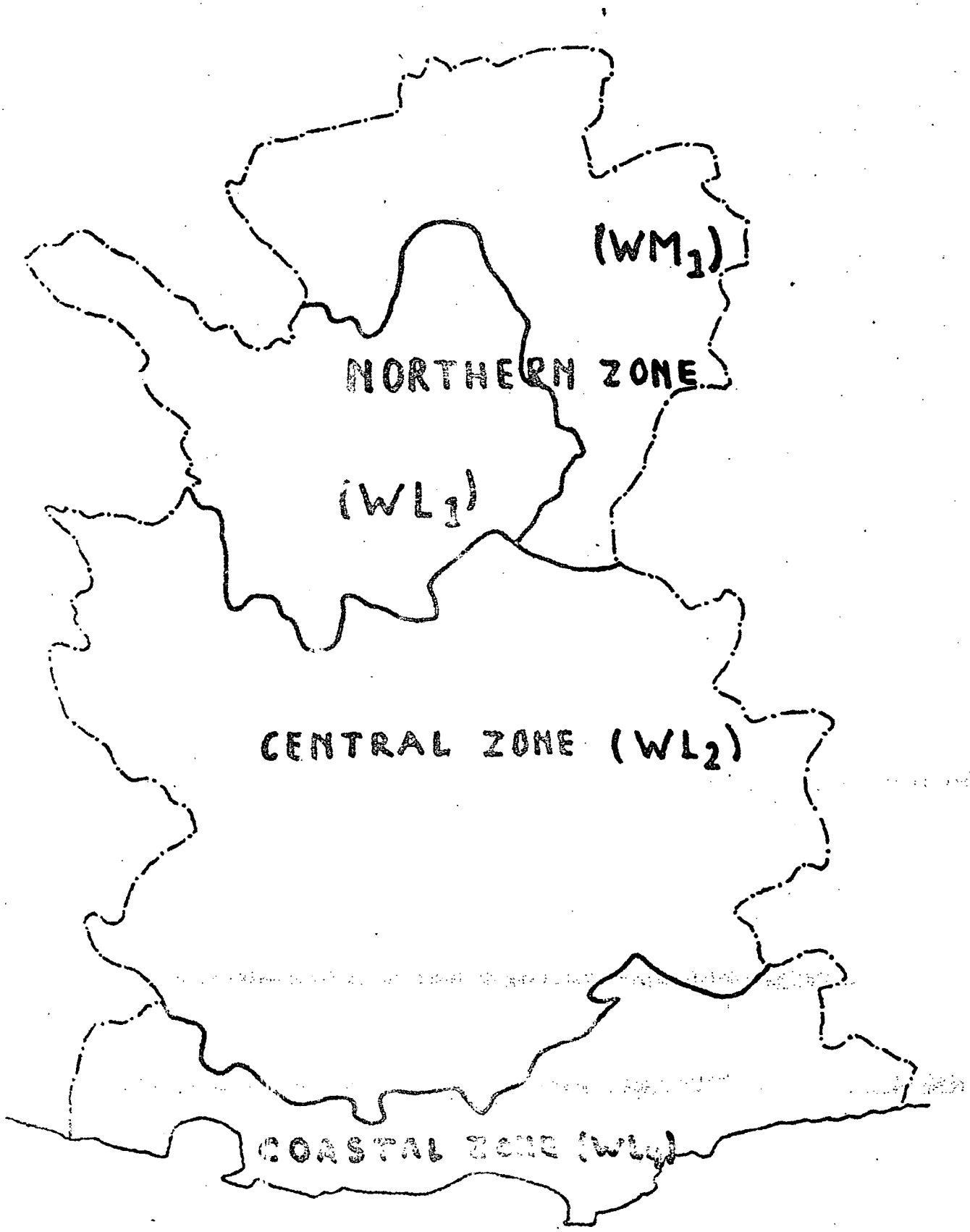
LSM	-	Land Suitability Mapping
MIRDP	-	Matara Integrated Rural Development Project
MPCS	-	Multi Purpose Cooperative Society
MPI	-	Ministry of Plan Implementation
MP	-	Member of Parliament
MT	-	Metric tonne or Made Tea
NIV	-	New Improved Varieties
NLDB	-	National Livestock Development Board
OIV	-	Old Improved Varieties
RCD	-	Rubber Control Department
RMP	-	Rubber Master Plan
RRISL	-	Rubber Research Institute of Sri Lanka
RSS	-	Ribbed Smoked Sheet
SIDA	-	Swedish International Development Agency
SLETDP	-	Sri Lanka Estate Tea Development Project
SMS	-	Subject Matter Specialist
SPC	-	State Plantation Corporation
TMP	-	Tea Master Plan
TRI	-	Tea Research Institute
TSHDA	-	Tea Small Holdings Development Authority
VA	-	Value Added

GLOSSARY

Chena	-	Shifting Cultivation
District	-	Principal Administrative Unit in the Country
Maha	-	Major Cultivation Season coinciding with North East Monsoon (October to January)
Paddy	-	Unhusked rice
Tank	-	Reservoir for rain water storage
Yala	-	Minor Cultivation Season coinciding with South West Monsoon (April to July)

FIGURE 1

MATARA DISTRICT AGRO-ECOLOGICAL ZONES



SCALE - 1:250,000

SUMMARY

Regional Planning for Agricultural Development - a case study of Matara District is the outcome of research undertaken in Matara district by the ARTI/Agricultural University of Wageningen Joint Project on Agricultural Planning. The broad aim of this exercise is to evaluate the agricultural potentials of the district and suggest measures for its development to the best advantage of the region and the nation as a whole. A further aim is to demonstrate to the authorities concerned a systematic approach to the formulation of regional agricultural plans and policies within the framework of district development projects.

The study analyses the prospects for agricultural development in terms of increasing value added and employment opportunities over a period of twenty years (1980-2000). The results of this analysis are used as a basis for the formulation of an investment programme for the corresponding period. However, it must be emphasised that this document should not be considered as a plan ready for implementation. Plan implementation is by far the most crucial stage in the development process and requires efficient administration, managerial and technical resources. No effort has yet been made to elaborate the measures suggested into implementable projects. It is hoped that this could be undertaken in collaboration with those directly responsible for agricultural development, if acceptance by policy makers of the suggestions made in this study is forthcoming.

THE APPROACH

The study follows an essentially pragmatic approach to the optimal use of scarce resources which, in the opinion of the research team, is suitable for adoption by planners at district level. It commences with a comprehensive inventorisation of the physical resources available in the district on the basis of detailed (one inch to the mile) land use and land suitability mappings and then examine the potentials for its development taking into consideration the economic, technical and social constraints which characterize the region. Where relevant, the national and world market constraints are also taken into account.

The analysis presented is on sub-sectoral lines. This is in recognition of the fact that implementing agencies at the district level are organized in this fashion. A further consideration was that preliminary investigations had revealed that, except perhaps for labour allocation there were hardly any inter-dependencies between the different components in the farming systems. The land use and land suitability mappings are also made use of to elaborate proposals that are location specific.

OVERVIEW OF DEVELOPMENT POTENTIALS IN THE DISTRICT

This study adheres to the broad objectives of agricultural development in the country as outlined in official documents and statements made by policy makers. These may be summarised as follows:

1. Self sufficiency in food production.
2. Export expansion in agricultural products not only from the traditional tree-crop sector but also from non-traditional export crops.
3. Expansion of employment opportunities in agriculture.
4. Raising the income levels of farmers.

The findings clearly reveal that development of the agricultural sector in Matara district could only marginally contribute towards the objective of achieving self sufficiency in food. The district at present is a deficit area in paddy and other major food stuffs. There is some scope for increasing milk production and perhaps a few other food crops. But the prospects for increasing paddy output appear limited even if substantial investment is made in improvement of the physical infra-structure for its cultivation.

On the other hand, the investigation demonstrates that the district could contribute significantly towards export expansion in the traditional tree-crop sector and also provide substantial increases in employment opportunities. Moreover, the development of the agricultural sector could also result in marked improvements in agricultural incomes. This potential is, however, confined to certain farm types with adequate land holdings.

Scope for the development of the non-agricultural sector is very limited particularly with respect to the creation of additional employment. Non-agricultural employment, which is assumed to have grown at a rate of 1.6% per annum over the last two decades at the same pace as population, is not expected to increase any faster in the future.

Although employment in agriculture could be improved if adequate measures are taken to develop this sector to its full potential, the limited capacity of absorption characteristic of this sphere could only result a modest reduction of the category of the technically unemployed in the district from 28% at present (1980) to 22% by the year 2000. If on the other hand measures are not taken to develop the agricultural sector as outlined in this study, unemployment will increase to about 33%. The assessment of the prospects for employment is based on the optimistic assumption that there would be a further decline in population as observed in the past decade. A contrary to this assumption would enhance the problems of unemployment. Total elimination of unemployment could only be achieved by substantial growth in the non-agricultural sector which is unlikely to occur. Consequently, unemployment would remain as a major problem in the district.

As far as agricultural development is concerned, there is a trade-off between income and employment. Two alternative strategies thus present themselves for the development of this sector. One would centre on a high employment but low labour productivity approach while the other vice-versa. After analysing the two alternatives in the context of Matara district this study opts for the alternative which ensures more employment at low labour productivity as this is likely to foster the best possible distribution of income. The study also demonstrates that the development of the agricultural sector on the lines suggested would result in a projected increase in value added by 112% and employment by 33% respectively.

AGRARIAN STRUCTURE AND LAND USE

The study assumes that there will be no major change in the agrarian structure of the district. This postulate can remain valid only if there are no radical changes in government policies, which are difficult

to foresee at this stage. It is thus posited that the dualistic situation of a stage owned plantation sector coexisting with innumerable smallholdings will continue. Within the small farm sector the basic features are assumed to remain unchanged.

It was observed that complex tenurial pattern constitutes a constraint in so far as paddy production is concerned. But, this is less evident in the case of the highlands. However, it is foreseen that fragmentation of holdings resulting from population growth will be a major problem in the future. It is expected that many small farms will cease to be agricultural holdings by the year 2000. This phenomenon will be strongly felt in the densely populated coastal zone, in those areas at less than 3 km from the sea.

It is also envisaged that there will be no major change in cropping patterns in the district. The suitability studies undertaken by the project show that the existing cropping patterns are near optimal on technical considerations (Dimantha 1980). The fact that the agricultural economy of the district is dominated by the perennial tree crop sub sector makes cropping patterns fairly rigid, at least in the short run.

Even from a long term perspective, there does not exist at present adequate research evidence to indicate viable alternatives to existing cropping patterns.

CROPS

PADDY:

Paddy occupies the largest land area under a single crop in Matara district. Nevertheless, the district is not considered to be a major paddy producing area in the country and in fact average yields (18 qt/ha) are among the lowest in the island. Unfavourable environmental conditions are the main constraint for paddy cultivation. About 47% of the paddy area is subject to frequent flooding. Statistics indicate that flooding occurred on 73% of the land area on which crops failed between 1969-79. Land suitability studies (Dimantha 1980) further reveal

that large extents of asweddumised lands are rated marginal or unsuitable for paddy cultivation on physical grounds. Besides these limitations, management practices adopted by farmers are generally of a low standard. Thus, there could be only a modest increase in paddy production even if large scale investments are made to improve physical infrastructure.

The Nilwala Ganga flood protection scheme is a project put forward for the achievement of this objective. However, authors of the present study have considerable doubts as to the economic feasibility of thos project. The reasons for this are explained below.

Due to the limitations inherent in paddy cultivation this study does not propose any major investment programme for the paddy sector other than the rehabilitation of minor and medium scale irrigation schemes under the District Integrated Rural Development Programme and the continuation of existing programmes by the departments concerned.

TEA:

Tea cultivation is a major agricultural activity in Matara district. The district ranks fifth in importance for tea area in Sri Lanka and a production about 18,000 tonnes in 1977 gave it sixth place in the output rating (Tea Master Plan 1980).

Matara produces what is classified as Low Country teas. Recent studies suggest that these teas will be in high demand. Future market outlook for such teas is amongst the best for any commercial quality in the world (TMP 1980). The importance of Matara as a Low Country tea producing zone is evident from the fact that 20% of the total area in Sri Lanka under this type of tea l ies in the district. Moreover in 1977, Matara accounted for about 27% of the overall Low Country tea production (Tea Master Plan 1980).

Due to the dominant position of tea in the agricultural economy both at district and at national level, this study attaches considerable importance to the development of this subsector.

Projects have been identified to increase tea production both on state plantations and on private holdings. The latter form an important component of the tea industry in the distruct accounting for about 70% of total production. A further aim is to raise the income levels of cultivators operating small and medium sized holdings. However, while taking steps to increase production, a certain degree of caution should be exercised so as to avoid serious marketing problems.

The Tea Master Plan estimates that low country tea production will expand at the rate of 4% per annum till 1985. This would result in a marketable quantity of 87,000 tonnes at the end of this period. If Matara retains its present share (27%) of production of Low Country tea the estimated output in 1985 will be approximately 23,500 tonnes. The Tea Master Plan expects that state plantations in Matara will increase their production from 4,500 tonnes (in 1977) to 6,750 by 1985. This would imply that 16,750 tonnes will be produced on private tea holdings which means that tea output in this sector should register an increase of 3% per annum from their production level (13,300 tonnes) in 1977. The permissible increase in the private holdings in the district is therefore less than the average estimated for low country teas.

RUBBER:

According to the Rubber Master Plan the area under rubber in Matara district accounts for only 4% of the national acreage. Land suitability studies reveal that about 25,000 ha of land in the district are agronomically suited for rubber cultivation but only 40% of this extent is actually under this crop. Rubber is perhaps the crop which has the best prospects in international markets. Unfortunately, in Matara district this commercial potential has not received the attention it merits except on the state plantations. A major shortcoming is that there is no regional office at the district level to promote and develop the rubber industry particularly the small holdings which form the dominant group. Consequently, the development of the rubber holdings was overlooked even in the district integrated rural development programme, which operates through existing organisations representing each sector. A further limitation was the absence of reliable data (particularly in respect of

smallholdings) that would facilitate a good understanding of the state of rubber cultivation in the district.

This study gives due recognition to the development of rubber holdings. Projects have been identified to rehabilitate approximately 9,000 ha of private land with a view to benefiting 30,000-40,000 smallholders and about 500 private estates in the district. Projects have also been identified to enhance production on state plantations. Besides programmes for the improvement of existing rubber holdings, measures to increase the extent under rubber have also been suggested. The latter aims at converting about 8,000 ha of abandoned scrub land to rubber smallholdings. It is hoped that this programme will help to ease the problem of landlessness in the district to a certain extent.

CINNAMON:

Sri Lanka has a large share (about 70%) in the world cinnamon market. Matara is a major contributor to national production. Although only 6% of the land in the district is cultivated with this crop, this accounts for about 42% of the national cinnamon acreage. District production estimated at 1,600 tonnes (1977-1979) amounted to 25% of national production and about 17% of the total world cinnamon production.

Despite its importance, cinnamon cultivation has been neglected in recent years. Almost the entire area under this enterprise is on lands considered marginal for other crops. The average yield of 200 kg a year is far below level of 400-500 kg/ha/yr judged satisfactory for the district (Herath 1980). Moreover, a recent study indicates that 97% of the cinnamon produced in Matara is of a low grade and the average prices are consequently much lower than those fetched by producers in other areas.

Cinnamon is essentially a smallholder crop in the district. Besides management standards being very poor, a major constraint is that many of the existing cinnamon stands are almost senescent. Other constraints are inadequate marketing facilities and, more importantly, the lack of

adequately skilled peelers. This study recommends two major programmes for the cinnamon industry in the district. The first project aims at rehabilitating 4,000 ha of pure cinnamon stands by replanting, soil conservation and improving management standards. This is expected to benefit about 2,500 cinnamon holdings. The second project is aimed at inaugurating a training programme for cinnamon peeling so as to enable the cultivators themselves to peel their own produce.

LIVESTOCK:

Animal husbandry is a relatively insignificant agricultural activity in Matara with the exception of curd production, for which the district is traditionally famous. However, the potential exists in the district for large scale development of animal husbandry particularly in the northern zone, where environmental conditions are ideally suited for milk production on a commercial scale.

A major constraint for the development of dairying is the price of milk. The present prices offered by the National Milk Board provide no incentive to the farmers, as costs of production are high. Furthermore, despite some recent efforts, the institutional framework for the promotion of animal husbandry remains inadequate. This study is therefore cautious in suggesting development programmes for the livestock sector. The project on livestock under coconut and some of the programmes being implemented under the District Integrated Rural Development Programme constitute commendable exceptions.

COCONUT AND OTHER CROPS:

The area under coconut has remained almost static over the last 10 years. At present, this crop occupies about 19% of the total arable land area in the district of which a large extent is mixed stands. Coconut processing is a major activity which is carried out both in large scale enterprises and as a cottage industry. Although no major projects are suggested in this report, a separate study on the state of the coconut industry had been commissioned and the reader is advised to refer to it for details. The projects identified in this study are included in the proposals under

the integrated rural development programme.

Other crops include fruit trees, vegetables, minor export crops, etc. which are generally cultivated on a homegarden scale. Projects for the promotion and development of these crops are included in the homegarden development programmes suggested under the integrated rural development programme.

NILWALA GANGA FLOOD PROTECTION SCHEME

The Nilwala Ganga flood protection scheme is often seen as a major development project for the Matara dis-rict. This project has been the subject of several feasibility studies and the most recent one is that undertaken by GERSAR (Groupment detudes et de realisations des societes damenagement regional) published in 1980.

As the title suggests, this is essentially a flood protection scheme which, if implemented, will prevent flood damage in about 6,000-7,000 ha of paddy lands. In addition to this it will also prevent the inundation of sections of Matara town during periods of major flooding. GERSAR identified three possible alternatives fro implementation, each of which has internal rates of return of 5.35, 4.45 & 4.5 percent respectively. The consultants recommend the implementation of the alternative with the highest IRR (5.4%) which would in fact provide the smallest protection area (6000 ha). The total cost of implementing this project is estimated at about Rs.800 million.

The study team has very strong reservations as to the real extent of the expected beneficial effects of this project. The reasons are as follows:

1. The project has a very poor internal rates of return.
2. Even in arriving at the above value for the IRR the consultants have made a basic error in their calculation. These are based on an economic price for paddy at Rs.7,450 per tonne, whereas the real economic price is about Rs.3,000. This overestimation, when rectified, would result in a negative IRR.

3. As stated above this project primarily aims at benefiting paddy lands. However, flooding is only one of the problems which confront paddy cultivation in the district. Unfavourable soil conditions is also a major bottleneck. This leads one to ask if Rs.700 million are available to develop paddy cultivation whether it should be invested in the Matara district at all which is not considered as a major paddy producing region. On the contrary, it might be more worthwhile making the investment in the more traditional paddy areas such as the Dry Zone or the Mahaweli Ganga Scheme.
4. Another consideration would be that the success of this type of project depends to a great extent on the efficient functioning of the pumping stations. Unfortunately, the experience with pumping stations in Sri Lanka has not been very encouraging.
5. A further argument is the high cost of the project (Rs.800 million) in relation to the small extent of land benefiting. If this amount of money is actually available for investment in Matara district, it would be more advantageous to invest it in the programmes identified in the present study, which require approximately the same amount of investment capital. Projects identified under the Tea and Rubber Master Plans might alternatively receive funding. This would also result in a greater spread of investment in the district, would expand the number of beneficiaries, create more employment than envisaged under the Nilwala Ganga Scheme and also afford much better returns to investment.

LIMITATION OF THE STUDY

Because this study is perhaps the first of its kind in Sri Lanka a few shortcomings must be recognised. The analysis of agricultural potentials is confined to the development of existing crops. This is mainly because there is no research evidence available to suggest any viable alternatives. Even so, land suitability studies and economic analysis do support the development of existing crops.

A major limitation of the exercise is inadequate research into the social parameters of the farming community itself. Little information is available as to how farmers could be motivated to respond positively to a development programmes of the magnitude suggested. Such material could be

collected only by conducting further investigations.

The study also recognises that inadequate implementation capacity at district level could be a major constraint to operationalising the proposals. This aspect of the problem also requires further enquiry.

FINANCIAL REQUIREMENTS

The financial requirements for implementing the proposals outlined are estimated at around Rs.900 million at current prices. It is felt that this is reasonable given the financial capacity of the government over a 20 year period. For instance the Kurunegala district development programme, which is planned for implementation over a period of 5 years, is estimated to cost about Rs.400 million.

Finally, as mentioned earlier, it is hoped that this exercise will arouse interest among policy makers. If acceptance in principle of these proposals is obtained, it is anticipated that appropriate steps be taken to elaborate the document into an implementable programme.

CHAPTER 1

INTRODUCTION

1.1. AIMS AND PURPOSES OF THE STUDY

The aim of this study is to provide a comprehensive plan for the agricultural sector in Matara district. Comprehensiveness is meant in the sense that the plan covers all the land and water resources available in the district, all crops that are or could be grown, and includes all types of farms. It is also comprehensive in the sense that it weighs a set of possibly competitive objectives, i.e. production, income and employment. It also considers any policy instrument which the government may deploy if necessary. In this way the plan is to provide a complete consistency framework for project identification and priority ranking at district level. In the case of the latter, factors that go beyond the scope of the district are also taken into account. These concern national price policies, the world and domestic market situation and inter-regional linkages.

The plan is detailed for agro-ecological zones within the district and for farming systems within each zone. This is to make the identified projects location specific and target group specific.

The study addresses itself to all agencies in Sri Lanka involved in planning and implementation of agricultural development policies. It demonstrates the way in which national policies and programmes have to be detailed to fit into the specific conditions of the district. It also shows where national policies and programmes are lacking. Finally, upon synthesizing the various sub-sectoral plans, an assessment is made on the combined impact of agricultural development policies on the district. This would help planners to understand the scope of the development which should take place in non-agricultural fields in order to achieve overall socio-economic objectives.

1.2. MATARA DISTRICT IN THE NATIONAL CONTEXT

The salient features of Matara are common to most of the wet zone districts in Sri Lanka. High population densities, acute man-land ratios, a virtually stagnant non-agricultural sector and a labour force dominated by educated youths, who cannot find suitable employment within the region, are among the outstanding features.

Located in the southernmost part of the wet zone the district is served by railway and a network of roads which make most of the district easily accessible from the capital city and other principal towns in the country.

Agriculture dominates the economy of the region. As is the case in several other wet zone districts the agricultural sector of Matara exhibits a typically dualistic structure with a relatively well developed state owned plantation sector alongside a non-plantation sector, in which a large number of private cultivators operate small and medium sized holdings.

Agriculture centres on perennial tree-cropping. Traditional export crops such as tea, rubber, coconut and cinnamon are cultivated both on small holdings and on plantations. Paddy occupies the first place among annual crops.

In a perspective both regional and national tea and cinnamon are the crops which make the largest contribution to the economy. Matara produces what has been classified as 'low country tea'. Teas of this quality fetch favourable prices and have good future prospects on the international markets. According to the 'Tea Master Plan' the total area under tea in the district ranks fifth largest in the island. In terms of the volume of production Matara is sixth.[2] However, with regard to the production of specifically 'low country' teas Matara is, together with the neighbouring district of Galle, one of the two principal producers.

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[1] Tea Master Plan 1980, Final Report CIDA/Government of Sri Lanka.

[2] Ibid.

Cinnamon is the other major crop of national importance cultivated in Matara. The district accounts for 40% of the total cinnamon acreage of Sri Lanka, which supplies about 70% of the cinnamon traded in the World Market. But only about 25% of the total national production comes from Matara. The reasons for this low level of productivity are explained elsewhere in the text.

The area planted with rubber is not substantial from the national point of view despite the fact that most parts of the districts are agronomically suited for its cultivation. Only about 5% of the national rubber hectarage is in Matara district. Although a considerable extent of the land area particularly at lower elevations is under coconut, the district is not considered a major growing area when compared to certain other districts in the wet and intermediate zones. Due to a strong local demand for fresh nuts and low levels of production the district's coconut sector contributes on only a very minor scale to the national export economy.

Paddy is the only annual crop which occupies a significant land area in the district. Inspite of a good rainfall pattern, adverse soil conditions make Matara a poor rice growing district. The average yields are among the lowest in the island. The high local demand and low levels of productivity make Matara a paddy deficit area. Consequently, rice has to be imported from other districts in order to meet local requirements.

Matara is not endowed with mineral resources of any importance. There is hardly any industrial development in this field, though gem mining in recent times has become a significant activity in certain parts of the district.

An area in which Matara district plays a role vital to the national economy is its export of skilled labour. Literacy levels in the district are very high. Many professionals or those holding important positions in government and the administration are natives of Matara. Politically too the district occupies a place of considerable importance.

Matara is not a poor district when compared to most others in the country. Although no reliable information is available on district incomes, evidence suggests that the inhabitants of Matara are possibly on average rather better off than those of most other districts in the island.

1.3. OVERVIEW OF THE PROBLEMS AND PROSPECTS FOR AGRICULTURAL DEVELOPMENT IN MATARA DISTIRCT

The availability of adequate supplies of water and fertile soil conditions in most parts of Matara permit the cultivation of a large variety of tropical crops.

Elevation is the main determinant of landuse. In the low coastal zone in the South coconut and paddy are the dominant crops. In the higher elevations one finds cinnamon, rubber, tea and also coconut and paddy. In the Northern part of the district, which is located at higher altitude, tea is the main crop. A wide range of tropical vegetables, fruit trees and spice crops are grown in homesteads throughout the district. Livestock farming is insignificant in the district except for dairy farming which is being practised on a limited scale.

The district is densely populated with a long standing tradition in crop cultivation. Population pressure on land is high. There is hardly any possibility for the cultivation of new lands except for recultivating some abandoned scrub lands. Clearing of forest for cultivation purposes would highly increase the risk of erosion.

Matara district experiences much rainfall. The distribution of rain is rather even throughout the year. Agriculture therefore is mainly rainfed. Irrigation is not easy also because of the generally rolling topography. Paddy is the only crop which is irrigated. However, the major problem confronting paddy cultivation in the district is not irrigation but drainage. Poor drainage is a constraint particularly in low lying paddy lands. Improvement of drainage is very costly and the possible increases paddy yields is not substantial. Nevertheless, paddy cultivation is not an economically important crop in the district. This in general holds true for most other annual crops cultivated in the district.

Introduction of new crops in the immediate future is generally more difficult than expansion of existing crops except on an experimental scale. In this regard crops such as sugar cane which is traditionally grown in the adjacent Galle district, coffee (on a plantation scale) which was wide spread in Sri Lanka before tea was introduced and oil palm which is rarely grown in Sri Lanka, but which is cultivated successfully on a limited scale in Galle District are some of the potential new crops. Sugarcane cultivation is feasible on small areas in Matara District but requires specific forms of processing as wet zone sugar cane contains little sucrose.

Oil palm generally is not a small holder's crop. This crop requires quick and heavy transport facilities to processing plants which cannnot be easily performed by small growers. An industrial nucleus estate catering to small holder out-growers would be possible. The cultivation of palm oil is still in its infancy and further experiments on the technical and economic feasiblility are necessary before it is introduced on a large scale in the Matara district.

From the agronomic and economic point of view, there are possibilities for substitution within the existing crop mix such as rubber for coconut or rubber, coconut, cinnamon and pastures for tea. These possibilities give rise to two completely different alternatives for development. One, based on extension of coconut, is the Low Employment-High Labour productivity alternative. Two, based on replanting of rubber and tea, is the High Employment-Low labour productivity alternative.

In both cases it is assumed that crop husbandry will improve such that yields will reach their potential levels. Indeed, large increases in physical yields are possible for all perennial crops within the market constraints (with the exception of tea and cinnamon).

1.4. METHODS AND TECHNIQUE OF PLAN FORMULATION

This study basically follows a pragmatic approach to optimal utilization of resources. The use of formal mathematical programming techniques are avoided. The mathematics we used do not go beyond the four basic arithmetic operations and the use of interest tables.

The procedure of plan formulation is based on gradual exclusion of possibilities for development starting from the least removable constraints and going on to constraints which are easier to relax or those of which the resolution is in the hands of the government itself.

In this order the following factors are scrutinized:

A) Availability of land, water and human resources
B) Technical possibilities for crop production
C) Market constraints on crop production
C) Economic feasibility of crop production (profitability and role of crops in the farming system)
E) Social feasibility of crop production (attitudes to adoption of new techniques of production and to change in cropping patterns).

The examination of these potentials and constraints leaves one with a range of feasible future situations from which an optimal one has to be chosen which contributes most to the stated objectives of socio-economic development. The difference between the future and the present situation and the bottlenecks which have to be eliminated indicate the scope and the nature of the projects to be undertaken. Once projects have been identified two other constraints have to be examined :

F) Financial means
G) Implementation capacity

These two constraints do overlap, as implementation capacity can be overcome to a certain extent if adequate capital resources are available.

1.5. BASIC ASSUMPTIONS AND CONCEPTS

1.5.1. Time Horizon

A comprehensive plan is necessarily a long term plan but its time horizon should not exceed the outlook of one human generation. In the study a period of 20 years was assumed to be adequate to fulfill that requirement. Moreover such an extended period will be necessary to

develop the agricultural potential in Matara district. This is due to the predominance of tree crops. The projection period adopted by us is therefore 1980-2000. The year 1980 is of course described in terms of a normal agricultural year based on recent trends.

1.5.2. Agricultural Potentials

The term agricultural potential leaves much room for interpretation. Relationships between yields and inputs are not straight forward in agriculture. There are for instance good farmers and bad farmers which causes a large variation in yields under otherwise equal conditions. Hence, one has to think in terms of future average yields. But these too are not perfectly predictable. The mean also would show a variation. There is obviously no way to observe this variation in a particular case, as the development process cannot be repeated and one should satisfy oneself with point estimates of future yields. These are made as realistic as possible by taking account:

- the time horizon given for crop development;
- the present yields and their position on the assumed growth curve;
- the existence of some physical relationships, such as fertilizer to output, although subject to variation;
- the performance of the best farmers in the region and if such evidence does not exist, the result obtained elsewhere at farm level (research stations should not be used as a reference).

1.5.3. Agro-ecological zones and farming systems

In order to specify the agricultural potentials and to localize the projects to be undertaken the District is sub-divided into agro-ecological zones in accordance to the generally accepted classification made by the Land and Water Use Division of the Department of Agriculture. For statistical purposes the limits of the agro-ecological zones were approximated with the boundaries of Grama Sevaka divisions, i.e. the smallest administrative unit in Sri Lanka. Annex I, gives the full list of A.G.A.divisions or G.S.divisions contained in each zone. The zones occurring in Matara district cross the district in a West-East

direction. Their technical denominations are WL_4, WL_2, WL_1 and WM_1. In this report the following terms are used to denote the zones and only in a purely agronomic context will the technical codes be used.

- Coastal zone (WL_4)
- Central zone (WL_2)
- Northern zone (WL_1 and WM_1)

Cropping patterns differ with each zone and hence so do the farming systems. Within each zone various farming systems can be distinguished according to size of holding, labour availability and degree of dependence on agriculture. Zones and farming systems provide tools to localize projects and to gear them to specific target groups. The description of farming systems (present and future) necessarily entails a simplification of reality. The variation in farms is almost infinite, To make analysis manageable we have to reduce them to a small number of average farm types. One should not ask us to show the average farm type in reality. It does not exist. But it explains the behaviour and the economic situation of the class of farms to which it belongs. The main criterion for classification is the capacity of the farm to provide a livelihood to a household at present and at full development. Average farm types are real in the sense that their aggregate number is consistent with regional totals such as landuse, crop production, labour force and employment.

1.5.4. Prices

Projections are based on constant relative prices of inputs and products. Chapter 3 gives an analysis of input-output relationships at market prices and at economic prices defined as border prices.

1.6. Data

This plan makes extensive use of statistics, already available, whenever necessary special studies and data collection were undertaken by the project team. Some of them are to be published separately. The following studies were carried out by consultants on the request of

the project team and financed from project funds:

a) Land use and Land Suitability Study by S. Dimantha and L.D.Jinadasa, June 1980 (Land Use Division of the Irrigation Department).
The scale of these maps is 1:60,000. These maps allow for a very precise localization of project areas within the agro-ecological zones defined in the District.

b) Cinnamon Cultivation in Matara District, by Prof. H.M.W.Herath, August 1980 (University of Peradeniya).
This study was necessitated by the absence of a national cinnamon policy.

c) Coconut Processing in Matara District, by U.V.H.Perera, N.T.M.H.de Silva and L.Ranbanda, July 1980 (Planning Division, Coconut Development Authority).

The following two formal surveys were conducted by project team:

a) Structure of Rural Households Survey (June 1980).
This survey, based on interviews with Grama Sevakas, gives data on size of holdings, land tenure, cropping patterns and occupational structure of the labour force. The sample consisted of 16 G.S. divisions, spread over the district.

b) Tea Small Holders Survey (May 1980).
This survey was conducted in the tea areas in the Northern zone of the district among 150 small holders. It covers a large range of information on socio-economic conditions of the household and on tea husbandry comprised in the whole farming system.

For the most important sub-sectors very elaborate and recent information was at our disposal. Among these figure:

- On tea: Tea Master Plan (March 1980), CIDA/Government of Sri Lanka
- On rubber: Rubber Master Plan (September 1979), Commonwealth Development Corp.
- On coconut: Conditions and Management on Coconut lands in Kalutara, Galle, Matara.1978, F.A.O.

- On irrigation and drainage: Nilwala Ganga Flood Protection Scheme (1980), GERSAR. This study also covers the problems and prospects of paddy cultivation.

Most important sources of socio-economic information were:

- Basic Village Statistics 1977-1978, Department of Census and Statistics
- Population Census, Department of Census and Statistics
- Central Bank Annual Reports and Consumer Finances Survey (1973)

CHAPTER 2

STRUCTURE OF THE DISTRICT - PRESENT SITUATION AND FUTURE PROSPECTS

2.1 NATURAL RESOURCES AND PHYSICAL INFRASTRUCTURE

2.1.1 Physiography

With the increasing elevations from south to north, the land area in the district could be separated into five physiographic regions. The coastal plain in the south is mainly low land a part of which is below sea level. Next to it is the mantle plain with undulating to rolling topography and elevations up to about 50 metres. The highland plain follows at an elevation between 50 to 300 metres. The Northern part of the district is the mountainous region starting at an elevation of about 300 metres and going up to about 1000 metres. The Northern hill country of Matara district, in fact, consists of the southern slopes of the central massif of the island. The floodplain occurs in proximity to the Nilwala Ganga which is the major river in the district, and also around some minor streams.

2.1.2 Hydrology

The major part of the district (about 80%) lies within the drainage basin of the Nilwala Ganga and its tributaries. The Nilwala Ganga flows in a north-south direction in conformity with the general slope of the land, whereas its tributaries have dissected the area forming small valleys running across the main stream. The river is in spate during heavy rainfall periods and the flood plain is subject to high ground water tables and flooding. The local inhabitants claim that in recent years floods have been more frequent. This is attributed to the indiscriminate clearing of lands in the upper catchment areas resulting in high run-off from these lands. The valleys of the mantle plain and the highland plains receive runoff water during rainfall periods and sometimes flash floods occur.

2.1.3 Climate

The major part of Matara district lies within the wet zone of Sri Lanka. The climate is tropical, characterised by heavy rainfall and relatively constant high temperatures and humidity.

Mean annual temperature ranges from 24.5C° in the north to 26.6C° in the coastal low lands. Diurnal extremes are not marked in the coastal areas of the district, but are felt slightly more in the northern hill country.

Relative humidities are essentially constant throughout the year. They average 70% in the inland areas and 80% on the coast.

Evaporation varies from 1 metre per year in the high elevations in the north to about 2 metres per year in the adjacent dry zone area of Hambantota to the East.

Evaporation figures for the lower regions of the district are not available, but evaporation of about 1.4 metres found in Colombo may serve as a good approximation. Reference crop evapotranspiration may be estimated at 4mm/day gaining from 3.5 mm/day in November and December to 4.5 mm/day in March.

Precipitation

Matara district benefits from two monsoonal rains and two inter-monsoonal rains. Hence, there is a fairly balanced distribution of rainfall over the year. Rainfall varies essentially with the topography, ranging on the average from 2250 mm per year along the coast to more than 5000 mm in the mountainous upper catchment areas of the District.

The north-east monsoon generally occurs from mid November through March. Matara is on the leeward side of the central hill country for the north-east monsoon and should be fairly dry. However, depressions bring in rains to all parts of the country and, therefore, Matara district, too, gets intermittant rainfall. This is the minor rainfall poured in the district coinciding with the Maha season. The south-west monsoon from mid-May through September during which very heavy rainfall is

experienced in the south-western part of the island and corresponds with the Yala season.

2.1.4 Soils

Red yellow podzolic soils occupy most of the residual in the district and occur most typically in the mantle plain and on the more gentler slopes of the highland plains. These soils are deep (more than 2 metres) and well drained. They are extensively leached and poor in natural fertility but respond well to good fertilizer management. The moisture holding capacity of the soil is about 8 to 10%. Given an average evapotranspiration demand of about 4 mm per day, a 1.2 metre deep soil could supply moisture for 20 - 30 days. The soils are very stable but given high intensities of rainfall, very good soil conservation measures have to be taken to protect the soil against erosion. The red yellow podzolic soils of the more sloping lands are not very deep and contain a fair amount of decomposing rock. Large extents in the north are liable to erosion. Imperfectly drained red yellow podzolic soils occur in the lower areas of the residual landscape and are most commonly seen in the mantle plain. Minor soil groups such as Bog soils and half bog soils occur close to the coastal plain in places such as backswamps of flood plains and in areas adjoining lagoons. Bog soils have more than 30% organic matter, are poorly drained and have a low bulk density. These soils cannot support men, animals or machinery even at low field moisture contents. This is the major limitation to intensive paddy cultivation. Half bog soils contain less organic matter (between 15 - 30%) and are therefore easier to manage.

Humic alluvial and humic colluvial gley soils occur in the flood plains. These soils contain 5-15% organic matter, have good bearing capacity and light tractors could be operated on them. low humic alluvial gley soils have similar properties except for relatively low organic matter content (less than 5%). They tend to dry out rapidly.

Very fertile levee alluvial soils occur in a narrow band alongside the Nilwala river and its main upstream branches. They contain a high amount of silt. Regosols occur in the coastal plain. These soils are associated with coral beds and sea shells and contain a certain amount of calcium.

Ground water levels are high ranging from 1-3 metres in well drained locations to 0.5-2 metres in imperfectly drained locations. Coconut plants are capable of using this water.

2.1.5 Irrigation

Irrigation plays a minor role in the district's agriculture as rainfall is abundant and fairly evenly distributed throughout the year. The irrigated area is only 7% of the cultivated area in the district. The only crop cultivated under irrigation is paddy and still most of the paddy is rainfed: 7,100 hectares of paddy lands are irrigated as against 11,400 hectares rainfed. As in most other areas in the wet zone the existing irrigation systems are mostly based on blocking water-courses either by means of diverting water through an anicut to the paddy fields or by effecting flood-irrigation in which case the area upstream of the dam is allowed to submerge.

Unlike the tank irrigation systems in the dry zone, which store water, the above mentioned systems depend on the discharge of the streams. In the dry season the system would not work and in the rainy season the paddy fields would not need much supplementary water.

2.1.6 Roads and Transport

Matara district has a relatively dense road network. Major roads connecting the divisional towns have a total length of nearly 1000 kilometers, a density of 0.9 km per square km. These roads are all tarred. Access roads to the major roads are almost all tarred, but may be very narrow. Small rural roads may not be motorable.

Except for the northern tea areas of the district roads do not constitute a major bottleneck for the transport of agricultural produce.

The density and frequency of bus services is high. A train and bus service along the coast offers a fast connection with Galle and Colombo. It is generally assumed that good public transport facilities have kept people in the villages, slowing down urbanisation and making it possible for a

fair portion of the population to earn income outside the district (M.Moore, and G.Wickramasinghe, 1980 p.79).

2.1.7 Energy

The main source of energy used for domestic purposes is firewood and coconut husks. There is a large potential for the production of charcoal from coconut husks. Kerosene is the second source of energy, whereas the use of gas and electricity is negligible at household level.

Farm power is mainly based on human labour and draught animals (buffaloes). Tractors are mainly used for haulage.

2.2.POPULATION

2.2.1 Socio-cultural Features

The predominant ethnic group in the district are the Low Country Sinhalese (94% of the total population). Indian Tamils, descendants from south Indian labour force imported by the British to work on the plantations constitute 3.2%. They mainly live on the estates. Religion is closely related to ethnicity, almost 94.% of the population being Buddhists. In spite of strong colonial influences the culture has remained Sinhalese, in contrast to the coastal region between Colombo and Galle where Christianity has rooted more firmly.

2.2.2 Educational Standards

Matara district has a very high literacy rate. This is an important asset for any government sponsored development effort (credit, extension, family planning, etc.). Enrolments in secondary and higher education are also relatively large. Education at all levels has almost equally benefitted males and females.

Educational efforts have strongly upgraded the manpower. Nevertheless, this has resulted also in problems associated with unemployment as educated persons in most instances do not find the type of employment they expect.

This problems is not specific to Matara district, but assumes national proportions (see Seers et. al. 1971). Matara, however, may be an extreme case.

2.2.3. Population Trends (overall growth, inter-regional and intra-regional migration)

Among the districts in Southern Province, Matara has the highest rate of net out-migration. Most of the life-time in-migrants, counted in 1971, came from Galle, Hambantota and Ratnapura, whereas the largest streams of life-time out-migrants went to Colombo, Hambantota and Galle. Out-migrants to Colombo and Galle were educated people and those with commercial interests. Out-migrants to Hambantota went as settlers in agricultural colonization schemes. Migration generally takes place family-wise and this affects all age-groups and both sexes equally.

The table below presents overall population growth over the period 1946-1971 and its decomposition into natural increase and net emigration.

Table 2.1 Population growth, Matara district, 1946 - 1981 (Unit: Persons)

Year	Population	Population Increase	+ Net out-Migration	= Natural Increase
1946	351,900			
		61,500	16,122	77,622
1953	413,400			
		101,500	44,246	145,746
1963	514,900			
		71,543	46,111	117,654
1971	586,443			
		58,241	70,199	128,431
1981	644,684			

Source: Population Census 1946, 1953, 1963, 1971, 1981
Bulletin on Vital Statistics (1977) Dept. of Census and Statistics.

From table 2.1, the effect of net out-migration on population growth can be derived in terms of annual growth rates.

Table 2.2 Effect of net out-migration on population increase, Matara District 1946-1981 (%).

Period	1946-1953	1953-1963	1963-1971	1971-1981
Average annual natural growth rate	2.9	3.0	2.6	2.1
Annual rate of net out-migration	0.6	0.7	1.0	1.1
Average annual growth rate	2.3	2.3	1.6	1.0

The dent in population growth rate observed in the period 1963-1971 is the result of both decreasing fertility and the increased rate of net out-migration. The same trend is observed in the inter-censal period 1971-81 with a further decrease in population growth.

Historically, human settlements in the district commenced in the southern coastal areas. With the increase in population people started migrating towards the northern areas. However, the bulk of the population still live in the southern and central reaches of the district, but population densities decrease as one proceeds further to the north of the district. Another feature of intra-regional migration is urbanisation. In official statistics the urban population is defined as the population contained within the administrative boundaries of Urban and Town Councils. (These are in the coastal zone: Matara U.C., Weligama U.C and Dondra T.C. and in the central zone: Akuressa T.C., the northern zone has no urban population).

In Sri Lanka, urbanisation has progressed slowly over the last three decades. This is attributed to the relatively well developed social infrastructure and its deep penetration into the rural areas (schools, dispensaries, public transport). These circumstances undoubtedly prevail in Matara, where the relative share of the urban population has shown

only slight decrease from 11.74% to 11.24% over the period of 1963-71.

The table below summarizes the spatial distribution of the population in Matara district in 1971, derived from the Basic Village Survey 1977-1978 with necessary adjustments.

Table 2.3 Percentage distribution of the population, Matara district between agro-ecological zones and between urban and rural areas, 1971-1981.

	1971			1981		
Zone	Rural	Urban	Total	Rural	Urban	Total
Coastal	29.0	10	39.0	29	10	39
Central	44.0	1	45.0	39	1	40
Northern	16.0	-	16.0	21	-	21
District	89.0	11	100	89	11	100

Source: Basic Village Survey 1977-1978

* Provisional estimates from 1981-Census on Population. Dept of Census and Statistics.

The above figures indicate that during the intercensal period (1971-81) the distribution of population between the urban and rural areas of the district has remained static. However, if one considers the distribution between the various zones, it is observed that while the coastal zone continues to accommodate 39% of the population, the proportion in the central zone had declined by 5% whereas in the northern zone the population had increased by 5%. This is indicative of intra-regional migration of population from the central to the northern zone. This phenomena may be attributed to persons moving from the central zone to the northern zone to take up employment in the plantations and also as encroachers on state land in the northern zone.

2.2.4 Population Projections 1980, 1990, 2000

At the time of writing this report only the provisional estimates of the 1981 census were available.

If one considers the expected natural increase of the population, mortality rates in Sri Lanka have reached levels of about 0, 8% which is very low even compared to those prevailing in developed countries. There will be little change in this variable. Natural population growth will therefore, depend mainly on the future birth rates. These will tend to decrease in the long run along with the adoption of family planning, the increase of educational standards of women and the increase of income.

As far as income is concerned, its long term implications remain uncertain particularly in respect of the wet zone areas to which Matara belongs. On the other hand, the first two factors have had an impact in Matara district and may be expected to continue to do so. It should also be noted that Buddhism has no objections of principle against birth control, which contributes to a favourable climate for family planning. The rate of natural increase of the population, although showing a decline in the period 1963-1971 as against the previous period, was still very high (2.6%)

According to statistics published by the Department of Census and Statistics (Bulletin on Vital Statistics 1977) it could be inferred that the natural increase of population in Matara district was approximately 2.1% over the period 1971-80. Provisional results of the most recent population census (Census of Population 1981) estimate the average annual rate of population increase in the district to be 1% (Gazette of the Democratic Socialist Republic of Sri Lanka of 3-3-1981). These figures imply net out-migration in the district during the period 1971-81 to be 1.1% which is almost the same as in the previous decade. This leads one to conclude that the decline in population growth in the district is largely due to a decrease in fertility rates rather than to

enhanced out-migration.[1]

Fertility rates could be expected to show further declines in the next two decades owing to the following reasons:

- the continued impact of high educational standards
- efforts to promote family planning, particularly the sterilization programme which is gaining momentum with the monetary incentives introduced in 1980.
- the tendency of women to marry at a higher age

Considering the recent demographic trends in Sri Lanka it would be difficult to forecast accurately the future population patterns. Nevertheless, a reasonable assumption would be that natural increase of population in the period 1980-2000 would grow at an average of 1.6% per annum.

Natural increase of population will be offset by net migration. However, the rate of out-migration cannot be expected to be constant over the different zones in the district. Out-migration will be higher in the densely populated areas of the coastal and central zones where people have more contact with urban areas and also due to little income opportunities. This is definitely not the case in the northern zones, where tea cultivation is the predominant occupation and it appears that the population in this zone are firmly rooted in the region. Consequently, it is assumed that the out-migration rate in the northern zone is zero.

Evidence available profounds that in the next two decades out-migration from the coastal and central zones would continue. However, it is difficult to suppose that there would be an intra-regional migration as suggested earlier from the central to the northern zone for purposes of taking up employment in the plantations and also to encroach on state lands. Unlike the plantations in central hilly areas of the island, the plantations

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[1] Death rates in Matara are low and there is no reasonable evidence to assume that crude death rates will show substantial increase in the future.

in the Matara district do not have a large Indian Tamil labour force whose repatriation would create additional employment opportunities for the local inhabitants. At the same time strict government control on the unauthorised occupation of state land would discourage large scale encroachment. It is thus assumed that the population in the Northern zone would continue to grow at its rate of natural increase.

Out-migration rates of Matara district has remained almost static at around 1% during the last two decades. If one considers the destination of out-migrants from Matara district it is observed that the highest percentage migrated to Colombo. The adjoining districts of Hambantota and Galle too attracted out-migrants from Matara but to a relatively lesser extent. It is believed that Colombo is reaching saturation. Large scale development of Hambantota and Galle are not envisaged to the extent that it could enhance the present numbers migrating to these districts. Consequently, it would be too optimistic to expect that out-migration rates of Matara would be higher than at present. It is assumed that present out-migration rates would remain constant over the next twenty years.

Based on the preceding analysis the projected population growth rates in the different zones of the district are summarised in the table below.

Table 2.4 Composition of Projected Population Growth-Rates of Matara District

Period	Natural	Outmigration rate			Inmigration rate			Population growth		
		Coastal	Central	Northern	Coastal	Central	Northern	Coastal	Central	Northern
1971-80*	2.1	1.1	2.1	0	0	0	1.4	1.1	0	3.5
1980-90	1.6	1.0	1.0	0	0	0	0	0.6	0.6	1.6
1990-2000	1.6	1.0	1.0	0	0	0	0	0.6	0.6	1.6

* The figures indicated for the 1971-1980 period were obtained from the provisional estimates released by the Department of Census & Statistics from the population census of 1981.

The above table clearly shows that the northern zone has exhibited a high rate of population growth (3.5%) between the years 1971-80. This increase is attributed to an in-migration of persons presumably from the central zone for purposes cited earlier. The central zone on the other hand has registered zero growth during the intercensal period 1971-81.

As explained already it is too optimistic to assume that the trend observed over the last decade will continue particularly with regard to immigration to the northern zone. Hence, it is assumed that over the last two decades immigration to the northern zone would be zero and the population would continue to grow at its rate of natural increase, Similarly one cannot expect the same rate of outmigration from the central zone and it is assumed that the rate of outmigration would drop to 1% as in the coastal zone during the next twenty years.

On the foregoing assumptions, the population of Matara district and its spatial distribution would develop as follows:

Table 2.5 Projection of the population and its zonal distribution, Matara district, 1980, 1990, 2000, base year 1971 (Unit: 1000 inhabitants: percentages within brackets)

Zone	1971	1980	1990	2000
Coastal	229(39)	248(39)	263(38)	279(38)
Central	264(45)	263(41)	279(40)	296(43)
Northern	94(16)	127(20)	149(22)	175(19)
District	586(100)	638(100)	691(100)	750(100)

The overall District population growth rates would be:

1980 - 1990 0.8%

1990 - 2000 0.8%

From the projected population we derive that the density of the population would develop as follows:

Table 2.6 Density of the population, Matara district, per zone, 1980, 1990, 2000 (Unit: number of inhabitants per sq. km.)

Zone	1980	1990	2000
Coastal	1206	1280	1350
Central	429	455	482
Northern	271	318	373
District	495	537	582

In Matara district, and in fact in Sri Lanka as a whole, no urbanisation process has taken place to the extent where the population tends to concentrate in highly packed agglomerations functioning as centres of attraction for a rural exodus which de-populates marginal rural areas. Instead, settlement patterns are such that the intensity of habitation tends to increase evenly over the whole area. This is why the rate of urbanization, if defined according to administrative criteria, remains constant over extended periods. This concept of urbanization is practically meaningless for development planning. Table 2.6 shows that the entire coastal belt of Matara will be transformed into an area with urban population densities with its concomitant problems of housing and sanitation. If one leaves out the uninhabited parts of this zone, i.e. the paddy fields, the pure coconut stands and the swamps and water bodies the density on the remaining area would be 2790 persons per sq.km. in the year 2000. Needless to say that the coastal area is a case for town planning rather than agricultural planning.

2.2.5 Size and number of households

The household is considered as the basic decision making unit on production, consumption, savings and investments. The definition of household followed is as given by the socio-economic and consumer finance survey of the Central Bank.

"A household is either a person living alone or a group of persons living together in a housing unit and having common cooking arrangements. A housing unit could contain more than one household. The members of a

household need not be blood relations. A household can include boarders or servants". The average number of occupants per housing unit in Matara District is 6 (1971 Housing Census, Department of Census and Statistics). This corresponds fairly well with the the average household size as one would generally find one household per housing unit (except for urban areas where sometimes more than one household are packed in a housing unit).

The average household size tends to be bigger in rural areas than in urban areas. The Tea Small Holdings Survey (May, 1980) conducted in the typically rural northern areas of Matara indicates an average household size of 6.7. It seems reasonable therefore to assume different household sizes in each agro-ecological zone . In this context the average household size in the coastal zone is taken at 5.5, for the central at 6.0 and 6.7 in the northern zone. It is assumed that these averages will be constant for the whole projection period. Nevertheless, one could expect a decrease of the average household size as a consequence of 'modernization' i.e., the gradual disintegration of the extended family. A quantitative assessment of an eventual decrease in household size is difficult at this stage. However, given the projected population increase one could estimate the approximate number of households in the period under-consideration (see table 2.7).

Table 2.7 Number of households in Matara district, per zone, 1980, 1990, 2000 (Unit: 1000 households)

Zone	1980	1990	2000
Coastal	45	48	51
Central	44	47	49
Northern	19	22	26
District	108	119	126

2.3 ECONOMIC STRUCTURE

2.3.1 Occupational Structure of the Population

The age group between 15 and 64 years is considered to be the productive sector of the population. This age group constitutes a nearly constant proportion of 55% of the total population throughout the projection period. This is derived from the assumption that net migration affects age groups and sexes equally. The average number of persons in the productive age group per household is as follows:

Coastal zone	:	3 productive persons per household
Central zone	:	3.3 " " " "
Northern zone	:	3.7 " " " "

Table 2.8 indicates the occupational structure of the population in the productive age group. In estimating the labour force[1] it is assumed that 1% of those in the productive age group are too old, disabled, sick or in some way economically inactive. It is also assumed that one female per household is engaged in household work and is excluded from the labour force. Similarly, students, pensioners etc., are also left out from the labour force.

If one further deducts from the labour force the category employed both in the agricultural and non-agricultural sector the residual group consists of those who are 'technically unemployed'. This is indicative of the technical underutilization of the labour force. It does not mean that all persons in this category feel unemployed or are seeking a job. At this level of aggregate analysis details on the motivational aspects of unemployment are not discussed.

[1] Labour force is defined in accordance to internationally recommended standards, i.e. 'comprising all persons of either sex who furnish the supply of labour available for the production of economic goods and services, including employers, employees, self-employed persons and those who assist without pay in family, economic enterprises, but not in the normal running of the household : K.D.S.Baldwin (1975).

Agricultural labour is first expressed in the number of labour days required to cultivate the different crops and then connected to man/woman years on the basis of 250 labour days per year. Estimates of agricultural employment are very sensitive to this assumption. One might argue that the number of days in a man/woman/year is associated with the socio-cultural norm for the time a man or a woman is supposed to spend on agricultural activities in order to be regarded as a full time farmer. This norm may be 100 days a year in the Southern coconut-paddy areas and 250 days in the northern tea areas. To bring in some uniformity this study associates full employment with an income criterion. Given an estimated agricultural labour productivity of Rs.15/day one needs to work 250 days a year to earn about the officially accepted minimum income of Rs.300 a month. The employment situation in 1980 is assessed in table 2.8.

Table 2.8 Occupational structure of the population in the productive age group, per zone, Matara district, 1980 (Unit: 1000 persons)

	Coast		Centre		North		District	
	M	F	M	F	M	F	M	F
Productive age group(net of migration)	68.2	68.2	72.3	72.3	35	35	175.5	175.5
Disabled, etc., (1%)	0.7	0.7	0.7	0.7	0.4	0.4	1.8	1.8
Housewives (1 per household)	-	45.0	-	44.0	-	19.0	-	108
Students, etc.,	6.0	6.0	6.8	6.0	2.0	1.5	14.8	13.5
Labour force	61.5	16.5	64.8	21.6	32.6	14.1	159.9	52.2
Non-agric. employment	30.0	10.0	23.0	6.0	2.0	-	55.0	16.0
Employment in								
- Agriculture	4.3	1.5	20.5	8.3	27.1	13.1	51.9	22.9
- Livestock	0.5	-	1.6	-	0.3	-	2.9	-
- Fisheries	2.9	-	-	-	-	-	2.9	-
Technically un-employed	23.8	5.0	19.7	7.3	3.2	1.0	46.7	15.3
Technically un-employed as % of labour force	39%	30%	30%	34%	10%	7%	29%	25%

Source:- 1/ Population Census (1971)
2/ Basic Village Statistics
3/ Survey of structure of rural households (May-June 1980) conducted by the Project Team.

A striking feature is the difference in employment situation between the north and the rest of the district. Female unemployment rates in all zones are as high as for the males but female unemployment is much less in absolute numbers.

Some background information and further explanations to table 2.8 are warranted.

a) The School Census of March 1977 (Ministry of Education) indicates that total enrolment in grades 1 to 12 (5 to 16 years) in Matara district amounts to 127,000 pupils. For 1980 this may be estimated at 135,000 out of whom about 20,000 belong to the last two vintages (15 years and over).

b) Non-agricultural employment will be dealt with in more detail under 2.3.3. It is sufficient here to note that the informal sector is very important. Out of the 71,000 persons employed in the non-agricultural sector only about 15,000 work in government service or in private establishments with 5 or more employees. The grand totals of male and female employment in non-agricultural activities are derived from Population Census, the zonal distribution is based on the Basic Village Statistics with adjustments made with our "Survey on the structure of rural households, Matara district" (May - June 1980).

c) Agricultural employment is derived from the present landuse and norms for the labour input per hectare required to manage the crops. These are specific for different yield levels which may occur in agro-ecological zones or in farm types (small holdings, estates, etc.). The division of labour between sexes is based on general sociological knowledge (ploughing - male labour; planting and weeding - female labour; tea plucking - female labour; etc. For the estates crops (tea, rubber) processing is considered to be agricultural employment, for other crops, it comes under manufacturing. Agricultural employment is in fact, somewhat higher than indicated in table 2.8, as no allowance is made for sundry off-field activities necessary to run a farm.

d) Table 2.8 represents the employment generated <u>in the district</u>. Evidence suggests that a considerable number of people commute daily or weekly between Matara and Galle, Colombo and other places. On the other hand, people living outside the district work in Matara, especially civil

servants, as housing conditions in the district are far from adequate. However, it is felt that this phenomenon could not radically change the general employment picture.

2.3.2 District Income

An attempt was made in this study to estimate the approximate disposable income in the district, i.e. the income generated in the district minus income tax plus income transfers under social welfare programmes. This is the domestic district income as it does not take into account income earned outside the district by those whose district is Matara and vice versa. Evidence suggests that the balance of these inter-district transfers is positive for Matara and should be added to the domestic district income.

In the absence of data on value added, the easiest way is to count directly the components of income, i.e. wages, salaries, profits, rents and interest.

a) There are no complete and recent statistics on wages and salaries available.

From the 1973 survey of Sri Lanka's Consumer Finances (Central Bank) one can derive the average income per income receiver in various industries and services in south west Sri Lanka. The Central Bank Annual Report (1979) indicates that wages of workers in industry and commerce have risen by 150% over the period 1973-1979 and wages of government employees by roughly 100% over the same period. These wage increments have been applied to the 1973 income levels in predominantly private and predominantly government sectors respectively in order to arrive at income levels per sector at the beginning of 1980. Multiplying with the numbers employed in various industries and services one gets an estimate of total income earned in non-agricultural activities which amounts to 540 million rupees in 1980, averaging Rs.7,600 a year per income receiver in the non-agricultural sectors. It should be noted that this average includes male

and female wages.

b) The agricultural income is based on estimates of value added per crop at the farmgate. Value added mainly consists of labour income (family labour and hired labour) and rent on land which accrues as income to other households. The latter is included in the agricultural income.

c) Half of the population in Sri Lanka benefits from the 'food stamp scheme'. The payments made under this scheme are as follows:

Rs. 15/- per month for those over 12 years old
Rs. 20/- per month for those between 8 and 12 years
Rs. 25/- per month for those below 8 years

Island wide, 7.2 million people (i.e. half of the population) annually get 1,600 million rupees worth of stamps. This means Rs.222 per year per recipient on the average. It is assumed that in Matara district too half of the population receives the same amount.

c) Most of the houses in the district are owned by their occupants. House rent at opportunity costs is not included as an income component. The table below indicates the estimated disposable domestic income for the district for 1980.

Table 2.9 Disposable domestic income, Matara district, 1980, per agro-ecological zone (Unit: Million rupees)

	District	Coast	Centre	North
Agricultural income	416	52	167	197
Fisheries, livestock, poultry	21	16	4	1
Non-agricultural income	540	304	220	16
Pensions, interests, dividends	40	16	18	6
Food stamp scheme	76	29	34	13
Total	1093	417	443	233
Annual income per head (Rs.)	1593	1580	1457	1975

NOTE:- The zonal distribution of non-agricultural income is taken proportional to the numbers employed in the non-agricultural sectors. It is assumed that there are no differences in occupational structure and in wage rates between zones. However, approximate the income estimates may be, two striking features clearly emerge.

- The share of agricultural income (including fisheries, livestock and poultry) in total income is 16% in the coastal zone, 39% in the central zone and 85% in the north. This indicates very low dependence of the population on agriculture in the coastal zone and very high dependence in the north.

- The contribution of the food stamp scheme to total income is about 7% all over the district. Even if one assumes a rather equal income distribution (50% of the population having 30% of the income) the bottom 50% who receive the food stamps would depend for 23% on it. One can guess that in reality a large segment of the population would starve if the scheme were to be abolished.

2.3.3 Employment Prospects in Matara District

In the period 1963-1971 employment in the productive age group (leaving aside child labour) has increased as follows in non-agricultural activities:

Table 2.10 Changes in non-agricultural employment, Matara district, 1963-1971-1980 (Unit: 1000 persons)

	1963*	1971*	1980**
Manufacturing	15.7	16.4	17.0
Construction	4.0	5.2	6.8
Wholesale & retail trade, restaurants, hotels	10.8	14.7	18.2
Transport, storage, communications	4.0	5.8	8.0
Community, social, personal services	20.1	19.5	19.0
Others	0.6	1.4	2.0
	55.2	63.0	71.0
Annual growth rate		1.6%	1.6%

* Source: Population Census ** Own Estimates

The proportion of female employment remained practically constant at about 24%. Women are mainly employed in manufacturing and community, social and personal services. Leading sectors are construction, trade and transport which recorded employment growth rates of respectively 3%, 3% and 4.5%. Manufacturing remained practically stagnant, whereas services showed a slight decline. Other sectors include mining and quarrying, gas and electricity, banking and insurance.

Overall growth of non-agricultural employment just kept pace with population growth(1.6%) and hence also with the increase in the labour force, as the latter is about a constant fraction of total population. It implies however that employment among youth has rapidly deteriorated as employment created was just adequate to maintain the existing rate of un-employment,let alone to absorb the new comers on the labour market. The trends in employment are indicative for the type of economic development which has taken place in the district. The growth in the leading sectors is closely associated with population growth. A growing population requires more houses, more retail shops and more transport. This means more of the same rather than investments in new lines of development. Manufacturing in Matara district mainly consists of agricultural processing (tea, rubber etc.) wood and clay products. Employment in this sector is to a large extent related to agricultural output. However, the district has seen a downward spiral in crop production and lack of investment in produce processing units.

The economy of the district is depressed and it is hard to imagine that this will change radically in the near future. The district has no other natural resource than land and water. The national policy for large scale industrialization is limited to areas such as Colombo and possibly Trincomalee. Although Matara town is an important servicing centre in Southern Province there is no indication at present that it would develop significantly in that capacity. Strengthening of the existing manufacturing industries and their diversification is the most plausible employment strategy outside agriculture. However, the capacity of agro-based industries to create employment is generally low. One should be very prudent, also, not to destroy the labour intensive cottage industry in setting up industrial plants in this sector.

What are the prospects for reducing unemployment in Matara district? Are the potentials to create employment in both agricultural and non-agricultural activities sufficient to absorb the growing labour force?

This will be examined on the basis of the same assumptions applied in Table 2.8 and considering the population projections (table 2.5), the productive age groups and the labour force in 1980 and in 2000. (It is assumed that enrolment in schools is maintained at the present high levels).

Estimates of future agricultural employment are based on the agricultural sector plan outlined in the next chapters. This plan aims at optimal development of the agricultural potentials in the district within constraints resulting from natural conditions, cultivation practices, profitability and markets. Non-agricultural employment is supposed to continue to grow at the modest rate of 1.6% a year observed between 1965 and 1980. It has been argued that prospects for non-agricultural employment opportunities are rather limited in Matara. The assumed rate of growth needs hardly any government support to materizlize as it would occur almost autonomously as a result of private enterprise. The main purpose of this exercise is to show that even under this modest assumption the employment situation can be considerably improved if agriculture is being fully developed. The impact of optimal agricultural development on employment will however vary with the zones in the district as is shown in Table 2.11.

Table 2.11 Technical un-employment prospects under optimal agricultural development and weak non-agricultural development.

(Unit: 1000 persons)

	Coast		Centre		North		District	
	1980	2000	1980	2000	1980	2000	1980	2000
Population (net of migration)	248.0	279.0	263.0	296.0	127.0	175.0	638.0	750.0
Productive age group (55%)	136.4	153.5	144.6	162.8	70.0	96.3	351.0	412.5
Disabled, etc. (1%)	1.4	1.5	1.4	1.6	0.8	1.0	3.6	4.1
Housewives (1 per household)	45.0	51.0	44.0	49.0	19.0	26.0	108.0	126.0
Students, etc.	12.0	15.8	12.8	17.6	3.5	5.4	28.3	38.8
Labour force (male & female)	78.0	85.1	86.4	94.6	46.7	63.9	211.1	243.6
Non-agricultural employment	40.0	46.0	29.9	33.4	2.0	2.3	71.0	81.7
Agricultural employment	9.2	13.7	39.4	45.1	40.5	49.9	80.1	108.7
Technically un-employed	28.8	25.4	27.0	16.1	4.2	11.7	60.0	53.2
As % of labour force	37%	30%	31%	17%	9%	18%	28%	22%

The above analysis shows that the category of technically un-employed could decrease in absolute numbers bringing the overall district un-employment rate down from 28% to 22%. No doubt, un-employment will continue to be high in the future. Nevertheless, it is possible for a gradual reduction in the coastal zone and a significant reduction in the central zone. In the nothern zone however, un-employment may increase as a result of the high rate of population growth in the past. Total elimination of the un-employment problem, however, would require substantial growth rates in the non-agricultural sectors which are unlikely to occur. Any employment that could be realized over and above the modest increase assumed in table 2.11 are of course very beneficial.

CHAPTER 3

CROPS - PRESENT SITUATION, POTENTIALS AND CONSTRAINTS

3.1 PRESENT LAND USE

The present land use is principally derived from 1973-1976 aerial photographs (scale 1:25,000). The basis for the various categories of the land use are in accordance with the conventions of the World Land Use Legend modified for local conditions. The World Land Use Legend has been drawn up by the Commission on World Land Use Survey of the International Geographical Union. Adjustments and updating took place by information provided by the Basic Village Statistics of the Matara district and recent sub sector studies (Tea Master Plan and Rubber Master Plan).

Table 3.1 shows the present land use of Matara district

Table 3.1 Land use per agro-ecological zone (Unit:ha.)

Land Use	WL_4	WL_2	WL_1	WM_1	District
Total area	20,500	61,400	23,100	23,800	128,800
Forests	800	9,900	6,000	6,000	22,700
Scrub lands	900	6,300	2,500	2,200	11,900
Towns, villages	800	100	-	100	1,000
Other non-cultivated lands	800	700	-	-	1,500
Total non-cultivated	3,300	17,000	8,500	8,300	37,100
Tea	-	3,700	7,100	7,800	18,600
Rubber	500	7,300	1,700	500	10,000
Coconut	9,700	6,800	700	400	17,600
Paddy	3,700	11,200	1,900	1,700	18,500
Cinnamon	1,100	4,600	600	600	6,900
Others	2,200	10,800	2,600	4,500	20,100
Total cultivated	17,200	44,400	14,600	15,500	91,700
Of which in homesteads	6,500	12,600	3,100	3,600	25,800

Sources: All estimates derived from:
L.D.Jinadasa (1980), Basic Village Statistics(1978)
RMP (1979), TMP (1980).

3.2 PADDY

3.2.1 Area

According to the Land Suitability Map of the district, 23,000 ha are suitable for paddy cultivation of which 21,500 are actually asweddumized and are suitable for paddy only, Whereas 1,500 ha have alternative land utilisation possibilities such as for coconut, minor export crops and pastures. The present landuse of the latter category is mainly as homestead gardens. There is no scope for any further increase in the paddy acreage. The average extents sown (1959-1979) are presented in Table 3.2.

Table 3.2 Paddy extent sown in Matara district per agro-ecological zone

(Unit:Ha.)

	WM_1	WL_1	WL_2	WL_4	Total
Rainfed	1,700	1,700	5,600	2,400	11,400
Irrigated	-	200	5,600	1,300	7,100
Total	1,700	1,900	11,200	3,700	18,500
Of which subject to flooding	-	-	8,500	1,600	10,100

3.2.2 Flooding & Irrigation

The areas affected by flooding as indicated in Table 3.2 refer to lands below the 10 year return flood line.

During the most recent heavy floods in 1969-1970 submersion resulted in a complete crop failure on 8,500 hectares. In Matara generally the risks of yield losses due to water shortage are negligible compared to losses due to flooding as shown in Table 3.3.

Table 3.3 Causes of crop failures for Paddy 1969-1979 (maha+yala)

(Unit:Ha.)

	Drought	Flooding	Pests	Others	Total
Total area damaged in the period 1969-1979	3,400	24,600	3,600	2,000	33,600
Percentage	10	73	11	6	100

Source: GERSAR, July 1980.

Flood Protection

The first plans for flood protection in Matara were presented in the feasibility study on the three basins, Nilwala Ganga, Gin Ganga and Kalu Ganga in 1968 by the Irrigation Department (Consultant: Engineering Consultants Inc., U.S.A.). The weak economic feasibility of the Nilwala Ganga flood protection scheme (IRR: 5%) was the main reason to refrain from implementation. In 1979, the irrigation department studied the Nilwala Ganga flood protection scheme again (Consultant: GERSAR). Three alternative solutions for flood protection were elaborated, of which the Internal Rates Return (IRR) vary between 4.4% and 5.4%. This poor return to investment is due to costly constructions, pumping stations and limited agronomic potentialities for paddy cultivation (maximum yields: 3 tonnes/hectare. The consultant recommended the implementation of the solution with the highest IRR (5.4%) and the smallest protected cultivated area: 6,000 ha (the other solutions protect 7,200 ha.).

Irrigation

Shortage of water causes crop damage in the agro-ecological zones WL_2 and WL_4. In the two other agro-ecological zones of the district WM_1 and WL_1 soil conditions and rainfall patterns are such that no supplementary irrigation is needed.

Supplementary irrigation takes place on 7,000 ha for the following reasons:

a) To supply water on soils where moisture availability is below requirements without additional irrigation.
b) To leach lands below 1 foot above mean sea level, subject to salt-water intrusion.
c) To enable early planting on lands liable to flooding in order to harvest before the May-June floods damage the yala crop.

Table 3.4 presents the areas that require supplementary irrigation.

Table 3.4 Areas requiring supplementary irrigation in Matara District

(Unit:Ha.)

	WL_2	WL_4	TOTAL
Areas below 1 foot above mean sea level, suffering from salt-intrusion	1,800	1,300	3,100
Land that will have less than 50% successful sowings and less than 50% successful seasons without irrigation	4,500	3,000	7,500
Total	6,300	4,300	10,600

Source: Land Suitability Map Matara, Dimantha (1980).

The present irrigated area is 7,000 ha; an extension of the irrigated area with 3,600 ha mainly in WL_4 could be envisaged.

3.2.3 Yields

Flooding is the most important factor which determines average yields as is shown in Table 3.5.

Table 3.5 Paddy yields in Matara district, 1960-1979

(Unit: qt/ha.)

	WM_1	WL_1	WL_2	WL_4	TOTAL
Flooded areas					
Total	-	-	12	10	12
Non-flooded areas					
Rainfed	20	25	18	12	-
Irrigated	-	25	22	18	-
Average	20	25	20	15	-
Total Matara	20	25	18	12	18

Source: Estimates based on various sources

In the flooded areas there is no significant difference in yield between rainfed and irrigated paddy cultivation. The risk of yield reduction by flooding is however somewhat less in the irrigated areas, because irrigation allows earlier harvesting. In the non-flooded areas, in the zones WL_2 and WL_4 irrigation results in higher yields. The differences are not very impressive due to bad functioning of particularly the minor irrigation schemes and the generally mediocre ecological conditions for paddy cultivation.

Table 3.6 presents the potential paddy yields which could be achieved if the appropriate hydrological infrastructure (flood protection and irrigation schemes) would be realized and cultivation practices would improve

Table 3.6 Potential paddy yields in Matara district

(Unit: qt/ha.)

	WM_1	WL_1	WL_2	WL_4
Rainfed	25	25	30	25
Irrigated				
Areas below 1 foot above mean sea level	-	-	20	20
Other areas	25	30	30	30

In areas where no improvement of the hydrological infrastructure will take place no yield increases can be expected.

3.2.4 Production

Table 3.7 presents the average present paddy production in the district. No significant production increase took place in the recent decennium. Yields during both maha and yala season do not show any improvement since 1968; as mentioned earlier no extension of the acreage has been possible.

Yala and maha sown extents are almost identical. Hence, two crops a year is the general intensity of paddy cultivation in the district. Triple cropping is practiced by a small number of farmers but is generally being abandoned. It proved to be more sensitive to diseases, too costly and less profitable than double cropping.

The harvested area in maha is 85% of the sown extent; in yala this figure is about 9%.

Table 3.7 Average paddy production in Matara district

(Units: ha. and tonnes)

	WM_1	WL_1	WL_2	WL_4	TOTAL
Total harvested area (maha and yala) (ha.)	3,000	3,300	19,700	6,500	32,500
Average yield (qt/ha)	20	25	18	12	18
Production (tonnes)	6,000	8,250	35,460	7,800	57,500

Source: Estimates based on various sources

Table 3.8 gives an estimate of the potential paddy production in the district. This estimate is based on the following assumptions:

a) The Nilwala Ganga flood protection scheme would protect 6,000 hectares (alternative proposed by GERSAR).
This implies that about 4,000 hectares would still be subject to regular floodings. It is supposed however that it would not be feasible to protect this better area for technical and economic

reasons.

b) Irrigation would be extended with 3,600 ha to 10,600 ha. In this way all areas that require supplementary irrigation are supposed to have irrigation facilities.

c) All existing irrigation schemes would be upgraded to the required standards.

d) Farm management would be optimal.

Table 3.8 Potential paddy production in Matara district.

	WM_1	WL_1	WL_2 + WL_4	TOTAL
Unprotected area				
Total harvested				
Area (maha & yala)*	-	-	7,600	7,600
Average yield (qt/ha)			12	
Production (Tonnes)			9,100	9,100
Other areas				
Total harvested				
Area (maha & yala)	3,300	3,500	20,400	27,200
Average yield(qt/ha)	25	30	28	
Production (tonnes)	8,300	10,500	57,100	75,900
Total production	8,300	10,500	66,200	85,000

* Harvested area = 90% sown area; sown area = 90% of asweddumised area.

If the potential production could be realized in 15 years the annual growth rate of paddy production in the district would be 2.6%. GERSAR assumes a 15 year period to realize 95% of the potential production in the Nilwala Ganga scheme.

3.2.5 Cultivation Methods

Soil Preparation and Ploughing

Soil preparation in Matara is mainly done by turning the soil with the mammoty. This is practised on 55% of the cultivated paddy area. Buffaloes are used on 20% of the cultivated area. The restricted use of draught animals is due to the fact that buffaloes cannot work soils with insufficient hold (bog soils), which are rather frequent in Matara, and the limited availability of the animals. 25% of the soils are prepared by tractors. Low yields are the main constraint for more intensive use of tractors which are relatively costly (Rs.600 per ha.).

Sowing

The general practice is broadcasting in the mud. Transplanting is very exceptional (only 3% of the cultivated area). 60-70% of the seed paddy utilized is new improved varieties (N.I.V) and old improved varieties (O.I.V.). N.I.V. represent about 45% of the improved varieties used.

Traditional varieties are used on 30-40% of the area, particularly in the flooded areas. The local traditional varieties withstand longer periods of submersion and are preferred by the farmers for this reason.

Weeding

Chemical weeding is the common practice in Matara: 75% of the cultivated area is treated with herbicides and the effects are generally conclusive. Weeding with the mammoty or with rotary machines is rare.

Fertilizer Application

Fertilizers are generally applied on N.I.V. and O.I.V.; traditional varieties do not receive any fertilizer.

The quantities used in 1978 and 1979 are:

NPK 5:15:15	140 kg/ha.
Urea	50 kg/ha.
TPM 2 (2 units urea + 1 unit potash muriate)	50 kg/ha.

The required quantities of fertilizer are:

NPK	250 kg/ha. O.I.V. and 310 kg/ha. N.I.V.
Urea	80 kg/ha.
TPM 2	80 kg/ha.

Hence, there is a general underutilization of fertilizer amounting to a near 50% of the agronomic requirements.

Reasons mentioned for the insufficient use of fertilizer are:

- the non-availability of sufficient quantities of fertilizer at the right moment;
- the costs of fertilizer for the small farmer
- the risk of damage by flooding

Pesticides

Pesticides are used on 60% of the paddy area mainly on O.I.V. and N.I.V. The effectiveness of pesticide application is not clear. It is observed that farmers are not always aware of the correct doses and timing.

Harvesting and Processing

Harvesting is done by sickle, threshing takes place by treading with buffaloes. Winnowing is done by wind or hand fanning. About fifty small rice mills in the district transform paddy into hushed rice. The transformation coefficient is very low (60-65%) due to old equipment.

Table 3.9 summarises the present input levels for paddy cultivation in the district.

Table 3.9 Input-use for paddy cultivation in Matara district per ha.

	Labour (days)	Draught power & machinery(hr.)	Material input
1. Soil preparation and ploughing			
With mammoty	50		
With buffaloes	15	150	
With tractor	1	8	
2. Broadcasting	2		100 kg.
3. Fertilizer application*	5		230 kg.
4. Weeding (chemical)	5		Variable means
5. Pesticides application*	2		Variable means
6. Harvesting and Processing	56	100	
Total	120 85 71		

* Not on local varieties

Improvement on cultivation practices concern particularly application of fertilizer and pesticides. The transformation co-efficient of milling can considerably be increased.

3.2.6 Prices

The pre-fixed rates paid by the Paddy Marketing Board and the Co-operatives are Rs.40/bu. or Rs.1,920/tonnes (farm gate price). In the private market, paddy prices range between Rs.1,500 to Rs.2,500/tonnes.

These domestic prices are far below the international prices.

CIF price of rice, Colombo: 250 US $/tonne[1] at official exchange rate[2] of Rs.16/US $	:	Rs.4,000 per tonne
Transport Colombo-Matara 160 km x Rs.1/tonne/km	:	Rs. 160
Value of rice at Matara	:	Rs.4,160 per tonne
Equivalent value of paddy (paddy-rice ratio 0.65) at Matara	:	Rs.2,700 per tonne
Processing paddy - rice	:	- 100
Transport - rice mill to production area 20 km x Rs.1/tonne/km	:	- 20
Farm gate value at economic price	:	Rs.2,580 per tonne of paddy

Fertilizers are heavily subsidized as is shown in Table 3.10.

Table 3.10 Market prices and economic prices of fertilizer (1979)

	Market price	C.I.F. price	Transport (average)	Economic price at farm gate
Ammonium sulphate	1490	1606		1786
Muriate of potash	1065	1519		1699
NPK 5:15:15	1250	2299	180	2479
Urea	980	2441		2621
TPM 2	1010	2211		2391

Source: GERSAR (1980)

The ratio economic price/financial price varies between 1.2 and 2.7.

Herbicides and pesticides are not subsidized.

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[1] At 1979 US $ husked rice import price 1979 (External trade statistics, Sri Lanka, Sri Lanka Customs, December 1979)

[2] There is no evidence of substantial discrepancy between the official exchange rate and the real exchange rate.

3.2.7 Input-Output Analysis of Paddy

Distinct soil, hydrological and weather conditions in Matara district cause different input-output relationships in paddy cultivation.

Case a) Paddy cultivation in the flood plains in the agro-ecological zones WL_2 and WL_4

In these areas, regularly subject to flooding, only traditional local varieties can be grown. The average yield is 12 qt/ha. No fertilizer or pesticides are used. The insufficient hold of the bog soils does not permit buffaloes or mechanical tractors for soil preparation. Weeding is manual.

Case b) Paddy cultivation in the non-flooded plains in the agro-ecological zones WL_2 and WL_4

Here N.I.V. and O.I.V. are used, The average yields are 16 qt/ha rainfed and 20 qt/ha under irrigated conditions. Fertilizer and pesticides are generally applied although in insufficient quantities. Soil preparation is dominantly done by manual labour; buffaloes and tractors are used as well.

Case c) Paddy cultivation in the northern part of the district (zones WM_1 and WL_1)

N.I.V. and O.I.V. are used. Average yields are about 25 qxt/ha. No supplementary irrigation is needed. Fertilizer, herbicides and pesticides are generally applied in the required quantities. Soil preparation takes place by mammoty, buffaloes and tractors.

Table 3.11 presents the input-output analysis for the different circumstances. The production costs are based on the physical input levels presented in Table 3.9.

Table 3.11 Present input-output relationships of paddy cultivation in Matara district (On a hectare basis, for one harvest)

	Case a)		Case b)				Case c)	
			Rainfed		Irrigated			
	Labour (mandays)	Other Costs Rs.	Labour (mandays)	Other Costs Rs.	Labour (mandays)	Other Costs Rs.	Labour (mandays)	Other Costs Rs.
Soil preparation	50	-	50	-	50	-	50	-
Broadcasting	2	250	2	250	2	250	2	250
Fert. application	-	-	3	175	5	260	10	550
Weeding	16	-	5	150	5	150	5	300
Pesticides appl.	-	-	2	260	2	385	2	635
Harvesting & processing	56	300	56	300	56	300	56	300
Water Management								
Total	124	550	120	1135	130	1345	120	2035
Yield (qt/ha.)	12		16		20		25	
Gross value of production	2300		3070		3840		4800	
Value added (V.A.)	1750		1935		2495		2765	
Gross margin	- 110		135		545		965	
Costs/ton	458		709		672		814	
V.A./manday	14		16		19		23	

Related information

Hour rate for animal power	Rs. 2.00
Hour rate for threshing by 2 wheel tractor	Rs.15.00
Hour rate for soil preparation by 4 wheel tractors	Rs.80.00
Hour rate for spraying	Rs.45.00
Wage rate (daily)	Rs.15.00

Table 3.12 indicates the input-output analysis of paddy cultivation in the potential situation. In the unprotected areas no substantial improvements can be expected. The same applies to paddy cultivation in the northern part of the district where the present relatively high yields are close to optimum. In the agro-ecological zones Wl_2 and Wl_4, protected against flooding and provided with the required irrigation facilities, the following results can be expected.

Table 3.12 Potential input-output relationships of paddy cultivation in Matara district (on a hectare basis, for one harvest)

	Rainfed		Irrigated	
	Rainfed (mandays)	Other Costs	Labour (mandays)	Other Costs
Soil preparation	15	300	15	300
Broadcasting	2	250	2	250
Fertilizer application	10	550	10	550
Weeding	5	300	5	300
Pesticides application	2	635	2	635
Harvesting & Processing	56	300	56	300
Water management	-	-	10	-
Total	90	2,335	100	2,335
Yield (qt/ha)	25		30	
Gross value of production	4,800		5,760	
Value added	2,465		3,425	
Gross margin	1,115		1,925	
Costs/tonne	934		770	
VA/manday	27		34	

Related Information

Soil preparation is supposed to take place by buffaloes at a rate of Rs.2/hour. Fertilizers and pesticides applications are supposed to fulfill the agronomic requirements.

Economic pricing

Due to the important differences between domestic prices and international prices of both product and inputs, there is a considerable discrepancy between the value added calculated at market prices and at economic prices. The average present value added per ha, at economic prices is about Rs.3800 compared to Rs.2200 at market prices. The respective cost prices per tonne are Rs.1200 and Rs.970.

3.3 COCONUT

3.3.1 Area

The coconut area in Matara covers 17,600 ha; 8,400 ha are (almost) monoculture plantations, 9,200 ha is a mixed culture in homestead gardens. Here, coconut cultivation is mixed with other trees (jak, breadfruit, banana, mango) but intercrops such as coffee, pepper, cinnamon and vegetables are cultivated also. Table 3.13 presents the coconut area per agro-ecological zone.

Table 3.13 Coconut area in Matara district

(Unit:ha)

	WM_1	WL_1	WL_2	WL_4	Total
Coconut in homestead gardens	400	700	3,800	4,300	9,200
Coconut plantations	-	-	3,000	5,400	8,400
	400	700	6,800	9,700	17,600

The coconut area has been almost constant over the last 10 years. The area suitable for coconut cultivation is considerably larger than the present cultivated coconut area. Extension of the coconut area at the expense of other crops has not taken place until now.

3.3.2 Age of Palms

Table 3.14 presents the age distribution of palms in the district. Their average age is 49 years.

Table 3.14 Percentage distribution of coconut area by age group

Age (years)	Percentage of coconut area
Below 7	1
7-14	1
15-29	12
30-44	26
45-59	29
60	31
	100

Source: Own estimate based on FAO survey (1978)

The productive life of palms is about 60 years, so on 31% of the area, yields are declining. The age group 15-60 years is the peak productivity category and covers 67% of the coconut area. The pre-bearing period of tall palms is 8 years under good conditions. Due to poor management the pre-bearing period is generally prolonged to 15 years or more.

3.3.3 Yields

The average yield is about 3,600 nuts per ha. On the larger plantations of over 8 hectares yields are 5,400 nuts per ha. On smaller plantations and in homestead gardens the yields are about the average.

No differences in yields can be observed between the agro-ecological zones. Present yields are very low.

Agro-ecological zones WM_1 and WL_1 are less suitable for coconut cultivation. In the other zones however soil and climatic conditions are very favourable for coconut cultivation and yields of 9,000-15,000 nuts per ha could be obtained.

3.3.4 Production

The average district production can be estimated at 63 million nuts a year. 8% of the production is used for copra manufacturing 92% for fresh consumption. 29% of the husks are used for fibre production. The other husks are used for domestic fuel or for water conservation measures, but a large part is just wasted.

The potential production from the present coconut area with the existing varieties can be estimated between 200-250 million nuts a year, hence there is considerable scope for production increase.

3.3.5 Cultivation Methods

The dominant variety is the tall palm (typica variety) with an economic productive lifetime of 50-60 years and a non-productive juvenile stage of 7-10 years. King coconut and dwarf varieties are very rarely cultivated despite the ecological suitability of the district for hybrid varieties. This is mainly due to the limited availability or planting material. Hybrid coconut is unknown by most of the farmers. The availability of hybrid seedlings is also limited. Dwarf varieties are quite a different crop from tall varieties both in appearance and in husbandry. Dwarf varieties do not permit intercropping because of their high planting density. As the experience with dwarf varieties in Sri Lanka's is limited it would be very hazardous to weigh dwarf varieties against traditional varieties which can be intercropped with grass for livestock or intercropped with minor export crops. The planting of dwarf varieties in Matara is still in an experimental stage.

The recommended spacing of tall palms in the region is 8m x 8m or 160 trees per ha. However, in Matara only a restricted part of the area is planted under this recommended spacing as shown in Table 3.15.

Table 3.15 Density and percentage of area by spacing class

	Average density trees/ha.	Irregular spacing (% of acreage)	Regular spacing (% of average) 360 trees per ha.	300 tr. per ha.	240 tr. per ha.	160 tr. per ha.
Homesteads	200	60	7	10	13	10
Plantations	180	45	8	12	17	18

Soil and moisture conservation works are only practised in very few instances. Weeding, mostly carried out with a mammoty, is generally done. The percentage of coconut lands fertilized fluctuates between 8-15%. 10-20% of the area under pure stands is fertilized. In homestead gardens this figure is 3-6%.

No increase in the utilization of fertilizer can be observed in the last 10 years. The amount of fertilizer applied is 3.5 kg per tree on land which is fertilized. This is 1 kg less than the recommended rate. There is no difference in the dosages applied between different categories of cultivators.

Pesticides are not applied although problems of pests and diseases are widespread: 64% of the cultivators report problems in this respect. Damage by insects, black beetle, red weevil and coconut scale is the most important.

Intercropping is generally practised particularly in the homestead gardens. The relative share of intercrops varies according to the agro-ecological zones. In WL_4 the share of coconut in homestead gardens is the highest, i.e. almost 70% of the area. Here intercropping is relatively restricted. In WL_2 coconut occupies only 30% of homestead gardens and intercrops are much more important.

3.3.6 Prices

Government interferes in the pricing of coconut products in different ways: a) by fixing contingencies on exports and levying customs duties

b) by domestic price setting

The export of commercial grade copra is banned. The coconut oil is exported only when there is a surplus over the local needs. The shippers of coconut oil and desiccated coconut receive a fixed price, the Export Cost Price (E.C.P.). The difference between the F.O.B. export price and the E.C.P. is absorbed by the Customs Duty.

Local prices receivable by millers of desiccated coconut and copra or coconut oil are fixed by the Government, presently at Rs.7,600 per metric tonne for desiccated coconut; Rs.5,205 per metric tonne for copra & Rs. 8,750 per metric tonne for coconut oil.

The retail price of coconut oil is also fixed by the government presently at Rs.7,00 a bottle. Government keeps buffer-stocks in order to implement this fixed retail price.

As a result, the domestic prices of coconut are strongly influenced by these government measures. In mid 1980, the average farm-gate price was Rs.1,000/- for 1000 coconuts.

The prices received by small holders are generally less than the prices received by estate owners. Small holders receive Rs.100/-less per 1000 nuts than the estates.

Coconuts are sold either with or without husks. In the interior of the district prices paid for unhusked nuts are Rs.30/- per 1000 nuts less than those paid for husked nuts since transporting husked nuts is more efficient. In the coastal belt where the coconut processing industries are located no such price difference exist.

For non-kernal products there is only a restricted government intervention. An ad-valorem duty of 15% is charged on exports of fibre and fibre products. The shell products (charcoal) are exported duty free. Hence, the World Market prices generally influence the local market prices for the non-kernal products.

In contrast to the other coconut products, the prices of husks vary within the regions in the district. In the northern zone of the district husks are not sold. In the centre prices of brown husks are Rs.10 - Rs.15 per 1000 nuts. No green husks are sold. In the coastal zone the prices of brown husks are Rs.35 - Rs.50 per 1000 nuts and Rs.80 - Rs.120 for green husks. Green husks allow the production of white fibre of which the value is higher than that of brown fibre. The price of charcoal ranges between Rs.1,600 - Rs.2,400 per metric ton. The economic price of coconuts can roughly be estimated as follows:

The price of coconut oil and desiccated coconut expressed in 1000 nuts equivalents was in 1979 about Rs.2,600/- Colombo harbour F.O.B. Processing costs are about 10% of the value of coconuts. Margins for shippers and dealers vary by region and distance but since they are under government control will generally not exceed 10-20%.

i.e. the ratio $\frac{\text{Economic price}}{\text{Market price}}$ is 2 to 2.3

3.3.7 Input Prices

As for paddy the fertilizers for coconut are subsidized. However, inputs other than manual labour are hardly used in coconut cultivation.

3.3.8 Input-output analysis of coconut cultivation

At present homestead gardens and small coconut plantations show other input-output relationships than big plantations of over 8 hectares. In the potential situation there need not be any difference.

Most of the labour for harvesting and cultivation is hired labour. The present wage rate in the district is about Rs.15 a day. Coconut fertilizer is to be valued at Rs.1/kg.

Table 3.16 Present input-output relationships for coconut cultivation in homesteads and small plantations (on a hectare basis)

	Labour input (mandays)	Material inputs	Costs (Rs.)
Harvesting	22		330
Cultivation	17		255
Other activities	3		45
Total	42	None	630

Density : 200 trees/ha
Yield : 3,600 nuts
Price : Rs.0.90/nut
Gross value of production: Rs.3,240
Value added : Rs.3,240
Gross margin : Rs.2,610

Table 3.17 Present input-output relationships for coconut cultivation in big plantations (on a hectare basis).

	Labour input (mandays)	Material input	Costs(Rs.)
Harvesting	35		525
Cultivation	25		375
Other activities	5		75
Fertilizer (3.5 kg/tree)		630 kg	630
Total	65		1,605

Density : 180 trees/ha.
Yield : 5,400 nuts
Gross value of production : Rs.5,400
Value added : Rs.4,770
Gross margin : Rs.3,795

Table 3.18. Potential input-output relationships for coconut cultivation (on a hectare basis)

	Labour input (mandays)	Material inputs	Costs(Rs.)
Harvesting	75		1,125
Cultivation	25		375
Other activities	15		225
Fertilizer (5 kg/tree)		800 kg	800
Pesticides and insecticides		To be applied if pests & diseases occur	
Total	115		2,525

Density : 160 trees/ha.

Yield : 12,000 nuts

Gross value of production : Rs.12,000

Value added : Rs.11,200

Gross margin : Rs. 9,425

3.4. TEA

3.4.1 Area

Table 3.19. The tea extent in Matara district

(Unit: ha.)

Category	WM_1	WL_1	WL_2	WL_4	TOTAL
S.P.C. Estates	1,700	500	1,400	-	3,600
Private Estates (4 ha.-20 ha.)	2,300	1,800	1,600	-	5,700
Small Holders (4 ha)	2,300	2,600	500	-	5,400
Encroachers	1,500	2,200	200	-	3,900
Total	7,800	7,100	3,700	-	18,600

The tea area in the district has increased considerably over the last 20 years:

	Estates (Ha.)	Small Holders (Ha.)	Total(Ha.)
1959	8,700	2,000	10,700
1969	9,500	4,300	13,800
1980	9,300	5,400	14,700

Encroachments should be added to these figures. A rapid increase in the number of encroachments since the mid-sixties resulted in a total encroached, i.e. unregistered area of almost 4,000 ha. in 1980.

According to the Land Suitability Map the extents suitable for tea are the following in each agro-ecological zone:

WM_1	: 7,200 ha.
WL_1	: 6,700 ha.
WL_2	: 7,800 ha.
WL_4	: 800 ha.
District	: 22,500 ha.

In WM_1 and WL_1 together the present tea extent is 1,000 ha. larger than the suitable area. This is confirmed by observations of the Tea Master Plan (1980) which estimates that about 1,100 hectares are unsuitable for tea (yield perspectives below 600 kg/ha) in Matara.

In the other agro-ecological zones particularly in WL_2 there is scope for considerable increase of the tea area. At present these lands suitable for tea cultivation are predominantly used for rubber and coconut plantations. The tea revenues per hectare are considerably higher than those of rubber and coconut.

The T.M.P. recommends emphasis on rehabilitation rather than on extension of the tea area. However, possibilities for increasing the tea area in the District are not excluded by T.M.P.

3.4.2 Yields

The average yield in Matara district is about 1,000 kg made tea per ha.[1] The national average is 900 kg/ha. and Matara can be categorized as one of the six highest ranking districts in the country.

Table 3.20 presents the average yields on estates.

Table 3.20 Tea Yields on Estates (40 ha.) in Matara district

(Unit: kg/ha. made tea)

Year	Seedling Tea	Clonal Tea
1970	1,180	1,690
1971	1,080	1,550
1972	1,070	1,750
1973	1,080	1,710
1974	960	1,920
1975	900	1,860
1976	740	1,400
1977	860	1,630

Source: T.M.P. (1980)

The proportion in seedling tea in 1970 was 85% and in 1979 62%. The average estate yield in Matara was 1,250 kg/ha. in the normal year 1977 and 1,070 kg/ha. in the dry year 1979.

The decline in tea yields particularly of seedling tea corresponds with the island wide pattern observed since 1968. The threat of nationalisation of tea plantations since 1956, created a degree of uncertanity in the minds of plantation owners which discouraged re-investments on their plantations. Consequently, fertilizer application was reduced, machinery and equipment were seldom replaced. This

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[1] T.M.P. estimates an average yield of 1300 kg/ha. for the district. However, T.M.P. does not take in to consideration about 4,000 ha. non-registered encroached lands of which the green leaf produced is manufactured in the district and included in the total district made tea production figures.

coupled with heavy taxation, restraints in the repatriation of capital falling world market prices and so on resulted in the tea plantations gradually falling into a stage of neglect. The complexities caused in the estate management after the land reforms of 1972 and 1975 and the adverse weather conditions in the 1970s further contributed to the decline in tea yields.

Tea yields of small holders (750 kg/ha.) are lower than the estate yields. The quality of the green leaf too is considerably lower than that of the estates. One third of the respondents of the Tea Small Holders Survey (1980) reported decreasing tea yields over the last 10 years due to declining soil fertility and drought. Yields of the privately owned small estates can be estimated at 1,100 kg/ha.

Table 3.21 summarizes the present yields per agro-ecological zone. The present yields in the district are low when compared to the potential yields. Potential yields are at least twice as high as the present yields. Estimates of potential yields are indicated in table 3.22. It is assumed that clonal tea will be the exclusive growing stock in the long run and that cultivation practices will be optimal.

Table 3.21 Present tea yields in Matara district

(Unit:kg made tea/ha.)

	WM_1 + WL_1		WL_2		Average
	Clonal	Seedling	Clonal	Seedling	
S.P.C. estates	1,800	1,000	1,500	800	1,250
Private estates	1,800	800	1,500	500	1,100
Small holders / Encroachers	1,500	350	1,200	250	750
Average					1,000

Source: T.M.P. (1980).

Table 3.22. Potential tea yields in Matara district.

(Unit: kg made tea/ha.)

WM_1	WL_1	WL_2
2,700	2,700	2,300

In the zones WM_1 and WL_1 75% of the years will see a 1.5 months drought period. Generally such a drought period will not influence yields. In WL_2, however, the drought period is about 2-2.5 months which could affect yields, hence a lower average yield is expected. Also in areas frequently affected by drought, cultivators prefer to keep a certain area under seedling tea which is more drought resistent.

Soils characteristics and rainfall pattern make WL_4 almost entirely unsuitable for tea cultivation. T.M.P. estimates that potential yields of 2,000 kg/ha. for seedling tea and 2,400 kg/ha. for clonal tea are attainable in 5 to 10 years. Hence, it is assumed that the potential production levels indicated in table 3.22 could be realized in 10-15 years.

3.4.3 Production

The total production in Matara district in 1977 was 17,800 tonnes of made tea of which 4,500 tons produced on estates and 13,300 tonnes from bought leaf. Almost all the tea produced in the district is the low grown tea. In 1979, tea production was 10-20% lower due to the prolonged drought. As in Galle district, Matara is in the exceptional position of having a large share of the tea produced by small holders and private small estate owners.

The agronomic production potential from the existing tea area is estimated at 45,000 tons. If in zone WL_2 the tea area is extended to cover the entire area suitable for tea, the potential production could even be 54,000 tons. Hence, a production increase of 27,000 tons to 36,000 tons could be agronomically envisaged.

Market constraints however will prevent realization of these potentials. T.M.P. estimates a marketable quantity of low grown tea of 87,000 tons in 1985. This implies a production increase of 24,000 tons compared to 1980 figures for the whole Island.

For Matara the TMP expects that a production increase on the SPC estates from 4,500 to 6,750 tonnes within 5 years is feasible (50% increase). To other producers (small holders, small estate owners) TMP does not make any reference. If these categories would realize a comparable production increase the total production in the district would be 26,700 tons, an increase of 8,900 tons. If there were no change in the share of Matara in the national low grown tea production, the increase of the district quantity should not exceed 6,500 tons. Hence, unless Matara enlarged its production share, the output increase envisaged on the SPC estates should not take place to the same extent by other producers as it would result in marketing problems.

3.4.4. Cultivation Practices

THE GROWING STOCK

Sixty five percent(65%) of the tea area in Matara district is seedling tea and the balance clonal tea. The proportion of clonal tea is one of the highest in the country. 60% of the growing stock is younger than 40 years. Since 1970, 2,000 registered hectares have been planted of which 700 ha newly planted tea and 1,300 ha. replanted tea. The non-registered plantings in this period can be estimated to be at least 2,000 ha. Most of the newly planted and replanted tea is clonal. The clonal teas are well managed on estates as well as on the small holdings. The seedlings plantations show vacancy rates from 15-30% and are generally better managed on estates.

PLUCKING

Ideally the leaf harvested should consist of two leaves and a bud, but three leaves and a bud are also accepted. Particularly small holders to harvest large quantities tend to pluck even more leaves per bush which results in low quality tea.

WEEDING

Weeding is generally done by scraping the soil with the mammoty or pulling out weeds by hand. This method causes serious erosion. Clonal tea suppresses weed growth and weeding is hardly necessary here.

FERTILIZER

The Tea Research Institute(TRI) assumes a linear relationships between fertilizer application and yields: 10 kgs fertilizer per 100 kgs of made tea. Table 3.23 presents the average annual fertilizer application in Matara.

Table 3.23. Average annual fertilizer application by yield category

(Unit:%)

Fertilizer application in terms of nitrogen	Yield category (kg made tea/ha) 1000	1000-1400	1400-2000	2000	Total
100 kg/ha.	88	55	6	0	
100-140 kg/ha.	10	10	11	0	
140-200 kg/ha.	1	11	34	0	
200 kg/ha.	1	24	49	100	
Total	100	100	100	100	100
% of area in yield categories	82	13	4	1	100

Source: T.M.P. 1980.

In the lowest yield category (82% of the area), fertilizer applications are accordingly low. In the lower-middle yield category (13% of the area) fertilizer applications are mostly below TRI recommendations. In the upper-middle and high yield categories (5% of the area) fertilizer applications correspond to or even surpass TRI recommendations.

PESTS & DISEASES

Generally, pests and diseases of tea are kept under control. TRI developed conclusive pesticides against the major pests and diseases as plister plight, poria, shot-hole borer and livewood termite.

PRUNING

Pruning takes place to maintain tea as a bush, to cut away disease infested branches and to keep the bushes at the required height for plucking. Pruning cycles of seedling tea are 2 years. On clonal teas the pruning cycles are extended to 3 years.

PLANT DENSITY

Recommended bush density of seedling tea is 7,500 plants per ha. and for clonal tea 12,300 plants per ha. Infilling does not adequately take place resulting in vacancy rates up to 30%.

REPLANTING

Replanting takes place when yields are declining. For seedling tea this generally occurs after 60 years; clonal tea is expected to have a productive life time of about 40 years.

Since the development of the high yielding clonal teas, many cultivators replace seedling tea for clonal tea even before the end of its productive lifetime.

MANUFACTURING

Manufacturing of black tea, the tea produced in Sri Lanka, entails five different processes: withering, rolling, fermentation, drying, sifting and grading. There are two methods of manufacturing, the orthodox method and the CTC technique (CTC : cutting tearing curling). In Sri Lanka the orthodox method is generally applied.

There are 48 factories in the district with a total daily intake capacity of about 182,000 kgs green leaf.[1] The annual intake is determined by the possible number of plucking days; a certain annual production can be realized with a varying number of plucking days depending on the stand of the bushes, the drought periods, etc. The maximum annual intake on the basis of 300 plucking days would be around 55 million kgs of green leaf. Annual production of green leaf in Matara is about 81 million kgs. Hence, existing factory capacity hardly meets the demand and complaints about short-falling factory capacity are commonly observed. Generally, factory equipment is 20-30 years old and requires replacement.

3.4.5. Inputs in Tea Cultivation

The main input in tea cultivation is labour and the main factor determining labour input is the yield level. Therefore, table 3.24 presents different input levels in relation to yields.

The relation between the number of plucking days and the yields has been estimated by regression analysis (see T.M.P.) leading to the following exponential equation:

$$P = 3.6\ (Y)^{0.664} \qquad r = 0.934$$

P = Number of plucking days/ha/year

Y = Yield in kg made tea per ha.

Field sundry labour includes all field cultivation other than plucking. Weeding is the most important activity of field sundry. Sundry labour is almost independant of the yield levels. Most important in this respect is the elevation: low grown tea requires 20% more weeding than

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[1] The average daily intake of the 20 SPC factories is 3773 kgs. green leaf per fac. (SPC 1980). TMP's sample survey on factories in Matara calculates an average daily intake of about 4318 kgs. green leaf per fac. It should be noted that the figure on the factory capacity in the district presented in the Matara Tea Factory Survey (1978) of nearly 363,636 kgs. green leaf per day is virtually too high.

high grown tea. With sundry labour remaining almost constant employment in tea cultivation grows proportional to production.

The relation between factory labour and yield per hectare is theoretically determined since factories do not only manufacture own leaf but also bought leaf.

The plucking is entirely by female labour and the other activities rely on male labour.

Table 3.24 Present Input use in tea cultivation (per ha.)

Yield levels (kg made tea/ha)	500 kg/ha	1000 kg/ha	1500 kg per ha.	2000 kg/ha.
Labour (mandays)				
Plucking	225	350	460	560
Sundry (weeding, pruning, fertilizer and herbicides application)	180	170	170	160
Transport	5	10	10	10
Manufacture*	20	35	50	70
Total	430	565	690	800
Fertilizer (units)	-	100kg	180kg	200kg
Pesticides, herbicides	variable	variable	variable	variable
Number of chests	12	25	38	50

* On the basis of an output of 30 kg made tea/day/labourer

Source: TMP (1980) and own estimates.

3.4.6. Prices

Domestic tea prices are determined by World Market prices and the export duties imposed by the Sri Lanka Government. Sri Lanka is a major producer and provides about 25% of the world net export availability. As a result Sri Lanka's production and domestic price policy influence the World Market prices to a certain extent. World Market prices declined steadily until the early 1970s. The price of tea in real terms was in 1971-1972

about half of its 1955 level. From 1973 onwards however, prices moved up until 1977 as a consequence of increase in tea consumption. Prices peaked in 1977 due to high coffee prices and a feared shortage of tea. After 1977 prices declined again.

TAXATION MEASURES

The principal taxation measures on the Sri Lanka tea industry are:

- Export duty, applied as a fixed duty amounting to Rs.1,550/kg on bulk tea in 1979.
- Ad valorem tax, applied as a fixed levy on the increment of auction sales price above a specified minimum. The 1979 levy is 50% and the minimum is Rs.10/kg.
- Tea Board Cess, applied as a fixed levy of Rs.0.70/kg in 1979.
- Corporate Income Tax, applied as a fixed percentage tax to net earnings before tax.
- The resulting effective tax rates at current price levels (an average F.O.B. price of Rs.32/kg and an average Colombo Auction price of Rs.16) are presented in Figure 2.

In 1978, the revenues from the export tax on tea were Rs.3,000 million and the revenues from ad valorem tax were Rs.414 million. Both taxes are collected at or after the auction sale. In the course of 1980 the export duty was reduced to Rs.10.50/kg on bulk tea and the ad valorem tax minimum increased to Rs.12.00/kg. The domestic tea prices resulting from World Market prices and government taxation measures are presented in table 3.25.

Figure 2 : EFFECTIVE TAX RATES ON TEA INDUSTRY IN SRI LANKA

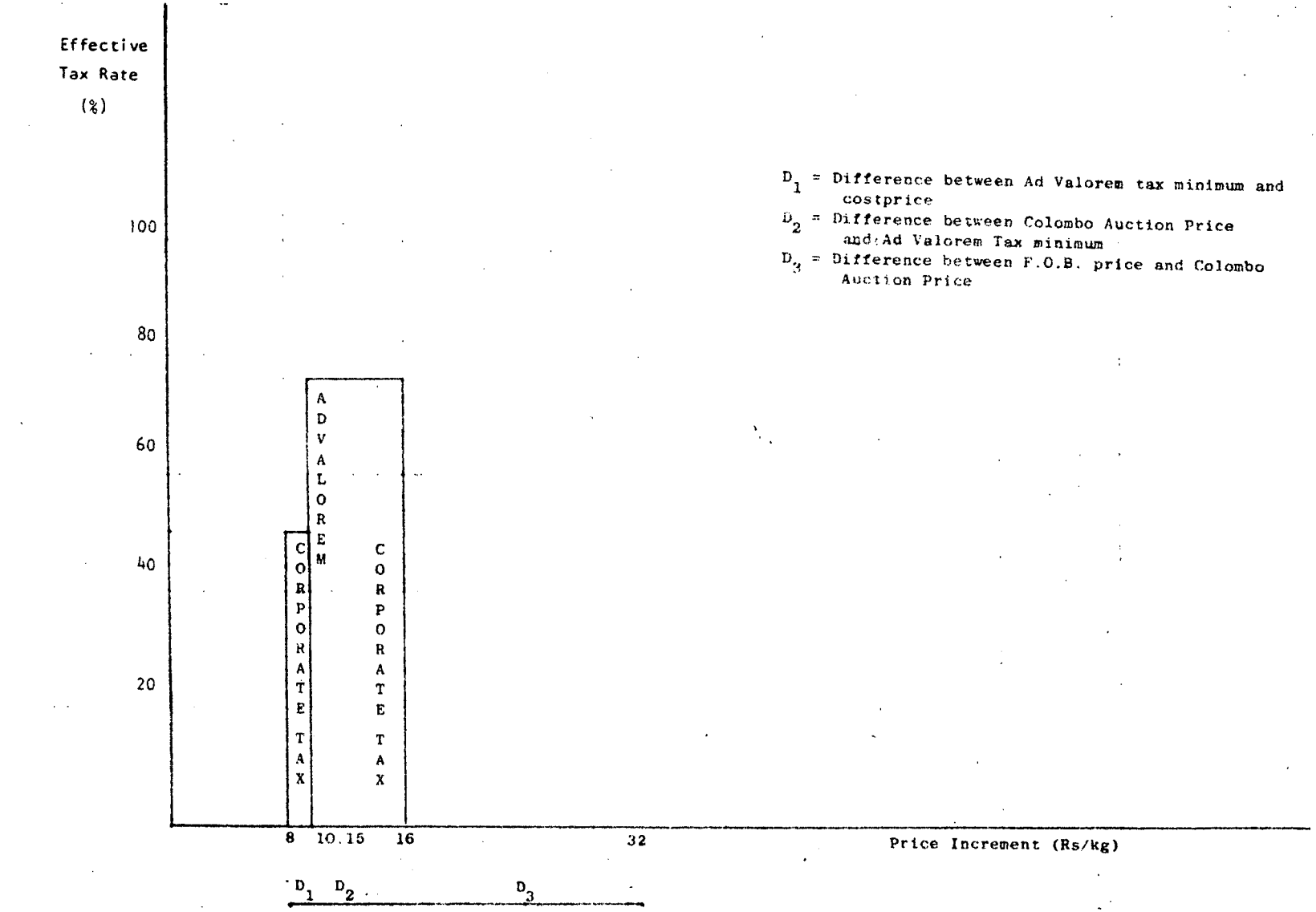

Table 3.25 Annual average tea prices Colombo auctions 1970-1980

(current prices)

(Unit:Rs./kg made tea)

Year	High grown	Medium grown	Low grown	All Tea
1970	4.6	3.6	3.1	3.7
1971	4.6	3.9	4.0	4.1
1972	4.7	4.1	4.4	4.4
1973	5.0	4.0	4.0	4.3
1974	7.1	6.2	6.7	6.6
1975	7.1	6.3	7.2	6.8
1976	9.6	8.7	9.3	9.2
1977	16.5	14.8	16.8	16.1
1978	13.6	10.7	17.4	14.1
1979	13.4	10.4	12.5	12.2
1980*	11.4	9.1	13.7	11.4

* Forecast

Source: T.M.P.(1980)

ECONOMIC PRICES

Government's taxation measures create an important discrepancy between domestic prices and international prices.

The F.O.B. price = Auction price + buying commission + handling/ financing charges + duty and cesses.

The buying commission is 2% of the auction price; handling and financing charges are Rs.0.50/kg; duty on domestic prices is 1.02/kg. Hence, the ratio of F.O.B. to domestic prices is:

$$\frac{1.02 \text{ (auction price)} + \text{Rs.}16.70}{\text{auction price}}$$

In 1979 this ratio was $\frac{1.02 \times 15.80 + 16.70}{15.80} = 2.08$

FUTURE PRICES

F.A.O. considering supply and demand until 1985 predicts a future price level around the low 1972-1974 levels (in constant 1979 prices). The World Bank assumes a faster growth of world tea production which will result in a future price level below the 1972-1974 levels. The T.M.P.s forecasts based on FAO and World Bank figures are presented in Table 3.26.

Table 3.26 Tea Price forecast - Sri Lanka tea (constant 1979 prices)

(Unit:Rs./kg made tea)

	Colombo Auctions				London
	High grown	Medium grown	Low grown	Average	Auctions*
1981	11.3	9.0	13.6	11.3	29.8
1982	11.2	8.9	13.4	11.2	29.7
1983	11.0	8.8	13.3	11.0	29.6
1984	10.9	8.8	13.1	10.9	29.5
1985	10.9	8.7	13.0	10.9	29.4
1990	10.6	8.5	12.8	10.6	29.2

Source: T.M.P. (1980)

* Exchange rate : £ = Rs.30/-

Considering the fact that Sri Lanka is a major supplier of tea to the international market it may be argued that the future economic price of tea is equal to the marginal value of increased tea production.

The price elasticity of tea is -0.3. Thus, the unit value of increased tea production would be (1.0-0.3) x 100% = 70% of the World Market price forecasts. However, as demonstrated in the demand study (Annex 2), Sri Lanka's eventual production increase would replace India's expected reduction in future exports.

The price forecasts in table 3.26 are based on a balanced world demand supply position. Hence, it is implied that shortfall in supply

consequent on the reduction of India's tea exports would be met. Therefore, it is assumed that economic prices of Sri Lanka teas would be about the projected World Market prices.

3.4.7 Input-output analysis of tea

Table 3.27 Present input-output relationships of low green tea

Yield levels (kg made tea/ha.)	500		1000		1500		2000	
Labour	Mandays	Rs.	Mandays	Rs.	Mandays	Rs.	Mandays	Rs.
Plucking	225	2,700	350	4,200	460	5,520	560	6,700
Sundry	180	2,520	170	2,300	170	2,300	160	2,240
Transport	5	70	10	140	10	140	10	140
Manufacturing	20	280	35	490	50	700	70	980
Total labour	430	5,570	565	7,210	690	8,740	800	10,080
Material inputs								
Fertilizers	-	-	100kg	500	180kg	900	200kg	1,000
Other costs and general charges	-	1,400	-	1,900	-	2,400	-	2,800
Total costs		6,970		9,610		12,040		13,880
Yield levels (kg/ha.)		500		1,000		1,500		2,000
Value or production 1979		6,500		13,000		19,500		26,000
Value added		5,100		10,600		16,200		22,200
Gross margin		(- 500)		3,400		7,500		12,000

"Other costs + general charges" are estimated at about 20% of the total costs. On SPC estates this figure is higher; about 30%. Consequently, the figures for SPC estates are:

Yield levels(kg/ha.)	500	1,000	1,500	2,000
Total costs	7,970	11,000	13,700	15,900
Value added	4,100	9,200	14,500	20,200
Gross margin	(-1,500)	2,00	5,800	10,100

Table 3.28 Future input-output relationship of low grown tea

Yield levels (kg made tea/ha.)	2,300		2,700	
Labour	**Mandays**	**Rs.**	**Mandays**	**Rs.**
Plucking	610	7,320	680	8,160
Sundry	135	1,890	130	1,820
Transport	15	210	20	280
Manufacturing	75	1,050	920	11,520
Total labour	835	10,470	920	11,520
Material inputs				
Fertilizer	230kg	1,150	270kg	1,350
Other costs and general charges		2,900		3,300
Total		14,520		16,170
Yield(kg/ha.)	2,300		2,700	
Value of production	29,900		35,100	
Value added	25,900		30,500	
Gross margin	15,400		19,000	

"Other costs + general charges" are estimated at 20% of the total costs.

3.5. RUBBER

3.5.1. Area

Table 3.28 Rubber extent in Matara District

(Unit: hectares)

Category	WM_1	WL_1	WL_2	WL_4	Total
S.P.C. Estates	-	300	1,000	-	1,300
Private Estates (4-20 ha.)	100	500	2,200	200	3,000
Small holders (< 4 ha.)	400	900	4,100	300	5,700
Total	500	1,700	7,300	500	10,000

Whereas in most other districts a shift from rubber to other crops took place the rubber area in Matara has been rather constant. The area suitable for rubber cultivation is considerably larger than the present rubber area - the land suitability map indicates an area of 25,000 ha. suitable for rubber. Land suitable for rubber are especially located in WL_2 (19,000 ha.) and WL_4 (6,000 ha.). In WM_1 and the Northern part of WL_1 the elevation is too high for rubber. In WL_2 on lands suitable for rubber, but not used as such one finds mainly scrub and to a lesser extent tea and homesteads. In WL_4 the present land use of lands not planted with rubber, but suitable for rubber is coconut and to a lesser degree scrub lands. Generally, lands suitable for rubber are suitable for coconut as well.

One can conclude that there is a considerable scope for increase of rubber cultivation in the district.

3.5.2. Age Distribution

Table 3.29. Age distribution of rubber trees in Matara District

Age class (years)	%
0 - 7	-
8 - 13	20
14 - 17	18
20 - 25	27
26 - 31	20
32 - 37	6
+ 37	9
	100

Source: RMP (1979)

First tapping is possible after about 7 years. The productive life time of a tree is 18 years out of 25 years field life. However, with good tapping practices life expectancy can be extended to more than 30 years. With poor maintenance and over-tapping life expectancy could be less than 20 years. In Matara 34% of the rubber trees have

a remaining lifetime of less than 5 years and should thus be uprooted within that period.

3.5.3. Yields

Rubber yields on the SPC Estates vary between 700 kg/ha. and 1,100 kg/ha with an average of about 800 kg/ha. dry rubber sheets (per hectare of mature trees). No data are available on rubber yields among small holders and private estates in the District. Records of the latex yield of suppliers to the Mawanella crumb factory reveal yields of 830 kg/ha. for small holders (< 4 ha.) and of 790 kg/ha. for small private estates (4 - 20 ha.).

The average national yield for small holders and private estates is 750 kg/ha. There is no reason to assume that Matara would deviate considerably from these figures.

There is no evidence of different rubber yields in the agro-ecological zones. Rubber yields can be improved. The potential rubber yields with appropriate management practices can be estimated at 1,000 - 1,500 kg/ha. in the Matara district. Small holders generally applying the S/2 D/1 tapping[1] can expect a lifetime of 20 years and an average yield of about 1,300 kg/ha. Estates generally applying the S/2 D/2 system can expect a lifetime of 26 years and an average yield of about 1,500 kg/ha.

3.5.4. Grades

Rubber is processed in different grades. The grades are:

Ribbed smoked sheets (R.S.S.), Latex Crepe, Sole Crepe, Scrap Crepe, Latex Concentrate, Block Rubber.

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[1] Rubber Tapping Terms:
S/2 = half spiral 2S/2 = 2 half spirals S/4 = quarter spiral
D/1 = every day D/2 = every other day
The bark of a tree is divided into 4 panels which are tapped in sequence.

R.S.S. is further sub-graded into 5 R.S.S. grades numbered 1-5. R.S.S. is the most important grade produced in Sri Lanka: about 60% of the total production. In Matara only R.S.S. grades are produced on estates as well as on small holdings.

According to a survey conducted in Kalutara and Ratnapura, small holders produce lower R.S.S. grades than bigger holdings as shown in table 3.30.

Table 3.30. Size of holding and grade distribution of Ribbed Smoked Sheets (R.S.S.)

	Percentage RSS Grades					Mean Price
	1	2	3	4	5	Rs/kg
Holding size(ha.)						
0 - 0.4	16	12	64	6	2	6.48
0.4 - 1.6	7	20	61	10	2	6.83
1.6 - 4.0	22	30	40	8	-	7.01
4.0 - 10	19	44	32	5	-	7.11
10 - 20	14	63	21	2	-	7.34
Mean	14	32	47	6	1	

Source: R.M.P.(1979)

3.5.5. Production

The total production of the small holders and private estate sector is not known. Considering the areas and average yields production can be estimated at 7,000 tonnes R.S.S. The S.P.C. produces about 1,000 tonnes R.S.S, hence, the District production can be estimated at 8,000 tonnes R.S.S. This corresponds with 5.1% of the national rubber production.

The potential production from the existing rubber area can be estimated at 13,000 tonnes R.S.S. If the rubber area were extended to the total area suitable the total district production would even reach 33,000 tonnes R.S.S.

Natural rubber has very favourable World Market prospects. Consumption projections show higher growth rates than production projections and substantial replanting and new planting will be necessary to meet the projected demand. For Sri Lanka, the problems related to production increase will constitute a constraint, World Market conditions will not.

The R.M.P. foresees that national production could increase from 156,000 tonnes in 1980 to 202,000 tonnes in 2000. For the private sector in Matara district R.M.P. proposes 4,300 ha. replanting and 1,100 ha. new planting in the period 1980-2000.

For the S.P.C. estates R.M.P. proposes 1,100 ha. replanting and 250 ha. new planting in the same period. This programme would result in a total district production at the end of this century of about 14,000 tonnes dry rubber which represents an annual increase of 2.8% over 20 years.

3.5.6. Cultivation Practices

PLANTING MATERIAL

Rubber can be propagated by seedlings or by bud grafts. About 80% of the planting material used are bud grafts. The most popular clone is PB 86.

DENSITY, GROUND COVER AND SOIL CONSERVATION

The average density is about 350 trees per ha. which is as recommended. Ground cover is adequate and soil conservation measures in the form of drains, stone walls or terraces are generally well constructed. No figures for Matara district are available, but island wide 80% of the area has good ground cover and soil conservation status.

FERTILIZERS AND USE OF AGROCHEMICALS

Fertilizer use by small holders is much less than the quantities recommended. An island wide field survey revealed that only 25% of

the holdings had been given fertilizer in 1978. The average fertilizer use on SPC estates in Matara district was in 1979 200 kg/ha. The recommended average quantity is 400 kg/ha.

Fertilizer applications according to the RRISL recommendations are the major condition for an increase in yields.

Herbicides and chemicals are rarely used, but there is no evidence of damage by panel diseases or root diseases in the district.

TAPPING PRACTICES

The majority of the trees on small holder's plots are opened at an average girth of 46 cm. This is less than the recommended opening girth of 51 cm. On estates the average opening girth is 50 cm.

Most small holders apply the S/2 D/1 tapping system and starts more intensive tapping in early stages. On small estates the general practice is S/2 D/2. On S.P.C. estates the following practice is applied.

S/2 D/2 until 7 years before uprooting
S/2 + S/4 D/2 during 4 years
2S/2 D/2 during 2 years
2S/2 D/1 for 1 year (slaughter tapping)

The annual bark consumption is of vital importance for the lifetime and yields of rubber trees.

Bark consumption is generally 3-8 cm. above the standard annual limit of 18 cm. Smaller farms use the available bark at a more rapid rate than large farmers. Bark renewal here is generally poor.

INTERCROPS

Intercropping of rubber lands usually does not take place, particularly among small holders. There are however substantial possibilities for

intercropping during the immature stages and recent studies conducted by the Rubber Research Institute show encouraging results.

PROCESSING & MARKETING

Most of the private sector latex production is processed into RSS (Ribbed Smoked Sheets). There are three stages in this process:

- Coagulation with acid
- Milling through rollers into ribbed sheets
- Curing in a smoke house to dry and to prevent mould development.

Table 3.31. RSS Production by size of holdings

(Unit:%)

	Coagulation by		Rolling by		Smoking by	
	Holder	Contractor	Holder	Contractor	Holder	Contractor
1 ha.	95	5	34	66	69*	27
1 - 2 ha.	97	3	72	28	73	27
2 - 20 ha.	98	2	97	3	98	2

* A part of the sheets is not smoked.

Source: R.M.P.(1979)

Processing takes place in very small plants with a daily production varying from a few sheets to several hundred sheets.

The general feature is that most of the small holders produce a smoked sheet ready for marketing. In Matara there are two group processing centres processing a very restricted part of the district's latex production. The sheets are sold to dealers in the villages. The village dealers sell the rubber to middle-level dealers in towns mostly for cash. The middle-level dealers sell to shippers in Colombo or Galle who pay a 60% spot advance. The balance is paid after grading and sorting by the shippers. Apart from dealers the Commodity Purchase Department buys sheet and scrap from small holders. In Matara district there are 4 C.P.D depots with a total turnover of 640 tons in 1978.

SPC estate latex in Matara is almost completely processed into RSS on the estate. In this respect Matara is rather exceptional; in other

districts most of the SPC latex is processed into crepe rubber in factories. No processing on behalf of small holders takes place by the SPC Estate rubber is directly sold to CPD.

3.5.7. Prices

Domestic rubber prices are determined by World Market prices and Government export duties. F.O.B. rubber prices are presented in table 3.32.

Table 3.32. Average F.O.B. value per kg of natural rubber exported

(Unit:Rs./kg)

	R.S.S.	Sole Crepe	Latex Crepe	Scrap	Block Rubber	Average
1973	3.33	5.20	4.43	3.55	3.79	3.68
1974	5.40	8.53	6.59	4.43	5.33	5.75
1975	3.92	5.09	4.41	3.32	3.80	4.06
1976	5.66	10.02	8.00	5.64	6.40	6.49
1977	6.27	11.30	8.00	5.04	7.49	6.85
1978	14.78	18.56	14.60	12.36	14.89	14.64
1979	17.69	24.60	25.53	15.83	19.07	19.44

Source: Sri Lanka Customs returns.

RSS is the most important grade: 50% of the total exports. Latex crepe's share is 27% and scrap's share is 10% of the total exports.

The Sri Lanka Government imposes a sliding scale of export duties. The effects of the sliding scale export duties are indicated in table 3.33.

Table 3.33. Effects of sliding scale export duties for rubber

F.O.B. Value per kg. RSS 1 (Rs.)	Export Duty Payable (Rs.)	Export Duty as % of F.O.B. Value
12.00	5.35	44.6
14.00	6.85	48.9
16.00	7.85	49.1
18.00	8.85	49.2
20.00	9.85	49.3

Source: R.M.P. (1979)

Apart from the export duty three cesses are levied at a fixed rate on all rubber exported in addition to export duties.

In 1979 these cesses were:

- Rubber Control Cess : Rs.0.01/kg
- Rubber Research Cess: Rs.0.08/kg
- Medical Wants Cess : Rs.1.65/kg

Total : Rs.1.74/kg

Domestic prices are indicated in Table 3.34.

Table 3.34. Domestic Prices of Rubber

Comparative average Colombo Latex Crepe and RSS prices

Year	Latex Crepe I	R.S.S.I	R.S.S.2	R.S.S.3	R.S.S.4	R.S.S.5
1975	4.08	2.93	2.73	2.66	2.34	2.28
1976	6.23	4.34	4.05	3.95	3.83	3.54
1977	5.12	4.53	4.29	4.14	3.74	3.62
1978	7.78	6.93	6.38	6.17	5.26	4.94
1979	14.37	9.15	8.56	n.a.	n.a.	n.a.
1980	10.35	10.33	9.27	n.a.	n.a.	n.a.

Source: R.M.P.(1979), Central Bank

The average net sales price of RSS in Matara on estates was in 1980 Rs.9.31/kg dry rubber. No figures are available on small holder farmgate prices. Considering the high competition among village dealers no important discrepancy with estate prices would occur.

FUTURE PRICES

Prices of natural rubber are closely related to the prices of synthetic rubber which, in turn are dependent on the crude oil prices. With rising crude oil prices, the World Bank foresees rising natural rubber prices as presented in table 3.35.

Table 3.35. Natural rubber projected prices, 1980-1990, RSS I CIF New York.

	Constant 1979 US $/kg	(1 US $ 1979=Rs.16/-)
1980	1.20	19.20 Rs./kg.
1981	1.22	19.52 Rs./kg.
1982	1.21	19.36 Rs./kg.
1985	1.27	20.32 Rs./kg.
1990	1.36	21.76 Rs./kg.

Source: World Bank Ec. Analysis and Projections Dept.

Sole crepe prices will be 60% higher than RSS I prices. Other crepes will be 25% higher and Scrap will be 10% lower than RSS I prices.

ECONOMIC PRICES

The ratio between the economic price and the domestic price can be calculated as follows:

Economic price = F.O.B. price in Colombo = Rs.22.00 in 1979 (RSS I)

Handling charges	:	Rs. 0.38/kg
Cesses	:	Rs. 1.74/kg
Export duty	:	Rs.10.73/kg
Total	:	Rs.12.85/kg

Colombo Price: Rs. 9.15/kg

$$\text{Ratio} \quad \frac{\text{Economic Price}}{\text{Comestic Price}} = \frac{22.00}{9.15} = 2.4$$

3.5.8. Input-output analysis of rubber

Table 3.36. Present input-output relationships for rubber on small holdings (per ha.)

Labour	Mandays	Rs.
Tapping	220	3,080
Field sundry	25	350
Processing	20	280
Total	265	3,710
Material inputs		500
Total		4,210

Yield : 850 kg/ha.

Gross Value of production (Rs. 9/kg in 1980) : Rs. 7,650/-

Value added : Rs. 7,150/-

Gross margin : Rs. 3,440/-

About 40% of the total labour requirement is hired (rate Rs.14/day) hence the family income from 1 ha. rubber can be estimated at about Rs.6,000/.

Table 3.37 Present input-output relationships for rubber on small estates (per ha.)

Labour	Mandays	Rs.
Tapping	160	2,240
Field sundry	25	350
Processing	15	210
Total	200	2,800
Material inputs		500
General charges		700
Total		4,000

Yield	:	800 kg/ha.
Gross value of production (Rs. 9/kg in 1980)	:	Rs.7,200/-
Value added	:	Rs.6,000/-
Gross margin	:	Rs.3,200/-

Table 3.38. Present input-output relationships for rubber on S.P.C. estates (per ha.)

Labour	Mandays	Rs.
Tapping	175	2,450
Field sundry	60	840
Processing	40	560
Total	275	3,850
Fertilizer	200 kg	200
Processing material		500
Other charges and general charges		1,500
Total		6,050
Yield	: 800 kg/ha.	
Gross value of production	: Rs.7,200/-	
Value added	: Rs.5,000/-	
Gross margin	: Rs.1,150/-	

S.P.C. estates in the district show relatively low benefits. This is mainly due to inefficient labour use for field sundry and processing and high general charges which account for 25% of the total costs.

Table 3.39. Potential Input-output relationships for rubber (per ha.)

Labour	Mandays	Rs.
Tapping	180	2,520
Establishment and maintenance	60	840
Processing	30	420
Total labour	270	3,780
Fertilizer	400 kg	400
Processing materials		800
Other charges		1,500
Total		6,480
Yield	: Rs.1,400/ha.	
Gross value of production	: Rs.14,000/-	
Value added	: Rs.11,300/-	
Gross margin	: Rs. 7,520/-	

3.6. CINNAMON

3.6.1. Area

Table 3.40 Cinnamon area in Matara district

(Unit:ha.)

	WM_1	WL_1	WL_2	WL_4	Total
Pure stands	-	-	3,400	800	4,200
Intercropped	600	600	1,200	300	2,700
Total	600	600	4,600	1,100	6,900

Almost the entire extent of cinnamon in Matara is cultivated on land marginal for growing other crops. Cinnamon is not a very exigent crop and can be cultivated where other crops do not succeed. Zone WM_1 is not suitable for cinnamon cultivation. Although no statistics are available it is probable that the cinnamon area has increased in recent years, particularly on encroachments where it is grown as a cash crop.

3.6.2. Age

Table 3.41. presents the age distribution of the growing stock in **Matara district.**

Table 3.41. Age distribution of cinnamon in Matara

Age	Area(%)
10 years	27
10-20 years	37
20-40 years	26
40 years	10

Source: Herath (1980)

The economic life span of cinnamon is 40 years, hence 10% of the area should be replanted in the recent years.

3.6.3. Yields

The average yield in the district is 220 kg of quills per ha. Compared to other cinnamon growing areas - Negombo, Ambalangoda - this is a rather low yield. Matara which account for 40% of the total cinnamon area in Sri Lanka produces only 25% of the national production. This is mainly due to the fact that in Matara cinnamon is considered a crop suitable only for marginal lands whereas in other districts it is cultivated on better soils.

No differences in yields between the zones are observed; there are however, differences in yields between the larger holdings and the smaller holdings, the latter cultivating cinnamon often as an intercrop.

Holdings < 1 ha. (64% of the holdings) : 100 kg/ha.
Holdings 1-2 ha. (18% of the holdings) : 200 kg/ha.
Holdings > 2 ha. (18% of the holdings) : 350 kg/ha.

The yields of the larger holdings are quite satisfactory. A yield of 400 kg-500 kg per ha. can be considered as a good yield for cinnamon in the district. With good management practices the potential yield of 600 kg/ha. could be obtained. On the smaller holdings however, which cultivate cinnamon as an intercrop, yields are far below their potential and considerable increase is agronomically possible.

3.6.4. Grades

There are 11 grades in cinnamon. Grading is based on the thickness of the quills, their colour and appearance. In Matara the most common grade is produced - H2 - which fetches lower prices than the C5 special grade produced in the Ja-Ela & Ekala region (Colombo district).

3.6.5. Production

The average district production can be estimated at 1,600 tons of quills per year. This is equal to about 25% of the national production of 6,400 tons (average 1977-79) and to about 17% of the total world production of cinnamon. Other products of the cinnamon industry are chips, bark oil, leaf oil and fuel wood. Chips and bark oil are insignificant in the district. No figures are available for leaf oil production. There are 30 leaf oil distilleries in the district and 17% of the cultivators sell their leaf to these distilleries. The peeled sticks are sold for fire wood. The potential production from the existing area in the district can be estimated at 4,100 tons of quills, an increase of 2,500 tons compared with the present situation. An increase in the demand for Sri Lanka cinnamon will allow Sri Lanka to export about 1,700 tons more within 10 years (= an annual growth rate of production of 2.5%).

3.6.6. Cultivation Methods

PROPAGATION AND PLANTING

Cinnamon is propagated by seeds. Seedlings are ready for transplanting

from the nurseries after 6 months. Plant density is 6,700-9,000 plants per hectare. Plantations consist of several varieties. Up to now no selection and breeding at farm level has taken place.

FERTILIZER USE

In many instances no fertilizer is applied for cinnamon crops in Matara district. Only 16 percent of the cultivators reported application of any type of fertilizer. These were mostly mixtures recommended for other crops. Although no research has been done in Sri Lanka on the response of cinnamon to fertilizer it is evident that yields can be improved substantially by appropriate fertilizer application.

WEED CONTROL

Normal weeding is carried out by all farmers at least once a year. This is obviously not sufficient considering the fact that 50% of the holdings are overgrown with weeds.

PESTS AND DISEASES

Most cinnamon growers in the district reported the occurence of pest and diseases. However, no significant effects on yields were observed and consequently pesticides or herbicides are not applied.

SOIL AND MOISTURE CONSERVATION

Most farmers cut drains to prevent soil erosion. Effectiveness of these drains is not always optimal.

PRUNING AND TRAINING

Most farmers prune and train their cinnamon plants although this is not regularly practised.

INTERCROPPING

Cinnamon is sometimes intercropped with coconut. The spacing of cinnamon stands does not allow planting most other crops between cinnamon.

HARVESTING AND PEELING

Harvesting and peeling of cinnamon require skilled labour and are generally not done by the cultivator. Peelers belong to the Halagama caste and in the past other people were reluctant to engage in this

work. This is different now, but still 94% of the cultivators in the district hire labour for harvesting and peeling because they lack the skill. Peeling takes place both on a share and on a hire basis, according to the number of pounds peeled.

The picture of cinnamon cultivation in the Matara district is that of a crop, grown on marginal lands to which little attention is paid. With the exception of some larger plantations cultivation methods are not geared towards regular and high production. Small Holders consider the crop as a stock of liquid cash and very often farmers harvest the crop when they are hard pressed for money.

3.6.7. Prices and Markets

Table 3.42. Average price of cinnamon quills - F.O.B. Colombo

(Unit:Rs./kg)

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Price	7.2	6.2	5.8	5.8	13.9	10.2	11.4	12.3	27.4	29.9	32.5

Source: Central Bank of Ceylon, Bulletin September 1980.

The sharp price increase in 1974 is probably due to the introduction of a minimum export price (floor price) of which one of the aims was to prevent under-invoicing. This was practiced by shippers as a way to accumulate illegal foreign currency. Hence the real price increase is probably less than suggested by table 3.42.

The more recent price increase (from '78 onwards) was caused by a change of the exchange rates and by an upward trend in the demand for Sri Lanka cinnamon. The latter is partly due to a production decrease in the Seychelles and fluctuation in the production of Indonesian cassia in recent years.

The Sri Lanka State Trading Corporation is the sole exporter of cinnamon from Sri Lanka. Sri Lankas floor prices for cinnamon determine to a large extent the world market prices. F.O.B. prices very closely follow

the Sri Lanka floor prices.

There is quite a discrepancy between the F.O.B. prices and the producers' price due to the marketing procedures and malpractices of dealers. Peddlers collect small lots of quills and sell to district dealers. The district dealers sell to shippers in Ambalangoda and Colombo. Dealers and shippers bleach, trim, grade and pack in 100 pound gunny sacks.

The average price structure of cinnamon is presented below (1980 prices; per/kg of quills).

Producers' farmgate price	:	Rs.22.0
Peddlers' selling price	:	23.2
District dealers' selling price	:	25.6
Shippers' selling price	:	29.2
Taxes (= 10% of the floor price)	:	3.3
F.O.B. price (around floor price)	:	32.5

Cinnamon prices fluctuate strongly throughout the year due to instability of supply and demand and other factors (see M.P.Moore,1978). Farm gate prices for leaf oil are about Rs.20/bottle. The price of peeled sticks is Rs.7-8 per 100 sticks.

FUTURE PRICES

Price forecasts for cinnamon are not available. Considering the market prospects it is assumed that there will be no change in the present price level.

3.6.8. Input-output analysis for cinnamon

The production costs are closely related to the yield, hence it is warranted to differentiate the input-output analysis according to yield levels.

Table 3.43. Present input-output relationships for cinnamon per ha.

	Yield levels of quills					
	100 kg/ha.		200 kg/ha.		350 kg/ha.	
Labour	Mandays	Rs.	Mandays	Rs.	Mandays	Rs.
Weeding, pruning, soil conservation	50	700	50	700	70	980
Peeling (2 kg/day at Rs.8/kg)	50	800	100	1600	175	2800
Other practices	15	210	15	210	15	210
Total	115	1710	165	2510	260	3990
Material inputs	kg	Rs.	kg	Rs.	kg	Rs.
Fertilizer	-	-	-	-	500	450
Replanting	-		-			20
Total						470
Other charges				250		500
Yield quills	100kg		200kg			350kg
Gross value of production quills	2000		4000			7000
Value of leaf oil	-		-			500
Value of peeled sticks	700		900			1100
Total gross value	2700		4900			8600
Value added	2700		4650			7630
Gross margin	990		2140			3640

On small farms (yield 100 kg/ha.) all labour except peeling is done by the family. The family income from cinnamon can be estimated at Rs.1900/ha.

Table 3.44. Potential input-output relationships for cinnamon per ha.

Labour	Mandays	Rs.
Weeding, pruning, soil conservation	70	980
Peeling	300	4,800
Other practices	20	280
Total	390	6,060
Material inputs		
Fertilizer	700kg	630
Replanting		40
Total		670
Other costs		700
Total costs		7,430
Yield - 600kg quills per ha		
Value of quills		12,000
Value of leaf oil		900
Value of sticks		1,500
Total value of production		14,400
Value added		13,030
Gross margin		6,970

3.7. OTHER CROPS

Other crops grown in Matara district are bananas, plantains, coffee, pineapple, fruit trees (such as jak, mango, breadfruit), cloves, nutmeg, cardamon, pepper and vegetables.

Generally, these crops are grown as an intercrop under coconut and in homestead gardens. The total extent is 20,100 ha. of which:

2,200 ha. in zone WL_4

10,800 ha. in zone WL_2

4,500 ha. in zone WL_1

2,600 ha. in zone WM_1

Bananas, plantains, pepper and mango are partly cultivated for the market, most of the other crops are grown for home consumption only. No figures are available on yields, areas, prices, quantities for home consumption, etc. Field observation suggests that no input, except labour is used and that yields are generally low.

The estimated value added on a hectare basis is Rs.1,000-2000.

There are interesting prospects for these crops in the district. With good management practices yields of the individual crops could increase considerably. The area could also be extended particularly under coconut and under immature rubber.

INTERCROPPING WITH COCONUT

As stated earlier the category of crops referred to above is frequently cultivated in mixed stands particularly under coconut. About 52% (or 9200 ha.) of the coconut area in the district contain other crops grown under the palms though in a rather unorganized way. There are 8,400 ha. of pure coconuts stands under which systematic intercropping with 'other crops' is feasible. However, a considerable extent of the latter category of coconut lands is under large holdings where the owners do not show much interest in the cultivation of their holdings.

INTERCROPPING ON RUBBER LANDS

At present, intercropping on rubber lands does not take place. The RRISL conducted intercropping trials and the most promising are bananas, coffee and pineapple. There is however, insufficient experimental evidence on the basis of which firm technical recommendations could be given.

Considering the above mentioned factors improvement of cultivation of these intercrops should be focussed on their present area. An order of magnitude of the benefits of improved intercropping is presented in table 3.45. for some products. It should be noted that the yields

we mention are the yields one may expect within the intercropping system. The same products as a purestand may yield differently.

Table 3,45. Potential input-output relationships for bananas, coffee and pineapple as intercrops (per ha.)

Average input requirement over total life time	Bananas		Coffee		Pineapple	
	Units	Rs.	Units	Rs.	Units.	Rs.
Labour	30 m.d.	420	30 m.d.	420	70 m.d.	980
Planting material	300 plants ha. every 5 yr.	60	450 plants ha. every 10 yr.	20	1000 plants ha every 6 yr.	330
Fertilizer	600kg	600	200kg	200	650kg	800
Other costs		120		100		770
Total costs		1200		740		2880
Yield	1 bunch of 100 fruits per plant 300 pl/ha=300 bunches/ha.		140 kg made coffee/ha. 4th year onwards		5500 fruits average from 2nd year	
Value of production	Rs.20/b,	6000	Rs.16/kg*	2240	Rs.1.50/fruit	8250
Value added		5220		1920		6350
Gross margin		4800		1500		5370

* The coffee price is derived as follows: World Market price:Rs.45/kg
60% discounted for quality = Rs.27/kg
Rs.2/kg marketing costs; Farmgate price = Rs.(45-27-2) = Rs.16/kg.

3.8. LIVESTOCK

3.8.1. Present situation

Livestock farming in Matara is a marginal activity. The number of animals per agro-ecological zone is presented in table 3.46.

Table 3.46. Livestock numbers per agro-ecological zones

(Unit: 1000 heads)

Type	WL_4	WL_2	WL_1	WM_1	Total
Cattle	4.4	8.9	0.3	0.8	14.4
Buffaloes	0.7	2.4	0.8	0.2	4.1
Goats	0.6	0.7	0.5	1.2	3.0
Poultry	12.5	11.0	3.9	2.9	30.3

Source : Basic Village Statistics, Matara district (1978)

These figures are based on information provided by the Grama Sevakas. A survey of livestock farming conducted in Galle district by FAO showed discrepancies in the information collected by Grama Sevakas. There was evidence of substantial under reporting. However, even in the case of serious under reporting (50-80%) livestock density would be very small, i.e. 1 head of cattle/buffalo per 3-6 ha.

3.8.2. Performance of livestock farmers

Table 3.47 presents some key indicators which indicate the poor performance of livestock farming in the district. Figures are based on a field survey conducted by the FAO/Department of Animal Production & Health in the adjacent Galle district. The Matara figures will be of the same order of magnitude..

Table 3.47 Physical performances of cattle and livestock

	European cross-breads	Sinhala (local)	Buffaloes (local)
Cows in milk (%)	71%	39%	56%
Calving rate (%)	75%	60%	65%
Calving interval (months)	16 months	20 months	19 months
Calf mortality (%)	5%	13%	12%
Lactation length (days)	340 days	240 days	310 days
Lactation yields (bottles)*	1500 bots.	290 bots.	560 bots.
Yield per lactation day(bots.)	4.4 bots.	1.2 bots.	1.8 bots.
Annual yield (bottles)	1100 bots.	170 bots.	370 bots.
Annual average yield all cows	800 bots.	70 bots.	200 bots.

* 1 bottle = 0.6 litres

Source: FAO/Department of Animal Production & Health (1980)

The number of European cross-breds constitutes only a very limited part of the total herd. Sinhalese cattle and buffaloes are dominant.

The estimated income per cow derived from cattle/buffalo raising in its present state is given in table 3.48.

Table 3.48 Present income from cattle (per cow)

	Cattle	Buffaloes
Annual milk yield	70 bottles	200 bottles
Value of milk production	Rs.91 (Rs.1.3/b)	Rs.440 (Rs.2.2/b)
Net number of calves	0.5	0.5
Value of calf production	Rs.560	Rs.560
Total value of production	Rs.650	Rs.1000

The production value corresponds grosso modo with the value added. Labour is the only input which is used on a very limited scale. Buffaloes are used as draught animals. The present rate for animal power is

Rs.2/hour/animal. Assuming 100 working days/year the value of buffalo draught power is almost Rs.1,500 per year.

3.8.3 Livestock development possibilities

Livestock development in Matara should be oriented towards buffalo raising and poultry farming. Buffaloes have obvious advantages over neat cattle. There is a tradition for buffalo farming in the district; Matara is famous for its buffalo curd for which a ready market exists in the country. Curd making is a very simple process which can easily be done by the farmer. It prevents mouldering of the milk and the organisational problems related to milk collection can be avoided by processing curd at the farm level. Buffalo milk fetches higher prices than that of neat cattle due to its higher fat content. When processed into curd the value of the milk increases by 60%. The potential input-output analysis for buffalo milk production is presented in table 3.49. It is based on production estimates of the improved Indian buffalo breeds such as Murrah and Surti. The indigenous breed are low milk yielders. The figures are presented per cow-equivalent which implies that costs of calf & heifer raising are included in the concentrate, fodder and labour costs.

Poultry is very suitable for development in homestead gardens in small units of 25-50 chicks. The average net profit can be estimated at Rs.30 per chick/year.

Table 3.49 Potential input-output relationships for buffalo milk husbandry (Costs per year cow equivalent)

	Units	Rs.
Concentrates	1,200 kg	2,700
Fodder from improved pastures (zero grazing)	0.3 ha.	300(excl. labour)
Labour (included grass cutting and pasture maintenance)	75 mandays	1,050
Other costs		1,600
Total costs		5,650
Annual milk yield	2000 bottles	
Gross value of milk production(milk converted to curd)		7,000
Gross value of calf production	0.6	
Total gross value of production		7,700
Value added		3,100
Gross margin		2,050

On a hectare basis the value added is Rs.10,200/- and the gross margin is Rs.6,800/-.

3.8.3. Areas suitable for buffalo raising

The areas suitable for buffalo raising are the pure stand coconut lands where fodder can be grown as an intercrop. Other areas include scrub lands and patna lands. Pure coconut stands cover 8,400 ha. in the District, in which patna lands and scrub lands amount to 14,100 ha. However, scrub lands can be used for rubber cultivation of which the potential value added per hectare at domestic prices is about equal to that of buffalo raising. Commercial dairy husbandry requires skills which are not available at present. Another concern on the large, scale introduction of buffalo raising is the uncertainty of the future curd prices which may drop if large quantities are produced. Further,more profitable buffalo husbandry is restricted due to the unavailability of an adequate number of Indian breeding stock in the country.

CHAPTER 4

GENERAL CHARACTERISTICS OF FARMING SYSTEMS & STRUCTURE OF SMALL FARMS

4.1. GENERAL CHARACTERISTICS

4.1.1. Cropping principles in small farm sector

The small farm sector in Matara is the dominant sector in the agricultural economy of the district. Over 90% of the total arable extent in the district is under small farms and provides the main source of livelihood to the majority of the rural population in the district.

A notable feature of the small farm sector in Matara district is its diversity. It is usual to characterize the small farm sector as producing annual crops particularly food mainly for the domestic consumption. However, the small farm sector in Matara district is to a very large extent essentially engaged in the cultivation of perennial crops. Crops such as rubber and tea in particular, which have been traditionally identified as plantations crops are cultivated extensively by small farmer Crops such as cinnamon where Sri Lanka has a large share in the world market of which nearly 40% comes from Matara district are to a large extent cultivated on small farms.

The major annual crop cultivated in the district is paddy. This crop is cultivated in very small units mainly for subsistence requirements. Paddy cultivation in the district is not a profitable activity and the paddy yields in the district are among the lowest in the island. The low yields could be attributed to climatic conditions and the risk involved due to frequent flooding of paddy lands. Cultivation of other food crops is insignificant as they are extremely scattered over the district in very small units often in homegardens.

4.1.2. Animal husbandry

Animal husbandry is a marginal activity in the district. Most stock

farming activities among small holders are essentially for the purpose of meeting their household requirements though some are engaged in the production of milk products, such as curd for sale on a limited scale. Cattle rearing is the most popular livestock farming enterprise. Poultry keeping is practised by many mainly as a backyard activity.

4.1.3. Land tenure systems in the small farm sector

Complexities in tenurial patterns in the small farm sector in Sri Lanka are in general related to paddy lands. Various forms of paddy land tenure are in existence and several studies indicate its direct influence on productivity and social relationships in village societies. Consequently, most data available on land tenure are those pertaining to paddy lands. The same can be said of Matara district where different forms of tenure are evident in respect of paddy lands. With regard to non-paddy lands the limited data available on tenure patterns relate to lands under specific crops rather than of the total holdings.

PADDY LAND TENURE

Two distinct features emerge from the analysis of land tenure patterns in Matara district. First is the predominance of share tenancy and second the small size of paddy holdings.

A detailed breakdown of the tenure pattern in the district is presented in the table below:

Table 4.1. Land tenure on paddy lands - Matara district

Tenure type	No.	%
Share tenants	37,082	47
Owner cultivators	33,785	42
Owners employing paid labour	674	1
Owners who are also tenants	8,332	10
Total	79,873	100

Source: I.K.Weerawardena, Land Tenure Data, Sri Lanka, 1977.

Rotational forms of tenure (thattumaru and kattimaru) are excluded in the above table as no information is available on the number of cultivators who operate land under these systems. However, it is estimated that almost 13% of the total paddy acreage in the district is cultivated under rotational tenure(Weerawardena, ibid).

Share tenancy is usually considered as a disincentive to increased production both from an economic point of view and for sociological reasons. The conditions under which the type of tenure is functioning vary with each district. Nevertheless one would expect this to be a major constraint in any planning effort to enhance production particularly in a district like Matara, where a majority of the paddy farmers are tenants. Contrary to this general belief the findings of Moore and Wickremasinghe (1980) from their case studies in three villages in Galle and Matara districts reveal that although the social context of tenant-landlord relationships show variation in the villages studied from a production point of view there was no consistent difference between owners and tenants.

The farming techniques of both share tenants and owner cultivators were similar and there was hardly any difference in the decision-making process. Moreover, the average size of holding of the share tenants was the same as that of the owner cultivators. The same authors further state that rent paid by tenants in the low country wet zone are low and they are relatively secure against eviction, perhaps due to the high levels of politicization in the villages in this area. Moore and Wickremasinghe conclude that in the low country environment, share tenancy does not constitute a major obstacle to improved agriculture.

The incidence of rotational tenure is common in densely populated areas of the wet zone. The few studies on this tenure pattern have clearly shown that productivity on lands under rotational tenure is low mainly due to the prevalence of this practice. However, the occurrence of this tenure type in Matara is relatively insignificant when compared to other areas and cannot be considered a major constraint for improving production at least for the present.

The other aspect of paddy land tenure is the small size of holdings. Seventy percent (70%) of the paddy holdings in the area are less than 0.5 ha in average size and only 2% were large farms of about 2 ha in size. The impact of size of holding on productivity has received little attention by researchers in Sri Lanka. This is an area which has been widely debated by farm economists and several studies indicate that productivity on small holdings is as high or even higher than on larger holdings. A small holding per se may show high productivity, however, one should not overlook that the occurrence of small holdings in densely populated areas like Matara could at some point in time in the future lead to rotational forms of tenure which, as mentioned earlier, is a cause for low productivity on land under these tenure patterns.

LAND TENURE PATTERN IN THE NON-PADDY SECTOR

Land tenure patterns in the non-paddy sector in Matara district are less complicated. The majority of these lands estimated at over 80% of the total agricultural area are owned and cultivated. Leasing in of land has been reported (approximately 7%) and occurs to a large extent under highland colonization schemes established by the State where lands were allocated under long lease to the beneficiaries. Cultivation on encroached lands is also prevalent. Although this involves a considerable hectarage it is not very significant when compared to the total cultivated area in the District.

Absentee landlordism is minimal. This mainly occurs in the medium sized farms (5-20 ha) category which are under perennial crops. Field studies indicated that absentee landlordism is not a major problem for development particularly in farms which are above 10 ha, as these units generate sufficient income to engage the services of fairly competent managers. However, farms which are below 10 ha-and where absentee landlordism occurs are very often in a state of neglect, as such farms do not provide sufficient income and consequently the absentee landlords cannot engage good managers.

In conclusion it can be stated that problems associated with land tenure in the district are mainly confined to paddy cultivation. In this case, although the general belief is that share tenancy can be a constraint, the evidence presented above shows the contrary as far as production characteristics are concerned. Although from a social context there could be certain disadvantages. However, these are common in all areas where share tenancy prevails and measures to overcome these problems should be taken at the national level for the country as a whole. Rotational tenure was mentioned to be detrimental to production, but is not widespread in Matara district, because of its low occurrence. Nevertheless the small sized holdings and the fragmentation of such holdings due to population pressure on limited land resources could lead to rotational tenure becoming significant. In spite of the fact that complexities occur in the tenure pattern of paddy lands, land tenure is not a significant constraint for agricultural development. Paddy cultivation has only a very limited potential in the district for reasons mentioned earlier and the tenure pattern in non-paddy sector does not appear to be a constraint.

4.2. FARMING SYSTEMS IN THE SMALL FARM SECTOR

4.2.1 Importance of farming systems approach

In a situation where the agricultural sector of a country is characterized by a predominant peasantry operating small and medium sized farms, the farm becomes a major decision making point in agricultural development. The fact that society leaves the functions of decision making to the farmer indicates that while pursuing their own objectives the latter are also expected to contribute towards the common interest of the nation. A clear understanding of the existing pattern of farming is therefore an essential prerequisite for the formulation of policies for agricultural development.

Although there exist several studies on small holder agriculture in Sri Lanka, the majority of them tend to concentrate on the investigation of specific agricultural activities (or components) that take place on small farms. What most investigations generally tend to ignore is the fact that the specific agricultural activities are carried out in the

broader framework of a farming system where there are several components which are clearly related to each other by the common use of farm labour, land, capital, risk distribution and by the farmer's management capacity (Ruthenberg 1975). In an analysis of farms it can be expected that an understanding of the links between various components in the production process is as important as a knowledge of the separate components themselves. The essence of this procedure is to describe a farm with many interacting elements, where any individual element in the system will be viewed in the context of the whole farm.

In the next few sections of the chapter an attempt is made to describe the main farming systems in the district and discuss the structure of classes of farms in which these systems occur in terms of size of holdings, cropping patterns, income and employment generation. The main criterion used in the classification of farms was its capability to generate an income level above or below the official poverty line of the country at the present state of development or at its full development potential. The analysis of Farming Systems is essentially confined to the small farm sector as those of the plantation sector is dealt with in Annex II.

4.2.2 General Characteristics of Farming Systems

Farming systems in the small farm sector in Sri Lanka are closely related to the traditional three-fold pattern of land use. The first element of this land use pattern is the cultivation of valley bottoms usually referred to as 'lowland'. Paddy is customarily cultivated in these lands under water-logged conditions and is ecologically the most suited crop for such land. The second element of this land use pattern is the cultivation of the slopes and the ridges referred to as 'highland'. The 'highland' is further separated physically into the 'homestead' which forms the third element of the three fold system of land use and contains the dwelling and a small area under 'mixed crops' characteristically referred to as 'homegarden' crops. These three elements of land use determine the farming systems and traditionally a single farm consisted of all three physically separated elements.

A quite comprehensive study on farm types and farming systems has been published recently (Herath et al: Structure of small farms in Sri Lanka, 1980). In this study the authors identify three types of farms in the small farm sector. Firstly, farms retaining the traditional threefold pattern of land use, namely lowland, highland and a homegarden in a single farm. Such farms are designated as three component farms. Secondly, where only two elements exist in various combinations in a single farm referred to as two component farms; and thirdly, farms which contain a single element of land use which are named single component farms. In addition to the three farm types referred to above which is essentially confined to crop farms livestock farming is also prevalent. This may either form a separate farm type or very often integrated into one of the types referred to earlier.

Within the three basic farm types the farming systems can show variation depending on the cropping pattern. While paddy is essentially cultivated in the lowlands and homegardens in general have a uniform cropping pattern, highland cultivation shows great diversity in cropping pattern depending on environmental and agronomic considerations.

The typology presented in the document referred to above is used to indicate the farm types and farming systems in the small farm sector in Matara district. The discussion excludes livestock farming and is confined to crop farms. This is due to the fact that livestock farming is a relatively under developed activity in Matara district with some exceptions in the northern zone.

The types of farms as a percentage of the total number of small holder farms in the district are given below:

- Single component farms	= 52%
- Two component farms	= 31%
- Three component farms	= 17%
Total	100%

From the figures presented above, it is evident that single component farms are predominant in the district. These farms are generally very small and the average size is approximately 0.3 ha (Herath et al, 1981). The main farming system in these single component farms is homegardening. Almost 86% of these farms contain homegardens only, while 9% are paddy farms and 7% have only the highland component. Although detailed information is lacking from field observations it could be inferred that the majority of the single component farms are in the coastal zone, particularly those with only the homegardens component. This is attributable to the fact that the coastal zone is characterized by a high population density so that population pressure on land resources is more acute. Consequently, a large number of farms are of very small size. This is discussed in greater detail in the next section.

Two component farms are the next largest category of farms in the District. The farming systems here consists of either paddy-homegardening or paddy - highland. It is estimated that approximately 63% of the two component farms in Matara district belongs to the former category while the rest to the latter. Three component farms account for only 17% of all farms in the district. Nevertheless, they are the larger farms and accounts for a substantial acreage of cultivated land.

The cropping patterns in the farming systems show variations with each zone, particularly in regard to the crops cultivated in the highland component. In the coastal zone, coconut is the major crop in the highland area. The farms in the central zone show much diversity in the crops cultivated in highlands, whereas in the northern zone the tendency is to specialize on tea cultivation. The cropping patterns on the lowland and homesteads is uniform throughout the district, with paddy essentially cultivated in the former category of land and mixed cropping in the latter. Details of the cropping patterns are presented in the subsequent section on the structure of small farms.

4.3. STRUCTURE OF FARMS IN THE DISTRICT

Matara district comprises about 107,000 small holder farming units. The largest number being in the central zone, where approximately 45% of these farms are located.

Five major classes of farms have been identified in the District. These have been designated as follows:

- Homesteads
- Micro holdings
- Small holdings
- Medium sized holdings
- Small estates

As mentioned in section 4.2.1 the criteria used in the classification of farms is based on ability to generate an income comparable to the official poverty line of the country either at the present state of development or on realising full development potential with the existing organizational structure.

The cropping pattern in the different classes of farms shows recognizable variations with respect to each zone. In the coastal zone paddy-coconut form the dominant system. The central zone shows much diversity, as a variety of crops are cultivated in small farms while in the northern zone tea cultivation is the predominant activity in all classes of farms. The structure of the farms in respect of each zone is discussed in detail in the next section.

Livestock farming is not included in the discussion for the reasons cited earlier under section 4.1.2.

The analysis of the farm classes is limited to income and labour use described. The reason for this is that labour is the major input in small farms in the district. Recurrent capital investment in farming was less, particularly in the farms of the smaller size classes.

4.3.1 Data

The analysis presented here relies heavily upon the data provided by Grama Sevaka's in 16 selected divisions in the district. Although the information was checked by members of the project team, there is still room to doubt the representativeness of the data supplied. This is particularly true in respect of cropping patterns on small farms. Consequently, the structure of small farms described may not give a realistic picture of farming systems in the area, but should be considered as the model. A certain level of caution must therefore, be exercized in the interpretation of the results.

The procedure adopted to describe the structure of small farms was to obtain the total hectarage of a farm type, identified on the basis of the size of holding and then determine the land use pattern by aggregating the hectarages under different crops. This was followed by constructing a model for each farm type on the basis of the average size of holding and the model cropping pattern estimated as described above. Information on the use of variable capital input was not collected and therefore capital constraints related to small farm agriculture are not discussed. The reason for this ommission is that neither fixed nor variable capital investment by small farmers is of much significance because the agricultural system of small farms in the area is mainly based on the cultivation of perennial crops. As mentioned earlier, the major annual crop cultivated is paddy. However, here too the use of variable inputs is minimal due to its high risk, low potential character.

4.3.2 Structure and Income levels of farms in the Coastal Zone

The table below gives the main characteristics of the farm classes in the coastal zone.

Table 4.2 General characteristics of farms in the coastal zone

Farm classes	Homestead	Micro holding (0-0.5 ha)	Small holding (0.5-2 ha)	Medium size holding (2-4 ha)	Small Estates (4-20 ha)	Total
Number	20,000	9,000	9,000	800	700	39,500
Percentage	51	23	23	2	1	100
Average size (ha)	0.1	0.2	1.0	2.5	12	
Total hectarage	2,000	1,800	9,000	2,000	2,400	17,200

Cropping pattern Ext. (ha)	Ext.	%	Ext.	%	Ext.	%	Ext.	%	Ext.	%
1. Homegardens & mixed crops	0.1	100	0.1	50	0.1	10	0.1	4	0.5	4
2. Paddy	-	-	0.03	15	0.3	30	0.3	12	2.5	21
3. Coconut	-	-	0.07	35	0.5	50	1.7	68	7.0	59
4. Cinnamon	-	-	-	-	0.1	10	0.2	8	1.0	8
5. Rubber	-	-	-	-	-	-	0.2	8	1.0	8
Total	0.1	100	0.2	100	1.0	100	2.5	100	12	100

Present composition of average annual farm incomes	Rs.	Rs.	Rs.	Rs.	Rs.
1. Homegardens & mixed crops	260	260	260	260	1,300
2. Paddy	-	62	620	620	5,175
3. Coconut	-	334	1,650	8,100	33,400
4. Cinnamon	-	-	270	540	2,700
5. Rubber	-	-	-	2,250	7,650
Total annual farm income	260*	656*	2,800*	11,770	50,225

*Below official poverty line of Rs.3,600/- per annum.

HOMESTEADS

Homestead gardening is the dominant farm class in this zone. Fifty one per cent of the agricultural holdings consist of home gardens only. However, the other farming systems too consist of home gardens. The predominance of the 'homegarden only' category is due to the fact that the area is characterized by high population density and a resultant acute pressure on available land resources. Furthermore, this zone is relatively more urbanized when compared to the other two.

Although the 'homegarden only' category forms the dominant farm system in the zone its contribution to household incomes and employment is very limited. The average size of a homegarden is only 0.1 ha. Consequently, the operators of such land could be considerd as near 'landless' and thus have to rely on other sources of income.

The cropping patterns in home gardens reveal that approximately two-third of the extent in homesteads is under coconut with the balance under a mixture of other crops. The income from coconut in homesteads is estimated at Rs.3,300 per ha per annum, but only Rs.1,500 per ha per annum for other crops in homestead. On this basis the average annual income from homesteads averaging 0.1 ha amounts to Rs.260/- per annum.

Homegardens are generally a source of supplementary household income. They are predominant in the more urbanized areas of the zones and those who own homegardens only usually have other sources of income.

MICRO HOLDINGS

This class of farms designated as micro holdings comprises those which are below 0.5 ha in size. 23% of the holdings in the zone falls into this category with an average size of 0.2 ha. The cropping patterns in these farms as indicated in the table consist of coconut mixed with other crops and small extents of paddy.

The estimated present annual income in these micro holdings amounts to Rs.656.00. On the assumption that they are developed

to their full potential the estimated annual income from such holdings with the present cropping patterns is as follows:

Income from 0.2 ha micro holding at full development

1.	Income from 0.1 ha homesteads	- Rs. 600.00
2.	Income from 0.03 ha paddy	- Rs. 90.00
3.	Income from 0.07 ha coconut	- Rs. 780.00
		- Rs.1,470.00

As indicated above, the potential income from micro holdings at full development is well below the income threshold of Rs.3,600 p.a. which is considered as the official poverty line in Sri Lanka. Furthermore, even at full development the potential income from these holdings is below the present annual income per head of Rs.1,580 for the zone (see chapter 2, page 29). It is therefore obvious that households operating such lands cannot even meet their minimum subsistence requirements from their holdings and consequently have to depend on additional sources of income.

SMALL HOLDINGS

Small holdings consist of farms which are in the range 0.5-2 ha. Twenty three percent (23%) of the farms in the zone belong to this category and have an average size of 1 ha. The cropping pattern on these farms is varied but coconut and paddy together occupy a substantial acreage. These types of farms also contain a home-garden in which a variety of highland crops are cultivated and a small extent is devoted to the cultivation of cinnamon.

The present average annual income of farms in this category is Rs.2,800. This is based on the value added at the present state of development. If, on the other hand, the farms are developed to their full potential, the income from these farms is as follows:

Potential income per year at full development

1.	Potential income from 0.1 ha homesteads	-	Rs. 600.00
2.	Potential income from 0.3 ha paddy	-	Rs. 890.00
3.	Potential income from 0.5 ha coconut	-	Rs. 5,600.00
4.	Potential income from 0.1 ha cinnamon	-	Rs. 1,300.00
			Rs. 8,390.00

The analysis presented above clearly demonstrates that incomes from farms of this category are at present very low and even below the official poverty line of Rs.3,600/- per annum. If, on the other hand these farms can be developed to their full potential it could result in a substantial increase in farm income which could provide the household with a reasonable standard of living.

MEDIUM SIZED HOLDINGS

Farms which are classified under this category are those which come in the range of 2-4 ha. The average size of such farms in this zone is approximately 2.5 ha. But they account for only about 2% of the agricultural holdings in the zone. The cropping pattern in these farms is similar to small holdings with coconut and paddy being the major crops. However, unlike the small holdings, farms of this category have a greater extent under 'mixed' crops.

The latter extent may be considered an extended version of a homegarden as the cropping pattern in the area under 'mixed crops' is similar to a homegarden with coconut with a variety of 'minor export' crops.

The present average annual income from a farm of this category is Rs.11,770, which is well above the poverty line. Furthermore the income derived from this category of farm is higher than the average household income for the zone.

This leads one to conclude that farmers operating medium sized farms could obtain a reasonable living from their agricultural incomes alone.

These farms have substantial room for development and if developed to their full potential the income levels could be increased considerably.

SMALL ESTATES

Small estates (4.0-20.0 ha) in this zone account for only about 0.5% of the total agricultural holdings, and about 14% of the acreage. The average size of the small estates is about 12 ha. The model cropping pattern in these holdings are more or less similar to the other farm types. However, there are some holdings-particularly the larger ones-which are more cropped with coconut. In addition to this a few of the larger holdings in the category own a few head of cattle and other livestock.

The average annal gross income generated by a small estate of the average size (12 ha) is approximately Rs.50,225.

Although the small estates provided the owners with a substantial income, in many instances the land holding is not utilized to its full capacity. Intercropping is hardly practised. Many owners of small estates are persons who are in regular employment or are engaged in non-agricultural occupations such as trading and so on. Consequently, the income they obtain from these holdings is considered supplementary to their incomes from their regular occupations.

LABOUR USE PATTERNS IN SMALL FARMS IN THE COASTAL ZONE

It was mentioned earlier that the predominant farming system in all classes of farms in the zone is paddy-coconut. Paddy cultivation is labour intensive. The total labour requirement for a hectare of paddy is estimated at 120 mandays. An important aspect of the labour requirement in paddy cultivation is its seasonality characterized by two peaks first at land preparation and planting, then at the time of harvesting and threshing. The estimated labour requirement for the former activities is 52 mandays and for the latter 56 mandays per ha. Coconut cultivation on the other hand has a low labour requirement of only 42 mandays, which are uniformly spread throughout the year.

From the figures presented in table 2.8 it can be estimated that the labour availability for agricultural work averages 1 man equivalent per day in the coastal zone. On the assumption that one man-year is equivalent to 250 mandays, a farm in this zone should generate at least 250 mandays of employment per year if it is to provide full employment to those members of households who are available for agricultural work. The labour requirements of the different classes of farms is presented in table 4.3.

Table 4.3. Labour requirements of small farms in the coastal zone

Farm class and cropping pattern	Average extent (ha)	Total labour requirement (man-days)	Average availability of family labour (man-days)	Additional labour required (man-days)
	(1)	(2)	(3)	(4) = 2-2-3
1. Micro holding				
a) Homegardens + mixed cropping	0.1	6		
b) Paddy cultivation	0.03	4		
c) Coconut "	0.07	3		
Total	0.02	13	250	-237
2. Small holding				
a) Homegardens + mixed cropping	0.1	6		
b) Paddy cultivation	0.3	37		
c) Coconut "	0.5	21		
d) Cinnamon "	0.1	12		
Total	1.0	76	250	-174
3. Medium sized holding				
a) Homegardens + mixed cropping	0.1	6		
b) Paddy cultivation	0.3	37		
c) Coconut "	1.7	71		
d) Cinnamon "	0.2	24		
e) Rubber "	0.2	49		
Total	2.5	187	250	- 63
4. Small estates				
a) Homegardens + mixed cropping	0.5	30		
b) Paddy cultivation	2.5	310		
c) Coconut "	7.0	294		
d) Cinnamon "	1.0	115		
e) Rubber "	1.0	245		
Total		994	250	+744

The above table clearly demonstrates that family labour available for agricultural work in this zone is grossly underutilized except in the case of small estates. Consequently, it is only in the latter class of farms that the need for hired labour is evident. In terms of labour allocation between the crops in the different classes of farms there is little competition. Competition for labour can occur in the case where paddy and rubber are cultivated on the same farms, particularly during the peak labour requirement periods of the former crop. However, this combination of crops is present only in the medium sized holdings and the small estates. In the case of the former the extent under rubber is too insignificant to demand labour from outside the household even during periods when the labour demand for paddy are at its seasonal peak. Labour requirements for other crops cultivated in the different farm classes in the zone are not strictly associated with timeliness[1] and a certain amount of adjustment in the labour requirement is possible, so that the farm can meet the demand from the labour available within the household.

4.3.3. Structure and income levels of farms in the central zone

Micro holdings and small holdings are the dominant classes of farms in this zone. Homegardening is included under micro holdings, as this category of holdings which contain homegardens only, is relatively less in this zone. Plantations are an important component in terms of hectarage under cultivation. However, as plantations are dealt with in great detail in a separate section, they are not discussed here.

Table 4.4 shows the general characteristics of farms in this zone.

MICRO HOLDINGS

Micro holdings comprises 42% of the farm types in this zone. The average size of a micro holding is 0.2 acres with paddy, coconut and 'mixed crops' (including homegardens) as the dominant crops. The

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[1] For example operations such as harvesting of coconuts, peeling cinnamon or fertilizer application for these crops could be delayed for a limited period of time without having adverse effects.

extent under mixed crops contains a variety of crops such as minor export crops, fruit trees, coffee, jak, etc., which are usually grown in overcrowded stands. Paddy cultivation is mainly carried out under rainfed conditions. A major portion of the coconut is in mixed stands. The land use pattern of micro holding is shown in table 4.3.

The total annual income from micro-holdings is almost the same as that of the micro holdings in zone A, and is well below the official poverty line of Rs.3,600/- per annum. However, the composition of income shows a slight variation as in this category of holdings in zone B the income from paddy is the major component.

The potential income from micro holdings in this zone is as follows:

1.	Potential income from 0.07 ha mixed cropping	= Rs. 420.00
2.	Potential income from 0.08 ha paddy	= Rs. 600.00
3.	Potential income from 0.05 ha coconut	= Rs. 560.00
		= Rs.1,580.00

This clearly indicates that micro holdings,even if they are developed to their full capacity under the existing cropping pattern,will generate an income well below the official poverty line.

Table 4.4 General characteristics of small farms in the central zone

Farming systems	Homesteads+ micro holdings (0-0.5 ha)	Small holdings (0.5-2 ha)	Medium sized holdings (2-4 ha)	Small estates (4-20 ha)	Total
Number	19000	23000	1800	450	44250
Percentage	43	52	4	1	100
Average size (ha)	0.2	1.2	3	10	
Total hectarage	3800	27600	5400	4500	41300[1]

Cropping pattern(ha)	Ext.	%	Ext.	%	Ext.	%	Ext.	%
1. Mixed cropping (including home gardens)	0.07	35	0.5	42	0.6	20	1.5	15
2. Paddy	0.08	40	0.4	33	0.7	23	2	20
3. Coconut	0.05	25	0.2	17	0.5	17	2	20
4. Rubber			0.1	8	0.7	23	2	20
5. Cinnamon			-		0.5	17	2	20
6. Tea			-		-		0.5	20
Total	0.2	100	1.2	100	3	100	10	100

Present composition of average annul farm income	Rs.	Rs.	Rs.	Rs.
1. Mixed Crops	180	1300	1560	9000
2. Paddy	170	824	1450	4100
3. Coconut	160	645	1620	6500
4. Rubber	-	763	5350	15300
5. Cinnamon	-	-	1350	5400
6. Tea	-	-		3900
Total	510*	3532*	11330	44200

1) Excluding 3,000 ha under plantations.

* Income level below official poverty line.

SMALL HOLDINGS

Small holdings are the dominant class of farm in the central zone accounting for 53% of the farms in the zone. The average size of 1.0 ha is the same as that in the coastal zone. However, the cropping pattern shows variation with paddy, coconut, rubber and 'mixed' crops as the crops cultivated.

The present average annual income from small holdings in the zone is estimated at Rs.3532.00. If however, the farms are developed to their full potential, the income generated is as follows:

1.	Potential income from mixed crops	(0.50 ha)	= Rs.3000
2.	Potential income from paddy	(0.40 ha)	= Rs.3000
3.	Potential income from coconut	(0.02 ha)	= Rs.2840
4.	Potential income from rubber	(0.01 ha)	= Rs.1130
		Total	= Rs.9370

The above analysis demonstrates that small holdings in this zone generate an income below the poverty line at the present state of development. If, however, it is developed to its full potential, the income generated is well above the official poverty line. Nevertheless, the income generated even after full development will not be sufficiently high for a household to depend exclusively on agriculture for its livelihood.

MEDIUM SIZED HOLDINGS

This category of farms amount to only 4% of the farm types in the zone. The average size of 3 ha is slightly higher than that of similar farmers in the coastal zone. The cropping pattern shows a slight variation with paddy, coconut, rubber and cinnamon together with 'mixed' crops as the dominant crops in the system. The land use pattern of a medium sized holding is presented in table 4.3.

The estimation of annual average income at Rs.11,330 shows that farms of this category are providing cultivators with a high level of income even at the present level of development. The income

derived from such a farm is even higher than those that of farms of the same category in the coastal zone, and it can be expected, if the farms are developed to their full development potential, that the income generated would provide the operators with a satisfactory standard of living from agricultural incomes alone.

SMALL ESTATES

Small estates comprise only about 1% of the farms types in this zone covering an area of about 8% of the total cultivated extent. The average size of holding is 10 ha. The cropping pattern consists of paddy, cinnamon, coconut, rubber and tea together with an area which includes the homegarden and mixed crops. The land use pattern of small estates is given in table 4.3.

Small estates generate very high incomes amounting to an average of Rs.44,200 per annum. The largest contribution to this is from rubber, which accounts for nearly 35% of the income generated.

LABOUR REQUIREMENTS OF SMALL FARMS IN THE CENTRAL ZONE

As mentioned earlier the farms in this zone are characterized by a diversity in their cropping patterns. Consequently, the labour requirements show variation depending on the pattern. Labour intensive crops such as paddy, rubber and tea are cultivated in all classes of farms except in the micro holdings, where paddy and coconut are grown in addition to an extent under mixed crops.

From the data presented in chapter 2 it is estimated that the household labour available for agricultural work in this zone is 1.5 man equivalents. Assuming that this labour is available for at least 250 days per year, a farm in this zone should generate 375 mandays of employment if it is to absorb the household labour available for agricultural work. Table 4.5. indicates the labour requirements in the different farm classes in this zone.

Table 4.5. Labour requirements in the different class farms in the central zone

Farm class and cropping pattern	Average extent(ha) (1)	Total labour requirement/ mandays (2)	Average availability of family labour/ mandays (3)	Additional labour required (4) = 2-3
Micro holdings				
a) Mixed cropping	0.07	4		
b) Paddy	0.08	10		
c) Coconut	0.05	2		
Total	0.2	16	375	-359
Small holdings				
a) Mixed cropping	0.50	30		
b) Paddy	0.40	50		
c) Coconut	0.20	8		
d) Rubber	0.10	25		
Total	1.0	113	375	-262
Medium sized holdings				
a) Mixed cropping	0.6	36		
b) Paddy	0.7	87		
c) Coconut	0.5	21		
d) Rubber	0.7	172		
e) Cinnamon	0.5	56		
Total	3	372	375	- 3
Small estates				
a) Mixed cropping	1.5	90		
b) Paddy	2	248		
c) Coconut	2	84		
d) Rubber	2	190		
e) Cinnamon	2	230		
f) Tea	0.5	249		
Total	10	1,391	375	-1016

The information provided in table 4.5.clearly demonstrates the gross under-utilization of family labour in both micro holdings and small holdings. Medium sized holdings almost provide full employment to the agricultural work force in the household. Small estates on the other hand would require approximately 1,000 man equivalents of outside labour to meet their labour requirements.

The estimates presented in the table are based on the assumption that paddy is cultivated only during one season per year. If paddy cultivation is practised in both seasons, the medium sized holdings inevitably require an additional 84 man equivalents of labour which has to be met from sources outside the household. Even in instances of single cropping of paddy in medium sized holdings,a certain amount of outside labour would be required to meet the labour demand during the peak labour requirement periods of land preparation/sowing, harvesting and threshing.

In the case of the micro holdings and small holdings double cropping of paddy does not require any hiring in of labour, as the labour demand can be met from household labour available for agricultural work.

4.3.2 Structure and Income levels of farms in the northern zone

There are 4 major classes of farms in the zone of which small holdings constitute the dominant category amounting to about 77% of the farm types. Tea is a crop which is extensively cultivated as it is the most favoured crop both from an economic and from a social point of view. Consequently, tea cultivation is carried out on practically all types of farms. Farms in this zone show a tendency towards greater specialisation. While there is somewhat more diversity in the smaller holdings the larger farms tend to specialize in the cultivation of tea. The structure of the farm systems in this zone is presented in table 4.6.

MICRO HOLDINGS

Micro holdings account for about 10% of the holdings in this zone. The average size is about 0.2 ha. The cropping pattern consists of paddy cultivation in the lowlands and mixed cropping in the highlands. The area under mixed crops includes the homegardens. The model land use pattern of a micro holding in this zone is given in table 4.6.

The present estimated annual income from a micro holding is Rs.800/-. This amount is barely sufficient even for subsistence purposes. Thus, the operators of these farms have to rely on outside sources of income for their livelihood. The majority of operators of micro holdings are employed as wage labourers in the state plantations in this area. Many of these will have to continue seeking outside income sources. Even if their micro holdings are developed to the fullest capacity, this will yield only a marginal income which is quite incapable of providing a decent level of living.

SMALL HOLDINGS

Small holdings are the dominant farm type in this category. The average size of a farm is 1.2 ha. The cropping pattern consists of tea as the major crop, together with paddy and cinnamon. In addition, all holdings contain a homegarden with coconut and a variety of other crops. The land use pattern of the small holdings is given in table 4.6.

The present average income of Rs.5,615/- from small holdings is almost twice as much as the small holdings in the other zones. This is mainly because of the high contributions to farm income tea cultivation. Unlike small holdings in the other two zones, farms in this category generate an income level above the official poverty line even at the present state of development. However, there is substantial scope for improvement of these farms, particularly of extents under tea and rubber.

Table 4.6 General characteristics of small farms in the northern zone

Farming systems	Micro holdings (0-0.25 ha)		Small holdings (0.25-1.5 ha)		Medium sized holdings (1.5-4 ha)		Small tea estates (4-20 ha)		Total
Number	1,900		14,600		2,000		380		18,880
Percentage	10		77		11		2		100
Average size (ha)	0.2		1.2		3		12.5		
Total hectarage	380		17,520		6,000		4,750		28,650[1]
Cropping patterns(ha)	**Ext.**	**%**	**Ext.**	**%**	**Ext.**	**%**	**Ext.**	**%**	
1. Mixed cropping	0.16	80	0.5	42	0.5	16	1.6	8	
2. Paddy	0.04	20	0.2	17	0.3	10			
3. Coconut	-		-		-		-		
4. Cinnamon	-		-		-		-		
5. Rubber	-		0.1	8	0.2	7	-		
6. Tea	-		0.4	33	2	67	11.5	92	
Total	0.2	100	1.2	100	3.0	100	12.5	100	
Present composition of average annual farm income	**Rs.**		**Rs.**		**Rs.**		**Rs.**		
1. Mixed crops	720		1,250		1,300		2,600		
2. Paddy	80		400		600				
3. Coconut	-		-		-				
4. Cinnamon	-		-		-				
5. Rubber	-		765		1,520		97,175		
6. Tea	-		3,200		16,900				
Total	800*		5,615		20,320		99,775		

1 Excludes 2,800 ha under plantations.

* Below official poverty line of Rs.3,600/-.

The potential income from small holdings at full development of the existing cropping patterns is as follows:

1. Mixed crops	(0.5)	=	Rs. 3,000
2. Paddy	(0.2)	=	Rs. 1,500
3. Tea	(0.4)	=	Rs.12,000
4. Rubber	(0.1)	=	Rs. 1,130
			Rs.17,130

The above estimates show that small holdings are capable of generating a substantial income on full development.

MEDIUM SIZED HOLDINGS

This category of farms accounts for only 10% of the holdings in the zone. The average size is 3 ha. Farms of this category show a tendency towards greater specialization with tea as the major crop. Paddy and mixed crops and home gardens are also cultivated in this farming system. The land use pattern in these farms is given in Table 4.4.

The present average annual income of these farms is estimated at Rs.20,320 with tea contributing over 80% to the amount. As stated in the case of small holdings there is substantial room for improvement particularly of the tea holdings. The potential income from medium sized holdings with the above cropping pattern is estimated at approximately Rs.66,140/-.

LABOUR REQUIREMENTS OF SMALL FARMS IN THE NORTHERN ZONE

The labour requirements of the farms in this zone are higher than in the farms of this class in the other two zones. This is attributable to the fact that tea, which is a highly labour intensive crop, is the dominant enterprise in most farms in this zone.

The average family labour available for agricultural work in this zone is 2.5 man equivalents which is higher than that in the other two zones. Thus a farm in this zone should provide 625 mandays work if it is to provide full employment for those in a household who are available for agricultural work.

The labour requirement of the farms in this zone are summarized in table 4.7.

The estimates presented in table 4.7 show that the labour requirement in all classes of farms in this zone are higher than the corresponding classes in the other two zones. At the same time the household labour available for agricultural work is also higher. Consequently, only the medium sized holdings and the small estates provide full employment

to the agricultural labour force of the household.

Unlike the medium sized class of farms in the other two zones, these farms in the northern zone require an additional 487 manday equivalents of labour from outside sources. This is attributable to the large percentage of the area of medium size farms cultivated with tea. Small tea estates would require an additional 5,933 units of labour particularly for the operations associated with tea cultivation.

Table 4.7 Labour requirements of small farms in the northern zone

Farm class and cropping pattern	Average size	Total labour requirement/ mandays	Average availability of family labour mandays	Additional labour requirement/ mandays
	(1)	(2)	(3)	(4)=2-3
Micro holding				
Mixed cropping	0.16	10		
Paddy	0.04	5		
Total	0.20	15	625	- 610
Small holdings				
Mixed cropping	0.5	30		
Paddy	0.2	25		
Rubber	0.1	25		
Tea	0.4	199		
Total	1.2	279	625	- 346
Medium sized holdings				
Mixed cropping	0.5	30		
Paddy	0.3	37		
Rubber	0.2	49		
Tea	2.0	996		
Total	3	112	625	+ 487
Small tea estates				
Mixed cropping	1.0	60		
Tea	11.5	6498		
Total	12.5	6558	625	+5933

4.4 FUTURE TRENDS OF SMALL FARMS IN THE DISTRICT

In this section we discuss the changes foreseen in the farming systems of the district over the next 20 years. Inadequate (and inaccurate) information on past and future trends of farming in Matara district- particularly with regard to future prices of inputs, labour use, etc. is a serious constraint for a detailed analysis of future trends. What is attempted here is to present a broad overview with particular reference to the fragmentation of farm holdings.

The estimates on fragmentation of farm land is based on the trend observed during the 11 year period 1962-1973. Information for this was obtained from the Agricultural Census of the respective years. It is assumed here that the same trend will continue over the next 20 years unless programmes for the consolidation of land or land reforms are introduced.

Furthermore, there is very little evidence to show that except for intercropping and possibly an increase in the rubber hectarage there will be a dramatic change in the cropping patterns in the district, as there are hardly any alternatives for the crops presently cultivated. It is therefore, assumed that the cropping patterns will remain fairly static over the next few years.

FUTURE TRENDS IN THE COASTAL ZONE

The table below gives the farming types and their broad structure as it is now and what is foreseen for the year 2000 A.D.

In terms of number of holdings in 2000 it is estimated that the micro holding category will register a substantial increase in number. Fragmentation will be highest in this category and the hectarage size of holding, which is estimated to be 0.15 ha at present, will be around 0.06 ha by 2000, a decrease in the hectarage size of 60%. The total hectarage remains static, which further shows the high degree of fragmentation of holdings in these farms types. Small holdings too shows an increase in number as well as in hectarage. The increase in this category is a result of fragmentation of land in the medium

sized holdings category at the same time. There will be also a fragmentation of holdings within the category itself thereby resulting in a decline in the average size of holding from 1.0 ha to 0.77 ha in the year 2000 A.D.

Table 4.8. Present and future farming classes in coastal zone

Farm class	1980			2000		
	No.	Hectarage	Av. size (ha)	No.	Hectarage	Av. size (ha)
Micro holdings	29,000	3,800	0.15	64,000	3,800	0.06
Small holdings	9,000	9,000	1.0	13,000	10,000	0.07
Medium sized holdings	800	2,000	2.5	600	1,500	2.5
Small estates	200	2,400	12	140	1,900	13.5
Total	39,000	17,200		77,740	17,200	

Medium sized holdings and the small estates will register a decline both in terms of number and hectarage by the year 2000. The average size of a medium sized holdings will remain static, while small estates will show a slight increase in size by 1.5 ha.

Fragmentation of land has a direct bearing on agricultural incomes. It was shown in the previous section, that income received from micro holdings and homegardens is grossly inadequate and such holdings cannot generate sufficient income even at full development.

By the year 2000 over 80% of the farms in this zone will be micro holdings or homegardens. This means that the majority of the holdings will cease to be agricultural holdings and most of the farmers in this zone will have to rely on income sources outside their own farms. Furthermore, as pointed out earlier the average size of the micro holding will decrease by 60%. Therefore, at present price levels it can be reasonably assumed that the average annual income from these holdings will be reduced by 60%.

Small holdings represented about 23% of the farm types in 1950 will account for only about 17% in 2000. It was shown earlier that such farms are capable of generating an income sufficient for minimum living at present standards only at full development. However, by the year 2000 A.D. the average size of these farms will be reduced by 23%. If we assume that there would be a proportionate reduction in income by the year 2000, small holdings will generate an income of about Rs.6,500/- per annum.

Medium sized and small estates were shown to be viable holdings even at the present stage of development. These will continue to be viable over the next 20 years when estimated at present levels of production and prices.

FUTURE TRENDS IN THE CENTRAL ZONE

The general picture of the future of farms in the central zone is the same as that of the coastal zone.

Table 4.9 Present and future of farm classes in the central zone

Farm classes	1980			2000		
	No.	Hectarage	Av.size	No.	Hectarage	Av.size
Micro holding	21,000	4,200	0.2	46,000	5,400	0.12
Small holdings	27,000	27,000	1.0	39,000	29,500	0.75
Medium sized holdings	2,200	6,600	3	1,600	4,000	2.5
Small estates	360	3,600	10	250	2,500	10
Total	50,560	41,400		86,850	41,400	
Plantations		3,000			3,000	
Total hectarage		44,400			44,400	

A noteworthy feature is that while small holdings form the major category of farms in 1980 micro holdings will be the dominant farming system in the year 2000 A.D. This is clearly reflected in an increase in terms of both number of holdings and area under micro holdings by the year 2000 A.D. The average size too decreases from 0.2 ha to 0.12 ha

by the year 2000. These trends indicate that fragmentation of holdings will take place not only within the category of micro holdings itself but also as a result of a fragmentation of other farm types into micro holdings.

In terms of income generation the same trend as shown for the coastal zone will be experienced here.

FUTURE OF FARMING SYSTEMS IN THE NORTHERN ZONE

The general situation with regard to the future of farm types in the northern zone substantially differs from the other two. The agricultural economy in this zone appears more stable and promising than in the other two zones. The structure of future farming systems is shown in the table below.

Table 4.10 Present and future of farm classes in northern zone

Farm type	1980			2000		
	No.	Hectarage	Av.size	No.	Hectarage	Av.size
Micro holdings	1,800	360	0.2	4,500	430	0.1
Small holdings	13,500	16,200	1.2	22,200	19,780	0.90
Medium sized holdings	2,000	6,000	3.0	1,500	4,000	2.6
Small tea estates	380	4,750	12.5	260	3,100	12
Total	17,680	27,310			27,310	
Plantations		2,800			2,800	
Total		30,110			30,110	

Small holdings will continue to remain the dominant farm class in this zone in the year 2000, as is now the case. It was shown in a previous section that small holdings with an average size of 1 ha even at the present stage of development generate an income above the official poverty line of Rs.3600/- per annum and that a substantial increase in incomes is possible at full development. In 2000 A.D. it is estimated that the average size would decline from 1 ha to 0.90 ha showing a decline of about 20%. If we assume that there would be a proportionate decrease in incomes based on current prices and levels of production, the estimated income for small holdings will continue to remain above the present

poverty line in 20 years time.

Incomes from the category of farms which are classified as medium sized holdings and small estates could be expected to remain stable. However, it is estimated that these categories of farms will register a decline both in number of holdings and hectarage by the year 2000 A.D.

4.5 IMPLICATIONS OF PRESENT SITUATION OF THE SMALL FARM SECTOR ON PLANNING

The discussion presented above gives a clear indication for policy options for the development of the agricultural sector in Matara district. In all three zones the development of homesteads and micro holdings will have a limited impact on household incomes. These types of farms are too small to generate a reasonable household income even at full development and, consequently, the operators of these farms will have to depend on outside sources for both additional income and employment.

Agricultural practices in both homestead and micro-holdings in a majority of cases are in an disorganised state. High density of planting and very little use of input characterize these farms. In order to enhance production one should concentrate on extension facilities to these types of farms. The distribution of planting material free of charge could contribute to the development of these holdings. Small holdings and medium holdings on the other hand offer good potential for development . In all three zones the present state of development of small holdings is at low levels. If developed to their full capacity, it could offer a substantial increase to production and incomes and also provide the household with enough employment. However, in many instances there is very little capital investment for these farms, as the income generated at present is just sufficient to maintain a basic standard of living. Thus, if one is to concentrate on the development of these farms, a comprehensive credit programme should be introduced together with extension facilities and input supplies. This is particularly necessary for the small holdings and medium size holdings in the coastal and central zones, while in the

northern zone the need for credit may not be that urgent. But what is required urgently is extension and input supplies.

Small estates show good performance from an income point of view in all zones. Nevertheless, these farms can be developed further to give substantial increases in production income levels and employment. Capital does not appear to be a constraint but serving facilities, such as inputs, extension and transport of produce particularly in the northern zone where green tea has to be transported on time, are an urgent requirement.

In conclusion, it can be stated that the priority for development of farming systems lies in small holdings, where capital is a major constraint and a suitable credit programme is imperative. There is little justification for state intervention by way of high capital investment in micro holdings and homesteads and the state should rather concentrate on extension facilities.

In small estates, the need for capital is less urgent and the pressing need for these farmers is the timely supply of inputs and extension.

CHAPTER 5

OBJECTIVES AND OPTIONS

5.1 QUALITATIVE OBJECTIVES

A district agricultural sector plan has to respond to two sets of objectives. On the one hand it has to fit into the national agricultural development policies, on the other hand it should serve specific needs of the district.

Although there is no official planning document in which objectives of agricultural development are clearly stated, the objectives as derived from different reports and statements made by leading politicians and government administrations are as follows:

1. self-sufficiency in food production so as to eliminate food imports as far as possible;
2. export expansion in agricultural produce, not only from the traditional export oriented trees crops sector but also from the domestic sector;
3. expansion of employment opportunities in agriculture.

This enumeration does not imply a priority ranking of objectives. All three receive equal weight. Objectives 1 and 3 are long established ones. Export expansion of non-traditional export crops, particularly spices, has been emphasized in view of its favourable trade prospects in the international markets.

The World Bank's interpretation of Sri Lanka's objectives for agricultural development (Kurunegala IRDP, Staff appraisal report, 1979, page 3), is practically the same. The only difference being that employment should be created in agriculture and income levels improved, particularly for the economically disadvantaged groups. The latter pointing at distributional aspects of development seems to receive more attention in a district approach to development than in a sectoral approach.

Applying the stated objectives for agricultural development to Matara district, it is clear that the district has only a minor role to play in the achievement of the objective of self-sufficiency in food. Of all deficit food products only milk has some potential in the district. However, the district has a substantial contribution to make to export expansion of low country tea, rubber, copra and cinnamon. In non-traditional export items the scope for export from Matara is much smaller. Employment in agriculture can be increased considerably in the district, but as shown in chapter 2 unemployment will remain a big problem in the District even with the full development of agricultural potentials.

Major policy matters such as import substitution and export expansion, aiming at improvement of the balance of payments, do not directly concern the district. At district level, employment, income distribution and intra-regional equilibrium are more important aspects of development.

As we will show in this chapter, there is a trade-off between income and employment depending on which crops will be developed. We opt for an alternative which ensures much employment at low labour productivity, as this is likely to promote the best possible distribution of agricultura income. Two additional distribution-of-income policies could be carried out. One would be to favour small holdings whenever big and small holdings compete for the same scarce resource (e.g. export possibilities). This is the case for tea, where we propose to concentrate production increase on small holdings and government owned estates. The other policy would be land reform. Sri Lanka has seen a land reform which has been put through fairly effectively. Large private holdings have been cut down to 50 acres maximum. As a result extreme disparities have been removed. Without being even, the present distribution of land in Matara district leaves little scope for further redistribution. Turning small holdings into mini-holdings is not worth the social upheaval and is doubtful from the economic point of view. We exclude the option of land reform, which is in line with current thinking of the Sri Lankan government.

Intra-regional equilibrium may determine the options to be taken if linkages exist between sub-regions which would cause development

in one sub-region to influence development in another. For example, excessive concentration of growth in one place may attract labour and cause labour shortages elsewhere. Or, one sub-region may require inputs from another if geographical specialization is warranted. Such cases do not exist in Matara district. However, budget constraints may exclude development possibilities. Such an exclusion would call for deliberate localization of projects in order to avoid accentuation of intra-regional disparities.

5.2. OPTIONS FOR SUB-SECTORAL DEVELOPMENT

This section examines the options for the development of different crops on the basis of economic and agronomic criteria. Social and other constraints will not be taken into consideration at this stage and will be the subject of discussion in the next paragraph. Land suitability, value added and employment generated by the different crops and market constraints are dealt with here.

5.2.1 Land Suitability

Lands suitable for rubber, coconut, cinnamon, pastures and other crops largely exceed the present areas used for these crops. To a certain extent these crops compete for land.

Rubber cannot be cultivated in the north. In the central zone extension of the acreage of this crop is possible by 12,000 ha, mostly on lands presently under scrub jungle. In the coastal zone rubber can be grown on almost 5,000 ha. However, in the latter zone rubber will compete with existing coconut plantations.

Coconut is not a very exigent crop and can be grown on many types of soils. However, it cannot be cultivated in agro-ecological zone WM_1 and is suitable for only a restricted part of WL_1 due to the high elevation of these zones.

Cinnamon can be cultivated on soils where other crops would not succeed. In Matara the lands presently under cinnamon cannot be

used for any other crop. A variety of other crops can be grown in each particular soil type occurring in the district. Cocoa, cardamom and pepper however, should be excluded for climatological reasons (Domrös, 1979). Pastures have the greatest potentialities on a large number of soil types and in all zones.

Most of the present paddy lands are suitable only for that crop. Nor is it possible to increase the area.

The area under tea exceeds the area technically suitable by almost a thousand hectares in the northern zone. In the central zone, however, the tea area can be increased by 5,000 ha based on land suitability mapping. At present, these lands are predominantly used for coconut and rubber cultivation.

The alternative land use possibilities on the current tea area are shown in Table 5.1.

Table 5.1. Alternative land use types on present tea lands

(Unit:ha.)

	Present tea extent	Alternative land use types				
		Rubber	Coconut	Cinnamon	Pastures	Other crops (except paddy)
WM_1	7,800	-	900	7,400	7,400	1,400
WL_1	7,100	600	6,700	6,700	6,700	1,600
Total North	14,900	600	7,600	14,100	14,100	3,000
WL_2 = Centre	3,700	3,700	3,700	3,700	3,700	1,600
Total	18,600	4,300	11,300	17,800	17,800	4,600

Source: Dimantha (1981)

In the northern zone almost all tea lands could be cultivated with cinnamon and pastures as well. Half of the tea area is also suitable for coconut and a minor part could be used for rubber and other crops.

In the central zone the extent of alternative land utilization types is even more pertinent. Except for 'other crops' all tea lands could be used for rubber, coconut, cinnamon and pastures.

All crops in the district, except paddy and cinnamon have alternative land utilization types. However, factors other than land suitability will determine the ultimate optimal land use.

FORESTRY AND SOIL CONSERVATION

The soil conservation classification in the Matara district, reveals a category of severely degraded lands which have to be withdrawn from regular cultivation to prevent further deterioration and should be reforested. These lands are currently under tea estates and small holdings and are located mostly in the north of the district. The total area to be withdrawn from cultivation is at least 3,500 ha, of which 2,800 ha in the north and almost 700 ha in the centre. About 1,000 ha of tea in the north and 2,500 ha of mixed crops on small holdings have to be brought under forest cover.

Soil classification identifies another category of moderately to highly degraded lands where soil conservation and rehabilitation measures are necessary to prevent irreversible degradation. This amounts to an area of about 13,000 ha. Soil conservation measures can partly be executed by the farmers themselves, an important part however, will be beyond the farmers control and government assistance will be required.

SCRUB LANDS

Almost 12,000 ha in the district area classified as scrub lands. About 10,600 ha of these abandoned lands could be used for cultivation if appropriate weed and erosion control measures are taken. Rubber is one of the potential crops for these lands. Certain types of annual crops might also succeed.

5.2.2. Market Constraints

Information substantiating the contents of this section is given in Annex III.

Market constraints are not expected to prevail for rubber, coconut and paddy. For the first two of these crops the problem is rather to increase production at a rate sufficient to meet the increasing demand (see Annex III).

Livestock and other products are produced in relatively small quantities and demand does not impose constraints on production. Demand forecasts are not available for these products. Large scale development projects will not be suggested for economic and institutional reasons . It is assumed that no market constraints will occur within the limits of the estimated production increase.

In the case of tea and cinnamon the position is different. For these crops the production targets should not exceed projected marketable quantities as sharp price declines could result.

TEA

The T.M.P. forecasts a marketable quantity of 257,000 tons made tea for Sri Lanka in 1985 of which 87,000 tons is low elevation tea. This is an increase of 19,000 tons compared to 1979 figures for the whole island. Assumptions about Matara's share in this marketable quantity determine the production increase allowed in the district.

The average share of Matara in the national low country tea production is about 25%. There is no reason to suppose a substantial shift in this share in the near future. The 'allowed' production increase of the district is then about 5,000 tons. This implies that an annual production increase of about 5% is marketable. However, without special development programmes it will probably not be possible to attain the targeted increase.

The position with regard to tea development projects in the district is as follows:

a) The T.M.P. proposes replanting and infilling on SPC estates in the framework of its Sri Lanka Estate Tea Development Project (SLETDP). It is unlikely that the necessary funds for this project will be forthcoming in the short term. The project is not mentioned in the proposals for the Sri Lanka Aid Group Meeting 1980 (Ministry of Finance and Planning). This implies that no funds can be expected before 1982 or 1983. The same applies to T.M.P. projects aimed at tea small holders and private estates development. These projects are still in a preparatory phase and an impact cannot be expected within the next 5 years.

b) The Tea Small Holders Development Project Proposals under the IRDP are subject of discussions with the donor agency and the Ministry of Plan Implementation. If the funds for the proposed factory projects are made available in 1981 the impact cannot be expected before 1984. Hence, it may be concluded that till 1985 no substantial impact of tea development projects can be expected and that the production increase of the district will probably not exceed the marketable quantities.

World demand projections have not been made beyond 1985. It may be argued that the incremental production, resulting from the implementation of the T.M.P. projects can be exported without market constraints as no price decline has been assumed.

The incremental production of the T.M.P. projects amounts to 35,000 tonnes of made tea in 15 years. The low elevation tea component is about 11,000 tonnes. Matara's expected production increase would commence in project year 5 and will be at full development in year 15. According to T.M.P., the projects would start in 1979 or 1980; from 1985 onwards the above incremental production would take place and in 1995 the project would be at full maturity. This would imply that by 1995 257,000 tonnes would be produced. It seems more realistic to suppose that the project will not reach

full production levels before 2000. Hence, it can be stated that Sri Lanka's production would be about 290,000 tons in 2000.

Matara would increase its district production with 9,000 tonnes(i.e. 5,000 tonnes till 1985 and 4,000 tonnes beyond 1985)to about 27,000 tonnes.This figure should be considered to indicate an order of magnitude of what may be produced without marketing problems by the end of this century. This is far below the potential production of 45,000 tonnes from the existing tea area (see chapter 3).

This leads to the conclusion that the potential production increase of tea can only be realized to a limited extent due to market constraints.

CINNAMON

In Annex III it is shown that the marketable quantity of cinnamon by the end of this century can be estimated at about 8,500 tonnes.Assumptions about the share of Matara in this national exportable quantity are crucial with regard to the development possibilities of this crop in the district.

At present, Matara produces 25% of the national production or 1,600 tonnes. The other major production areas are Ambalangoda and Negombo. In Negombo a decline in the cinnamon production can be expected due to the increasing use of land for industrial purposes in this region. Galle district (where Ambalangoda is situated) is not likely to come under the national IRD programme. It may be reasonably assumed that no special development programmes for cinnamon cultivation will be undertaken in Galle. Considering this, it may be concluded that Matara could increase its share in national cinnamon production. It is difficult to forecast the extent of the increase. A realistic assumption might be that Matara will retain the 40% share of the cinnamon extent in the country. This would correspond with 3,400 tonnes by the end of this century and would imply a production increase of 1,800 tonnes.

As shown in chapter 3, a production of 3,400 tonnes is somewhat below the potential production of 4,000 tonnes which could be obtained from the

existing area in the District. Hence, it is possible to increase cinnamon production in Matara district, almost to its potential level. Expansion of the cinnamon area however is not advisable, as it may lead to marketing problems.

5.2.3. Value added and employment

Table 5.2 summarizes the value added and the employment generated by the different crops on a hectare basis, in the actual and in the potential situation, as follows from the input-output analysis in Chapter 3.

Table 5.2. Value added and employment of agricultural subsectors in Matara district

(Unit: Rs/ha and mandays/ha)

Product	Present Situation		Potential Situation	
	Value added	Employment	Value added	Employment
Tea	9,800	570	26,000-31,000	835-920
Coconut	3,300	55	11,200	115
Rubber	6,800	250	11,300	270
Paddy	4,000	250	5,000-6,800	190
Cinnamon	5,300	190	13,000	390
Average other crops	1,500	40	6,000	80
Livestock*	700/CE**	-	10,200	225

* Present animal husbandry practices are not based on the cultivation of fodder crops hence a figure per ha cannot be provided. Labour inputs are very restricted.

** Cow Equivalent

Tea is superior to any other sub-sector in terms of value added as well as of employment. Also in incremental terms tea is the most favourable crop. The potential value added of rubber, coconut, cinnamon and livestock is about the same. The difference between the present and the potential situation is however larger for cinnamon, coconut and livestock.

In terms of employment cinnamon and rubber are more propitious than coconut The potential value added and employment deriving from the category.

'other crops' (coffee, bananas, pineapple, vegetables)are substantially lower than that for the above mentioned crops. These crops can be grown as an intercrop under coconut and as such intensify land use. Paddy has hardly any scope for significant improvement from the present situation.

The present and potential value added is based on domestic prices of inputs and products. For tea, rubber and coconut the ratio between economic prices and domestic prices is respectively : 2.1, 2.4 and 2.3. For rice this ratio is 2.5. Cinnamon, livestock and other products do not show a substantial difference between economic and domestic prices, which is mainly due to the absence of substantial export/import duties for these products. This implies that tea, rubber and coconut will become more attractive from a national economic point of view whereas paddy improves its position in the economic priority ranking.

Combining employment and value added the following priority ranking can be established.

At domestic prices	At economic prices
1. Tea	1. Tea
2. Cinnamon	2. Rubber
3. Rubber	3. Coconut
4. Coconut	4. Cinnamon
5. Livestock	5. Paddy
6. Other crops	6. Livestock
7. Paddy	7. Other crops

The potential value added of perennial crops presented in table 5.2 is calculated on the basis of an existing stand of homogeneous age. For new plantations, the value added is different due to the fact that these crops have a non-productive stage. In order to be able to compare existing with new plantations the future value added of the latter has to be discounted at its present value. The table below presents, for the major perennial crops, the value added of new plantations, compared with the potential value added of existing plantations.

Table 5.3. Value added of new plantations of perennial crops compared with potential value added of existing plantations

Crop	Non-productive	Lifetime	New plantations Value added at 10% discount rate	New plantations Value added at 5% discount rate	Existing plantations value added
Tea	2 years	40 years	21,200-25,400	23,200-27,600	27,600-31,000
Rubber	7 years	25 years	5,200	6,700	11,300
Coconut	8 years	60 years	5,200	7,200	11,200
Cinnamon	3 years	40 years	9,700	10,900	13,000

The economic ranking of new plantations is:

At domestic prices	At economic prices
1. Tea	1. Tea
2. Cinnamon	2. Coconut
3. Coconut	3. Rubber
4. Rubber	4. Cinnamon

Comparison with the potential value added of existing plantations makes it clear that:

a) It is profitable to extend tea at the cost of existing rubber, cinnamon and coconut plantations. However, Market limitations will prevent expansion of the tea area.

b) It is not profitable to convert existing productive plantations into coconut or cinnamon.

It is also not profitable to convert existing productive coconut plantations into rubber or cinnamon. For non-productive old plantations, which have to be replanted anyway, one should apply the economic ranking of new plantations.

(c) It is not profitable to convert existing cinnamon plantations into coconut or rubber when the discount rate is 10%. At a lower discount rate this conversion becomes economically feasible.

If the potential value added of new plantations is compared with the present value added of existing plantations the former is generally higher (except for rubber where there is a small difference).

However, the conclusion that uprooting and new planting is always profitable is not warranted. Where rehabilitation of existing plantations results in quick yield increases this will generally lead to higher economic returns than new planting.

This is particularly true for rubber, coconut and cinnamon. For tea considering its short productive period new plantings with clones might be preferable to rehabilitation f existing seedling stands.

5.2.4. Trade-offs between value added and employment

Possible trade-offs between value added and employment will mainly occur with regard to tea, rubber and coconut development. The problem of weighing these two objectives will not arise in the case of development of other sub sectors.

Tea is the crop which combines the highest value added with the highest labour requirements. This crop faces however serious market limitations and development to its full potential will not be possible.

The major question is whether it is desirable to reduce the tea extent in the district and to aim at producing at the full potential level on the remaining areas. In this way land would become available for the development of other crops, particularly coconut, livestock and rubber. The alternative is to produce on the existing tea lands at below production potential. Considering the market limitations production of about 60% of the potential production could be allowed.

The effects of both alternatives on value added and employment are presented in table 5.4.

Table 5.4. Alternatives for tea development

(Unit: V.A. in million Rs.;
employment in man years)

Alternative I: Reduction of the tea area and reconversion to coconut and rubber				
	Ha.	Value added Domestic prices	Value added Economic prices	Employment
Tea	10,000	254	555	36,800
Rubber	4,300	22	59	4,600
Coconut (with livestock intercropped)	3,300	51	72	4,500
Total	17,600	327	686	45,900
Alternative II : Tea production on the existing area at 60% of the potential production level				
Tea	17,600	294	667	51,000

The existing tea area is 18,600 ha. It is assumed that 1,000 ha of eroded land will be taken out of production. The yield levels in alternative II are 1,600 kg made tea/ha in the north and 1,350 kg made tea/ha in the centre. In alternative I all tea production is concentrated in the north where yields of 2,700 kg made tea/ha can be realized.

Livestock under coconut has higher returns than rubber. It cannot be supposed that livestock could be introduced to the entire area suitable. Livestock farming is in its infancy and its development will depend on overcoming several technical problems (see Chapter 3).

Considering a 10% margin of incertitude in the calculations presented above no obvious preference for one of the other alternative can be made.

Value added at domestic and economic prices and employment are in the same order of magnitude for both alternatives.

The cost price of tea in Alternative II is however considerably higher: Rs. 8-9/kg made tea. In Alternative I the cost price is Rs.6/kg made tea.

Another possible trade-off between employment and value added may occur for coconut versus rubber development. Rubber and coconut have about the same value added per ha, but labour requirements for rubber are higher. However, coconut with livestock is more attractive from the employment and from the value added point of view. Rubber has few possibilities for intercropping. Hence, the choice depends on the possibilities for livestock introduction on coconut lands.

5.2.5 Implications for future land use

Considerations on value added, employment, land suitability and market constraints lead to the following options for sub-sectoral development.

TEA

Tea is the crop with the highest financial returns and the most intensive labour requirements. Due to reasons cited earlier 27,000 tonnes should be considered to be the maximum 'safe' production level by the end of this century. This production can be realized on 10,000 ha, which would imply reduction of the present tea area by 45%, (Alternative I). On the other hand the same production could be realized on the existing area at sub-optimal yield levels (Alternative II). With regard to value added and employment both alternatives are equally attractive. It is suggested that production should be at the sub-optimal yield levels on the existing area for the following reasons:

- realization of the potential tea yield on a reduced area would imply an annual yield growth rate of 3.7% for S.P.C. estates, 4.1% for private estates and 6.3% for small holders. Small holders in particular, who are occupying 60% of the tea area, will find it rather difficult, to achieve such an annual growth rate even with state assistance.

- conversion of tea into other crops on private holdings will be seriously resisted by the generally traditional tea cultivators.

- Alternative I is equivalent to Alternative II under the condition that the livestock development component succeeds. This however is rather uncertain for various reasons.

- Alternative I implies new planting with coconut and rubber, promotion of livestock development. Efforts in these fields will also be required in other parts of the district, where no alternative agricultural development possibilities exist and where employment problems are more serious. Priority should be given to these regions.

- the forecast of the marketable quantity is subject to incertitudes and Alternative II is safer.

Tea cultivation should thus take place on the existing area. 1,000 ha should be taken out of production and be reconverted to forest or permanent pastures. 17,600 ha of the existing tea lands should produce about 1,500 kg/made tea/ha by the end of this century, an annual yield increase of 2.2%.

COCONUT AND BUFFALO HUSBANDRY

Rearing buffaloes under coconut is the second in the ranking of economic returns and employment.

The constraints on the development of this sub-sector may be listed as:

- the low state of development of the livestock farming in the District.
- livestock can be introduced only in pure coconut stands.
- cattle breeding requires a minimum hectarage of 0.3 ha, considering the fodder requirements for 1 cow equivalent (with the zero grazing system).

- incertitude of the market situation if larger quantities of milk is produced.

The present area of holdings of pure coconut stands which exceed 0.3 ha can be estimated at 9,000 ha. If intercropping with pasture were extended to this entire area the number of buffaloes (cow equivalent) that can be raised is 27,000.

The present buffalo stock is mainly of the indigenous breed which has very low milk potential. It is necessary to introduce Indian breeds like Murrah and Surti, of which there are almost none at present. For this purpose a calf-heifer raising unit has to be established. In a 15 year period a unit as described in the Matara IRD project proposals (IRDP project proposals, 1980) could generate 15,000 breeds and cross breeds (cow equivalent). It is not realistic to assume that more than one such a calf-heifer raising unit will be set up. Hence, 15,000 buffalo cows should be considered as the maximum number that can be raised by the end of this century. This implies that intercropping on 5,000 ha of pure stand coconut land is the maximum that could be achieved. A programme of this nature will result in a considerable increase in curd production and it is uncertain if the market can absorb the increased quantity.

INTERCROPPING COCONUT WITH OTHER CROPS

The most common practice of intercropping with coconut is homestead gardens. More than 9,000 ha of coconut lands in the district are in mixed home gardens. The present production levels are low. Intensive cultivation of homestead gardens (as proposed in the Matara IRDP) could result in a considerable increase in the production of bananas, nutmeg, coffee, mangoes, jak and so on. If such a programme succeeds there will be no urgent need to develop these crops elsewhere. Most of the above products are subject to market constraints and increase in production could aggravate marketing problems.

PURE COCONUT STANDS

The income from pure coconut stands could rise considerably if appropriate cultivation measures are adopted. Enhancing coconut production should be by increasing productivity of existing stands. Extending the present area under coconut is not advocated for the following reasons:

- Rubber competes with coconut for the new lands available for cultivation. However, rubber should be given priority for reasons of employment.
- It is generally not profitable to uproot existing perennial crops in order to install new plantations.
- Rehabilitation of existing coconut plantations is more profitable than new coconut planting.

RUBBER

Rubber is a very promising crop regarding income, employment and foreign exchange earnings. Furthermore it is not subject to market constraints. Rubber ranks third in the economic priority ranking. Rehabilitation of existing stands and cultivation of rubber on the present non-cultivated scrub lands is recommended. More detailed soil surveys are required to determine the ultimate area suitable for the cultivation of rubber on scrub lands.

A preliminary estimate based on the land suitability map arrives at about 8,000 ha situated almost entirely in zone WL_2 (see map 2). Uprooting of existing perennial crops in favour of rubber is generally not profitable.

CINNAMON

Cinnamon is usually cultivated on lands where other crops would not grow. Market constraints impede the expansion of the area under the crop. The quantity which the market allows the district to produce could be obtained on the existing lands where it is estimated that the yields would increase at the rate of 4% per annum.

PADDY

The present extent of paddy coincides with the area suitable for paddy in the district.There is no suitable alternative for paddy on these lands. The prospects for paddy cultivation are gloomy even if the Nilwala Ganga flood protection scheme or supplementary irrigation schemes are implemented.

OTHER CROPS

Development of crops under this category should be confined to homesteads. Part of the lands under these crops particularly in the north of the district are very often encroached lands. They need to be reconverted to forests due to danger of severe soil degradation. The total area of these degraded lands is 3,500 ha.

NEW CROPS

The scrub lands in the north of the district are not suitable for rubber. Annual crops such as maize and or a variety of pulses or vegetables might be cultivated. However, further research is needed to ascertain the suitability of these crops on the land types.

Table 5.5 summarizes the changes in landuse proposed based on the foregoing considerations.

5.2.6. Social feasibility of developments proposed: the urbanization constraints

The emphasis so far has been on the availability of natural resources and the technical and economic feasibility as the main criteria for taking options. Social factors such as tradition and motivation have also been taken into account whenever there was evidence of their influence. For example the reluctance of tea small holders to diversify tea or the lack of motivation of large coconut growers to undertake intensive dairy production. Another social constraint of a general nature, i.e.

Table 5.5. Projected changes in landuse in Matara district, 1980-2000

(Unit:ha)

	North		Centre		Coast		District	
	Present	Future	Present	Future	Present	Future	Present	Future
Total area	46,900	46,900	61,400	61,400	20,500	20,500	128,800	128,800
Forests	12,000	14,800	9,900	10,600	800	800	22,700	26,200
Scrub lands	4,700	1,300	6,300	-	900	-	11,900	1,300
Towns, villages	100	100	100	100	800	800	1,000	1,000
Other non-cultivated	-	-	700	700	800	800	1,500	1,500
Total non-cultivated	16,800	16,200	17,000	11,400	3,300	2,400	37,100	30,000
Tea	14,900	13,900	3,700	3,700	-	-	18,600	17,600
Rubber	2,200	2,900	7,300	13,600	500	1,400	10,000	17,900
Coconut	1,100	1,100	6,800	6,800	9,700	9,700	17,600	17,600
Paddy	3,600	3,600	11,200	11,200	3,700	3,700	18,500	18,500
Cinnamon	1,200	1,200	4,600	4,600	1,100	1,100	6,900	6,900
Others	7,100	5,300	10,800	10,100	2,200	2,200	20,100	17,600
New crops	-	2,700	-	-	-	-	-	2,700
Total cultivated	30,100	30,700	44,400	50,000	17,200	18,100	91,700	98,800
Of which in homesteads	6,700		12,600		6,500		25,800	

not specifically related to a crop or a group of farmers, is operative in the coastal belt of the District. The complex of factors related to urbanization and high population pressure have over the years weakened the peoples' interest in farming. This process will continue and amplify. As shown in chapter 2 the population densities in the coastal zone will reach high levels in the near future. This area which is still considered as rural will acquire characteristics observed presently in the Colombo suburbs and along the western coast line. Closer examination of the settlement pattern in Matara's coastal region reveals that the population is concentrated in a narrow two-miles wide belt along the coast. This stretch should be excluded from any agricultural development, with the exception of paddy fields and pure stands of tree crops. The future landuse in the coastal zone as presented in Table 5.5 will not be affected by the urbanization process. However, it is assumed agricultural production, income and employment would register zero growth rates in the following areas in the two-miles wide coastal belt:

- 2,300 ha of coconut in pure stands (big holdings)
- 2,100 ha of coconut in homesteads.

5.3. QUANTITATIVE OBJECTIVES

The options taken in this chapter with regard to landuse and the input-output relationships described in chapter 3 permit the formulation of detailed quantitative objectives for agricultural development in Matara district in terms of production, income and employment. These are indicated in Annex IV. . What is presented here is the aggregate of the objectives for the whole district.

Table 5.6. Objectives for agricultural production in Matara district 1980-2000

(Unit:Metric tonnes).

Crop	Present production	Future production	Growth rate
Paddy	57,500	85,000	2%
Coconut*	63,000	192,000	5.5%
Tea (made tea)	17,800	27,000	2%
Rubber (R.S.S)	8,000	14,000	2.8%
Cinnamon (Quills)	1,600	3,400	3.8%
Milk (1,000 litres)	500	18,000	-

* 1 metric tonnes of coconuts = 1,000 nuts

Table 5.7. Objectives for agricultural income in Matara district, 1980-2000

(Unit:Million Rs.)

Crop	Present V.A.	Future V.A.	Growth rate
Paddy	76.6	111.0	1.8%
Coconut	58.0	165.6	5.0%
Tea	184.3	293.9	2.5%
Rubber	68.1	154.1	4.1%
Cinnamon	36.4	89.7	4.5%
Livestock	5.6	40.8	11.0%
Other crops	30.2	105.6	6.5%
New crops	-	13.5	-
Total	459.2	974.2	3.8%

Table 5.8 Objectives for agricultural employment in Matara District, 1980-2000

(Unit:man year = 250 working days)

Crop	Present employment	Future employment	Growth rate
Paddy	18,500	14,080	- 1.5%
Coconut	2,960	7,020	4.4%
Tea	42,060	50,970	1.0%
Rubber	9,870	19,330	3.5%
Cinnamon	5,240	10,770	3.7%
Livestock	2,560	3,600	1.7%
Other crops	3,220	5,630	2.9%
New crops	-	1,080	-
Total	84,410	112,480	1.4%

5.4. DISCUSSION OF AN ALTERNATIVE DEVELOPMENT PATH

The changes in landuse proposed in table 5.5. aim at maximizing employment in accordance with the general objectives for agricultural development as perceived by the Government of Sri Lanka.

It is interesting to examine an alternative development path which is theoretically possible and which would create less employment at similar income levels. The strategy suggested by this study denoted as the High Employment - Low Labour Productivity (HE-LLP) alternative is compared with the Low Employment - High Labour Productivity (LE-HLP) alternative.

It was argued that tea could be replaced by other crops, but this would not lead to significantly different income and employment situations. The landuse of all other crops is exclusive except for coconut and rubber. The development of rubber was favoured for its high employment potential. However, all new rubber areas (on scrub lands) could be planted with coconut as well and one could even gradually turn all existing rubber into coconut by replacing old rubber trees with coconut. (To recall, 34% of the rubber trees in Matara have a remaining lifetime of less than 5 years). If this were done vigorously, rubber would disappear and the coconut area would develop as follows:

Coconut area (ha)	Northern	Central	Coastal	District
Present	1,100	6,800	9,700	17,600
Future	4,000	20,400	11,100	35,500

The district's agricultural income and employment under the two alternatives mentioned above would compare as follows (taking into account the value added of new coconut plantations and zero growth of coconut production in the two-miles wide coastal belt):

Table 5.9 · Comparison of HE-LLP and LE-HLP alternatives

	Present	HE-LLP	LE-HLP
Agricultural income (million Rs.)	459.2	974.2	973.2
Agricultural employment (manyears)	84,410	112,480	111,384
Labour productivity (rupees per man day)	21.71	34.64	38.44

The difference between the two alternatives becomes more articulate if one considers only the central zone of the district which contains the major area of possible substitution of coconut for rubber. Here rubber exists in plantations and in all small holdings, except in the homesteads-cum-micro holdings (see chapter 4, table 4.4.)

All plantation labourers and 58% of the private farms would be affected by this substitution.

For the central zone the two alternatives would work out as shown in table 5.10.

Table 5.10 Comparison of HE-LLP and LE-HLP alternatives in the Central zone

	Present	HE-LLP	LE-HLP
Agricultural income (million Rs.)	190.5	467.8	470.8
Agricultural employment (manyears)	34,360	50,170	41,736
Labour productivity (rupees per man day)	22.18	37.30	45.12

CHAPTER 6

PROJECT IDENTIFICATION

6.1. INTRODUCTION

This chapter concentrates on the identification and formulation of suitable projects for the development of the agricultural economy of Matara district over the next 20 years. The projects proposed cover all the key components of the agricultural sector in the district. The projects are identified on the assumption that technical and economic constraints are the major bottlenecks to agricultural development rather than sociological and institutional constraints. Consequently, the projects proposed are envisaged to be implemented within the existing institutional framework.

Ten major projects have been identified. Although there is no priority ranking for implementation, the elements for priority ranking are included. Nevertheless, all projects identified are recommended for implementation except the Nilwala Ganga Flood Protection Scheme. The reasons for this are discussed elsewhere in this chapter.

Out of the projects the ones proposed for the tea sector need particular attention. This is in view of the fact that low-country tea production has good prospects for the future (Tea Master Plan, 1980). Two projects are proposed for the sub-sector namely the tea small holders project and the estates development project. Tea small holdings form an important category of farms in the district; nearly 50% of the total tea area in the district are under small holdings and tea is the main source of livelihood for almost 20,000 households. Consequently, any project for the development of the agricultural sector cannot ignore the tea small holdings.

The types of projects for this sector are discussed under section 6.2. The project is intended for small-holdings and for medium sized holdings, as it is in these types of holdings that the problems are more

pronounced and that state assistance is needed. The tea estates development project discussed in section 6.3. aims at increasing tea production on estates with low economic returns managed by the State Plantations Corporation. At the same time this project also aims at providing better social conditions for the estate labour population. There are no specific projects for the small tea estates. The reason for the exclusion of this category of tea holdings is derived from economic consideration. The extent to which tea production from Matara district could be increased without causing any disruption in the demand-supply relationships and its consequent effects on prices is limited. Small tea estates show high levels of productivity even at the present state of development.

If measures are taken to enhance production in the small estates it will obviously be at the expense of those who operate small and medium sized holdings. This will inevitably result in unequal distribution of benefits of a tea development project and will only add to the disparities in incomes between the different categories of tea growers. Therefore, in order to ensure that all measures to enhance tea production in private holdings will be more beneficial to the small holders , small tea estates have been excluded in the investment programme.

Three projects have been formulated for the development of the rubber industry in the Matara District. One caters to rubber estates while the other concentrates on the promotion of rubber growing on lands presently underutilized. The third project is intended to benefit to about 30,000-40,000 small farmers who have rubber on their holdings by appropriate measures taken to rehabilitate their rubber lands.

The first project aims at increasing rubber production on the estates. The second project is designed to benefit the landless or near-landless families, who would take up rubber cultivation on scrub lands which are in reality encroached lands where some form of cultivation was practised and presently neglected. These lands are concentrated mainly in the Central zone. From an agro-climatological point of view the Central zone is very well suited for rubber growing. Furthermore,

rubber is a labour intensive crop and consequently it would provide the household benefiting under this programme with adequate employment.

Cinnamon is a crop which has a special place in the agricultural economy of the Matara district. Two projects have been formulated for this sector, the Cinnamon Rehabilitation Project and the Peeler Training Programme. The rehabilitation programme is oriented towards larger holdings with pure stands, where production increase is most promising. For small holdings the peeler training programme will result in a substantial income increase. Cinnamon peeling is a skilled occupation. Traditionally, this activity was carried out by persons who belonged to a particular caste. The major problem confronting the cinnamon industry in recent years is the shortage of skilled labour for peeling. Though the caste factor is still prevalent,field studies indicate that several cultivators particularly the small timer are willing to harvest cinnamon himself if adequate training is provided. This project is intended to cater to these persons.

No major projects have been proposed for paddy except for the rehabilitation of minor irrigation crops. Paddy cultivation is a high risk, low potential activity in the district. Paddy yields in the district are generally among the lowest in the country.

As explained earlier flooding is the major problem affecting paddy cultivation. If one considers enhancing paddy production in the Matara district it would call for massive investment in physical infrastructure development. The Nilwala Ganga Flood Protection Scheme is one such project. However, for reasons explained in a later section it is given very low priority.

Projects for livestock development are suggested. The Integrated Rural Development Programme is also listed as a project. These are discussed in detail elsewhere.

In formulating projects for the agricultural sector we do not suggest the introduction of new crops in to the district. There is very little research evidence to suggest major changes in the cropping

pattern. Sugarcane and oil palm cultivation have been suggested. But these require further studies. The possibilities of introducing horticultural crops such as pineapple and vegetable cultivation too needs further investigations.

The projects presented reach about 50% of the rural population in the Matara district. The beneficiaries are predominantly small-holders, certain categories of small estate owners and SPC estates.

The agricultural development programme, presented in this chapter does not fully cater to the category of persons who are landless or near landless except to a limited extent the Rubber New Lands Project. It is not possible to identify feasible agricultural development projects for this group as they are deprived from the main production factor, namely land. Income from sources outside agriculture or social welfare programmes will constitute the source of subsistence for this group.

6.2. TEA SMALL HOLDERS PROJECT

6.2.1. Objectives

The objective of the Tea Small Holders Project is to improve the family income of tea growing households by increasing tea production and upgrading the quality of made tea. More specifically the project would aim at:

- Provision of better processing and transport facilities for green leaf.
- Improving input supply
- Improvement of extension services
- Promotion of replanting and infilling of vacancies by strengthening the existing subsidy schemes.

6.2.2 Location and target groups

The location of the project is indicated on the Matara Project Map. The

total project area is 8,300 ha of which 700 ha in the central zone and 7,600 ha in the north. The target group consist of about 14,000 small holders with an average farm size of 1 ha of which the tea extent is 0.6 ha and of 2000 medium sized holdings with an average tea extent of 2 ha.

Tea is the major cash crop cultivated in these holdings. Other crops cultivated are paddy, rubber and mixed crops in homegardens. About 5,300 ha out of the 8,300 ha in the project area need rehabilitation.

6.2.3. Project activities

The project activities include:

- Construction of 5 new factories each with a daily intake capacity of 13,600 kg. of green leaf. This proposal takes into account the ongoing rehabilitation programmes. One factory is needed to bridge the present short fall of processing capacity and 4 factories are required to meet the increasing demand for processing capacity as a result of the project.

- Construction of 200 leaf collection centres and provision of transport facilities.

- Construction of 50 stores in order to improve the input supply.

- Strengthening of a Field Advisory Service (FAS) within the Tea Small Holders Development Authority (TSDA)

- Infrastructural support to TSDA and construction of roads.

- Training of extension officers and technical assistance to build up the FAS.

- Improvement of subsidies and credit services.

(It is suggested by TMP to revise the existing subsidy payments and

organization of credit services).

6.2.4 Development of Fields (Replanting / Infilling)

Field development can be realised by infilling of vacancies and upgrading of existing seedling tea or by uprooting of the existing seedling stands and replanting with V.P. tea.

Farmers show strong preference for the latter method of rehabilitation. This is clearly seen by the fact that the replanting rate among small holders in the district is high whereas infilling is negligible. On the other hand, infilling is cheaper, has a shorter bearing period. The objectives of enhancing yields in this project can be realised by rehabilitating seedling tea as well. This gives two alternative possibilities .

Alternative I : Uprooting and replanting with V.P. tea on 4,900 ha and infilling on 400 ha in the drier areas.

Alternative II : Infilling and rehabilitation of existing seedling stands on 5,300 ha.

6.2.5 Organizational framework

Directions on the organization of supporting services for small holder development should be provided from the national level. TSHDA would be the primary organization responsible. The SPC estates and may be private estates could be developed to function as a nucleus for providing services to small holders particularly in regard to leaf collection, input supply and processing.

6.2.6 Costs and benefits, I.R.R.

The project costs of both alternatives are summarised in table 6.1. For details and schedule of operations see Annex V(1).

Table 6.1 Costs - Tea small holders project

	Alternative I Million Rs.	Alternative II Million Rs.
Factory development	35.0	35.0
Leaf collection centres and transport	17.2	17.2
Stores	8.2	8.2
FAS	1.6	1.6
Infrastructure	8.2	8.2
Training & technical assistance	9.2	9.2
Field development (replanting & infilling)	249.2	185.5
Total	328.6	264.9

The yield will increase from 750 kg made tea/ha to 1,500 kg made tea/ha. A yield of 1,500 kg/ha corresponds with a net benefit of Rs.7,500/ha. The net benefits without the project can be estimated at Rs.1,500/ha.

The IRR at domestic prices of the project is 6.4% for alternative I and 9.4% for alternative II. At economic prices the IRR will be 11.5% for alternative I and 17.7% for alternative II.

Although alternative II has a higher rate of return, implementation of alternative I is recommended considering farmers obvious reluctance to infilling.

6.3 ESTATE TEA DEVELOPMENT PROJECT (E.T.D.P)

6.3.1 Objectives

The objectives of E.T.D.P. is to increase the tea production both quantitatively and qualitatively on those estates with low economic returns managed by the SPC. At the same time the project aims at the amelioration of the social conditions of the 15,000 estate workers

employed on these estates.

The total area under tea on estates in the Matara district in this category is 3,000 ha. The yields are between 700-1,100 kg made tea/ha. As a result of these low yields and considering the relatively high production costs on these state owned enterprises, net benefits are low.

The project particularly deals with:

- Modernisation of the factories managed by the S.P.C.
- Promoting, replanting and infilling.
- Improvement of economic and social infrastructure.
- Training and technical assistance.

6.3.2 Target estates

The 22 SPC tea estates in the Matara district can be distinguished into 3 categories. The first category (4 estates) achieves yields of more than 1,500 kg MT/ha and are generally profitable. This category is excluded from this project. (Deniyaya, Kobomella, Mawarola and Wilpita estate).

The second category (9 estates) realises yields between 800-1,500 kg MT/ha and have low economic returns. (Anning kanda, Beverly, Diddeni-potha, Ensalwatte, Handford, Hulandawa, Indola, Tannahena, Sathmala Ella).

The third category (9 estates) with the yields below 800 kg MT/ha and incur heavy losses. (Andapana, Akuressa, Bisodola, Diyadawa, Hallala, Kamburupitiya, Kiriwanaganga, S.Charley Mount, Surinyamal).

This project is oriented towards the latter two categories of SPC estates. These estates have on the average a present net benefit per ha of only Rs.1,700. The project aims at improving the economic returns of these state owned estates by increasing yield to a level of 2,000 kg MT/ha.

The estates under this project are indicated on the Matara Project Map.

6.3.3 Project activities

The modernisation process involves the replacement of driers which are more than 30 years old. Installation of incremental drier capacity where the daily green leaf intake capacity falls short is foreseen as well. Furthermore, the tats which are predominantly used for withering will be replaced by troughs. This programme also consists of electrification of 4 SPC factories.

Out of the total area of 3,000 ha about 2,200 ha need rehabilitation. This would mean replanting 12000 ha with V.P. tea and infilling 500 ha . Contrary to the small holders project, replanting is preferable here as a much higher yield could be envisaged. Yields of 2,000 kg MT/ha can hardly be achieved with seedling tea.

Activities regarding improvement of economic and social infrastructure concern:

- Supply of fuel and power to the estate labourers
- Development of a regional distribution centre for chemicals, machinery and fertilizer
- Construction of ware-houses
- Construction of new roads and replacement of transport material
- Improvement of housing for the estate labourers and the regional management personnel and construction of new buildings for offices.

The technical assistance is proposed for:

- Management assistance to the state corporations
- Development of a management information system
- Land suitability mapping for tea
- Technical assistance for project preparation and project implementation.

6.3.4 Organizational framework

The organization responsible for the implementation of the project will be the SPC.

6.3.5. Costs, benefits and I.R.R.

The costs of the project are summarised in table below.

Table 6.2 Costs of the E.T.D.P. (For details see annex V(2).

Field development	
Replanting	81.6
Infilling	17.5
Factory modernisation	14.7
Economic and social infrastructure	6.3
Training and technical assistance	2.1
Total	122.2

The benefits of the project are based on a yield increase from 700-1,100 kg MT/ha to 2,000 kg MT/ha. The net benefits resulting from the latter yield level is Rs.10,000/ha. The benefits without project are in the average Rs.1,700/ha. The internal rate of return at domestic prices is 10.3%. At economic prices the IRR will be above 15%.

6.4. RUBBER REHABILITATION PROJECT

6.4.1 Objectives

The objectives of this project is the rehabilitation of 8,700 ha of rubber in order to improve the agricultural incomes of 30,000-40,000 small holders and 500 small private estate owners in the district. The income from rubber of a small holding of an average size of 0.15 ha

is about Rs.1,000/- per year and this income could be doubled if appropriate rehabilitation measures are taken.

The project particularly aims at:

- Replanting the entire rubber area during a 15 year period.
- Establishment of nurseries with a total capacity of 300,000 stumps/ year.
- Improvement of supply of fertilizer, chemicals and materials.
- Improvement of services to the small holder and private estate sector.

6.4.2 Location and target groups

The target group consist of 30,000 - 40,000 small holders with an average farm size of 1 to 3 ha cultivating rubber an extents ranging from 0.1 to 0.3 ha. In this category of farms rubber is one of the major cash crops. Other crops grown are paddy, coconut and a mixture of others cultivated in homestead gardens. The average rubber extent on small estates is 2 ha. The total size of these estates average 10 ha. and grow paddy, coconut, cinnamon and a mixture of other crops.

6.4.3. Project Activities

The Rubber Master Plan (CDC, Sept. 1979) contain proposals for the implementation of a development programme. The actions, specified for the Matara District are summarised below:

- In order to promote the replanting scheme a new phasing of subsidy payment is recommended. The total subsidy would be Rs.10,000/ ha. extended over 7 years.
- At a rate of a yearly production of 35,000 stumps per nursery hectare, 9 ha. of nurseries will be required for the project. It is recommended that production and planting material should be given

out on contract to the SPC.

- In order to meet the increasing demand for fertilizer, chemicals and materials as a result of the project, construction of new stores and extension of existing stores will be necessary. 50 stores with a capacity of 70 tonns each will be required.
- Improving the supporting services to the small holders and small estate sector. This includes the Advisory Services Division(ASD)and the group processing centres.

The Advisory Services Division is heavily understaffed and in order to be effective substantial improvements to the advisory service will be necessary. At least 25% of all holdings should be visited every year. The responsibility of ASD would be: extension, subsidy field inspection, rubber nurseries and the issue of planting material.

Presently, only one group processing centre operates in Matara. It is proposed to extend the number to 30 in the district.These centres will provide storage capacity for material inputs as well.

6.4.5 Organisational Framework

A substantial reorganisation of the supporting services for the Rubber Small Holders sector is proposed by the R.M.P. It is suggested that one should refer to the R.M.P. for further details.

6.4.6. Costs, benefits, I.R.R.

The project costs are summarised in table 6.3.

Table 6.3. Costs of the rubber rehabilitation project

(Unit:Million Rs.)

Replanting costs	187.9	
Extension and reorganisation of supporting services	67.0	
Operational costs supporting services		3.8/year
Total	254.9	

(For details and schedules of operation see Annex V(3).

With the implementation of the project the yield would increase from 800 kg dry rubber/ha as at present to 1,200 kg/ha. The average net benefits from 1 ha would be Rs.6,900. Without the project the average benefits would be Rs.2,500/ha. At domestic prices the IRR is 6.0%. At economic prices the IRR is 6.1%.

The IRR is rather low. This is due to the relative long period of implementation. If the schedule of operations of the rehabilitation programme is completed in a shorter period i.e. 7 years. The IRR at domestic prices can be raised to 9.7%.

However, it is not realistic to speed up the rehabilitation programme. A major constraint is that farmers income will drop drastically during the first years of the project and could cause problems unless the government intervenes. Furthermore the management of such an accelerated programme would be another difficulty.

6.5 ESTATE RUBBER DEVELOPMENT PROJECT (E.R.D.P)

6.5.1 Objectives

The objective of E.R.D.P. is to increase the rubber production on the estates in the district. The total area under rubber on estates is 1,300 ha. The yields vary between 700 kg dry rubber/ha to 1,100 kg/ha. These relatively low yields combined with high production costs lead to low benefits or losses.

The project particularly deals with:

- Replanting of the entire area in a period of 4 years
- Factory improvement
- Improvement of transport facilities and housing

6.5.2 Target estates

12 rubber estates are included in the project.

6.5.3 Project Activities

Replanting will take place within a 4 year period. The rapid replanting rate is preferable for economic reasons i.e. the IRR increases if implementation is accelerated. Secondly the total area involved is much smaller hence management constraints are less. Lastly, unlike the rehabilitation project the drop in income during the first years of the project is less of a problem for state owned enterprises.

About 300 ha per year will be replanted. There are no crepe factories in the Matara district at present. It is proposed that the existing processing equipment for RSS on the estates should be replaced rather than to introduce construction of new crepe factories.

Improvement of transport and housing facilities on rubber estates are foreseen as well. For details see Annrx V(4).

6.5.4 Organisational framework

The SPC is the organisation responsible. For details on restructuring and upgrading the SPC management see R.M.P.

6.5.5 Costs, benefits, IRR

The costs of the ERDP are presented in the table below.

Table 6.4 Costs of the E.R.D.P

(Unit:Million Rs.)

Replanting programme	28.1
Factory rehabilitation	2.2
Transport	2.6
Housing	7.6
Total	40.5

For details see Annex. V.(4)

The present yields are 800kg dry rubber per ha. This could be expected to increase to 1,500 kg/ha. as a result of the project. The resulting net benefits are Rs.8.400 / ha.

Without project the yields will be at such a level that on the average the net benefits will be zero.

The IRR at domestic prices is 14.2%. At economic prices the IRR will be above 20%.

6.6. RUBBER NEW PLANTING PROJECT

6.6.1 Objectives

The objective of the Rubber New Planting Project is the reclamation of 7,900 hs of scrub lands suitable for rubber cultivation. These lands will be planted with rubber in order to generate a decent agricultural income to 7,900 landless and near landless families who will receive 1 ha of rubber land each. The average annual family income from 1 ha of rubber with an average production of 1,200 kg dry rubber per ha will be about Rs.9,000/-.

6.6.2 Location and targets groups

The location of the project is indicated on the Matara Project Map. It is almost entirely situated in the central zone. The scrub lands are actually abandonned encroachments. Encroachers were forced to give up cultivation due to increasing weed problems. However, with appropriate cultivation methods these problems can be overcome. According to the land suitability map rubber would do very well in the district.

Most of the scrub lands are state owned lands, hence, generally, no problems will arise with regard to land alienation. The target group are landless or near landless families living in the villages adjacent to the scrub area. At present these families find a modest income by

cultivating their micro holding or by working as casual labourers in addition to the benefits of the social welfare programme (Food Stamp Scheme) The distribution of one hectare of rubber land to such families could considerably improve their living standards.

6.6.3 Project activities

The project includes the following activities:

- Reclamation of 7,900 ha of scrub lands at an annual rate of 800 ha over a 10 year period. Weeding and clearing scrub lands would take 1 year and should be undertaken by the future owners of the land. Approximately 200 mandays per ha would be required for these activities and the Project whould pay Rs.3,000/- per ha cleaned.
- In the second year field preparation (levelling and holing) takes place. This requires about 220 mandays. The project would survey the land. The future beneficiaries will be paid Rs.15/day and will be supervised by the Project.
- In the third year terracing, fencing and planting takes place,which will take 360 mandays. A wage rate of Rs.15/day will be paid by the project and planting material and fertilizers will be given to the beneficiaries.
- In the fourth to the eighth year about 100 mandays per ha are required for maintenance. The project would have to pay Rs.1,500 per ha to the future owners for maintenance costs.
- From the ninth year onwards rubber tapping could start. The processing will be done by the small holders individually or collectively. The project would provide the equipment on credit.
- The Project will continue advisory services to the rubber small holders for 3 years, after which the responsibilities will be transferred to Small Holders Advisory Services Division.

The Project will not include housing, road construction and other infrastructural activities. It is assumed that the small holders will make their own provisions in this regard. Most of the owners will be able to operate their holdings from their existing dwellings as the distances to their rubber plots will not exceed 1 - 2 miles.

6.6.4 The Organisational Framework

It is proposed to create a seperate organisation to within A.S.D. to in charge with the implementation of this Project. This body would have its own budget but would continued to operate within the structural framework of the ASD.

6.6.5 Costs, benefits, I.R.R.

The project costs are summarised below:

Table 6.5 Costs of the Rubber New Planting Project

Unit:Rs.Million

Replanting	199.1
Operational costs	84.8
Total	283.9

After planting the overhead costs of the A.S.D for the project area will be 3.4 million/year. The schedule of investments and details are shown in Appendix 5.(5)

The average net benefits will be Rs.6,900/ha. The benefits without the project are zero. The IRR at domestic prices is 9.8%. At economic prices IRR is 19.3%.

6.7 COCONUT - LIVESTOCK PROJECT

6.7.1 Objectives

The objective of the Coconut - Livestock Project is the intensification of the use of coconut lands by the development of dairy farming under pure coconut stands. The income from coconut lands can considerably be increased by the intercropping with pasture for dairy farming.

This is considered advantageous from an economic point of view and can contribute to the improvement of nutritional standards in the district.

The project aims more specifically to develop milch buffalo raising on 4,000 ha in the Hakmana region where coconut lands suitable for this type of activity are available. In a 15 year period 13,000 buffalo cows could be raised in this region producing about 15,000 tons of milk per year. The milk will be processed to curd at farm level. The absence of breeding stock in the District makes the establishment of a buffalo calf heifer raising unit necessary.

6.7.2 Location and target groups

There are 10,000-12,000 small holdings with an average farm size of 1 ha - 3 ha. These consist of pure stands of coconut averaging 0.3 ha - 0.5 ha which could benefit from the project. It is expected that a project of this type would raise the incomes of small holdings by Rs.2,000-3,000/year. The location of the project is indicated on the Matara Project Map.

6.7.3 Project activities

The project activities concern:

- The establishment of a buffalo calf heifer raising unit on 60 ha. in Hakmana with an annual production capacity of 260 heifers in incalf stage. This unit will purchase surplus calves or if necessary import calves from India to raise them to in-calf stage for distribution. (for details see Matara IRDP Project Proposals).
- The BCR unit will encourage farmers by assisting them to raise heifers and by offering incentive prices.
- The BCR unit will provide extension facilities and training to cattle farmers and would function as a model farm.
- The BCR unit will supply farm inputs such as fertilizer, seeds for pastures, concentrates, materials and will also provide the services of stud bulls.

In the first phase of the project (7 years) all heifers will be produced and distributed by the BCR unit. At the same time cattle breeders will be selected and trained .

In the second phase (8 years) the BCR unit will expand extension and input supply activities beyond the group of farmers who received heifers from the unit. An increasing number of farmers will get their heifers directly from private, BCR trained and supervised cattle breeders.

The subsidy on heifers met by the project will only be applicable during the first phase. In the second phase, the BCR unit will sell heifers at existing market prices.

The project is focussed on curd production. Processing milk to curd will be done by the individual farmers. Therefore, milk collection will not be necessary.

6.7.4 Organisational framework

The N.L.D.B. should be the implementing agency. (see further Matara Project Proposals).

6.7.5 Costs, Benefits, I.R.R.

The costs of the coconut - livestock project are summarized in table 6.6.

Table 6.6 Costs of the coconut livestock project

(Unit:Rs.Million)

Investments B.C.R., Unit	3.81
Operational costs B.C.R. Unit	1.10/year
Overhead costs	
Supporting services by the B.C.R.Unit (At full development)	2.40/year
Total	3.81+3.50/year

(For details see Annex V(6)

The net benefits of milk/curd production are about Rs.2,000/- per cow equivalent/year. On a hectare basis this corresponds with Rs.6,000/- per ha. These figures are based on the price level of Rs.3.5 per bottle which is the converted curd value. It is not certain to what extent curd prices will be influenced by increased supply. Therefore, as an alternative the IRR has been calculated at a 10% price decrease as well. The IRR is very sensitive to price fluctuations.

I.R.R. at current prices : 24.5%

I.R.R. at 10% price decrease : 16.6%

In case milk is not processed to curd and is sold fresh, the project at current milk prices would be a unviable.

6.8. THE CINNAMON REHABILITATION PROJECT

6.8.1 Objectives

The objective of the cinnamon rehabilitation project is the rehabilitation of 4,000 ha of pure cinnamon plantations in order to increase Sri Lanka's foreign exchange earnings from cinnamon and to improve the agricultural income of cinnamon cultivators.

The project deals particularly with:

- Establishment of a supporting service especially geared towards cinnamon cultivation. Presently, the Department of Minor Export Crops is entrusted with the responsibility of the development of cinnamon in addition to other crops. The importance of cinnamon in the district justifies the need for a specialised agency. The responsibility of this agency would be extension, field subsidy controls and providing market information. The latter is presently totally absent and farmers rely completely on private dealers for any information on prices.

- A review of the existing replanting subsidy scheme and improvement of the implementation of the subsidy scheme.

6.8.2 Location and Target groups

The target groups consist of about 2,500 medium sized holdings and small estates with an average farm size of 3-10 ha and containing 1.5-2.5 ha of cinnamon.

Improvement of cinnamon cultivation on small holdings and growing cinnamon generally as an intercrop in homestead gardens is elaborated in the homestead garden project. The location of the project is depicted on the Matara Project Map.

6.8.3 Projeect activities

The project aims at the rehabilitation of the entire extent mono cropped with cinnamon in the district at a rate of 500 ha/year.

Cinnamon cultivators will receive a subsidy of Rs.3,200/ha in two instalments. The subsidies will be given after the work has been completed.

The rehabilitation works consists of:

- Uprooting of weak plants and infilling of vacancies
- Soil conservation
- Pruning, training
- Weedin g
- Fertilizer application

A Cinnamon Advisory Service (CAS) will be established and will consist of 1 Asst. Director, 1 A.O , and 5 K.V.S. Transport and housing facilities will be provided. The C.A.S. will control the rehabilitation works and be in charge with the payment of the subsidies.

6.8.4 Costs, Benefits, and I.R.R.

The costs of the project are summarized in table 6.7

Table 6.7 Costs of the Cinnamon Rehabilitation Project

(Unit:Million Rs.)

Investments C.A.S.	0.30
Operational costs C.A.S.	0.20/year
Overhead costs	
Subsidy schemes	1.3/year
Rehabilitation costs	12.8
Total	13.1+1.5/year

(For details see annex 5(7) and Herath (1980)

The immediate benefits of the project would be the increase of yields from 300 kg of quills per ha to 500 kg of quills per ha.

The net benefit resulting from the project is Rs.5,800/ha from the fifth year onwards. The net benefits without the project are Re.3,000/ha. (For details see annex 5(7). The resulting I.R.R. at domestic prices is 23%. Differences do not exist between economic and domestic prices for cinnamon cultivation.

6.9 CINNAMON PEELING TRAINING PROGRAMME

6.9.1 Objectives

The objectives of the Cinnamon Peeling Training Programme is to train cinnamon small-holders to peel their own crop.

Two thirds of the total labour requirement for cinnamon cultivation is for peeling. This activity requires a certain amount of skill and is normally done by hired labour. The main reason for small-holders not using family labour is due to the lack of skill (Herath, 1980). The gross value of production from 1 ha of cinnamon is Rs.2,700 (Yield level 100 kg quills/ha). Peeler wages amount to about Rs.800. If the small-holder is able to do the peeling himself, his income would increase by Rs.800/ha.

Most small holders find it difficult to hire skilled peelers as they prefer working on larger plantations. As a result harvesting and peeling is postponed which causes considerable loss both in terms of yield and quality.

6.9.2 Location and Target Group

The target group consist of 1,000 small-holders with an average farm size of 1 ha operating 0.2 ha to 0.7 ha cinnamon, often cultivated as a mixed crop in homestead gardens. These small-holdings are located in the Central zone in the A.G.A. divisions of Ganga boda Pattuwa N and W. and Morawak Korale East in the Northern zone.

6.9.3 Project Activities

A training programme should provide training for 200 persons a year and must continue for at least 5 years.

C.A.S. (see C.R.Project) would select experienced peelers as trainers and each trainer would train 5-6 trainees for a period of about 3 months. The trainer would be paid Rs.50/- per trainee. The trainees would be paid Rs.5/- per day. After 5 years, 1,000 peelers would have been trained. Continuation of this programme can be considered after that period.

6.9.4 Operational Framework

The C.A.S. will be the implementing agency. (For details see Herath, 1980).

6.9.5 Costs and Benefits, I.R.R.

The costs of the programme are summarized below:

Table 6.8 Costs of the Cinnamon peeling training programme

Allowance payable to 40 trainers (Rs.50/trainer)	Rs. 10,000
Allowance payavle to 200 trainees (Rs.5/day. 100 days)	Rs.100,000
Overhead C.A.S. for the programme	Rs. 10,000
Total	Rs.120,000

The total costs are Rs.120,000/year. For 5 years the costs will be Rs.600,000/-. It can be expected that the benefits of the programme will be about Rs.600/- per year per family. A part of this income increase is a result of redistribution: wages which had to be paid to the peelers are saved and this amounts to about Rs.400/-. Timely peeling would result in better quality and Rs.200/- could be expected.

The IRR is 15.5%. In the estimation of the IRR only the latter benefit is taken into consideration.

6.10 TNE NILWALA GANGA FLOOD PROTECTION SCHEME

The Nilwala Ganga Flood Protection scheme has been subject to several feasibility studies since 1968. The most recent one is that by G.E.R.S.A.R. (Groupement d'etudes et de realisations des societes damenagement regional) published in 1980. The main findings of this study are summarized below.

GERSAR presents 3 possible solutions for flood protection. This includes the construction of 24 km of bunds with a maximum elevation of 620 m. The bunds do not always follow the banks of the river; consequently some areas have been excluded from protection for which the main arguments are the excessive costs. The total protected area is 5,900 ha of paddy fields.

The bunds cut off independent zones as indicated on the Matara Project Map that are centred on the tributaries of the Nilwala Ganga.

These are subject to inflows which have to be evacuated. This is not possible by gravity discharge, it will therefore be necessary to construct pumping stations at the outlet of each of these zones. The solution selected requires the construction of 16 pumping stations with a total discharge of 175 m^3/S.

To avoid inundation of Matara town situated at the mouth of the river diversion of the river upstream from Matara over a length of 34 km will be necessary. The total costs are summarized in table 6.8.

Table 6.8 Investments and annual expenditure of the Nilwala Ganga Flood Protection Scheme

(Unit:Million Rs.)

	Year 1	Year 2	Year 3	Year 4	Total
Bunds & connected structures	35.7	26.6	55.4	31.1	148.8
Roads	2.5	2.4	5.3	4.0	14.2
Pumping stations	51.9	105.0	107.2	82.5	346.6
Drainage	5.0	23.6	18.3	12.8	59.7
River improvement	67.5	-	-	-	67.5
Engineering	22.0	15.8	18.4	17.5	63.7
Total investments	184.6	173.4	204.6	137.9	700.9
Operational costs	6.3	17.3	29.2	36.9	89.7
Total costs	190.9	190.7	233.8	174.8	790.2

Source: G.E.R.S.A.R.

The operational costs remain 36.9 million Rs/year from the fifth year onwards.

The benefits result from a yield increase of 1.2 tons per crop/ha presently to 2.5 tons per crop/ha after completion of the project. For detailed schedules of benefits we refer to the feasibility study.

The IRR at economic prices according to G.E.R.S.A.R. is 5.4%. However, an error in the calculation of the economic price of rice results in a considerable over-estimate. G.E.R.S.A.R.'s IRR calculations are based on a wrongly calculated paddy price of Rs.7,450/ton whereas the real economic paddy price is Rs.2,600/ton. Applying the latter price in the calculation of the IRR would result in a negative IRR, hence the project should not be implemented. Other arguments to refrain from implementation of the Nilwala Ganga Flood Protection Scheme is the dependence on pumping stations. Experience in Matara till now reveals the poor performance of existing pumping stations due to lack of maintenance and spare parts.

6.11 THE MATARA INTEGRATED RURAL DEVELOPMENT PROGRAMME (I.R.D.P.)

Since 1979 Matara is one of the districts receiving special development aid in the framework of the IRDP programme of the government. The ARTI/Wageningen Planning Team formulated project proposals for the development of the agricultural sector for the period 1981-1984 on the request of the Ministry of Plan Implementation. These project proposals constitute the core of the agricultural development component of IRDP. For details of the programme refer to the report on project proposals. In this section the major elements of the programme will be discussed in the light of the long term development policy of the district.

6.11.1 The Coconut Processing Project

This project has been given low priority by the Ministry of Plan Implementation and implementation has been postponed.

Utilisation of coconut fibre however has interesting prospects and the project should be considered as a pilot project that, if successful could be extended to other parts of the district as well. The total costs are Rs.1.7 million. The I.R.R. is below 10%.

6.11.2 The Buffaloe Calf Heifer Raising Unit

This project is included in the coconut-livestock project discussed in para 6.7. of this chapter.

6.11.3 Development of Regularised Encroached Lands

This project consist of 4 pilot schemes with the objective to get experience on soil conservation, diversification, reafforestation and reconversion of scrub lands. These pilot schemes with a total extent of 325 ha should constitute the base of a forestry and soil conservation programme aiming at the reafforestation of 3,500 ha currently cultivated lands and the reconversion of scrub lands, to annual crop cultivation of 2,700 ha. In addition to this, 13,000 ha of land need soil conservation works.

6.11.4 The Development of Tea Small Holdings

This project is included in the tea small holders project and the estate tea development project discussed in paras 6.2 and 6.3 of this chapter.

6.11.5 Homestead Development Project

Parts of this project will be implemented in the 1981 programme of the Matara IRDP. Depending on the results of this project continuation beyond 1981 could be considered.

The impact of the project even at full maturity on the agricultural development of the district will be very restricted. Generally homestead development programmes will be hampered by organisational constraints imposed by the very large number of units involved. No emphasis on the implementation of this programme is recommended.

6.11.6. Rehabilitation Minor and Medium Irrigation Scheme

This project has been accepted by the Ministry of Plan Implementation, and in 1981 implementation will start. The project should be restricted

to the 60 villages mentioned in the project proposals which cultivate approximately 2,400 ha. In other parts of the district additional irrigation is of minor importance.

The total costs can be estimated at Rs.30 million. Assuming a yield increase of 500 kg/ha/crop the incremental net benefit would be Rs.400/crop/ha or Rs.800/ha/year.

The IRR of the project at domestic prices under these assumptions would be 20.5%. (duration 8 years).

Table 6.9 summarises the costs of the IRDP programmes which constitute a part of the long term agricultural development programme of the Matara District. (in addition to the elements already included in projects earlier discussed in this chapter).

Table 6.9 Investments IRDP Programme in the Matara District

(Unit: Million Rs.)

Coconut processing project	1.7
Pilot schemes encroachments	2.4
Rehabilitation minor and medium irrigation schemes	3.0
Total	7.1

6.12 A SUMMARY OF PROJECTS - KEY INDICATORS

In table 6.10 key indicators of the projects identified are presented. The 9 projects reach 75,000 - 87,000 beneficiary families which corresponds with 60% to 70% of the total rural population in Matara in 2000. All projects except the cinnamon training programme are directly related to physical areas and they totally cover 36,000 ha or 39% of the cultivated area in the district.

The total investments are Rs.903.8 - 967.5 million. Projects have a duration from 3 - 21 years. Assuming a real scarcity value of capital in the country of 10% all projects identified are economically feasible with the exception of the rubber rehabilitation project. In an accelerated implementation programme however this project would become economically feasible.

Most implementing agencies concern existing organisations; reorganisation is however recommended in a number of cases. Taking the IRR as the main criteria, the economic priority ranking of the projects are as follows:

1. Cinnamon Rehanilitation Project
2. Rehabilitation of Minor & Medium Irrigation Schemes (Part of IRDP Matara)
3. Estates Rubber Development Project
4. Estates Tea Development Project
5. Rubber New Planting Project
6. Livestock Project (assuming a 10% curd price decrease)
7. Cinnamon Peelers Training Programme
8. Tea Small Holders Project
9. Rubber Rehabilitation Project

The Nilwala Ganga Flood Protection Scheme, costing Rs.790.2 million should not be implemented. This very expensive project is economically not feasible and farmers are sceptical about it.

The projects presented in table 6.10. constitute a far more lucrative alternative and reach much more people.

6.13 THE MATARA AGRICULTURAL DEVELOPMENT PROGRAMME AND THE NATIONAL AGRICULTURAL DEVELOPMENT POLICY

Once a year the Ministry of Finance & Planning presents project proposals for the Sri Lanka Aid Group Meeting. The set of projects put forward by the Government in this Meeting can be considered as the main indicator for its development policy.

4 categories of projects are distinguished:

Group A : Projects for which donor financing agreements have been signed

Group B : Projects for which negotiations have reached an advanced stage but for which agreements have yet to be signed.

Group C : New projects for which relevant studies have been completed and for which financing is sought for implementation.

Group D : New projects for which donor technical assistance is sought for project preparation.

In the most recent document of the Ministry of Finance & Planning (1980), the Matara IRDP is mentioned under Category A projects. A part of the Rubber Rehabilitation Project is presented under Category B projects.

A part of the Nilwala Ganga Schemes is proposed under the Category C projects. None of the other projects figure in Aid Group Meeting document.

The total amount of aid received or shortly expected for agricultural and rural development (category A + B projects) is Rs.1530.3 million for the period 1981-1985. Compared with the investments of the Matara Programme this latter proves to be rather substantial. However, IRDP Kurunegala received Rs.480 million for five year period which is much taking into consideration the long term characteristics of the Matara programme.

We may conclude firstly that most of the types of projects identified uptil now do not get attention from the key Ministry involved and

secondly, that the total amount of investments, although substantial, are not beyond the economic reach of the country's development programme.

Table 6.10 A summary of Projects - Key Indicators

Project	No. of beneficiaries (families)	Hectarage of project	Investments (Rs.Million)	Operational costs (Rs.Million/ year)	Duration (Years)	Rate of Return International Domestic Prices	Economic Prices	Organisational framework or implementing agency
Tea Small Holders Project	14,000	5,300	Alternative I 328.6 Alternative II 264.9	Included in overhead national depts.	10	I: 6.4 II: 9.4	11.5 17.7	Tea Small Holders Authority
Estates Tea Development Project	18 SPC estates	2,200	122.2	Included in overhead SPC	15	10.3	15	State Plantations Corporation
Rubber Rehabilitation Project	30,000 - 40,000	8,700	254.9	3.8	21	Accelarating 6.0 9.7	6.1 10	Advisory Services Dept. Groups Processing Services Rubber Manu. & Mark Board
Estate Rubber Dev. Project	12 SPC estates	1,300	40.5	Included in overhead SPC	10	14.2	20%	State Plan. Corp.
Rubber New Planting Project	7,900	7,900	199.1	First 10 yrs 6.1/year later 3.4 / year	17	9.8	19.3	Advisory Services Department
Livestock Project	10,000 - 12,000	4,000	3.8	3.5	15	At current price 24.5 10% price decrease 16.6	Not calculated	National Livestock Development Board
Cinnamon Rehabilitation Project	2,500	4,000	13.1	1.5	8	23.0	Not calculated	Cinnamon Advisory Service (Services of the dept. of Minor export crops)
Cinnamon Peelers Training Programme	1,000	-	-	0.1	5	15.5	Not calculated	The Cinnamon Advisory Service
IRDP Matara (in add. to project elements included in other progs.	9,300	2,700	5.3	1.8	3	Coconut 10.0 Irrig. 20.5	Not calculated	Coconut Dev. Board Irrig. Dept., Forestry Dept.
Total	74,700 86,700	36,200	I 967.5 II 903.8	16.8				

CHAPTER 7

SHORT TERM PRIORITIES

7.1 ASSESSMENT OF ON-GOING PROGRAMMES FOR AGRICULTURAL DEVELOPMENT IN MATARA DISTRICT

7.1.1 General Features

Four types of programmes affect agricultural development in the district.

a) Agricultural supporting services rendered by various Departments, Boards, Authorities and Corporations.
b) The Integrated Rural Development Programme for Matara District (MIRDP) sponsored by SIDA (Sweden)
c) The Decentralized Budget (DCB)
d) Major infrastructural investment programmes.

A major investment programme is being considered for Matara district, i.e. the Nilwala Ganga Flood Protection Scheme. Studies are in an advanced stage and financing is sought for this scheme by the Ministry of Finance and Planning. The scheme is going to cost Rs.790 million at current prices, which is about the same amount needed for long term development of all other agricultural activities in the district. However the flood protection scheme shows a negative IRR. Improvement of paddy cultivation ranks very low in the priority list of agricultural development in Matara district.

The Implementation of the Nilwala Ganga Flood Protection Scheme prior to other feasible projects in the district would be a great mistake.

If the decision to seek finance for the Nilwala Ganga Scheme can still be revised we strongly recommend to consider financing of the projects formulated under the Tea Master Plan and the Rubber Master Plan instead.

The DCB is an allocation of equal amounts of money to each electorate (currently 2.5 million Rs.per year per electorate). Decisions on spending of these funds are basically left to the MP's concerned. DCB

is administered by a Planning Officer of the M.P.I. attached to the Kachcheri. A recent survey of M.P.I. reveals that most of the expenditures under DCB are made for educational projects and small infrastructural projects. Very little goes to directly productive agricultural projects. DCB has practically no impact on agricultural development.

IRDP is a multi-sectoral programme for district development co-ordinated by MPI and sponsored by foreign donor agencies. SIDA is the donor agency for Matara IRDP. This programme in principle aims at strengthening on-going departmental programmes. Concomitantly it works through the existing organisations with a project office to coordinate the functions under the programme. The framework within which the IRDP operates appear to impose certain limitations on the programme as follows:

- No development activities will be included in the programme for which no implementing agency exists. This is the case for cinnamon and for small-holder rubber.
- No innovative lines of development will be undertaken as there will in general be no established organisation to take up responsibility. An example in Matara is the development of scrub lands for which IITA, having recently established a small research unit in Sri Lanka, proposes zero - tilling cultivation techniques. Other limitations of MIRDP are implied in its small budget (Rs.15-20 million per year) and its short term nature. It will therefore exclude the plantations sector and large infrastructural investment programmes (Nilwala Ganga Flood Protection Scheme). MIRDP is based on annual action plans. Swedish funding started in 1979 and is bound to end in 1982. There is no indication that the programme will be continued with local funds. It is generally believed, however, that staff recruited under IRDP will continue to work in the departments concerned.

The main components of MIRDP (investments wise) are: Tea Small Holders Development; Extension and Training; Irrigation and Drainage; Roads

Development. These four components cover about 80% of total planned expenditure. There are about 12 other components in various sectors. Most of them are too small to have any leverage. Other agricultural components in MIRDP are livestock development, minor export crops development, rural development (distribution of planting materials for homesteads), coconut cultivation.

Agricultural supporting services in the cultivation and pre-cultivation stage centre around extension, subsidies and input supply. Institutional credit is negligible and is concentrated on paddy cultivation. For tree crops no credit schemes are operated. The emphasis in paddy cultivation is on extension through the training and visit system (T & V) which is operated by the Department of Agriculture (DA). Inputs are not supplied along with the extension message but the farmer is supposed to obtain them from Agricultural Services Centres (ASC) coming under the Department of Agrarian Services (DAS) or from Multi Purpose Co-operative Societies (MPCS) sponsored by the Department of Co-operative Development (DCD).

DA and DAS come under the Ministry of Agricultural Development and Research, DCD under the Ministry of Food and Cooperatives.

Earlier special subsidy schemes for fertilizers were operated for certain crops. At present the fertilizer subsidy scheme is open, i.e. subsidy rates are uniform for all crops. Private traders are now allowed to operate next to the outlets managed by government organisations. Herbicides and pesticides are not subsidized. For perennial crops the main thrust of supporting services is on subsidies for rehabilitation, replanting, new planting and intercropping. Extension is supposed to go along with the subsidy schemes but administration of the latter is too demanding generally to allow field officers to do proper advisory work.

Input supply mainly concern provision of planting material. The farmer has to obtain chemical inputs from the usual selling points mentioned above with a few exception.

In the post-cultivation phase supporting services are concerned in the fields of marketing and processing. Most important organisations are the Paddy Marketing Board (PMB), the Tea Small Holders Development Authority (TSHDA) and the State Plantations Corporation (SPC). Paddy is milled by private millers only. Private marketing and processing is also important for tea and rubber. For coconut and minor export crops these services are completely rendered by private dealers. Agricultural insurance is provided by the Agricultural Insurance Board (AIB) and concerns mainly paddy cultivation. An overview of supporting services is given in table 7.1.

7.1.2 Extension, Subsidies, Input Supply

A. Annual Crops: Paddy and homegarden crops (vegetables, pineapple, manioc).

The DA has adopted the recommendation of the World Bank to introduce the T & V System on an island wide scale. The aim of T & V is to make extension work more systematical . In principle T & V is to cover all crops as it is meant to be a unified extension system carried out by generalists in the field, backed by subject matter specialists on all crops. In practice, T & V is only concerned with paddy and homegarden crops, as organisations responsible for other crops are reluctant to give up their extension functions.

The basic idea of T & V is that the village extension workers (KVS) visits a contact farmer at least once in two weeks. The latter in turn have to inform their follower farmers of the meeting with the KVS which takes place in the contact farmer's house. The extension message is thus brought to a group and not to a individual farmers.

The extension staff of DA Matara is composed as follows:

1 Assistant Director Agriculture
3 Agricultural Officers (AO)
6 Subject matter specialists (SMS)
21 Agricultural Instructors (AI)
120 KVS (village level extension workers)

Table 7.1 Overview of Agricultural Supporting Services, Matara District

	Paddy	Homegarden crops	Coconut	Tea	Rubber	Cinnamon other MEC	Livestock
Extension	DA(T&V)	DA (T&V) + WBSL +	-	-	RASD + RCD		Vet. Sur.
Subsidies	Fertilizer	RDS	C.C.B.	TSHDA		DMEC	-
Input supply	ASC+MPCS		Plants	Plants	-		-
Credit	Peoples Bank	(MPCS)+	-	-	-	-	-
Marketing	PMB (MPCS)	Private	Private	TSHDA+ SPC+	SPC+ GPC+	Private	Private
Processing	Private	Private	Private	Private	Private	Private	Private
Insurance	AIB	-	-	-	-	-	-

WBSL = Women's Bureau of Sri Lanka
RDS = Rural Development Societies
RASD = Rubber Advisory SErvices Department
RCD = Rubber Control Department
GPC = Group Processing Centre
DMEC = Department of Minor Export Crops
SPC = State Plantations Corporation
TSHDA = Tea Small Holders Development Authority
CCB = Coconut Cultivation Board

The district has been divided into 3 segments:

- The high potential paddy area (Kamburupitiya)
- The mid potential paddy area (Hill country)
- The low potential paddy area (Coastal area)

Each segment is headed by one A.O. One AI has to train about 6 KVS, supported by the SMS. Each KVS has 36 contact farmers. Three days a week are reserved for visits. The KVS visits 6 contact farmers a day according to an exact time table, the idea being that the farmers would know precisely when they might expect the KVS. Every two weeks the KVS visits all his contact farmers. At full development of the T & V system every contact farmer could cover 25 farmers, hence every KVS would cover 900 farmers.

The T & V system does not function according to expectations in Matara district. Farmers attendance at the meetings is very poor which causes frustration among the KVS. There is a number of inter related reasons for this.

a) There is evidence that farmers prefer an individual approach over a group approach;

b) Contact farmers have been selected by KVS on personal and sometimes political grounds.
In many instances contact farmers do not know who their follower farmers are or vice versa;

c) Farmers in the wet zone are part-time farmers who have other activities at hand;

d) The KVS do not come in time for several reasons:
   - their visiting programme for a day is over burdened (6 visits a day)
   - lack of transport

e) Farmers may hardly need extension on paddy cultivation. They appear to be doing quite well within the environmental constraints in the district.

f) The training programme necessarily follows a fixed curriculum dealing with activities which should be carried out under a theoretical cultivation calendar. However, it is only meant as a guideline. The KVS

has to adapt the message given to him to the circumstances special to his area. This would mean that the KVS has to assume some responsibility in respect of the programme. However it is likely that he plays it safe by just bringing the message as an order to be executed. As a result the farmer receives an out-dated message.

In conclusion, the T & V System which may work better among paddy farmers in the dry zone irrigation schemes should not be rigidly applied in wet zone agriculture. At present, paddy cultivation receives much more attention than other crops in Matara. It has the most dense extension network, the lowest potentials and the smallest need. As attendance of meetings by farmers is a big problem one may contemplate disseminating information through the farmer's wife. This however would require indepth sociological investigations.

B. PERENNIAL CROPS

The subsidy programmes for perennial crops can be summarized as follows:

1. Coconut

   For holdings over 0.5 acres:

- Coconut rehabilitation scheme in three instalments; cutting contour drains at about Rs.1.25/meter; uprooting excess trees at Rs.20/tree; filling vacancies at Rs.3.25/plant;
- Coconut underplanting scheme in five instalments (total subsidy in five years Rs.2250/acre);
- Coconut replanting scheme in five instalments (total subsidy in five years Rs.2250/acre);
- Coconut new planting scheme in five instalments (total subsidy in five years Rs.2800/acre);
- Pasture scheme in two instalments; clearing, ploughing, planting grass Rs.125/acre and fertilizer application and maintenance Rs.175/acre.

- Intercropping scheme (number of instalments depending on crop). For Matara coffee and pepper are recommended. Total subsidy Rs.1875/acre.

For holdings less than 0.5 acres:

- Filling vacancies in four instalments. Total subsidy 28 Rs/plant

Conditions and Procedures

Ownership of the land is a condition to obtain subsidy. The title deed should be submitted. In case of tenancy or co-ownership the owner or the co-owner have to give a letter of consent. Except for encroached lands this condition poses no problems. CCB has a regional office in Matara which covers Hambantota district. Eight Coconut Development Officers (CDO) are attached to this office of whom 4 are active in Matara. After receipt of an application form for subsidy filled in by the farmer the CDO inspects the land and advices on the type of subsidy. In this respect the CDO also provides extension. There is however no follow up extension but only inspection of the proper execution of the works. The farmer receives his instalments only after completion of the work. This implies pre-financing of the costs by the farmer.

The procedure described above is basically the same for the other tree crops.

Performance

Since October 1979,(when the regional office Matara was established) to April 1980 the following results are obtained.

	Applications received	Permits issued	Acreage
Holdings over .5 acres			
Rehabilitation	551	663	1705
Underplanting and Replanting	123	104	285
New planting	184	114	176
Pasture	9	-	-
Intercropping	37	37	46
Holdings less than 0.5 acres			
Filling vacancies	9	5	2
Total	913	923	2214

There are only 4 CDO's for an area of 17,600 ha coconut. Farmers receive extension only if they take the initiative to visit the office. More than 50% of the coconut area is on homesteads of which the owners are little interested in improvement of the coconut stand. Most of the programmes are rightly geared to somewhat bigger holdings.

2. Tea

Subsidy Schemes:

- Tea replanting scheme in six instalments; total subsidy Rs.8,000-10,000/acre.
- Tea new planting scheme in six instalments; total subsidy Rs.4,750/acre
- Tea infilling scheme; subsidy of Rs.1/plant up to 1,500 vacancies per acre after planting and Rs.1/plant after it is brought into bearing.

Conditions and Procedures

Conditions for obtaining subsidies are:

- the size of holding should be less than 50 acres;

- the land should be registered at the Tea Commissioner's Department;
- V.P. clones should be used.

Most of the tea lands are registered but checking on registration causes delay. This should be handed over to TSHDA. Availability of VP plants is a bottleneck.

Performance

TSHDA keeps no records of the number of beneficiaries and their characteristics. The size of the tea holding does not appear in the inspection report as only the area included in the subsidy is reported. One beneficiary may hold more than one permit if he replants parcels successively. Only the number of permits issued and the acreage subsidized is known.

Replanting and new planting subsidy schemes started in 1978. The infilling subsidy scheme commenced in March 1979.

Replanting	1978	1979(up to June)
Permits issued	323	351
Acreage replanted	322	220
New Planting		
Acreage completed	19	19

For infilling subsidies no data are available specifically for Matara. Issue of permits is unduly delayed by checking on registration at the Tea Commissioners Department. Out of 1305 applications received within three months after inception of the scheme in all provinces only 17 permits were issued.

At present, 9 Tea Inspectors in Matara District are responsible for the administration of subsidies having hardly any time for advisory work. They have to cater to the needs of about 12,000 small holders. On the basis of 1 field officer per 500 acres of small holders tea 48 tea extension workers would be required in Matara.

3. Rubber

Subsidy Schemes:

- Rubber replanting scheme provides subsidy in seven instalments; totaling Rs.6500 per acre for private holdings (less than 50 acres) and Rs.5000 per acre for state owned plantations.
- Rubber new planting scheme; total subsidy Rs.2700 per acre.

Extension:

The Advisory Services Department (ASD) of the Rubber Research Institute is responsible for extension and training of rubber holders. It has no regional office in Matara district. The head office is in Colombo. There are 3 Extension Officers (E.Os) in Matara working in the main rubber areas of Kamburupitiya, Morawakka and Akuressa. Their main function is to give extension to small-holders operating less than 10 acres. Subsidies and extension go together. The Rubber Control Department (RCD) issues the permits for subsidies.

Performance

No data are available on recent performance. RCD statistics estimates the total replanted acreage at 12,401 as from 1953 up to 1979. This means that only 54% of the registered rubber area has been replanted in 26 years. This explains the old age of the rubber stands in Matara. A notable feature is that the rubber area is decreasing in favour of other crops, mainly tea.(registered rubber lands in 1934: 28,000 acres; in 1975:22,470 acres).

In this light it seems odd that RCD does not encourage rubber new planting, especially if one takes the potential for rubber into consideration. The implementation capacity of RCD and ASD is very weak. The absence of a regional office leads to lack of supervision and delays in the subsidy schemes. The subsidy given for new planting is too low compared to the replanting subsidy. Supply of planting

material is a problem. Farmers have to fetch improved plants at government nurseries in Kalutara district.

4. Minor Export Crops

Subsidies:

- Cash subsidy plus free planting material for permit holders who plant 0.5 to 10 acres as a mono crop for new planting or re-planting.
- Cash subsidy plus free planting material for permit holders who plant at least 290 plants of minor export crops per acre as a mixed stand of 0.5 to 2 acres.
- Free planting material is sometimes given for non-permit holders who interplant tea, rubber or coconut with minor export crops. They are entitled for 700 free plants per acre without restriction on the acreage.

Conditions and Procedures

The subsidies and the number of instalments vary with the crop. For example, the total subsidy is (under the 1978 revised scheme):
Rs.2500/acre for cinnamon re-planting
Rs.1000/acre for cinnamon new planting
Rs.2750/acre for coffee new planting
Rs.2500/acre for pepper new planting

Entitled to subsidy are lands which have not received subsidies earlier from DMEC or any other source. Operators should be owners of the land or their agents or the lawful lessees. On the receipt of an application for subsidy, suitability of soil will be inspected by an Extension Officer (EO) and on approval, a permit will be issued. Permit holders are required to enter into an agreement with DMEC. Permit holders who fail to comply with the conditions laid down by DMEC or fail to maintain the crop as instructed by DMEC may be required to return the money obtained under the scheme. If the farmer wants to interplant tea or rubber with minor export crops,

he should obtain the approval of the Tea or Rubber Commissioner in the respective cases.

Performance

There are four EO working in Matara district at divisional levels. Due to lack of transport facilities, extension and training provided by them is very limited. In supplying planting materials priority is given for permit holders due to the general shortage of plants.

The number of permits issued for new planting or replanting and the acreages do not show a regular trend in Matara district.

Permits issued for new planting	1976		1977		1978		1979	
	No.	Acres	No.	Acres	No.	Acres	No.	Acres
Cinnamon	9	21	9	18 3/4	53	24 3/4	7	18½
Coffee	-	-	2	1½	-	-	1	½
Pepper	6	9¼	5	5	1	½	5	4½
Cloves	1	2	1	2	-	-	2	2½
Permits issued for replanting								
Cinnamon	53	70½	35	55¼	53	103½	88	113

The response of farmer to the subsidy schemes is very low. The reasons are inadequate publicity and the farmers' reluctance to abide by the strict conditions imposed by DMEC. Most of the minor export crops are grown for home consumption only.

5. Livestock

Apart from the Veterinary Service there are no supporting service for livestock. A small heifer distribution scheme under MIRDP was suspended because of mismanagement.

7.2 DEVELOPMENT CHOICES

7.2.1 Financing

It is strongly felt that within a few years no funding will be found for the long term development programme outlined in chapter 6 even if mobilizing of funds start in 1981.

Certain elements of the projects suggested do however find support in on-going programmes although the scope of the latter is much smaller than what is warranted for full development of potentials.

Most of the subsidy schemes for perennial crops contain the right measures to be taken to increase production, but their impact so far has been very small due to lack of implementation capacity and due to lack of proper follow-up extension, (extension is wrongly seen as bringing a technical message and providing material inputs under more or less strict supervision).

Tea factory development is a major requirement in the district. For the other crops there is no substantial problem in processing and marketing.
The only funds one could rely upon in the short run are the very limited budgets available with the Departments and under IRDP.

What one could do immediately is to create conditions favourable for future developments, for example:

- avoiding the implemention of poorly planned projects.
- re-orientation of current programmes without additional costs
- implementing current programme in the best locations.

Considering the above facts the following suggestions are made for immediate action:

7.2.2 Immediate Actions

a) Abandon the Nilwala Ganga Flood Protection Scheme.

b) The T & V system, now concentrated on paddy cultivation should serve its declared purpose of a unified extension system. To put it emphatically; extension on paddy could be stopped almost completely in Matara District. Instead, the manpower of 120 KVS spread over the district should be used to assist the few extension officers working in the various subsidy schemes for perennial crops. One may expect that more time will become available for true extension activities.

c) Subsidies for new planting of tea and coconut should be abolished as the area under the crops should not be extended.

d) New planting of rubber should be encouraged contrary to the attitude of the Rubber Control Department. The Rubber Advisory Service Division should establish a regional office which would bring extension activities closer to the farmers. The number of Extension Officers should be increased from 3 to 10 in order to reach a better coverage of the 5,700 ha small holders rubber in the District.

e) Planting of VP tea is currently a condition for obtaining tea development subsidies. In view of the market constraints a ceiling has to be put on the districts production. Containing the production increase below 60% of the potential level of production on the existing area would be easier with seedling tea. Farmer's preference undoubtedly is for VP tea (mainly for reasons of prestige). Supply of VP clones is however a bottleneck. It is suggested to relax the condition that VP clones be used and allow seedling tea as well in the subsidy schemes.

f) No increase in milk production can be expected without revision of milk prices. The price received by the farmer should be increased from Rs.2.20 a bottle to Rs.3.20 a bottle. At current prices only curd production from buffaloe milk is profitable.

Curd production should be promoted in the Hakmana area alone.

g) The milling efficiency of paddy mills should be increased by modernizing the equipment and/or by installing new mills. The latter could be undertaken by Multi Purpose Co-operative Societies. At present the purchase of paddy, the milling and the retailing of the rice to the consumers involve complex procedures. This leaves room for losses due to corruption and mismanagement and also leads to unnecessary costs.

h) Coconut processing industries should be promoted along with measures taken for increasing nut production. At present a large portion of the coconut processed into copra in the district is imported from outside. There is scope for a small coconut fibre plant for which a detailed proposal is presented separately (see Project Proposals for MIRDP).

i) Improvement of minor tanks is another area requiring immediate action. Initially this should be concentrated in the Hakmana and Weligama electorates.

j) Encroached lands unsuitable for cultivation should not be regularized. A detailed map is provided with Project Proposals for MIRDP on which such lands are located.

ANNEX I

AGRO-ECOLOGICAL ZONES IN MATARA DISTRICT BASED UPON ADMINISTRATIVE BOUNDARIES.

Agro-ecological zone	A.G.A.Division	G.S.Division
Coastal zone (WL_4)	- Weligam Korale West	All except G.S.Division mentioned under central zone
	- Wellaboda Pattuwa West	All
	- Wellaboda Pattuwa East	All
Central zone (WL_2)	- Kandaboda Pattuwa West & East	All
	- Weligama Korale North	All
	- Weligama Korale Sorth	All
	- Gangaboda Pattuwa North	All
	- Gangaboda Pattuwa South	All
		373 Wahala Kananke
		375 Hallala
		394 Wellana
		397 Watagedera mulla
		399 Warakapitiya
Northern zone(west) (WM_1)	- Morawaka Korale West	All except G.S.Division mentioned under Northern zone east.
		267 Panakaduwa
		268 Rotumba
Northern zone(east)	- Morawaka Korale East	All except G.S.Division mentioned under Northern zone west.
		240 Mediripitiya
		240 A Kolawehigama
		241 Pallegama
		241 A Kiriweldola
		243 Deniyaya
		244 Viharahena

ANNEX II

STATE PLANTATIONS

Of the 22 State Plantations in Matara District 14 are in the Northern zone and 8 in the Central zone.

Table 1 presents the landuse on the plantations in the different zones and the total hectarage managed by the State Plantations Corporation in the district.

Table 1. S.P.C. Estates

Land use	Northern zone	% of total cultivated	Central zone	% of total cultivated	Matara District	% of total cultivated
Tea VP - Mature	762	23	137	5	899	15
- Immature	216	6	96	4	321	5
Seedling	1644	48	837	31	2481	41
Total	2622	77	1070	40	3692	61
Rubber-Mature	381	11	806	30	1187	19
-Immature	136	4	91	3	227	4
Total	517	15	897	33	1414	23
Paddy	120	4	322	12	442	7
Coconut	15	0.5	203	8	218	4
Cinnamon	23	0.5	154	6	177	3
Others	99	3	20	1	119	2
Total cultivated	3396	100%	2666	100%	6062	100%
Uncultivated	2753		638		3391	
Total SPC estates	6149		3304		9453	

Tea and rubber are the most important plantation crops. Their combined hectarages comprise 92% and 73% of the total cultivated area under the plantation in the Northern and Central zones respectively. The area under these crops together account for 57% and 24% of the total cultivated extents in the two zones.

TEA

The yield per hectare and production level of tea on state plantations are shown below:

	Mature extent in ha	Average yield in kg made tea /ha	Estate prod. in 1000 kg made tea	Bought crop in 1000 kg made tea	Total production in 1000 kg made tea
Northern zone	2406	1287	3097	2797	5894
Central zone	974	683	665	1006	1671
Total	3380	1113	3762	3803	7565

	Average yield per plucker	Average no. of plucking day
Northern zone	13.3 kg/day	278
Central zone	13.4	255
Total	13.3	270

The figures for the Northern zone show a slight increase as compared to 1979. Those for the Central zone show a decrease. On the whole production figures remain well below the estimated total production of 8859 tons of made tea.

In 1977 the total tea production in Matara District ammounted to 17,800 tons of made tea. The production in 1979 declined by some 10% . It is assumed that the 1980 production would be around 16,000 tons of made tea. As the table shows nearly 50% of this amount is produced by the 18 SPC factories and nearly 25% is grown on the plantations.

The area under tea on State Plantations amounts to almost 20% of the total tea extent in the district.

RUBBER

The table below presents the yield and production figures of rubber on State Plantations in 1980.

	Mature extent in ha	Average yield in kg/ha	Prod. in 1000 kg	Av. yield per day per plucker	Av. no. of tapping days
Northern zone	381	873	333	5.4	260
Central zone	806	947	763	5.1	259
Total	1187	923	1096	5.2	259

The plantations produce only Ribbed Smoked Sheets (RSS rubber). The production of 1980 was slightly below the estimated value. The total rubber production in the district is approximately 8,000 tons of which the plantations sector contributes nearly 14%. The rubber extent in plantations is 1414 ha which is little more than 14% of the district rubber extent.

PADDY

The extent under paddy owned by the SPC (442 ha) are rented out under the ANDE (sharecropping) system, usually to plantation labourers. Under this system the sharecropper takes full responsibility for the cultivation including the procurement of seed, fertilizer and pesticides. Twenty five per cent (20% on particularly low yielding lands)of the harvest is paid to the SPC as rent and is usually distributed among plantation labourers under various welfare schemes.

MINOR CROPS

A limited extent of cinnamon is found on the plantations. This crop is harvested once a year and processed by peelers who are employed on a casual basis. During the period of harvest (approximately a month) they are accommodated on the estate.

After the sale of the cinnamon the peelers are paid 50% of the proceeds.

COCONUT

Coconuts are commercially grown only on 3 plantations. As the SPC concentrates on tea and rubber cultivation these lands may be handed over to the Coconut Cultivation Board.

OTHER CROPS

Other crops grown in smaller extent include pepper, cardomom, cashew, coffee and mulberry for silk production. These crops are grown on an experimental basis.

LABOUR

Table 2 gives details of the composition of the labour force employed on the plantations.

Table 2

	Tamil		Sinhalese		Total
Northern zone	5150	45%	6420	55%	11570
Central zone	140	2%	5840	98%	5980
Total	5290	30%	12260	70%	17550

	Resident		Non-resident		Casual		Total
Northern zone	5570	48%	5840	51%	160	1%	11570
Central zone	350	6%	5430	91%	200	3%	5980
Total	5920	34%	11270	64%	360	2%	17550

	Male		Female		Child		Total
Northern zone	5530	48%	5740	50%	300	2%	11570
Central zone	2570	43%	3390	57%	20	-	5980
Total	8100	46%	9130	52%	320	2%	17550

Historically low country plantations have always had a lower percentage of Tamil labour than up country plantations. In recent years this propotion has further decreased as a result of the compulsory repatriation of stateless Indian Tamil labourers under Sirima-Shastri Pact of 1964.

Labour shortage is a serious problem in the plantations located in Northern zone where the resident labour forces are Indian Tamils (as high as 80%). It has proved very difficult to attract labourers from the villages either to reside on the plantations or to commute using transport provided by the SPC.

The plantations located close to and in the central zone are usually sufficient surrounded by villages to provide them with the required number of labourers who commute between the estate and their village. Hence problems are caused by

- a labour outturn of 75% or lower, especially in the peak periods of paddy cultivation.
- inexperienced plucker who often include coarse leaves and too much stalks among the green leaf resulting in low quality tea.
- a strong preference for working in the factory rather than in the fields.

LABOUR INCOME

Minimum wages to be paid to plantation labourers are set by the Government. The present rates are:

TEA	Male	: Rs.14.00/day
	Female	: Rs.11.69/day
	Child (up to 14 years)	: Rs.11.13/day
RUBBER	Male	: Rs.17.75/day
	Female	: Rs.15.59/day

INCENTIVES TO THE LABOUR FORCE

Tea pluckers and rubber tappers can supplement this income by plucking or tapping 'overpounds'. In practice few people succeed in plucking

or tapping substantially more than the required minimum which differs according to the yield of the fields. Each superintendent is free in setting his own incentives.

For tea the recompense for overpounds varies between 10 and 30 cents per kg of green leaf, for rubber it ranges from 60 cents to Rs.1 per kg of latex.

Most plantations have introduced ' cashplucking ' in high yielding periods and times of labour shortage. Cash plucking permits the pluckers to start plucking one or two hours earlier than usual. They are paid between 10 and 30 cents per kg of green leaf for the intake of this period before starting to pluck to meet the minimum daily intake.

To increase the labour outturn further incentives are paid based on attendance.

ANNEX III

DEMAND FOR AGRICULTURAL EXPORT PRODUCTS

1. Demand for coconut and coconut products

1.1 Production

Table 1 presents the world coconut production and the major producers

Table 1: World coconut production 1969-k979

(Unit:1000 MT=1000 nuts

	Indonesia	Philippines	India	Malaysia	Sri Lanka	Others	Total
1969-1971	5,892	7,601	4,472	1,039	1,963	6,830	27,797
1977	10,756	10,271	4,260	1,384	7,088	7,088	35,319
1978	10,800	10,072	4,325	1,202	1,677	7,243	35,319
1979	10,800	8,918*	4,300	1,219	1,700	9,031	35,968

Source: FAO Production year book 1979.

World production increased from 1969-1979 with 2.6% per year. The major contribution to the increase of the world production came from Indonesia and the Philippines which raised their production with 6.3% and 3.2% (till 1978)annually.

The non-Asian countries (Oceania) show also a production increase of 2.8% annually. In contrast to this increasing world production trend Sri Lanka's production declines and its share on the world market dropped from 7% in 1969 to 5% in 1979.

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* Philippines production decline is due to drought in 1978.

1.2 EXPORTS

Only a very restricted part of the coconut production is exported as fresh nuts. The major export products are: desiccated coconut, copra, copracake and coconut oil.

Table 2 presents the world exports of these products.

Table 2 : Exports of major coconut products

Unit: 1000 M.T.

Country	Coconut	Desiccated Coconut	Copra	Copra Cake	Oil
Philippines					
1977	2	98	635	436	770
1978	2	91	365	534	1017
1979	3	86	148	548	803
Indonesia					
1977	-	-	neg.	336	-
1978	-	-	-	335	-
1979	-	-	-	317	-
Malaysia					
1977	-	-	-	-	27
1978	-	-	-	-	22
1979	-	-	-	-	62
Sri Lanka					
1977	-	30	neg.	-	39
1978	-	40	neg.	-	37
1979	-	42	neg.	-	42
Other countries					
1977	45	9	306	98	260
1978	54	5	312	122	253
1979	64	7	283	143	229
Total world					
1977	47	137	941	870	1,096
1978	56	136	677	991	1,326
1979	67	135	431	1,008	1,136

The Philippines are by far the most important exporters of all type of coconut products. The total world export of coconut products has been rather steady in the last three years with the exception of copra which showed a sharp decrease.

Only for desiccated coconut Sri Lanka has a substantial share in world exports:27% (average 1977-1979)

For coconut oil its export share is only very restricted:3-4%.

1.3 Demand for coconut products

The demand for coconut products is mainly determined by the demand for fats and oils and the demand for oilcakes and meals.

Table 3 presents the projected demand for these products.

Table 3: Projected demand for fats and oils and oil cakes and meals 1985.

Unit:1000 M.T.

	High Projection	Low Projection	Annual Growth Rate High	Low
Fats and oils	69,300	66,630	3.3%	3%
Oil cakes and meals	44,850	42,250	3.8%	3.3%

FAO Agricultural Commodity Projection 1975-1985.

World exports for fats and oils are expected to increase at an annual rate of 3.5-3.9%. World exports for oil cakes and meals are expected to increase at an annual rate of 1.9%-2.6%.

A substantial increase in demand and in exports for fats, oils, oil cakes and meals can be expected. The share of coconut products in the world market for oils and fats is restricted:about 10%; for oil cakes and meals this share is about the same. It can be expected that the demand for coconut products will increase according to the overall increase in demand for oils and facts.

1.4 Prospects for the Sri Lanka coconut industry

The share of Sri Lanka in the world market for oils and fats is small. There is an increasing world demand for these products. Production of coconut products in Sri Lanka has been stagnant in recent years and the domestic demand increases.

These factors lead to the conclusion that problems related to increasing production and export promotion are a constraint rather than the demand for coconut products.

Hence, we do not assume market constraints for coconut products.

2. Demand for Sri Lanka tea

2.1 World tea demand and production

The world tea demand and the demand forecasts estimated by FAO are presented in table 4.

The world total figures exclude Asian centrally planned exporting countries (China and Vietnam). The projections are made on low income growth assumptions. The developed non producing countries show a stagnant growth. This is partly due to the increasing use of tea bags of which the number of cups per weight-unit is 10-30% higher than when loose tea is used.

Pakistan and the Near East have the fastest growth rates of the non-producing development countries. The producing net exporters show a consumption growth rate of 4.2%.

Tea production forecasts have been prepared by FAO and are presented in table 5. Official estimates by countries are also indicated if available.

Table 4: World tea demand

Unit: 1000 metric tons

	Average consumption 72-74	1980	1985	Annual growth rate
A. Non-producing countries	615.6	688.5	759.3	1.8
North America	99.3	109.4	118.4	1.5
Western Europe	249.6	230.7	222.7	negl.
of which U.K.	198.5	173.7	161.5	negl.
Eastern Europe	21.8	29.0	34.6	3.9
Near East	110.0	146.0	178.5	4.1
Far East	50.2	73.4	91.2	5.1
Others	84.7	100.0	114.3	2.5
B. Product importing countries	294.8	371.1	429.8	3.2
Japan	113.8	127.9	142.0	1.9
Russia	107.7	142.2	160.0	3.4
Iran	42.0	60.3	78.4	5.3
Others	31.3	40.7	49.4	1.6
C. Net exporting countries	343.1	454.9	562.3	4.2
India	248.3	317.0	400.2	4.1
Indonesia	19.1	30.9	38.3	6.0
Sri Lanka	20.1	23.4	26.9	2.5
Turkey	25.0	45.0	50.0	5.9
Others	30.6	38.6	46.9	1.6
World total	1253.5	1514.5	1751.4	2.8

Source: FAO 1976.

Table 5: World tea production

Unit: 1000 metric tons

	Average 72-74	1977	1980 (FAO)	1985 (FAO)	1985 Official	Growth rate (FAO figures)
A. Net exporting countries	1009.8	1170.4	1205	1392	1524	2.7
India	472.5	562.8	580	680	750	3.1
Sri Lanka	209.6	208.6	210	215	245	0.2
Indonesia	64.3	64.6	75	85	100	2.4
Bangladesh	28.0	37.5	32	37	41	2.4
Kenya	54.4	86.3	84	105	n.a.	5.6
Turkey	44.2	63.0	50	55	n.a.	1.8
Argentina	31.2	30.0	43	52	n.a.	4.4
Others	105.6	117.6	131	163	176	3.7
B. Producing-importing countries	205.7	n.a.	248	274	278	2.4
World total	1215.5	n.a.	1453	1666	1802	2.7

Source: FAO 1976

The difference between FAO estimates and official estimates for 1985 is 136.000 tons. This difference is mainly due to India and Sri Lanka whose 1985 production estimates differ a 100.000 tons with FAO's.

Exlcuded are Asian centrally planned exporting countries. The world supply/demand balance is shown in table 6.

According to the FAO estimates there will be a slight over-supply. However, if official estimates of the producing countires are used there will be an important over-supply even if higher national income growth rates are assumed.

Table 6: Balance of world supply and demand for tea

Unit: 1000 metric tons

	1972-1974 Average	1980(FAO)	1985(FAO)	1985* Official
Export availability				
Production - net exporting countries	1010	1205	1392	1524
Domestic requirements	343	455	562	627
Net export availability	667	750	830	897
Centrally planned exporting countries (net)	58	70	102	105
World net export availability	725	820	932	1002
Import demand				
Producer-importing countries, net	89	123	156	198
Non-producing countries	616	688	759	748
World import requirements	705	811	915	946
Balance	20	9	17	56

* Based on official production estimates; demand based on high national income growth.

Source: TMP 1980

An over-supply of 56,000 tons as indicated in table 6 would result in a sharp price decline due to the low elasticity of demand for tea (-0.3). TMP considers this picture less probable than the one based on FAO's assessment.

2.2 Sri Lanka's position on the world market

Sri Lanka's major markets are indicated in table 7.

Table 7: Export markets for Sri Lanka tea

Unit: 1000 metric tons

	1966	1970	1975	1977
U.K.	70.3	70.7	25.6	23.6
Other European countries	10.0	13.7	10.0	13.0
North & South America	28.2	26.0	23.3	23.6
South Africa	13.5	11.7	10.8	7.4
Arab countries	42.1	53.2	75.6	63.5
Pakistan	0.4	0.3	34.4	27.6
Oceania	21.3	19.5	14.4	13.4
Others	14.2	13.2	18.3	13.4
Total	200.0	208.3	212.4	185.5

There has been an important shift from the European market to the Arab and Pakistan market, accounting for 50% of the total exports in 1977. These are also the countries where a fast increase in demand is expected.

Sri Lanka's export availability according to FAO estimates(see table 4 and 5) is:

	Average 72-74	1980	1985
Production	209.6	210	215
Consumption	20.1	23.4	26.9
Export availability	189.5	186.6	188.1
% of net world export availability	26.1	22.8	20.7

Sri Lanka's share on the world market will decline according to these estimates.

Sri Lanka's major competitors are India, Indonesia an Kenya.

INDIA

In India domestic consumption of tea has increased at a rate of 5.2% per annum, whereas the production increased at about 3.5%. As a result India announced recently reduction of future exports to 200,000 tons/ year in order to meet the increasing domestic demand.

If the domestic consumption would continue at this high rate, India's export availability would be much lower than suggested by table 4 and 5.

		Average 72-74	1985
Production		472.5	680
Consumption according to table (4)	I	248.3	400.2
Consumption at 5.2%	II	248.3	456
Export availability	I	224.2	279.8
Export availability	II	224.2	224

The export availability would be about 56,000 tons less if the historical 5.2% growth of domestic tea demand would continue.

KENYA

For 1985 the production forecast for Kenya has been estimated at 105,000 tons. However, in 1978 this production figure has been realized and planting programmes continue unabated.

Hence, probably Kenya's 1985 production would be higher and would range between 100,000 and 140,000 tons.

INDONESIA

Indonesia has a strong domestic market and the FAO estimates of a constant 45,000 tons available for exports till 1985 are likely to be correct. It can be concluded that India will probably reduce its historical world market share. This shortfall could be met by Sri

Lanka. To what extent Sri Lanka can fill that gap is partly determined by Kenya's success in increasing its national production. In this respect Sri Lanka's orientation towards fast increasing markets such as the Middle East and Pakistan is an advantageous position.

Even if Kenya would realize its production potential of 140,000 tons in 1985, there would still be scope for an increased market share.

Share of Sri Lanka

T.M.P. makes the following forecasts of Sri Lanka's position on the world market.

Low elevation production can be expanded at 4% per annum to 1985. Medium and high elevation production can increase at 2% per annum to 1985.

This would result in the following marketable quantities for 1985.

High elevation : 92.2 tons
Medium elevation: 78.1 tons
Low elevation : 86.6 tons

256.9 tons

The 1985 consumption will be 26.9 tons, all medium elevation tea. The export availability will thus be 230,000 tons. This corresponds with 25% of the net world export availability for 1985.

3. DEMAND FOR RUBBER

3.1 World Rubber demand and production

World Demand

Natural rubber holds about 30% of the world Elastomer market (outside centrally planned economies). From 1980-2000 the ratio of natural to synthetic rubber in the manufacture of tyres is estimated to change from 1 to 2. This will result in an increase in the demand of rubber in developed countries of 3.7% per year.

In developing countries consumption is forecasted to increase at 4.3% per annum. Centrally planned economies are tending to greater self-sufficiency in synthetic rubber and the demand will increase at 2.0%. Table 8 gives the present and the projected demand.

Table 8: Actual and projected demand for natural rubber

Unit:1000 tons

	1976	1980	1985	1990
Developed countries	2,164	2,650	3,240	3,795
Developing countries	669	850	1,050	1,300
Centrally planned economies	710	850	950	1,040
Total	3,543	4,350	5,240	6,135

Source: R.M.P. 1979

Although the total world demand for rubber is increasing at almost 4% per year, demand projections for the different types of rubber diverge. The total world demand for sole, thick and thin crepe is likely to decline. This is of particular interest for Sri Lanka, producing 70% of the total world latex crepe production.

Block rubber however will find ready markets and conversion of crepes to block rubber, on which experiments are being done in Sri Lanka, should increase in future.

PRODUCTION

In table 9 the estimated world production of natural rubber and the major producers are indicated.

Table 9: World production of natural rubber

Unit: 1000 tons

	Malaysia		Indonesia		Thailand		India		Sri Lanka		Other countries	Total
Year	Q	%	Q	%	Q	%	Q	%	Q	%		
1967	990	39	701	28	216	9	62	3	143	6	410	2,522
1972	1304	42	774	25	337	11	109	4	140	5	456	3,102
1976	1640	46	847	24	392	11	148	4	152	5	386	3,565
1978	1605	44	880	24	464	13	133	4	156	4	437	3,675
1979	n.a		n.a	%	n.a		n.a		n.a		n.a	n.a

Source: Rubber Statistical Bulletin,
Volume 33, No.7, April 1979.

The total world production increased at 3.5% per year from 1967 to 1978. Malaysia, the major producer increased its world market share from 39% in 1967 to 44% in 1978. Thailand and India too increased their production and world market share.

Sri Lanka shows the weakest production increase (less than 1% per year) and a declining market share.

Table 10 Presents the world natural rubber production forecasts.

Table 10: Projected World Production of Natural Rubber

Unit: 1000 tons

	Developing countries	Centrally planned economies	Total
1980	3,893	160	4,053
1985	4,738	230	4,968
1990	5,882	280	6,162

Source: R.M.P. 1979

The world production of natural rubber will increase at 4.3% per year. The production increase will originate from new planted areas and from replanting with new high yielding clones.

Until 1990, the production will not meet the demand. Rubber has a gestation period of 5-7 years and the demand can only be matched after that period. Synthetic rubber production has to be expanded in the coming 5-10 years.

Table 11 summarises the projected net import requirements and the net world export availability.

Table 11: Projected import requirements and export availability of natural rubber, 1985 and 1990.

Unit:1000 tons

	Net Exports	Net Imports	Balance
1980	3,043	3,340	-297
1985	3,688	3,960	-272
1990	4,582	4,555	+ 27

Source: R.M.P. 1979

No projections are provided by the R.M.P. beyond 1990. We suppose that the increase in demand will continue at the same annual rate of about 4% and production should increase accordingly.

For Sri Lanka the above described world market situation has the following consequences.

In order to keep its present share of the world market, Sri Lanka should produce 243,000 tons in 1990 and 360,000 tons in 2000.

These production targets are very difficult to reach considering the present state of the growing stock.

Due to high rubber prices in recent years over-tapping has become a common practice resulting in an exhaustion of the trees and an immediate need for renewal and upgrading of the growing stock. It will take at least 10 years before even the present production levels could be regained.

3.2 Sri Lanka's position on the world market

The bulk of Sri Lanka's export sales of rubber is to China under the terms of the barter agreement for rice. (Since 1979 also for other goods). The total quantity of rice to be imported is estimated by the Sri Lanka Food Dept. The quantity is valued at world market prices and an equivalent rubber tonnage is calculated using forecast rubber prices.

Each shipment is valued on actual prevailing prices. The barter agreement stipulates that 15% of the rubber shipment is RSS 1, the rest being RSS 2 and 3. The Commodity Purchase Department has a monopoly buying power over all RSS 1, 2 and 3 grades in order to fulfil the terms of the barter deal. CPD buys all RSS 1, 2 and 3 produced through its own depots, through individual small dealers and directly from estates and large scale shippers in Colombo. Once the barter deal tonnages are realized the remaining rubber is sold to a variety of buyers.

Table 12 presents Sri Lanka's rubber exports.

Table 12: Export distribution of Sri Lanka Rubber

Unit: 1000 tons

Year	China	G.F.R.	Poland	Other Centrally planned countries	Others	Total
1973	69.3	11.2	8.7	23.7	47.9	160.8
1974	41.8	13.6	7.6	16.0	48.6	127.6
1975	91.6	9.1	6.9	15.5	37.8	160.9
1976	74.6	9.0	4.0	11.8	37.5	136.9
1977	64.0	11.0	7.4	14.3	37.8	134.5
1978	62.5	10.7	11.0	8.9	44.9	138.2

Source: R.M.P. 1979

Exports to China are declining in recent years which is partly due to increasing rice production in Sri Lanka. Sales to Western countries increase. World demand for rubber will not be a constraint for expansion of the Sri Lanka rubber production. A major concern is to increase production quantitatively as well as qualitatively. Demand for crepe will probably decline, so production of crepe should be monitored carefully. The Sri Lanka RSS generally complies to international standards. The price advantages of higher grades RSS makes upgrading of RSS profitable. The volume of block rubber produced in Sri Lanka is relatively low; only 4% of its national rubber production . (Compare Malaysia: 33%, Indonesia: 62%). The market for block rubber is very favourable. However, rubber factories are more suited to large turnover and constant quality, conditions which are rather difficult to meet for Sri Lanka's small holders dominated rubber sector.

Table 13 presents the estimated rubber production increase in Sri Lanka according to R.M.P.

Table 13: Estimated rubber production under the R.M.P. development strategy

Unit:1000 tons

Year	Estates	Small holders & private estates	Total
1982	39.4	74.0	113.4
1986	46.3	54.7	101.0
1990	58.6	61.1	119.7
1995	69.2	89.9	159.1
2000	76.6	125.7	202.3

Souuce: R.M.P. 1979

Production will decline the coming 10 years due to accelerated uprooting of old or overtapped trees and a general rejuvenation of the growing stock. In 1995 the 1980 production levels will be regained and in 2000 these levels will largely be surpassed.

On the estates where most of the crepe is produced, production will be doubled over 20 years. Flexibility in processing possibilities will

be necessary in order to meet shifts in demand for different grades. Small holders and private estates RSS production will decline, but will within 20 years reach 126,000 tons which is 30% above its current production level.

4. DEMAND FOR CINNAMON

4.1 Production

There are only a few countries producing cinnamon. Sri Lanka, the Seychelles and Malagasy Republic. Sri Lanka occupies a dominant place: it supplies 60-70% of the world cinnamon exports.

Also in quality and price Sri Lanka's cinnamon stands at top. Indonesia and China produce Cassia. Cassia is a different plant from cinnamon, but it has a similar taste and a similar range of uses. Generally, cassia and cinnamon are substitutes for one another. Quality and price of cassia is below Sri Lanka's cinnamon and Sri Lanka's cinnamon enjoys preferences in certain countries.

Sri Lanka occupies 35-45% of the combined cinnamon-cassia market. Table 14 presents the Sri Lanka exports of cinnamon

Table 14: Exports of cinnamon from Sri Lanka, 1970-1979

Year	Sri Lanka volume in 1000 kg.
1970	4,200
1971	4,460
1972	5,230
1973	6,510
1974	7,670
1975	4,280
1976	6,600
1977	6,350
1978	6,240
1979	6,700

Source: Central Bank of Ceylon, Bulletin Sept. 1980.

World imports of cinnamon show an increase from 1973 onwards. Production of cinnamon of the Seychelles declined and the production of Indonesian cassia has been irregular in recent years. Consequently, the market position of Sri Lanka cinnamon has been favourable in recent years and resulted in an increased export volume.

4.2 Markets for Sri Lanka's cinnamon

Demand for Sri Lanka's cinnamon comes from long established markets. The main markets are spanish countries. Table 15 presents the major markets for Sri Lanka's cinnamon.

Table 15: Exports of cinnamon by destination

(Unit:M.tons)

	1970-1975	1976	1977	1978	1979
Mexico	1,520	1,800	1,310	2,460	2,460
Spain	160	310	240	280	230
U.S.A.	650	1,480	1,630	1,100	900
Other countries	3,280	3,010	3,180	2,400	3,080
Total	5,610	6,600	6,350	6,240	6,700

Source: Sri Lanka Customs

"Other countries" are mostly Central and S.American countries. With Mexico a trade protocol exists since 1975. Exports to Mexico increased substantially from 1975 onwards. There is an active smugling of cinnamon from U.S.A. to Mexico, hence USA figures do not necessarily correspond with consurption in that country.

4.3 Market prospects

It is probable that the declining trend of the Seychelles cinnamon production will continue in future as a result of a shift of labour from agriculture to other sectors of that economy. Sri Lanka cinnamon being a high quality product could take over Seychelles world market share. Overall increase in demand for cinnamon will

probably be small and be in line with population growth in the importing countries.

Under the assumption that Sri Lanka would hold its traditional market share in spanish speaking countries and that it would be able to take over the Seychelles market an annual increase of exports of 2-2.5% can be expected from 1980-1990 resulting in a total export availability of 8,400 tons in 1990.

ANNEX IV

PROJECTIONS OF V.A. AND EMPLOYMENT PER ZONE 1980-2000

Present agricultural value added and employment in Matara District in a normal year

(Units:V.A. in million Rs., Employment in man years, 1 man year = 250 working days)

Crop	Northern zone V.A.	Northern zone Employment	Central zone V.A.	Central zone Employment	Coastal zone V.A.	Coastal zone Employment	District V.A.	District Employment
Paddy	19.9	3,600	41.7	11,200	14.9	3,700	76.5	18,500
Coconut	3.6	190	22.4	1,140	32.0	1,630	58.1	2,960
Tea	151.4	34,030	32.9	8,030	-	-	184.3	42,060
Rubber	15.0	2,190	49.6	7,200	3.5	480	68.1	9,870
Cinnamon	6.3	900	24.3	3,500	5.8	840	36.4	5,240
Livestock	0.7	290	3.4	1,560	1.5	710	5.6	2,560
Other crops	10.7	1,140	16.2	1,730	3.3	350	30.2	3,220
Total	207.6	42,340	190.5	34,360	61.0	7,710	459.2	84,410

Potential agricultural value added and employment in Matara Ristrict in a normal year

(Units: V.A. in million Rs., Employment in man year, 1 man year = 250 working days)

Crop	Northern zone V.A.	Northern zone Employment	Central zone V.A.	Central zone Employment	Coastal zone V.A.	Coastal zone Employment	District V.A.	District Employment
Paddy	21.6	2,740	67.2	8,520	22.2	2,820	111.0	14,080
Coconut	12.3	500	76.2	3,130	77.1*	3,386*	165.6	7,016
Tea	232.1	40,250	61.8	10.720	-	-	293.9	50,970
Rubber	29.7	3,130	111.8	14,690	12.8	1,510	154.1	19,330
Cinnamon	15.6	1,870	59.8	7,180	14.3	1,720	89.7	10,770
Livestock	negl.	negl.	30.8	2,700	10.2	900	40.8	3,600
Other crops	31.8	1,700	60.6	3,230	13.2	700	105.6	5,630
New crops	13.5	1,080	-	-	-	-	13.5	1,080
Total	356.6	51.270	467.8	50,170	149.8	11,036	974.2	112,476

* Correction for urbanization

ANNEX V

PROJECT COSTS, BENEFITS AND SCHEDULES OF OPERATION

(I) TEA SMALLHOLDER PROJECt

Investments

Table 1. Investment schedule, alternative I

Unit:Million Rs.

Year	1	2	3	4	5	6	7	8	9	10	Total
Replanting (ha)	500	500	500	500	500	500	500	500	500	400	4900
Infilling (ha)	80	80	80	80	80						400
Investments											
Replanting	20.4	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	19.0	235.2
Investments											
Infilling	2.8	2.8	2.8	2.8	2.8						14.0
Factories	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	35.0
Leaf collection	0.2	0.2	0.2	0.2	0.2						1.0
Transport	3.2	3.2	3.2	3.2	3.4						16.2
Stores	1.6	1.6	1.6	1.6	1.8						8.2
F.A.S.	0.8	0.8									1.6
Infrastructure	4.1	4.1									8.2
Training											
Technical Assistance	1.8	1.8	1.8	1.9	1.9						9.2
	42.0	42.0	37.1	37.2	37.6	27.5	27.5	27.5	27.5	22.2	328.6

Operational costs are either included in the calculation of the net margin of tea or concern departmental overheads which are excluded from the project costs.

Benefits

Table 3. Benefits schedule, alternative I, at domestic prices

Unit: Million Rs.

Year	Benefits replanting			Benefits infilling			Without Project	With - Without Project
	Existing Stock	Replanting	Total	Existing Stock	Infilling	Total		
1	6.6	-	6.6	0.6	-	0.6	8.0	- 0.8
2	5.9	-	5.9	0.6	-	0.6		- 1.5
3	5.1	-	5.1	0.5	0.6	1.1		1.8
4	4.4	-	4.4	0.4	1.2	1.6		2.8
5	3.6	3.8	7.4	0.2	1.8	2.0		1.4
6	2.9	2.5	10.4	0.1	2.4	2.5		4.9
7	2.1	11.3	13.4		3.0	3.0		8.4
8	1.4	15.0	16.4					11.4
9	0.6	18.8	19.4					14.4
10		22.5	22.5					12.5
11		26.3	26.3					21.3
12		30.0	30.0					25.0
13		33.8	33.8					28.8
14		36.8	36.8					31.8
15								
↓								
40								

Related information:

Uprooting of existing seedling stands take 2 years:

V.P.T. takes 2 years before coming into production, hence the first production is after 4 years.

The full results of infilling are achieved after 2 years.

Benefits with project = Rs.7500/ha. Without project = Rs.1500/ha.

Table 4. Benefits schedule, alternative II at domestic prices

Unit: Million Rs.

Year	Benefits infilling			Without case	With - Without case
	Existing stock	Infilling	Total		
1	7.2	-	7.2	8.0	- 0.8
2	6.5	-	6.5	8.0	- 1.5
3	5.7	3.8	9.5	8.0	1.5
4	5.0	7.5	12.5	8.0	4.5
5	4.2	11.3	15.5	8.0	7.5
6	3.5	15.0	18.5	8.0	10.5
7	2.7	18.8	21.5	8.0	13.5
8	2.0	22.5	24.5	8.0	16.5
9	1.2	26.3	27.5	8.0	19.5
10		30.0	30.0	8.0	22.0
11		33.8	33.8	8.0	25.8
12		39.8	39.8	8.0	31.8
13	↓	↓	↓	↓	↓
↓					
40					

Table 5. Benefits schedule alternative I. economic prices

Unit:Million Rs.

Year	Benefits replanting			Benefits infilling			Without	With-Without
	Existing Stock	Replanting	Total	Existing Stock	Infilling	Total		
1	49.3	-	49.3	4.5	-	4.5	59.4	-5.6
2	43.7	-	43.7	4.5	-	4.5		-11.2
3	38.1	-	38.1	3.6	2.2	5.8		-15.5
4	32.5	-	32.5	2.7	4.3	7.0		-19.9
5	26.9	13.5	40.4	1.8	6.5	8.3		-10.7
6	21.3	27.0	48.3	0.9	8.6	9.5		- 1.6
7	15.7	40.5	56.2		10.8	10.8		7.6
8	10.1	54.0	64.1					15.5
9	4.5	67.5	72.0					23.4
10		81.0	81.0					32.4
11		94.5	94.5					45.9
12		108.0	108.0					59.4
13		121.5	121.5					72.9
14		132.3	132.3					83.7
15 ↓ 40								

Related information to table 5

Costs are identical as in table 3

Benefits with Project = Rs.27,000/ha.

Benefits without Project = Rs.11,200/ha.

Table 6. Benefits schedule alternative II, economic prices

Unit:Million Rs.

Year	Benefits infilling			Without project	With-Without Project
	Existing Stock	Infilling	Total		
1	53.8	-	53.8	59.4	- 5.6
2	48.2	-	48.2		-11.2
3	42.6	13.5	56.1		- 3.3
4	37.0	27.0	64.0		4.6
5	31.4	40.5	71.9		12.5
6	25.8	54.0	79.8		20.4
7	20.2	67.5	87.7		28.3
8	14.6	81.0	95.6		36.2
9	9.0	94.5	103.5		44.1
10		108.0	108.0		48.6
11		121.5	121.5		62.1
12		143.1	143.1		83.7
13					
14					
15					
40					

Costs are identical as in table 4

(2) ESTATE TEA DEVELOPMENT PROJECT

Investments

Table 7. Costs of E.T.D. Project

Unit:Million Rs.

Year	Replanting (ha)	Infilling (ha)	Investments		Factory Modernisation			Infra-structure	Training & Technical Assistance	Total
			Replanting	Infilling	Withering	Drier	Electrification			
1	115	100	5.5	3.5	0.7		2.9	1.4	0.5	14.5
2		100	5.5	3.5	0.6	1.0	2.9	1.1	0.4	15.0
3		100	5.5	3.5			2.9	1.1	0.4	13.4
4		100	5.5	3.5		0.9	2.8	1.1	0.4	14.2
5		100	5.5	3.5				1.1	0.4	10.5
6			5.5					0.5		6.0
7			5.5							5.5
8			5.5							5.5
9			5.5							5.5
10			5.5							5.5
11			5.5							5.5
12			5.5							5.5
13			5.5							5.5
14			5.5							5.5
15	90		4.6							4.6
Total	1700	500	81.6	17.5	1.3	1.9	11.5	6.3	2.1	122.2

Related information to table 7.

Costs of replanting = Rs.48,000/ha

Costs of infilling = Rs.35,000/ha

Factory development costs

12,000 sq. ft. troughs
+ 27 fans = Rs.1.3 million

4 drier units = Rs.1.9 million

Electrification of 4 factories = Rs.11.5 million

Benefits

Table 8. Benefits schedule

Unit: Million Rs.

Year	Benefits replanting			Benefits infilling			Without-Project	With-Project
	Existing stock	Replanting	Total	Existing stock	Infilling	Total		
1	2.7		2.7	0.9		0.9	3.7	- 0.1
2	2.5		2.5	0.8		0.8		- 0.4
3	2.3		2.3	0.7	1.0	1.7		0.3
4	2.1		2.1	0.5	2.0	2.5		0.9
5	1.9	1.1	3.0	0.3	3.0	3.3		2.6
6	1.7	2.3	4.0	0.2	4.0	4.2		4.5
7	1.5	3.4	4.9		5.0	5.0		6.3
8	1.3	4.6	5.9					7.2
9	1.1	5.8	6.9					8.2
10	0.9	6.9	7.8					9.1
11	0.7	8.1	8.8					10.2
12	0.5	9.2	9.7					11.0
13	0.3	10.3	10.6					11.9
14	0.2	11.5	11.7					13.0
15		12.7	12.7					14.0
16		13.8	13.8					15.1
17		15.0	15.0					15.3
18		16.1	16.1					12.4
19		17.0	17.0					18.3
40		17.0	17.0		5.0	5.0	3.7	18.3

Related information to table 8

Benefits with projects = Rs.10,000/ha

Benefits without project = Rs. 1,700/ha

Time lags tea replanting and infilling see appendix VI.I

(3) RUBBER REHABILITATION PROJECT

Investments

Table 9. Investments and schedules of operation R.R.P.

Unit:Million Rs.

Year	Replanting(ha)	Investments replanting	Overhead investments	Operational cost	Total
1	300	1.1	6.8		7.9
2	600	4.4			11.2
3		7.4			14.2
4		8.9			15.7
5		10.0			16.8
6		11.1	6.6		17.7
7		12.4			19.0
8		13.0			19.6
9					19.6
10			6.6		19.6
11				3.8	16.8
12					16.8
13					16.8
14					16.8
15					16.8
16		10.8			14.6
17		6.3			10.1
18		4.8			8.6
19		3.4			7.2
20		2.5			6.3
21		1.2			5.0
22		-			3.8

Related information to table 9

Costs replanting per ha : Year 1 Rs. 3,600

2 Rs. 7,500

3 Rs. 2,500

4 Rs. 2,400

5 Rs. 1,400

6 Rs. 2,200

7 Rs. 2,000

Total Rs.21,600

Investments + Operational costs supporting services: Year 1-Year 5 = Rs.6.8 Million/Year

Year 5-Year 10= Rs.6.6 Million/Year

Operational costs, supporting services after 10 years : Rs.3.8 Million / Year

Operational costs continue beyond 22 years.

Benefits

Table 10 Schedule of benefits

Unit:Million Rs.

Year	Benefits replanting			Without project	With-Without project
	Existing stock	Replanting	Total		
1	36.1	-	36.1	36.1	0
2	33.5	-	33.5	36.1	- 2.6
3	27.4	-	27.4	31.9	- 4.5
4	25.1	-	25.1	31.9	- 6.8
5	19.8	-	19.8	27.7	- 7.9
6	15.1	-	15.1	23.5	- 8.4
7	13.4	-	13.4	23.5	-10.1
8	9.7	0.5	10.2	19.3	- 9.1
9	8.3	2.1	10.4	19.3	- 8.9
10	5.4	4.9	10.3	15.1	- 4.8
11	4.3	8.8	13.1	15.1	- 2.0
12	2.3	13.5	15.8	10.9	4.9
13	1.2	18.6	19.8	8.4	11.4
14	0.3	24.4	24.1	4.2	19.9
15		29.3	29.3		29.3
16		34.6	34.6		34.6
17		40.0	40.0		40.0
18		44.9	44.9		44.9
19		49.5	49.5		49.5
20		53.9	53.9		53.9
21		52.9	57.9		57.9
22		62.7	62.7		62.7
23		67.1	67.1		67.1
24		70.0	70.0		70.0
25		70.1	70.1		70.1
26		71.0	71.1		71.1
27		60.6	60.6		60.6
↓		↓	↓		
40		43.0	43.0		

Related information to table 10

Yield and net benefits proceed according to the following scheme

Unit: Kg/ha and Rs./ha

Year	With project		Without project	
	Yield	Net benefit	Yield	Net benefit
1	500	-	850	4300
2	625	-750	850	4300
3	850	3500	800	3800
4	1100	6000	800	3800
5	1200	7000	750	3300
6	1350	8500	700	2800
7	1350	8500	700	2800
8	1400	9000	650	2300
9	1400	9000	650	2300
10	1400	9000	600	1800
11	1350	8500	600	1800
12	1300	8000	550	1300
13	1250	7500	500	1000
14	1200	7000	450	500
15	1150	6500	400	-
16	1450	9500		
17	1350	8500		
18	1300	8000		
19	1200	7000		
20	1250	7500		
21	1000	5000		

(4) ESTATES RUBBER DEVELOPMENT PROJECT (E.R.D.P.)

Investments

Table 11. Investments schedule E.R.D.P.

Unit:Million Rs.

Year	1	2	3	4	5	6	7	8	9	10	Total
Replanting(ha)	300	300	300	400							1300
Investments											
Replanting	1.08	3.33	4.08	5.16	4.89	2.80	2.64	1.82	1.48	0.8	28.08
Factories	0.93	0.76	0.50								2.19
Transport	0.12	0.34	0.26	0.34	0.49						2.55
Housing	2.70	3.35	0.70	0.55	0.25						7.55
Total	5.83	7.7	5.54	6.05	5.63	2.80	2.64	1.82	1.48	0.8	40.37

Related information to table 11

For replanting costs, see appendix VI.3

Costs factory rehabilitation:

Bulking tanks	Rs.	42,000
Coagulation tanks	Rs.	12,000
Building extension	Rs.	175,000
Building rehabilitation	Rs.	100,000
Water supply	Rs.	65,000
Engines	Rs.	90,000
Sheeting batteries	Rs.	200,000
Smoke houses	Rs.	1,500,000

Transport: Jeeps, Tractors, and Trailers

Benefits

Table 12. Schedule of Benefits E.R.D.P.

Unit: Million Rs.

Year	Benefits Existing stock	Replanting	Benefits without project	With-without project
1	2.0		0	2.0
2	1.1			1.1
3	0.4			0.4
4				-
5				-
6				-
7	-0.5			-0.5
8	0.3			0.3
9	2.0			2.0
10	3.8			3.8
11	7.0			7.0
12	9.1			9.1
13	10.4			10.4
14	11.8			11.8
15	12.6			12.6
16	13.1			13.1
17	14.1			14.1
18	14.4			14.4
19	14.8			14.8
20	15.2			15.2
21	14.3			14.3
22	13.8			13.8
23	12.8			12.8
24	12.1			12.1
25	11.5			11.5
	Average 9.3			Average 9.3
40				

Related information to table 12

The yields and net benefits per ha. proceed according to the following scheme

Year	Yield (kg./ha)	Net benefits Rs./ha
1	500	- 1500
2	900	2500
3	1200	5500
4	1300	6500
5	1450	8000
6	1500	8500
7	1600	9500
8	1700	10500
9	1700	10500
10	1650	10000
11	1900	12500
12	1800	11500
13	1850	12000
14	1700	10500
15	1650	10000
16	1600	9500
17	1550	9000
18	1500	8500
19	1450	8000
20	1740	10900
21	1670	10200
22	1600	9500
23	1520	8700
24	1670	10200
25	1450	8000
26	700	500

(5) RUBBER NEW PLANTING PROJECT

Investments

Table 13. Investments schedule Rubber New Planting Project

Unit:Million Rs.

Year	Planting (ha)	Planting Investments	Operational Costs	Total
1	700	2.6	6.2	8.7
2	800	5.4	6.2	11.6
3	800	11.0	6.2	17.2
4	800	13.5	6.2	19.7
5	800	15.6	6.2	21.8
6	800	16.7	6.0	22.7
7	800	18.3	6.0	24.3
8	800	20.0	6.0	26.0
9	800	20.2	6.0	26.2
10	800	20.2	6.0	26.2
11		17.3	3.4	20.7
12		14.4	3.4	17.8
13		8.4	3.4	11.8
14		6.4	3.4	9.8
15		4.4	3.4	7.8
16		3.3	3.4	6.7
17		1.5	3.4	4.9
Total	7900	199.1	84.8	283.9

Related information to table 13

			Rs.
Planting costs per ha:	**Year**	**1**	**3600**
		2	**3600**
		3	**7500**
		4	**2500**
		5	**2400**
		6	**1400**
		7	**2200**
		8	**2000**
		Total	**25200**

Investments + operational costs, supporting services:

Year 1-Year 5: Rs.6.2 Million

Year 5-Year 10: Rs.6.0 Million

Operational costs supporting services after 10 years: 3.4 Million

Benefits

Table 14. Schedule of benefits

Unit:Million Rs

Year	Benefits
1	0
2	
3	
4	
5	
6	
7	
8	
9	1.2
10	3.9
11	8.4
12	13.9
13	20.6
14	27.4
15	34.5
16	41.7
17	48.9
18	55.8
19	60.8
20	64.1
21	64.9
22	64.6
23	65.1
24	65.2
25	64.9
↓	↓
35	36.9 Average

(6) COCONUT LIVESTOCK PROJECT

Investments

Table 15 presents the investments and schedule of operations

Table 15. Investments and schedules of operations of the Coconut Livestock Project

Year	Investments (Million Rs.)	Operational costs	Overhead costs	Hectares	Cows
1	3.00	0.28	0.2	-	-
2	0.81	0.55	0.2	10	30
3		0.83	0.2	40	
4		0.99	0.2	100	300
5		1.10	0.2	180	
6			0.9	280	
7			0.9	350	1000
8			0.9	450	
9			0.9	600	
10			0.9	800	
11			2.4	1100	
12			2.4	1500	
13			2.4	2000	
14			2.4	2500	
15			2.4	3000	10000
	3.81	14.25	17.5		

In the year 17,4000 ha. and 13000 cows will be produced. 4000 ha. is the maximum available project extent.

For details investments see Matara Project Proposals.

Benefits

Table 16 presents the scheme of benefits.

Table 16. Scheme of benefits of the Coconut Livestock Project

Unit:Million Rs.

Year		at 10% price decrease of curd
1	-	-
2	0.06	0.04
3	0.24	0.16
4	0.60	0.41
5	1.08	0.73
6	1.68	1.14
7	2.10	1.43
8	2.70	1.84
9	3.60	2.45
10	4.80	3.26
11	6.60	4.49
12	9.00	6.12
13	12.00	8.16
14	15.00	10.20
15	18.00	12.24
16	21.00	14.28
17	24.00	16.23

The benefits without project are zero.

(7) CINNAMON REHABILITATION PROJECT

Investments

Table 17 presents the investments and the schedule of operations

Table 17. Investments and schedules of operations of the Cinnamon Rehabilitation Project

Unit: Million Rs.

Year	Rehabilitation (ha)	Investments Rehabilitation	Supporting Services (C.A.S.) Investments	Operational	Overhead	Total
1	500	1.6	0.3	0.6	0.20	2.7
2	500	1.6				2.4
3	500	1.6				2.4
4	500	1.6				2.4
5	500	1.6		1.3		3.1
6	500	1.6				3.1
7	500	1.6				3.1
8	500	1.6				3.1
Total	4000	12.8		7.8	1.6	22.2

The operational costs and overhead will continue beyond 8 years

The schedule of benefits is presented in table 18

Table 18. Schedule of benefits of C.R.P.

Year	1	2	3	4	5	6	7	8	9	10	11	12 → 40
Benefits with project	12.0	12.0	12.4	13.3	14.7	16.1	17.5	18.9	20.3	21.7	22.7	23.2 →
Benefits without project	12.0 →											

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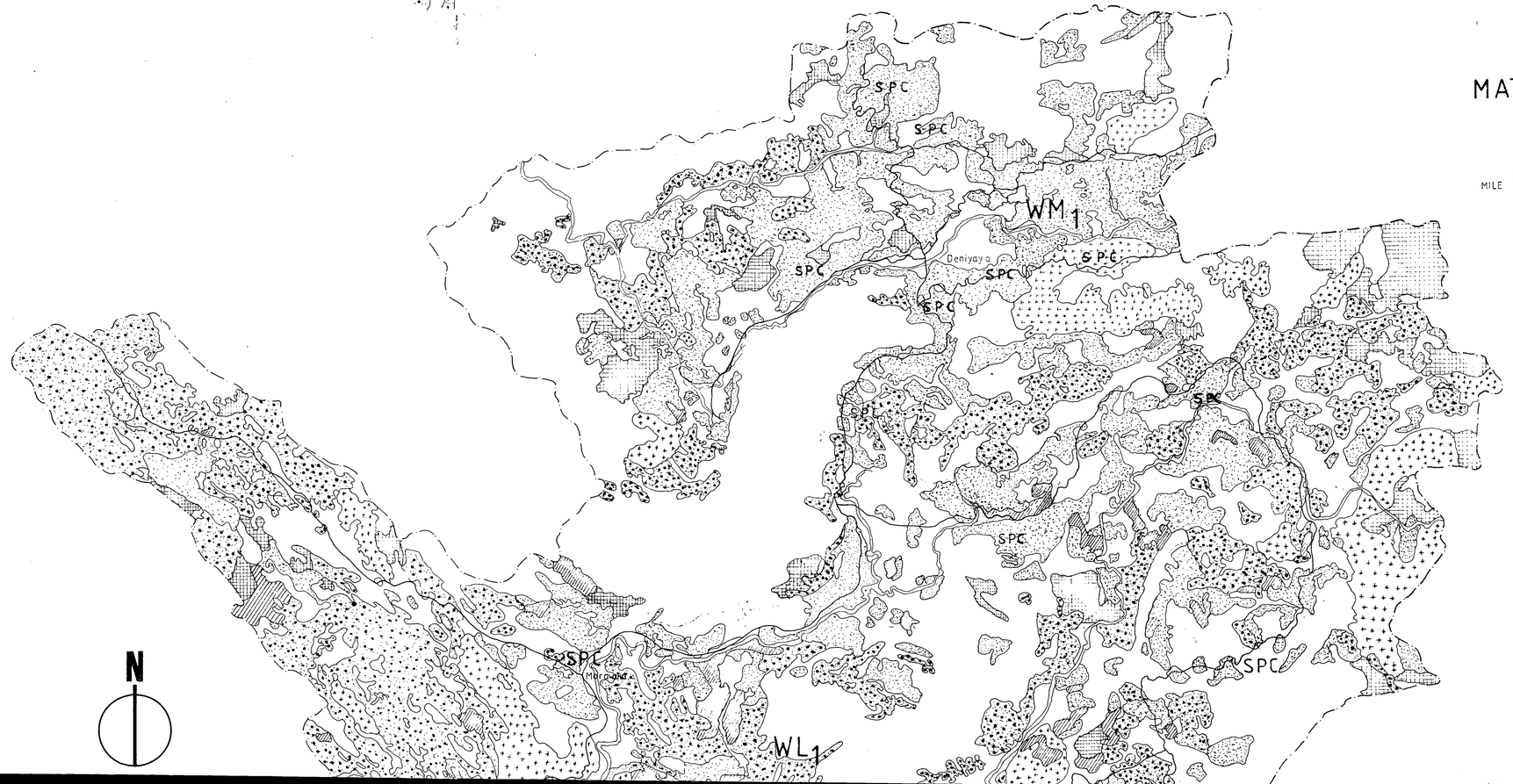
MAPS

MATARA DISTRICT PROJECT MAP



SCALE 1: 63,360"

MILE 1 0 1 2 3 4 5 MILES

1 TEA SMALL HOLDERS PROJECT

2 ESTATE TEA DEVELOPMENT PROJECT

3 RUBBER REHABILITATION PROJECT

4 ESTATE RUBBER DEVELOPMENT PROJECT

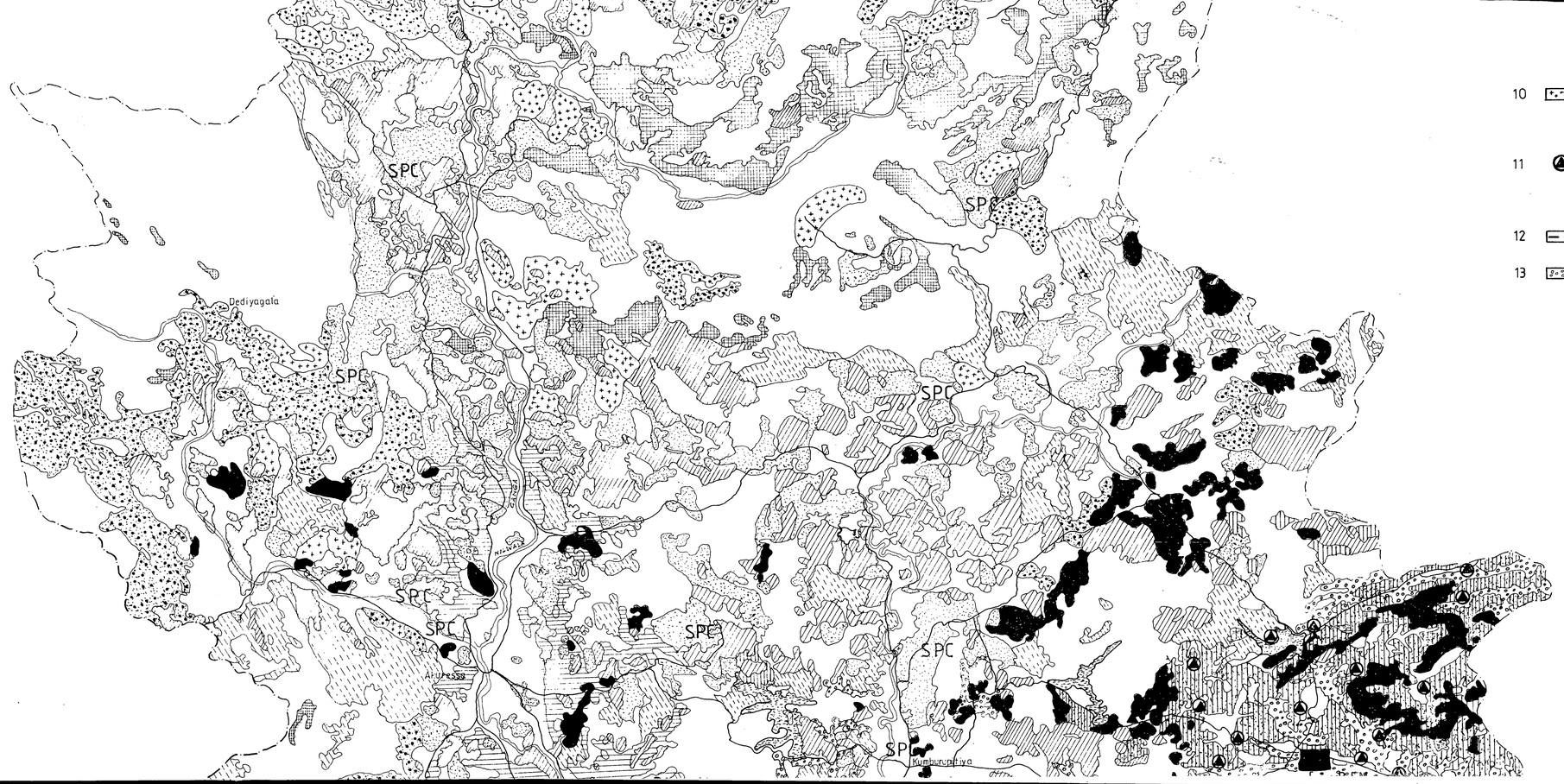
5 RUBBER NEW PLANTING PROJECT

6 COCONUT LIVESTOCK PROJECT

7 CINNAMON REHABILITATION PROJECT

8 NILWALA GANGA FLOOD PROTECTION SCHEME

9 DEVELOPMENT OF REGULARISED ENCROACHED LANDS



MATARA IRDP

ANNUAL CROP CULTIVATION PROGRAMME

10 DEVELOPMENT OF REGULARISED ENCROACHED LANDS MATARA IRDP

FORESTRY AND SOIL CONSERVATION PROGRAMME

11 REHABILITATION OF MINOR AND MEDIUM IRRIGATION SCHEMES, MATARA IRDP

12 2 MILES BELT

13 MEDIUM IRRIGATION SCHEMES (4,500 ACRES)

KEY

ROAD

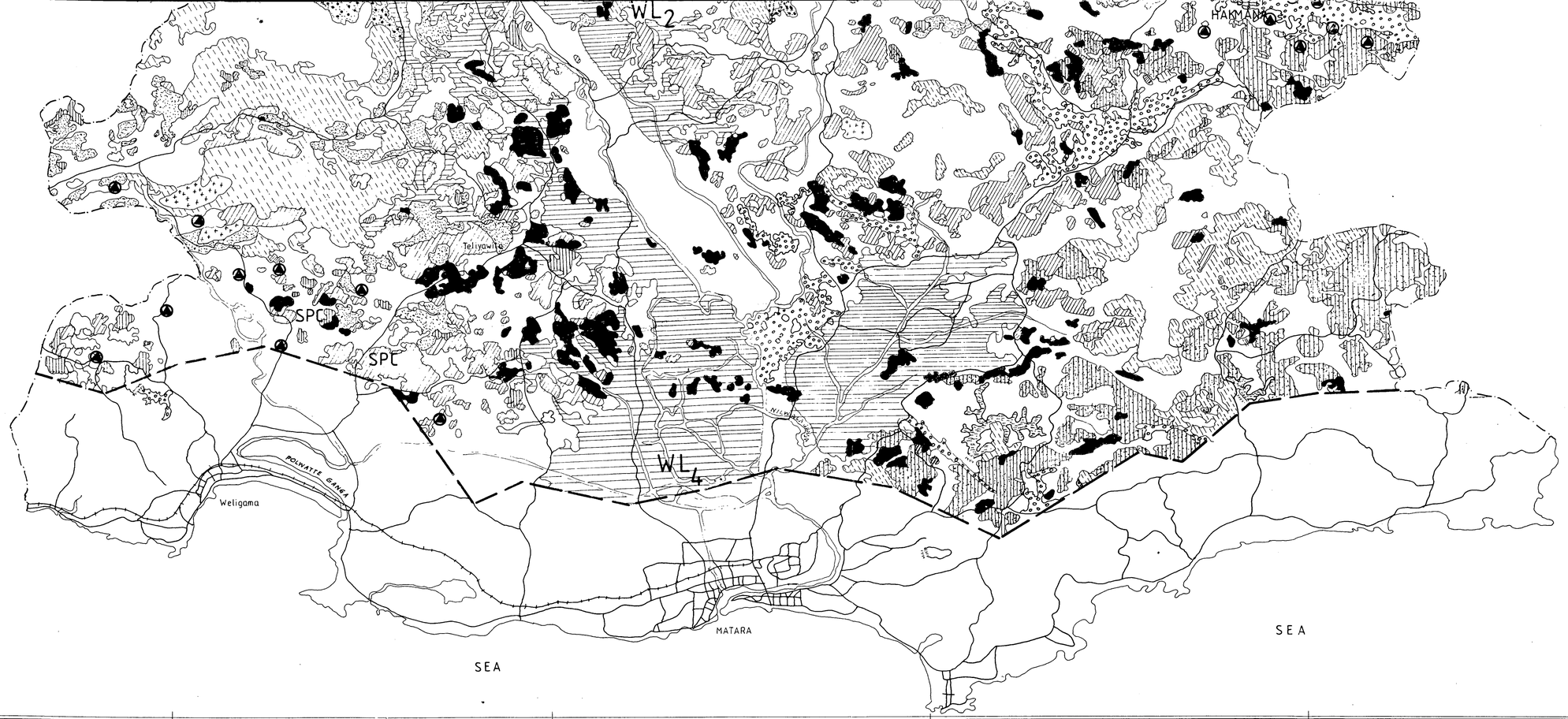
RAILWAY

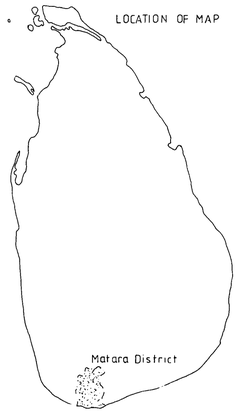
RIVER

TANK

AGRO ECOLOGICAL REGION BOUNDARY

DISTRICT BOUNDARY





KEY TO ADJOINING SHEETS

ALUTGAMA	RAKWANA	TIMBOLKETIYA
AMBALANGODA	MORAWAKA	AMBANTOTA
	GALLE	MATARA

S.S.Ster