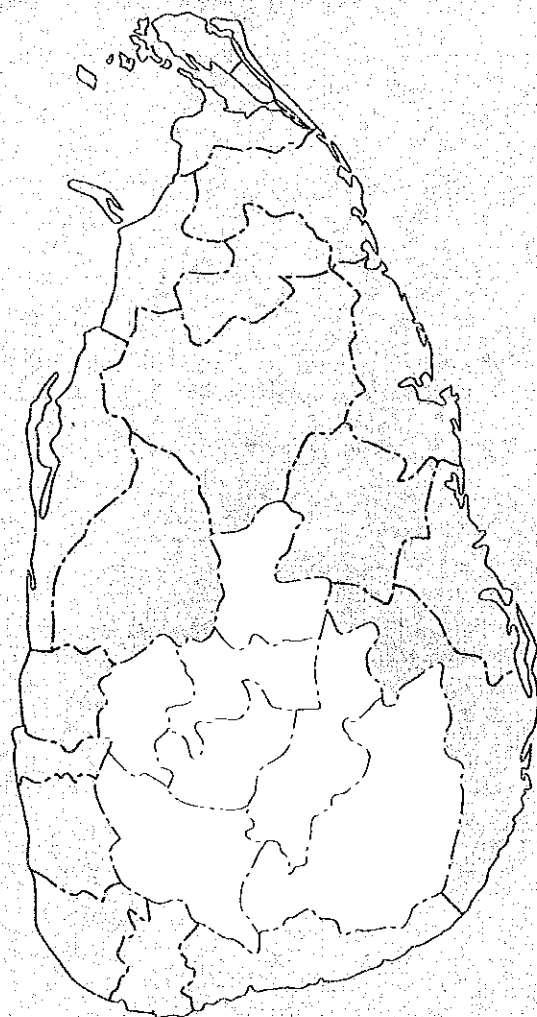


**MASTER PLAN STUDY ON
THE AGRICULTURAL AND RURAL DEVELOPMENT
FOR
UP-COUNTRY PEASANTRY REHABILITATION PROGRAMME**

VOLUME I

MAIN REPORT

AUGUST, 1994



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MINISTRY OF UP-COUNTRY
PEASANTRY REHABILITATION
DEMOCRATIC SOCIALIST
REPUBLIC OF SRI LANKA

JAPAN INTERNATIONAL
COOPERATION AGENCY

***MASTER PLAN STUDY ON
THE AGRICULTURAL AND RURAL DEVELOPMENT
FOR
UP-COUNTRY PEASANTRY REHABILITATION PROGRAMME***

VOLUME I

MAIN REPORT

AUGUST, 1994

NIPPON KOEI CO., LTD.

CHUO KAIHATSU CORPORATION

国際協力事業団

27372

PREFACE

In response to a request from the Government of Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to conduct a Master Plan study on the Agricultural and Rural Development for Up-country Peasantry Rehabilitation Programme and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Sri Lanka a study team headed by Mr. Takayoshi Yamazaki, Nippon Koei Co., Ltd., two times between February 1993 and March 1994.

The team held discussions with the officials concerned of the Government of Democratic Socialist Republic of Sri Lanka, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Democratic Socialist Republic of Sri Lanka for their close cooperation extended to the team.

August, 1994



Kimio Fujita

President

Japan International Cooperation Agency

August, 1994

Mr. Kimio Fujita
President,
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

Dear Sir,

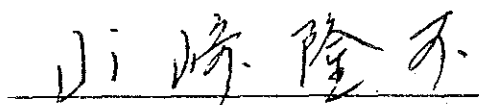
We have the pleasure of submitting the master plan study report on the Agricultural and Rural Development for Up-country Peasantry Rehabilitation Programme in Democratic Socialist Republic of Sri Lanka, in accordance with the Scope of Work agreed upon between the Ministry of Lands, Irrigation and Mahaweli Authority and the Japan International Cooperation Agency (JICA).

The Study was carried out for a total period of 19 months from February 1993 to August 1994. The Master Plan for the agricultural development was basically formulated with the principal aim of the increase of agricultural production and improvement of farmers' living standards paying attention to environment preservation and the historical background in the Up-country which consists of Central Province, Uva Province and Sabaragamuwa Province covering 18,970 km².

The Master Plan has consisted of four main aspects, namely (1) agricultural production promotion, (2) improvement of rural living conditions, (3) agricultural infrastructure development, and (4) agricultural institution reinforcement, and these aspects are interlinked each other to achieve the main targets of the Plan. We would recommend that the project will be soon implemented in line with the conclusions presented in this report.

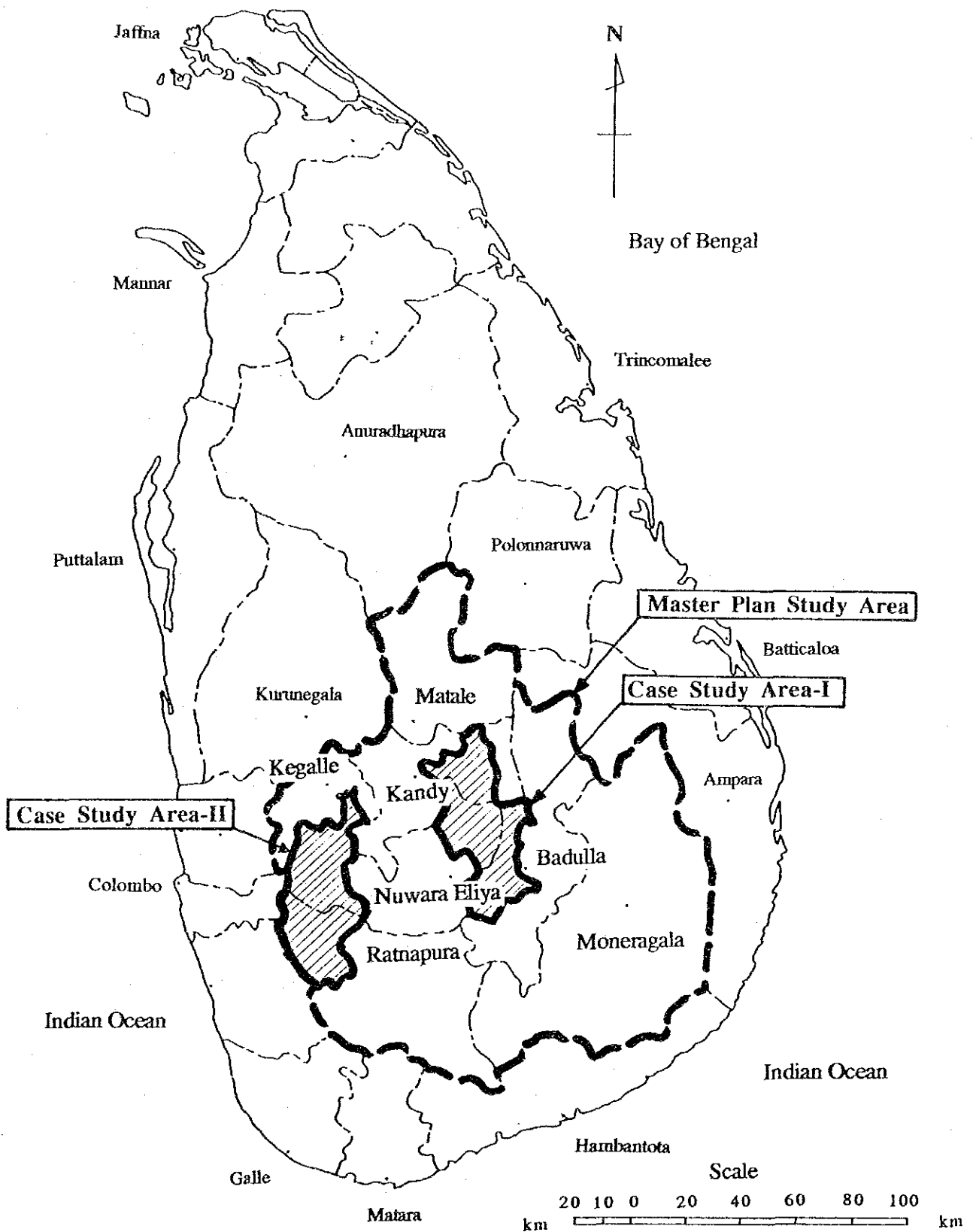
We wish to express our deep appreciation and gratitude to the personnel concerned of your Agency, your Sri Lanka Office, the Embassy of Japan in Democratic Socialist Republic of Sri Lanka and the Authorities concerned of the Government of Sri Lanka for the courtesies and cooperation extended us during our field surveys and studies.

Very truly yours.



Takayoshi YAMAZAKI

Leader of the Study Team for the Agricultural and Rural
Development for Up-country Peasantry Rehabilitation
Programme



LOCATION OF STUDY AREA

Master Plan Study on the Agricultural and Rural Development for Up-country Peasantry Rehabilitation Programme

Main Report Summary

Foreword

- 1 This Report has been prepared by JICA Study Team in accordance with the Scope of Work for the Master Plan Study on the Agricultural and Rural Development for Up-Country Peasantry Rehabilitation Programme agreed upon in November 1992. The Study was carried out during the period from February 1993 to June 1994.

Background of the Study

- 2 The Up-Country peasantry area comprising Central, Uva and Sabaragamuwa Provinces, and Ampara District of Eastern Province, is located mostly in the central hilly area of Sri Lanka. These areas are basically characterized by numerous mountains and deep valleys as well as a high altitude. The Up-Country region has been one of the regions worst affected by the chronic problems of high unemployment, landlessness, malnutrition, and slow growth, in addition to the serious problems of insufficient cultivation land and landless farmers. As a result of this situation the Government of Sri Lanka has given special attention to the rehabilitation of region. The Government of Sri Lanka established the Ministry of Up-Country Peasantry Rehabilitation (MUPR) under the Ministry of Lands, Irrigation and Mahaweli Development in March 1989 and requested the Government of Japan to extend technical cooperation for a Master Plan Study on the Agricultural and Rural Development for Up-Country Peasantry Rehabilitation Programme.

Present Condition of the Study Area

- 3 The Study area has a complex and unique topography characterized by rugged land, narrow deep valleys, high mountain ranges, peaks, plateaux, and broad plains. About 69% of the area is middle peneplaine with an altitude of 125~750m.
- 4 The population of the area was estimated at 5,103,000 in 1991, accounting for 27% of the total population of Sri Lanka. The agricultural sector accounts for 30% of GRDP and its contribution to regional employment is estimated at over 70%.
- 5 Average per capita GRDP in the Study area is estimated at US\$ 312, or about 66% of the average figure for the nation. The Study area's situation as a relatively poor area is reflected in the number of food stamps beneficiaries, which amounted to about 488,000 families or 46 % of the total number of families in the area in 1991.
- 6 About 11,746 km² ha or 61.9% of the total area (18,988 km²) are used for agriculture, about 27.2% of the total area is covered with forestland, and about 8.5% with grassland at present. The balance area comprising urban lands, water bodies, and barren lands accounts for 4% of the total area.
- 7 Agriculture in the Study area is basically dual structured and is characterized by two distinct production systems. The majority of the agricultural population cultivates very small mixed holdings ranging from 1.1 ha in Moneragala District to 0.6 ha in Kandy District with an average farm size of about 0.75 ha. Based on

the 1982 census, the latest available data, about 90% of small holdings (516,000 holdings) in the Study area were less than 1.6 ha, almost 40 % less than 0.4 ha, and 13.2% were landless .

- 8 Agriculture in the Study area contributes significantly to the national economy. It leads in term of cultivated area and production of most of the economically important crops in Sri Lanka. These crops include tea, rubber, export crops, potato, vegetables, sugarcane and tobacco. The area also contributes substantially to the national production of onion, subsidiary food crops, fruit crops, and chilli.

Basic Concept of the Master Plan

- 9 The objective of the Study agreed upon between the Governments of Japan and Sri Lanka is to formulate the Master Plan for agricultural development in the Study area paying attention to environment preservation and the historical background as well as the basic policy of MUPR. The four main aspects of the Master Plan, namely (1) Agricultural production promotion, (2) Improvement of rural living conditions, (3) Agricultural infrastructure development, and (4) Agricultural institution reinforcement, are interlinked to achieve the main targets of the Plan.

Agricultural Promotion and Supporting Plan

- 10 A target of increasing the crop yield and cropping intensity will be set up in the agricultural production plan. In order to achieve this target, the following agricultural facilities will be improved:
- (1) Strengthening of 178 Agrarian Service Centres by (a) Rehabilitating and/or constructing stores for agricultural inputs, and (b) Providing transportation vehicles;
 - (2) Construction of 53 stores for farm produce on the yard of the Agrarian Services Centres located in the main producing areas of SFCs and of vegetables.
 - (3) Improvement of half (55 numbers) of the 110 existing polas on the basis of the results of a survey conducted by MUPR.
 - (4) Improvement of agricultural training facilities by (a) Constructing an ISTI and a DITC in Sabaragamuwa Province, (b) Refurbishing 7 existing DATC, and (c) Providing equipment for training, particularly audio-visual training equipment.
 - (5) Strengthening of the Central Artificial Insemination Centre.
 - (6) Strengthening of the Veterinary Surgeon Station at the District Level.

Agricultural Infrastructure Development

- 11 The concept and target of agricultural infrastructure improvement in the Study area are (i) Rehabilitation of major/medium and minor irrigation schemes in these entirety, and (ii) Reconstruction of abandoned schemes identified in the Study. The target quantities are as follows:

Scheme	Project	Area (ha)	Completion Year	Rate
1. Rehabilitation of Existing Irrigation Schemes				
<u>Major/Medium</u>				
	NIRP	7,104	1996	38 %
	EEC, others	4,272	1995	23 %
	New Project	7,248	1996	39 %
	Sub-total	18,624		100 %
<u>Minor</u>				
	NIRP	7,704	1996	34 %
	IRDP	4,250	2003	19 %
	New Project	10,914	2003	47 %
	Sub-total	22,868		100 %
Total				
	NIRP	14,808		36 %
	EEC, others	4,272		10 %
	IRDP	4,250		10 %
	New Project	18,162		44 %
	Total	41,492		100 %
2. Reconstruction of the Abandoned Scheme				
	New Project	3,900		
3. Grand Total				
		45,392		

Rural Infrastructure Development Plan

Rural Roads

- 12 The rural road development plan covers the rehabilitation of Class C, D and E roads to rectify the existing regional differences. The quantities of rehabilitation work are as follows:

	(Unit: km)			
	Class C	Class D	Class E	Total
Kandy	250	120	220	590
Nuwara Eliya	80	60	70	210
Matale	70	110	150	330
Ratnapura	90	80	290	460
Kegalle	10	50	270	330
Badulla	130	110	200	440
Moneragala	20	50	220	290
Total	650	580	1,420	2,650

Rural Water Supply

- 13 The concept and target of rural water supply plan are as follows:
- (1) Since development plans expecting 100% water supply for Kandy, Ratnapura, Kegalle and Moneragala Districts are formulated by the funding agencies, the Master Plan will follow these plans;
 - (2) As for Nuwara Eliya and Matale districts, the water supply rate is set up at 70% and 100%, respectively, by year 2003. The number of schemes is given below.

District	Piped Scheme	Tube Well	Dug Well	Total
Matale	28	862	1,796	2,686
Nuwara Eliya	131	-	3,631	3,762

Rural Electrification

- 14 The rural electrification plan formulated under the ADB master plan will be adopted in this Master Plan as well. The target for the respective districts are as follows:

	No. of RESS Schemes up to 2000	Low-voltage Line (km)	Implementation Cost (Rs.)
Kandy	273	1,104	568.8
Nuwara Eliya	307	623	736.8
Matale	114	452	273.6
Ratnapura	228	1,093	547.2
Kegalle	244	1,244	585.6
Badulla	146	584	350.4
Moneragala	118	525	283.2
Total	1,394	5,625	3,345.6

Agricultural Land Conservation Plan

- 15 The final goal for farm land conservation is to attain sustainable development conditions in farmlands in the Up-Country area. Nearly 324,000 ha of the lands (about 17% of the Study area) are to be provided with appropriate land conservation measures. Of this area, about 72,000 ha are identified as the priority project areas in the Master Plan.

Implementation Programme

- 16 The Master Plan period is 10 years, from 1994 to 2003. The period is divided into Phase I from 1994 to 1998, and Phase II from 1999 to 2003. The components, quantities and implementation agencies of the Master Plan are listed below:

Component	Description	Quantity	Implementation Agency	Project Name	Funding Agency
1. Irrigation	1. R.Major Irr. Scheme	4,250ha	ID	NIRP	WB/EEC
	2. - ditto -	1,660ha	ID	MICDP	EEC
	3. - ditto -	7,250ha	ID	-	to be decided
	4. Recon.Major Irr.Scheme	3,390ha	ID	-	to be decided
	Sub-total	16,550ha			
	5. R.Minor Irr. Scheme	4,500ha	ID/DAS	NIRP	WB/EEC
	6. - ditto -	3,750ha	MPPI	IRDP	German,Dutch, Norway, IFAD
			ID/DAS		to be decided
	7. - ditto -	10,920ha	DAS/PC	-	to be decided
	8. Recon.Minor Irr.Scheme	510ha	ID	-	to be decided
	Sub-total	19,680ha			
Total		36,230ha			
2. Rural Road	1. R.Class C Road	250km	PC	-	the Government
	2. - ditto -	375km	PC	-	to be decided
	Sub-total	582km			
	3. R.Class D Road	250km	PC	-	the Government
	4. - ditto -	277km	PC	-	to be decided
	Sub-total	527km			
	5. R.Class E Road	860km	MPPI/PC	IRDP	German,Dutch, Norway, IFAD
	6. - ditto -	462km	PC	-	to be decided
Sub-total		1,322km			
Total		2,431km			
3. Rural Water Supply	1. Kandy WS	-	NWSDB	NWSDB	FINNIDA
	2. Badulla WS	-	NWSDB	NWSDB	UNDP
	3. Moneragala WS	-	NWSDB	NWSDB	ADB
	4. Ratnapura WS	-	NWSDB	NWSDB	UNDP
	5. Kegalle WS	-	NWSDB	NWSDB	ADB
	6. Matale :Piped WS	28 Schemes	NWSDB/PC	-	the Government
	:TW	8,625 Schemes	PC	-	- ditto -
	:DW	1,796 Schemes	PC	-	- ditto -
	7. N. Eliya:Pipe WS	131 Schemes	NWSDB/PC	-	- ditto -
	:DW	3,631 Schemes	PC	-	- ditto -
4. Rural Electrification	1. MV/LV lines	1,394 Schemes	CEB	Project	ADB
5. Agricultural Promotion and Support	1. R. Seed&Fertilizer	178ASC	DAS	-	to be decided
	2. Production Storehouse	53 Sites	DAS	-	to be decided
	3. R.Pola	55 Nos.	DAS	-	to be decided
	4. C. Sabaragamuwa	1 Site	DA	2nd AEP	WB/IDA
	5. R. DATC & ISTI	7 DATC, 3 ISTI	DA	2nd AEP	WB/IDA
	6. Imp. CAIC	1 Centre	DAPH	-	to be decided
	7. Imp. DVSS	7 Sites	DAPH	-	to be decided
6. Farmland Conservation	1. Farmland Conservation	13,500ha	to be decided	-	to be decided
	2. Watershed Management	58,200ha	to be decided	-	to be decided
	Sub-total	71,700ha			

<Note> R.: Rehabilitation, Recon.: Reconstruction, C.: Construction, Imp.: Implementation

- 17 The implementation agency of the Master Plan is MUPR. MUPR will coordinate the implementation of the projects/programmes in consultation and cooperation with the relevant ministries and agencies. Accordingly, it is desired to establish a "Steering Committee" at the national level and "Coordination Committees" at

the provincial level. MUPR, in this set-up, is expected to secure and allocate the budgets, negotiate with the funding agencies and coordinate the on-going programmes and projects.

Project Cost

- 18 The project cost is estimated according to the following conditions:
- 1) The cost is based on the results of the field survey from February to May 1993.
 - 2) The following exchange rates are applied:
US \$ 1.00 = Rs. 46.73 = J. Yen 115.0
Rs. 1.00 = J. Yen 2.46
 - 3) The project cost does not include contingencies, land acquisition and crop compensation costs, engineering and administration costs, and operation and maintenance costs.
- 19 The total amount of the implementation cost is estimated at Rs. 15,386.6 million with Rs. 7,283.8 million in Phase I and Rs. 8,102.8 million in Phase II. Since the implementation cost of on-going and scheduled projects is Rs. 6,784.4 million, the remaining implementation cost of Rs. 8,602 million is required through further financial arrangement.

Objective of the Case Study

- 20 The implementation of the Case Study has been stipulated in the Scope of Work agreed by MLIMD and JICA. The objectives of the Case Study are summarized as follows:
- 1) To formulate an agricultural and rural development plan for the Case Study areas on the basis of the Master Plan formulated through the Study.
 - 2) To verify the effectiveness of the Guidelines through the study, planning and designing of the priority projects, such as those for irrigation, rural road, rural water supply, farm land conservation, and agricultural promotion and support and thereby, to finalize the Guidelines.

Selection of Case Study Area

- 21 The following two areas are selected according to the selection criteria.
- 1) Case Study Area-I (Total area: 172,380 ha)

Kandy District	:	Kundasale, Meda Dumbara, Uda Dumbara
Nuwara Eliya District	:	Hanguranketa, Walapane
Badulla District	:	Welimada, Uva paranagama, Haliela, Kandeketiya
 - 2) Case Study Area-II (Total area: 144,695 ha)

Kegalle District	:	Dehiowita, Deraniyagala, Yatiyantota, Aranayake
Ratnapura District	:	Eheliyagoda, Kuruwita, Ayagama, Elapatha

Basic Policy for Project Formation in Case Study Areas

- 22 The sectoral development projects/plans in the Case Study Area-I would be selected within the framework of the Master Plan. The basic policy for the selection of priority projects is as follows:

- (a) The total quantity of the construction work in the Case Study Area should be determined giving due consideration to the capability of completing the project within two fiscal years at the latest.
- (b) The sector wise priority should be based on the direct contribution made towards agricultural production, e.g., irrigation, agricultural feeder roads, agricultural facilities, etc.
- (c) Priority projects within a sector should be selected considering their urgency and efficiency.

Projects	Area-I	Area-II	Total
1 Irrigation Facilities Rehabilitation			
Area	766.0ha	167.9ha&46.3ha	1,021ha
Canal Length	16.0km	15.0&2.1km	33.1km
2.Agricultural Feeder Roads Rehabilitation (mostly E-Class roads)			
Total distance	128.8km	67.0km	195.8km
Bridge	1 location	3 location	4 locations
Causeway	40 locations	11 locations	51 locations
Culvert	120 locations	89 locations	209 locations
Pipe drain	472 locations	205locations	677 locations
Retaining walls	15.7km	5.6km	21.3km
3. Rural Water supply			
Area	1 scheme	1 scheme	2 schemes
Beneficiaries (present)	1,780+1,000	9,924	12,704
Intake facility	1 location	1 location	2 locations
Total transmission pipeline length	915m	2,822m	3,37km
Total distribution pipeline length	3,485m	10,650m	14,135m
Slow sand filtration	9m x 9m x 2 ponds	20m x 20m x 2 ponds	962m ²
New storage tank	216m ³ x 1	750m ³ x 2	1,716m ³
4. Agricultural Promotion & Supporting Plan			
Produce storage	6 locations; 5,040m ²	-	5,040m ²
Pola rehabilitation	3 locations	3 locations	6 locations
Agri. input storage	-	5 locations325m ²	5location325m ²
Paddy seed storage	-	4 location260m ²	4 location260m ²
Seed laboratory	-	1 location168m ²	1 location168m ²
Training facility	-	1 location887m ²	1 location887m ²
Equipment	1 set each	1 set each	
5. Farm Land Conservation			
Model Project	2 areas; 100ha	1 area;50ha	150ha

- 23 The agricultural development plan in Case Study Areas consists of many projects. Those projects will be expected to induce synergistic benefit by the combination of projects. However, it is very difficult to quantify the impact/benefit of projects. The benefits of a project are directly countable in the case of irrigation and road projects, but are uncountable particularly in the case of basic human needs projects, which should be evaluated in terms of socio-economic effects on the regional and national economy. The latter kind of benefits is indeed characteristic of the agricultural development plan in the Case Study Area.
- 24 The population is estimated at 640 thousand in the Case Study Area-I and 510,000 in the Case Study Area-II. Most of the inhabitants in the Case Study

Areas will benefit directly or indirectly from the Project. The estimated number of beneficiaries is summarized below.

Project	Beneficiaries (estimated)
1. Agricultural Promotion and Supporting Rural Marketing Facilities (nos.)	43,650
Agr-produce Storage (farm family)	69,578
Agri-input Storage (farm family)	35,214
DATC	28,500
Paddy Seed Testing Laboratory	60,600
2. Irrigation Scheme (farm. family)	4,630
3. Rural Water Supply (nos.)	12,704
4. Rural Roads (family)	23,280

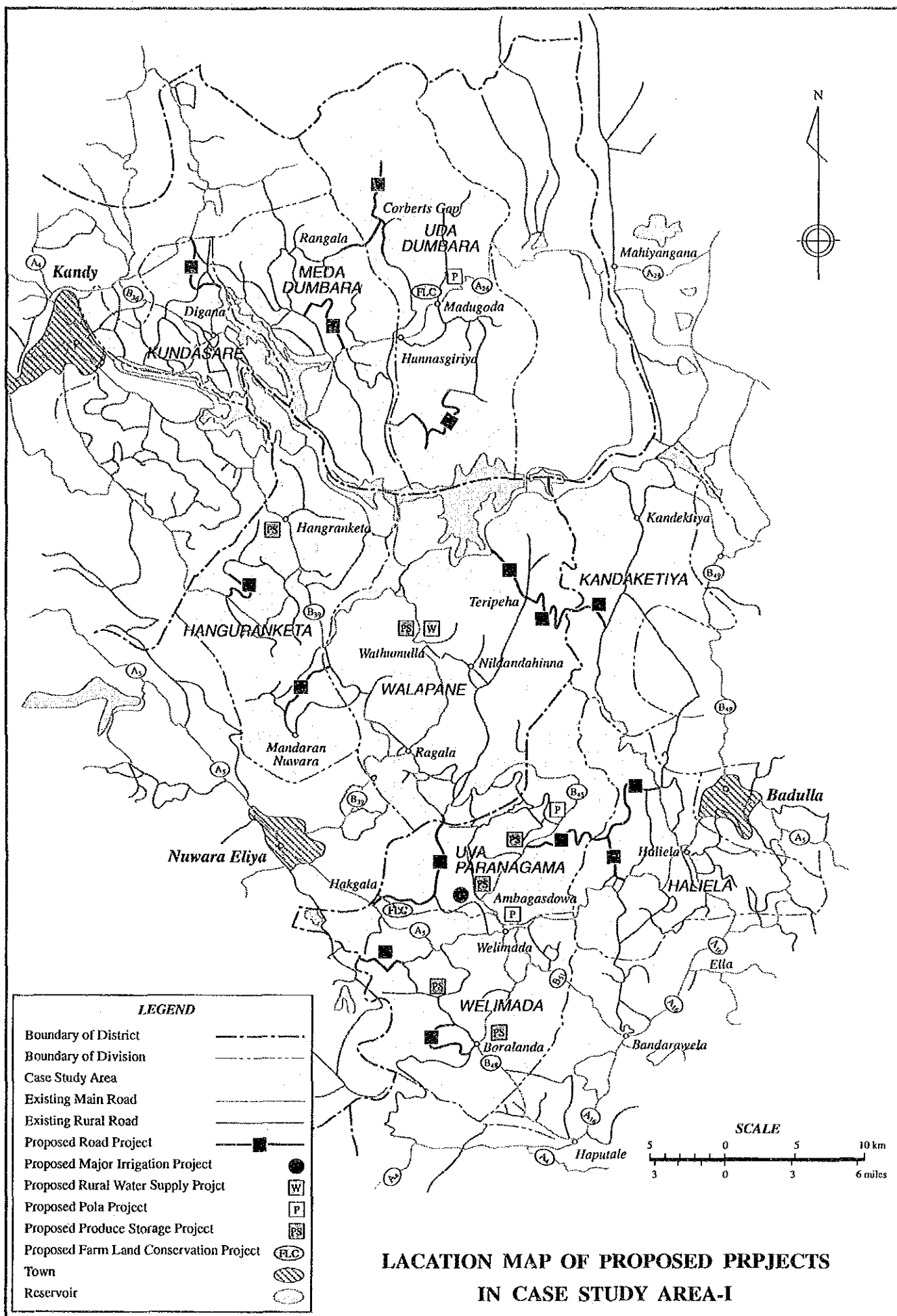
- 25 On the basis of the economic benefit and economic cost on each irrigation scheme, the EIRR of the Uma Ela, Damme Ela and Issodanawela irrigation Schemes is 19.6%, 1.5% and 38.8%, respectively.
- 26 The present road condition of the Case Study Areas is quite poor resulted less trafficability. Forty percent of the total road length is gravelled road and 30 percent is footpath. The improvement of the 23 roads (195.8 km) in the Case Study Areas was planned. The improvement of rural roads is expected great contribute to improving transportation in the area, in particular, saving of transportation cost and personnel expenses as well as saving of travelling time for farmers.
- 27 The total project cost is estimated at Rs. 2,652 million, breaking down into Rs. 1,742 million for the Area-I and Rs. 910 million for the Area II. Cost breakdowns of each project by area are shown below.

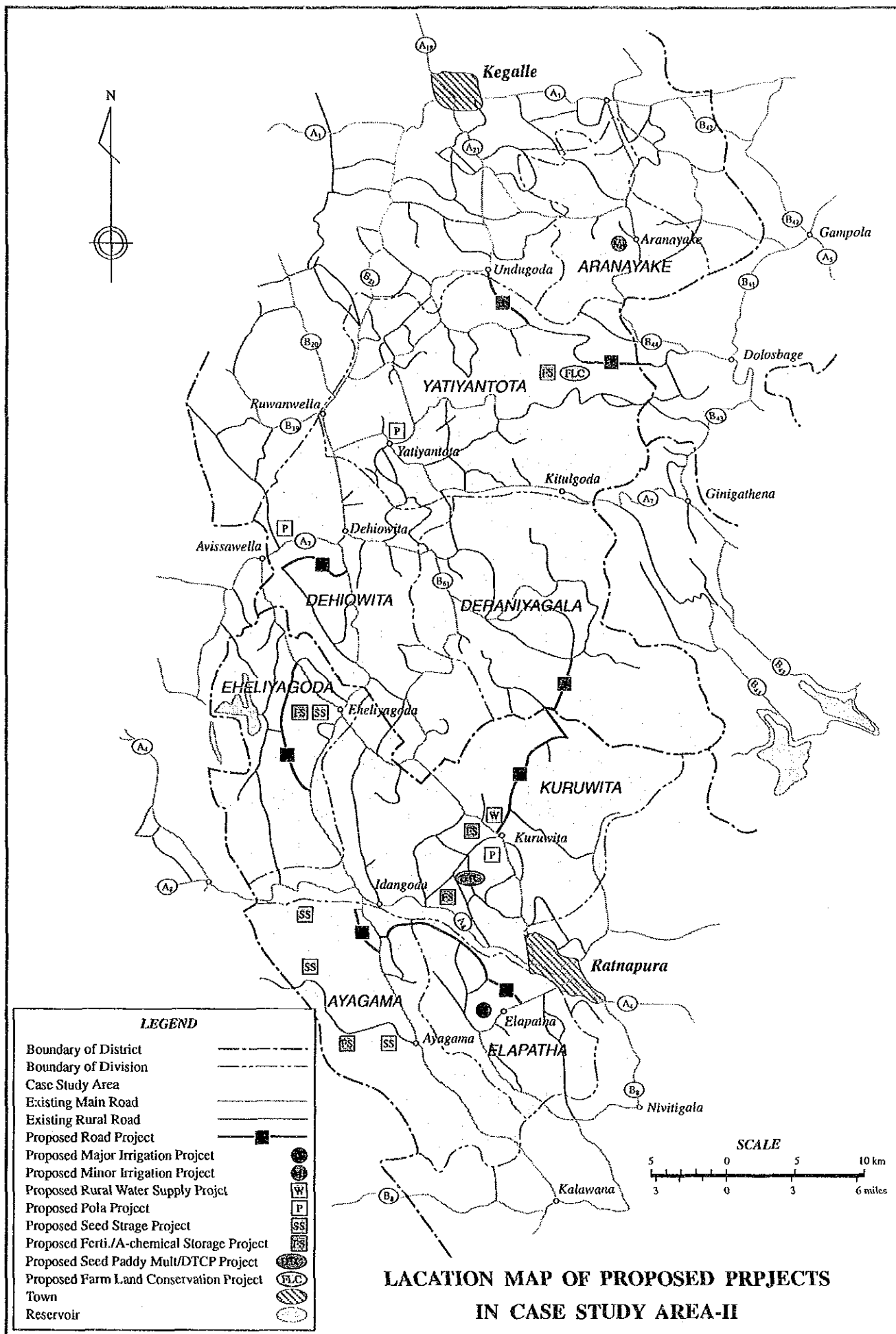
Items	(Unit: Million Rp.)								
	Area-I			Area-II			Total		
	F/C	L/C	Total	F/C	L/C	Total	F/C	L/C	Total
Const. Cost	535.7	610.3	1,146.0	262.3	272.3	534.6	798.0	882.6	1,680.6
Land Acquisit.	0	11.0	11.0	0	2.1	2.1	0	13.1	13.1
Engineer. Cost	55.0	36.7	91.7	25.7	17.1	42.8	80.7	53.8	134.5
Administration	0	57.3	57.3	0	26.7	26.7	0	84.0	84.0
Physic. Cont.	80.3	91.6	171.9	39.4	40.8	80.2	119.7	132.4	252.1
Price Cont.	45.6	218.0	263.6	40.8	83.0	223.8	86.4	401.0	487.4
Grand Total	716.6	1,024.9	1,471.5	368.2	542.0	910.2	1,084.8	1,566.9	2,651.7

- 28 In addition to the direct benefits taken into consideration in the economic evaluation, various secondary and intangible benefits and/or favourable socio-economic impacts are expected from the implementation of the Project. The principal socio-economic impacts are the following:
- 1) Securing stable food supply and increasing agro-products;
 - 2) Promotion of the willingness of farmers to work and increase of employment opportunities;
 - 3) Enhancement of economic and social activities and development of the regional economy;
 - 4) Improvement of the sanitary condition.
 - 5) Contribution to the watershed management
- 29 MUPR should make financial, administrative and other necessary arrangements for implementation of the projects formulated in the Master Plan and in the Case Study as follows:

- 1) Implementation of the projects formulated in the Master Plan is expected to be completed within a decade based on the demand of beneficiaries.
- 2) Soonest project implementation of 51 projects studied in the Case Study is desired since these projects are priority projects in the respective sector.

The implementation agency will be MUPR. MUPR will coordinate the project implementation in consultation and cooperation with the relevant ministries and agencies. Accordingly, it is recommended to establish a "Steering Committee" at the national level and "Coordination Committees" at the provincial level. In this set-up, MUPR is expected to secure and allocate the budgets, negotiate with the funding agencies and coordinate the on-going programmes projects.





PHOTOGRAPHS

(1) Up-Country Area

Tea plantation, Nuwara Eliya



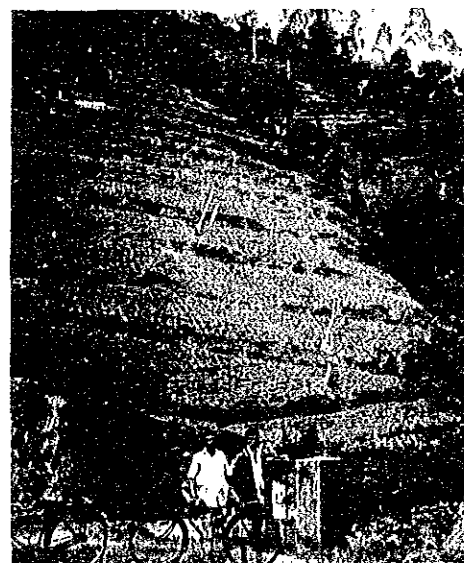
Nildandahinna, Nuwara Eliya



Meda Dumbara, Kandy



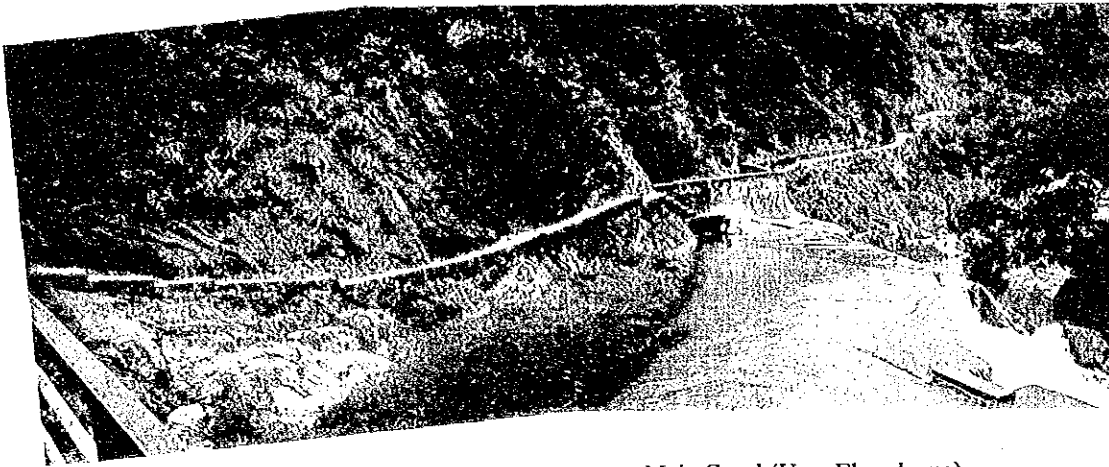
Walapane, Nuwara Eliya



Up-land crop field,
Up-hill portion of
Uma Ela scheme,
Badulla

(2) Irrigation Scheme

Uma Ela Anicut



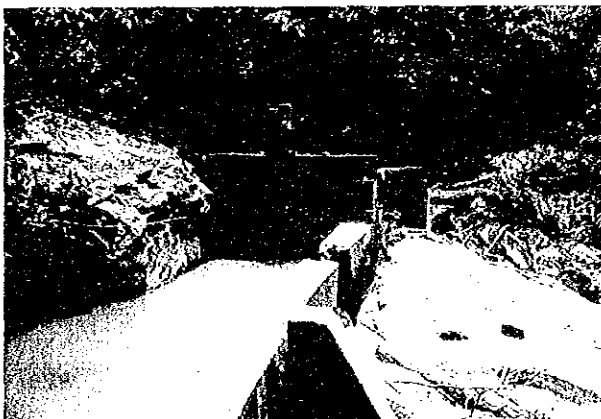
Main Canal (Uma Ela scheme)



Damme Ela Anicut



Intake (Damme Ela scheme)

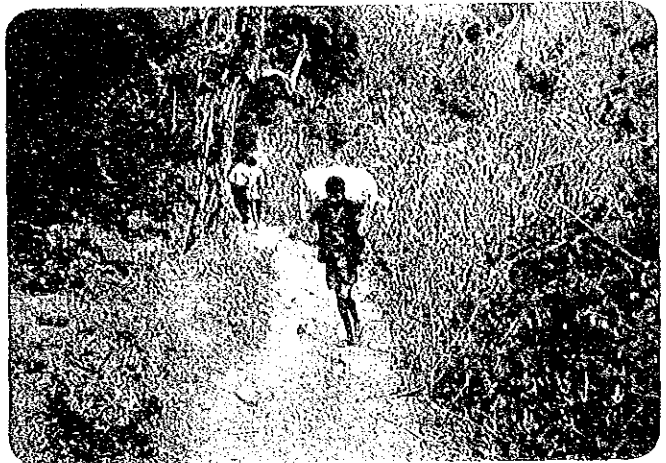


Main Canal (Damme Ela scheme)



(3) Rural Road

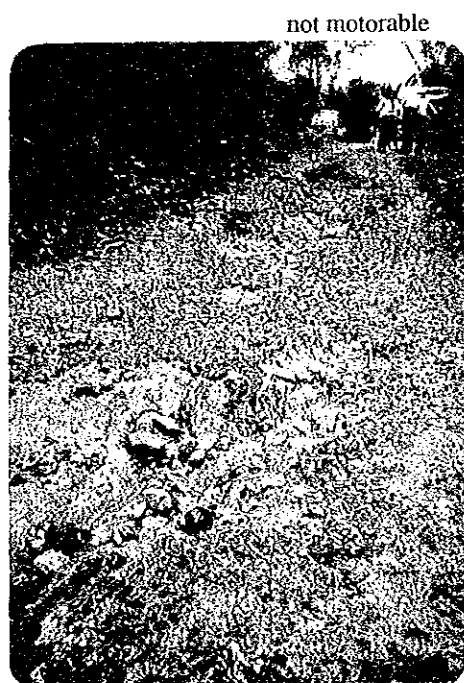
Transporting produce on head loads and on animal backs to Pola



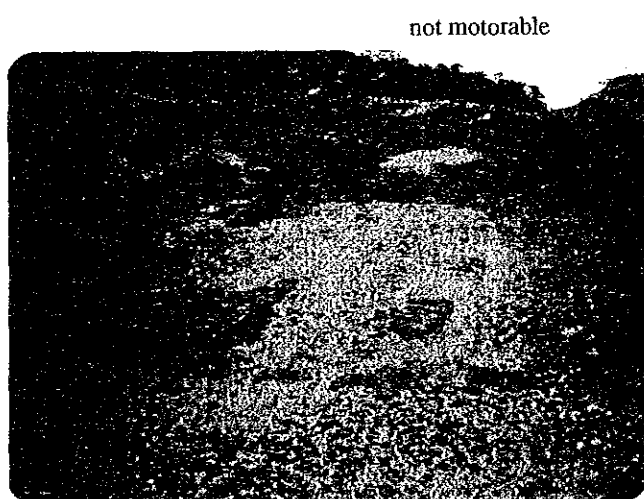
Present condition of road surface
Big damage due to no sub base course



not motorable



not motorable



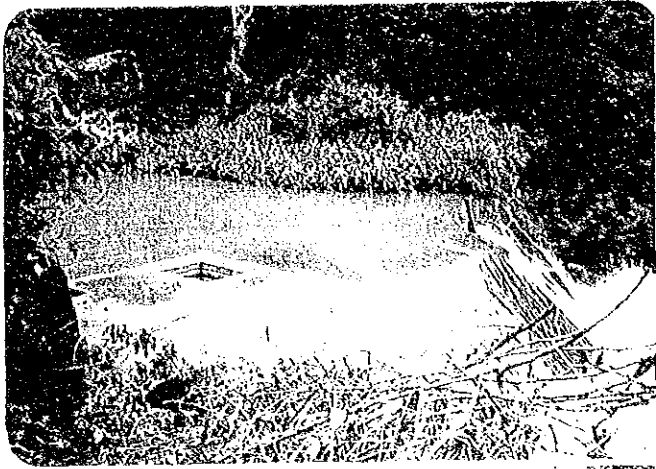
not motorable



Uma oya crossing point (Area-I, I-15 Rd.)

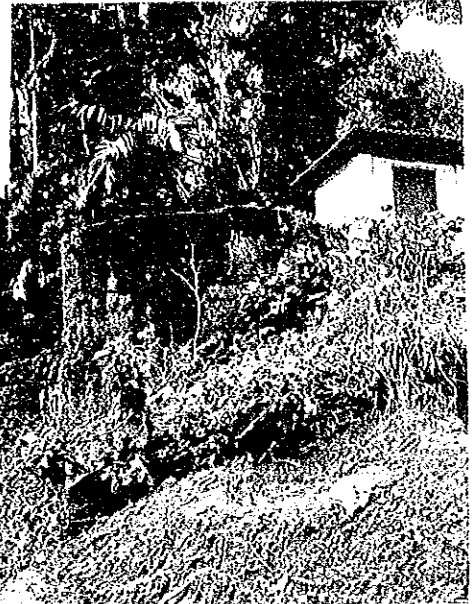
(4) Water Supply

Intake of Watumulla WSS, Nuwara Eliya



(Kurudu oya)

Intake of Kuruwita WSS, Ratnapura (Karu Ganga)



Small stream



Standpost



Small stream



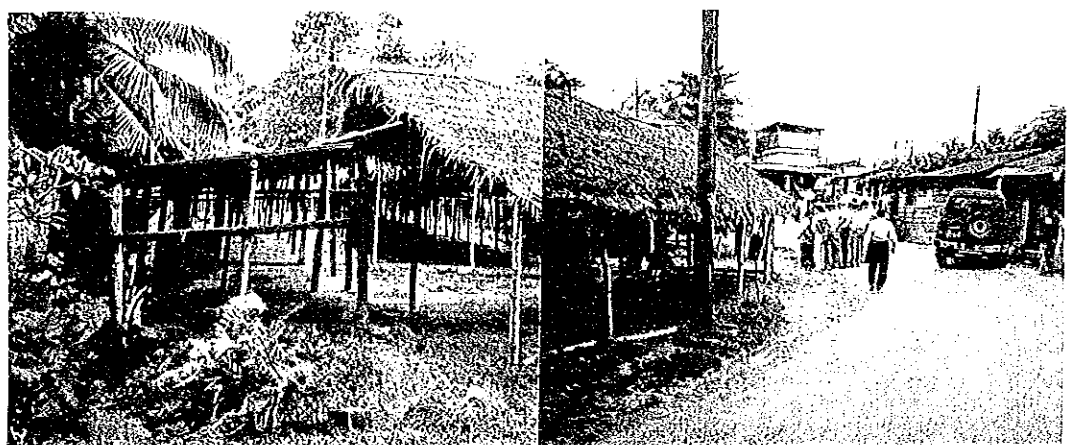
Tube well with Handpump

(5) Polas (rural market)

Yatiantota, Kegalle



Welimada, Badulla



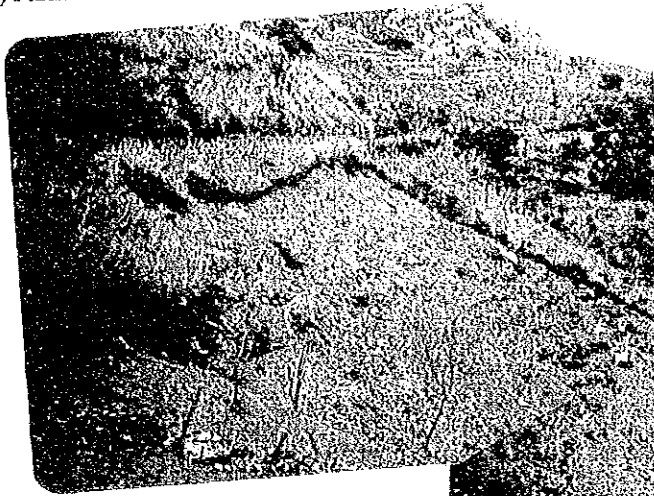
Talduwa, Kegalle



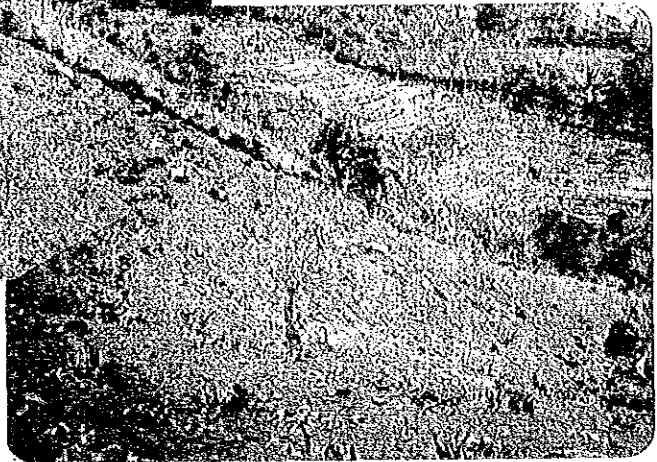
Kuruwita, Ratnapura



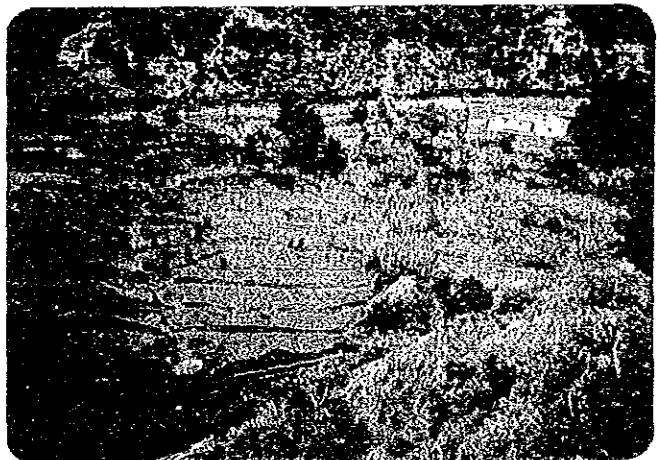
(6) Farm Land Conservation



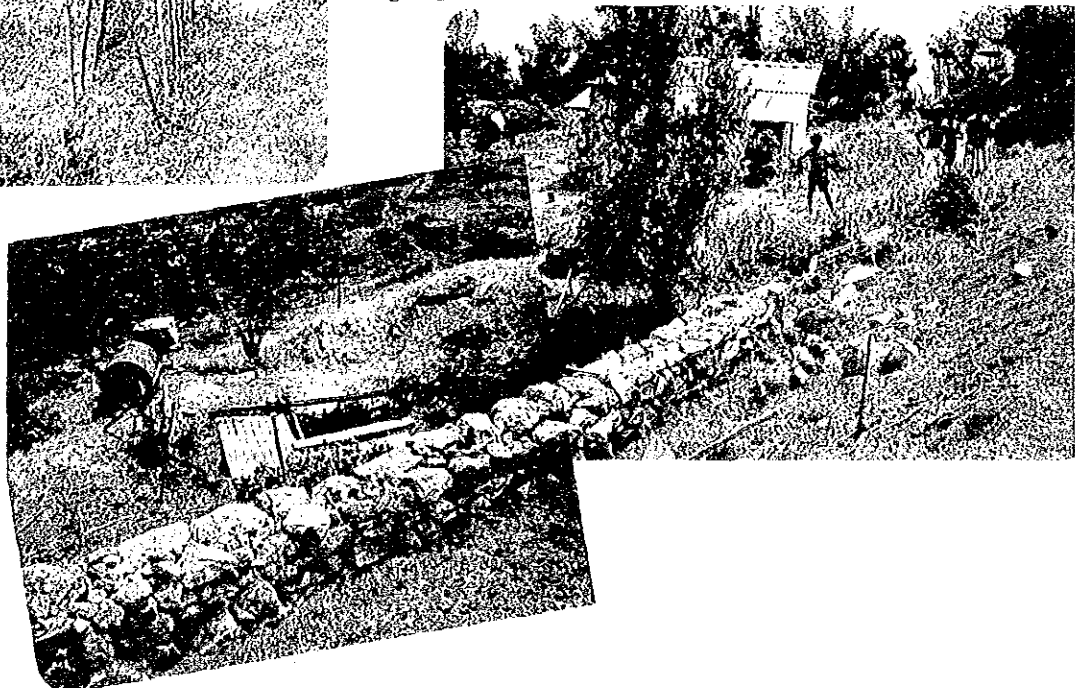
Madugoda, Kandy



Hakgala, Badulla



On-going farmland conservation project adopting SALT



MASTER PLAN STUDY ON THE AGRICULTURAL AND RURAL
DEVELOPMENT FOR UP-COUNTRY PEASANTRY REHABILITATION
PROGRAMME

VOLUME I

MAIN REPORT

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Attachment 2	Minutes of Discussion on Inception Report
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Attachment 4	Minutes of Discussion on Draft Final Report

List of Annexes

VOLUME I	ANNEX 1	:	MASTER PLAN
VOLUME III	ANNEX 2	:	CASE STUDY
VOLUME IV	ANNEX 3	:	GUIDE LINES

GLOSSARY OF TERMS AND ABBREVIATIONS

ADB	Asian Developing Bank
AEP	Agricultural Extension Project
AGA	Assistant Government Agents
ARS	Agricultural Research Station
ARTI	Agricultural Research and Training Institute
CEA	Central Environment Authority
CEB	Ceylon Electricity Board
CECB	Central Engineering Consultancy Bureau
CFC	Ceylon Fertilizer Corporation
Chena	Burning, slashing and shifting cultivation
CIDA	Canadian International Development Agency
CWE	Cooperative Wholesale Establishment
DA&DDP	Draught Animal and Dairy Development Project
DANIDA	Danish International Development Agency
DAPH	Department of Animal Production and Health
DAS	Department of Agrarian Services
DATC	District Agricultural Training Centre
DM	Department of Meteorology
DOA	Department of Agriculture
DUPR	Department of Up-country Peasantry Rehabilitation
DWC	Department of Wildlife Conservation
EC	Electric Conductivity
EIRR	Economic Internal Rate of Return
FAO	Food and Agriculture Organization of United Nations
FINNIDA	Finish International Development Agency
GA	Government Agent
GDP	Gross Domestic Product
GN	Grama Nalidari Sub-division of Assistant Government Division
GOSL	Government of Sri Lanka
GRDP	Gross Regional Domestic Product
HD	Health Department
IBRD	International Bank for Reconstruction and Development
ID	Irrigation Department
IDA	International Development Association
IFAD	International Fund for Agricultural Development
IRDP	Integrated Rural Development Programme
IUCN	International Union for Conservation of Nature and Natural Resources
JICA	Japan International Cooperation Agency
LUPPD	Land Use Policy Planning Division
MAD&R	Ministry of Agriculture Development and Research
Maha	North-east monsoon season (appox. Oct.-Mar.)
MASL	Mahaweli Authority of Sri Lanka
MCM	Million cubic meters
MICDP	Moneragala Irrigation and Community Development Project
MIFMD	Ministry of Irrigation, Forestry and Mahaweli Development
ML	Ministry of Lands
MUPR	Ministry of Up-country Peasantry Rehabilitation
NADSA	National Agricultural Diversification and Settlement Authority
NGO	Non Government Organization
NIRP	National Irrigation Rehabilitation Project
NLDB	National Livestock Development Board

NORAD	Norwegian Agency for International Development
NWS&DB	National Water Supply and Drainage Board
O&M	Operation and Maintenance
OECD	The Overseas Economic Cooperation Fund
OFCs	Other Field Crops, meaning all field crops other than paddy rice
PMB	Paddy Marketing Board
RARS	Regional Agricultural Research Station
RDA	Road Development Authority
RRS	Rice Research Stations
SAEP	Second Agricultural Extension Project
UNDP	United Nations Development Programme
WB	World Bank
WHO	World Health Organization
Yala	South-west monsoon season (approx. Apr.-Aug.)

CONVERSION FACTORS

	<u>Form Metric System</u>		<u>To Metric System</u>	
Length	1 cm	= 0.394 inch	1 inch	= 2.54 cm
	1 cm	= 3.28 ft = 1.094 yd	1 ft	= 30.48 cm
	1 km	= 0.621 mile	1 yd	= 91.44 cm
			1 mile	= 1.609 km
Area	1 cm ²	= 0.155 sq.in	1 sq.ft	= 0.0929 m ²
	1 m ²	= 10.76 sq.ft	1 sq.yd	= 0.835 m ²
	1 ha	= 2.471 acres	1 acre	= 0.4047 ha
	1 km ²	= 0.386 sq.mile	1 sq.mile	= 2.59 km ²
Volume	1 cm ³	= 0.0610 cu.in	1 cu.ft	= 28.32 lit
	1 lit	= 0.220 gal.(imp)	1 cu.yd	= 0.765 m ³
	1 kl	= 6.29 barrels	1 gal.(imp.)	= 4.55 lit
	1 m ³	= 35.3 cu.ft	1 gal.(US)	= 3.79 lit
	10 ⁶ m ³	= 811 acre-ft	1 acre-ft	= 1,233.5 m ³
Energy	1 kWh	= 3,413 BTU	1 BTU	= 0.293 Wh
Temperature	°C	= (°F-32) 5/9	°F	= 1.8°C + 32
Derived measures				
	1 m ³ /s	= 35.3 cusec	1 cusec	= 0.0283 m ³ /s
	1 kg/cm ²	= 14.2 psi	1 psi	= 0.703 kg/cm ²
	1 ton/ha	= 891 lb/acre	1 lb/acre	= 1.12 kg/ha
	10 ⁶ m ³	= 810.7 acre-ft	1 acre-ft	= 1,233.5 m ³
	1 m ³ /s	= 19.0 mgd	1 mgd	= 0.0526 m ³ /s

EXCHANGE RATE

US\$ 1.0 = J.Yen 115.0 = RS. 46.73 (as end of May 1993)

PART 1

PART I MASTER PLAN

CHAPTER 1 INTRODUCTION

1.1 Authority

This report is compiled in accordance with the "Scope of Work for the Master Plan Study on the Agricultural and Rural Development for the Up-Country Peasantry Rehabilitation Programme" agreed upon between the Ministry of Lands, Irrigation and Mahaweli Authority and the Japan International Cooperation Agency (JICA).

This report is of a summary nature and is supported by the three Annexes listed below.

Annex I	Master Plan Study
Annex II	Case Study
Annex III	Guideline

1.2 Background to the Study

The Up-Country peasantry area comprising the Central, Uva and Sabaragamuwa Provinces, and the Ampara District of the Eastern Province, is located largely in the central hilly area of Sri Lanka. These areas are basically characterised by numerous mountains and deep valleys as well as high altitude.

The Up-Country areas have suffered a great deal as a result of colonial rule. After the British occupation of the Kandyan Kingdom in 1815, there came the impact of the new rules concerning political organization, society, land utilisation, and commerce. In particular, land use in the areas was dramatically forced to change because that tremendous expanse of Crown lands was sold to planters at a nominal rate for establishing plantations, and because of the enactment of both Ordinances, the Crown Lands (Encroachments) Ordinance, No. 12 of 1840 and the Waste Lands Ordinance, No. 1 of 1987, deprived the people of much of their chena lands and land available for village expansion. In addition to this, the number of Indian Tamil estate labourers increased remarkably by leaps and bounds, due to the planters' practice of bringing their labour from South India.

By the end of 1850s most of the land resources in the Up-Country region with the exception of Moneragala district and part of Ampara district had been utilised for the commercial agricultural sector leaving very little room for the expansion of the traditional agricultural sector.

In addition to the serious problems of insufficient cultivation land and landless farmers, the Up-Country region was one of the regions which was greatly effected by the chronic problems of high unemployment, landlessness, malnutrition, and slow growth.

As a result of this situation the Government of Sri Lanka has given special attention to the rehabilitation of this region.

The statements of policies and programmes of the government identify the following as the plan of action for the Up-Country Peasantry Rehabilitation:

1. Provide the basic infrastructure needs of the impoverished peasantry;
2. Implement specific regional strategies to respond to the needs of the people of the hill country; and
3. Implement a unified land and human settlements development policy for landless villagers and plantation workers in the plantation areas, through a single instead of a dual-process of development for both these target groups.

The Government of Sri Lanka established the Ministry of Up-Country Peasantry Rehabilitation (MUPR) under the Ministry of Lands, Irrigation and Mahaweli Authority in March 1989 and requested the Government of Japan to extend technical cooperation for a Master Plan Study on the Agricultural and Rural Development for the Up-Country Peasantry Rehabilitation Programme (hereinafter referred to as the Study). In response to the request of the Government of Sri Lanka, the Government of Japan accepted the Project and dispatched the preparatory study team in November 1992 to conclude the Scope of Works for the Programme (Attachment 1).

1.3 Objective of the Study

The objectives of the Study as agreed upon between MLIMD and JICA are as follows:

- 1) To formulate the Master Plan of the Agricultural and Rural Development for the Up-Country Peasantry Rehabilitation Programme,
- 2) To carry out a case study in selected areas based on a guideline formulated through the Study, and
- 3) To carry out technology transfer to the Sri Lankan counterpart personnel in the course of the Study.

1.4 Study Area

The Study area consists of Central Province, Uva Province, and Sabaragamuwa Province covering 18,970 km² as shown on the Location Map.

CHAPTER 2 BACKGROUND TO THE STUDY

2.1 National Economy

Since independence in 1948, the Government of Sri Lanka has historically emphasised social welfare programmes, and social indicators of literacy, school enrolment, infant mortality, child birth mortality and average life expectancy are at relatively superior levels compared to nearby countries. Nevertheless, GNP per capita at current prices was low at US\$ 475 in 1991.

Sri Lanka has been experiencing considerable disruption of social and political life since 1983. This disruption, coupled with a prolonged drought and a decline in the terms of trade, has significantly hampered economic progress. The growth of GDP between 1985 and 1989 was estimated at about 2.7 %, the figure indicates that economic growth during the period was stagnant. However, the Sri Lankan economy has begun to show a sharp recovery in economic performance since 1990 due mainly to a recovery of commodity production, both agricultural and industrial, and a substantial improvement in the external trade and payment position. Furthermore, ethnic strife between Sinhalese and Tamils has also been less intense since 1990. The GDP in real terms grew by 6.2% and 4.8 % in 1990 and 1991, respectively, after the average growth rate of 2.7 % in 1985-89 (Table 2.1-1).

The sectoral GDP percent is shown in Table 2.1-1 which indicates that the contribution of the industrial and service sectors are averaged at 26 and 48 % of the total GDP, respectively. The agricultural sector accounted for about 26.9 % of the total GDP and especially paddy and plantation crops, such as tea occupy the greater part of it. Furthermore, the agricultural sector accounted for about 39.6 % of export earnings for recent years and about 47.8 % of the labour force depends on agriculture. The agricultural sector will continue to play a vital role in the Sri Lankan economy.

In 1991 the Sri Lankan foreign trade recorded export earnings of Rs. 84,378 million and import expenditure of Rs. 126,643 million, producing a trade deficit of Rs. 42,265 million. Textiles and garments earned Rs. 33,261 million or 39.4 % of the total export value in 1991, followed by tea at Rs. 17,867 million. The import outlay on food and drink in consumer goods rose by 13.9 % (Rs. 32,357 million) in 1991. In the food and drink category, the value of rice, sugar and milk, and milk products accounted for 29.5 % or Rs. 9,525 million.

2.2 National Development Planning

(1) National Development Planning

The Government of Sri Lanka, in consultation with the IMF and the World Bank, has pursued economic restructuring. The economic restructuring policy has stressed the specific components of: (i) stabilisation of the macro-economy, (ii) rationalisation of the public sector, (iii) private sector stimulation, and (iv) countermeasures for poverty.

Public Investment, 1992 - 1996, provides the latest national economic development policy for the coming five years. Sectoral investment allocation for the 1992-1996 period was basically guided by the priorities laid down in the sector strategies. The major policies for the irrigation sector, for the economic infrastructure such as road and electrification, and for the water supply of the human settlement sector are as follows:

Irrigation

The government policy in the irrigation sector is to continue to focus on investment for rehabilitation and improved operation and maintenance (O & M) to reap maximum benefit from the existing major/minor schemes. It is also the policy in the irrigation sector that the management of irrigation systems is to be handed over to farmer's organisations who will charge members who should pay by labour input or money.

Road Transportation

The greater part of the road network was built many years ago and generally was designed to carry neither the volume of traffic nor the weight of vehicles now using the system. In addition, road maintenance has not been adequately funded and periodic and routine maintenance has been neglected.

Hence, the highest priority should be accorded to the rehabilitation of roads and not to the construction of new roads.

Rural Electrification

Rural electrification should be given high priority in the economic infrastructural sector because of its socio-economic impact. Up to the end of 1991, more than 9,300 rural electrification schemes, including projects under IRDP & DCB, have been completed.

The government's overall goal is to raise the national average of rural electrification rate to 70% by the year 2000.

Water Supply

The government's overall goal is to achieve 100 % coverage by the year 2000 under an investment programme prepared by the National Water Supply and Drainage Board. The programme would be achieved in the rural sector through the provision of wells installed with hand pumps.

During 1987-1991, the share of the current expenditure of the government on GDP fluctuated between 20 % and 23 %, showing an average of 21.5 % per year for the 5 year period. The budget for development projects fluctuates greatly from year to year, with the proportion weight ranging from 40 %-66 %, with an estimated average of 48.8 % per year. The Government economic adjustment policy was initiated from 1989, and for the three year period from 1989 to 1991, the average share was estimated at 42.5 %. This figure is substantially lower than the average of 64.2 % during the preceding two years. Economic infrastructure is targeted for the largest allocation of about 35 %, in an effort to establish an infrastructural base for the efficient functioning of private sector activities. The next largest sector allocation is for human settlement at 21 %. Agriculture is third at 19 %, followed by social infrastructure at 10 %.

(2) Agricultural Policies

The last comprehensive agricultural strategy, the "National Agriculture Food and Nutrition Strategy" was initiated in June 1984 in order to help achieve a better regional and sectoral balance in resources allocation.

The major objectives of the agricultural sector which still apply today are:

- (a) moving towards a higher degree of self-reliance in basic food commodities, namely rice, fish, sugar, pulses and milk;

- (b) increasing the productivity of the tree crop sector to expand export earnings;
- (c) enhancing the incomes and creation of new employment opportunities in the rural sector; and
- (d) improving the nutritional status of the people.

In a more recent review of agricultural and rural development policy, considerable emphasis was placed on poverty alleviation. The Ministry of Agricultural Development and Research is going to formulate the new agricultural development strategy in 1994 namely the Agricultural Growth and Restructuring Strategy (AgGro Strategy). According to this strategy, the Ministry will set up the mid-term investment plan to accelerate the agricultural sector growth.

2.3 Administrative Organizations

The Government of Sri Lanka has 28 Cabinet Ministries and the local government is comprised of 9 Provincial Councils, 12 Municipal Councils, 39 Urban Councils, and 254 Pradeshiya Sabha.

The devolution of authority to the provinces under the 13th Amendment to the Constitution, and within the provinces to the administrative divisions is of paramount importance for virtually all government services. Since April 1992, the central government basically stopped executing projects, except very large-scale projects with were beyond the capacity of the providing or assisted foreign sources. Instead, the provincial and divisional governments carry out the projects relevant to their jurisdiction.

The executing agency for this Master Plan is the Department of Up-Country Peasantry Rehabilitation (DUPR) of MUPR under the Ministry of Lands (before August 1993, DUPR and MUPR were under the Ministry of Lands, Irrigation & Mahaweli Development (MLINDO). MUPR, as shown in Figure 2.3-1, has no executive divisions for project implementation. Since the present plan covers diverse fields involving many governmental ministries and agencies, the major components of the Master Plan and administrative bodies are shown in Figure 2.3.-2.

2.4 On-Going Major Development Programmes

(1) Integrated Rural Development Project (IRDP)

IRDP has emerged as a means of benefiting the poor population in areas outside the Mahaweli basin and the immediate environs of Colombo where the major thrust of development has been focused over the years. The focal points of IRDP implemented in Sri Lanka may be enumerated as follows:

- Direct investment in production,
- Active participation of project beneficiaries,
- Rectification of regional imbalances in development,
- Extension of benefits to the maximum number of beneficiaries,
- Restoration and rehabilitation of the existing facilities which are included as priorities,
- Schemes which are labour intensive, and
- Schemes which are readily implementable for the rapid realisation of benefits.

In the Study area, IRDPs have been implemented in six districts, except Matala district. The Ministry of Policy, Planning & Implementation (MPPI) is the executing agency for IRDPs which have been carried out on a district wise basis.

(2) Project for Acquisition of Equipment to Strengthen the Divisional Secretaries' Offices (AGA project)

Under the AGA project, equipment will be deployed to strengthen the divisional offices which function as centres for exercising local authority. This equipment will support the divisions in the implementation of their work programmes to establish social and economic infrastructure. The equipment was procured through Japan's Grant Aid and was distributed to targeted provincial and divisional offices in April 1993.

(3) Project for Rural Infrastructure Development in the Up-Country Region (PRIDU)

The Up-Country area is one of the regions which has been greatly effected by the chronic problems of high unemployment, landlessness, malnutrition and slow growth which characterised the Sri Lankan economy in general.

The Government of Sri Lanka has given special attention to rehabilitating this region. MUPR was established for this purpose under the MLINDO in March 1989. DUCPR formulated this project on the basis of the above policies in 1990.

(4) Moneragala Irrigation and Community Development Project (MICDP)

The project will raise the living standards and quality of life of people in about half of the disadvantaged districts of Moneragala. By the rehabilitation of 8 medium-scale irrigation schemes the project will enhance the productive capacity of one fifth of the irrigated paddy land of Moneragala. Supplementary programmes will ensure the adoption of improved and diversified agriculture, increase employment, improve rural, social, and physical infrastructure, and protect the environment. About 6,000 poor households will be the core beneficiaries, with up to 200,000 persons benefiting on the periphery of the project.

(5) National Agricultural Research and Extension Projects(SAEP)

SAEP arises mainly from its high operational costs and the change in extension needs. The Second Agricultural Extension Project (SAEP), also funded by the IDA, has been implemented on a 8 year project period from 1983 to 2000. The main components of SAEP are: (a) strengthening of agricultural extension services (excluding tree crops); and (b) developing a national seed policy. An allocation of US \$ 15.59 has been made for the extension services which consist of: (a) integration of services; (b) mass media; (c) plant protection; (d) pesticide control; (e) training; and (f) a private sector pilot extension programme.

(6) National Irrigation Rehabilitation Project (NIRP)

NIRP commenced in 1992 to stabilise and increase agricultural production and incomes and to raise the standard of living through the rehabilitation and improved O/M of the existing irrigation schemes. The major components of the project are as follows:

- (1) rehabilitation and improvement of about 1,000 minor and 60 medium/major irrigation schemes covering about 37,500 ha;
- (2) establishment of farmers organisations and the introduction of improved O/M practices in all the rehabilitation schemes;
- (3) training of farmers and staff of the implementing agencies;

Through this project, 19 major/medium schemes covering 4,554 ha and 7,700 ha of minor schemes are being/will be rehabilitated and improved in the Study area.

(7) Janasaviya Programme (JSP)

Sri Lanka confronts the problems of high unemployment and poverty, with serious impact on both political and socio-economic stability. The government has vigorously promoted measures to alleviate poverty including food stamps, school mid-day meals, and JSP since 1989.

The main objective of the JSP is to enable the beneficiary households to increase their own income and earn a livelihood which raises them above the poverty level, sustains their capacity to continue improving their living standards, and makes themselves-reliant so that they would no longer need to depend on state welfare.

CHAPTER 3 PRESENT CONDITION OF THE STUDY AREA

3.1 Natural Condition

(1) Topography

The topography of Sri Lanka is characterised by three steps of peneplains composed of high, middle, and low peneplains, of more than 750 m, 125 - 750 m and less than 125 m in altitude, respectively. The high peneplain corresponds to the so-called central highland surrounding Nuwara Eliya. The middle and low peneplains surround the central highlands and decrease in height gradually toward the coast.

About 69 % of the Study area, which consists of Central, Uva, and Sabaragamuwa provinces, is middle peneplain, and about 13 % and 18 % are high and low peneplain, respectively. The Study area is given complexity and unique characteristics by the rugged land forms, narrow deep valleys, high mountain ranges, peaks, plateaux, and broad plains. All the high peaks exceeding 2,000 meters lie in Nuwara Eliya district of Central province, and in the southern part of Badulla district of Uva province.

(2) Meteorology

The climate of Sri Lanka is characterised by tropical monsoon seasons, i.e. the Southwest monsoon from May to September, Northeast monsoon from December to February, and two intermonsoonal periods, the first from March to April, and the second from October to November. The Maha cultivation season for paddy which is from September to March, begins at the tail end of the Southwest monsoon, covers the intermonsoonal period of October and November, the full Northeast monsoon period, and a month of the other intermonsoonal period. The Yala cultivation season is from April to August and thus, the season begins during an intermonsoonal month and covers the major period of the Southwest monsoon.

There are 5 meteorological stations. The temperature shows much variation depending on the elevation from 34.4 m to 1,894.6 m. The mean annual maximum temperature at the above meteorological station ranges from 20.1 °C to 31.5 °C and minimum temperature ranges from 10.7 °C to 22.8 °C. The mean monthly maximum temperature ranges from 18.7 °C to 33.1 °C and the minimum temperature ranges from 7.7 °C to 23.8 °C.

The monthly rainfall is observed at all stations. These stations are affected by monsoons through out the year. The monthly rainfall varies from 24.1 mm to 494.3 mm and annual average annual rainfall varies from 1,548.4 mm to 3,641.1 mm depending on the location of the station.

(3) Water Resources

There are 15 river basins in the Study area. Of the 15 river basins in the Study area shown below the annual runoff ratio varies from 13 to 40 % and 62 to 78 % where rivers flow to the sea passing through dry zones and wet zones, respectively.

River Basins	Catchment Area km ²	Precipitation MCM	Run-off MCM	Runoff Ratio %
Keleni Ganga	2,278	8,692	5,474	62.98%
Kalu Ganga	2,688	1,0122	7,862	77.67%
Walawe Ganga	2,442	9,843	2,165	22.00%
Kirindi Oya	1,165	1,606	476	29.64%
Menik Ganga	1,272	1,472	486	33.02%
Kumbukkan Oya	1,218	2,140	74	36.17%
Wila Oya	484	653	215	32.92%
Heda Oya	604	967	394	40.74%
Gal Oya	1,792	4,031	1,250	31.01%
Unnichchai	346	605	290	47.93%
Mundeni Aru	1,280	2,236	859	38.42%
Maduru Oya	1,541	2,476	805	32.51%
Mahaweli Ganga	10,327	26,804	11,016	41.10%
Kala Oya	2,272	4,424	587	13.27%
Maha Oya	1,510	4,132	1,608	38.92%

There are many reservoirs/tanks in the above mentioned river basins. These reservoirs are used for irrigation, hydropower and domestic water supply. Many tributaries join the mainstreams through the reservoirs or tanks.

(4) Soil and Vegetation

A variety of soil types can be identified within the Study area. The major soil groups found in the wet zone Nuwara Eliya, Ratnapura, and Kegalle districts and the southern part of Badulla districts are the Red Yellow Podzolic Soils and association of Red Yellow Podzolic Soils and Mountain Regosols. The semi-wet and intermediate zone consisting of Kandy district and the southern part of Matale district, are widely occupied by the association of Red Yellow Podzolic Soils and Mountain Regosols, Reddish Brown Latosolic Soils, and Immature Brown Loams. The association of Reddish Brown Earths and Low Humic Gley Soils, the association of Reddish Brown Earths and Solodized Solonetz, and the association of Reddish Brown Earths and Immature Brown Loams are predominantly distributed in the semi-dry and intermediate zone consisting of Moneragala district, and the northern part of Matale and Badulla districts.

The natural vegetation of the Study area covers 429 km² or 26 % of the land area. The major part of the natural vegetation area in the Study area is natural forests and protected reserves.

3.2 Socioeconomic Situation

(1) Economic Situation in the Study Area

The Study area is located in the southern central mountainous part of the island and has an area of 18,970 km², which corresponds to 29 % of the total territory of 65,525 km². The area consists of three provinces, seven districts(former AGAs), 82 divisions, and 12,850 villages.

The population of the area was estimated at 5,103,000 in 1991, which accounted for 27 % of the total population in Sri Lanka. The population density was 270 /km²,

ranging from 62 /km² in Moneragala district to 645 /km² in Kandy district. About 91 % of the population reside in rural villages.

The Study area has contributed about 22 % of GDP, which is lower than the shares of land area and population to those of the country. The estimated Gross Regional Domestic Product (GRDP) of the Study area is summarised below:

GRDP in the Study Area, in 1990

Sector	Study Area		GDP	
	(Rs. Mn)	(%)	(Rs. Mn)	(%)
Agriculture, Fishery and Forestry	18,851	29.9	76,504	26.9
Industry	16,011	25.4	71,767	24.7
Services	27,862	44.2	142,224	57.8
Total	63,037	100.0	290,495	100.0

Source: Department of National Planning, MPPI, Original figures were adjusted

Although the regional economy stagnated until 1989, it has recovered since 1990 the same as the situation in the country. The average growth rate in the regional GDP for the 9 year period from 1982-1990 was 3.4 %, which was lower than that for the country of 4 %. The agricultural sector accounts for 30 % of GRDP and its contribution to employment was estimated at over 70 %.

The economically active population in the Study area is estimated at about 2,664,000 persons, or 54 % of the total population. About 35 % or more of the laborforce, some 931,000 persons, were estimated to be unemployed. Unemployment is the highest among workers seeking industrial occupation. In addition, about 25 % of the work force is under employed, being able to find work on the average for only about two-thirds of the year.

The average per capita GRDP in the Study area was estimated at US\$ 312, or about 66 % of the average figures for the nation. Furthermore, the Study area's situation as a relatively poor area is reflected in the number of food stamp beneficiaries, which amounted about 488,000 families or 46 % of the total families in the area in 1991. This figure is slightly higher than the national figure of 39.4 %.

With a variation in topography, soils, and climate, there is a considerable range in land use and farming systems. In the upland areas, the most appropriate forms of land use are perennial crops, such as tea, forests and pasture, although in areas with more stable slopes and soils, potato and temperate vegetables are successfully grown. At intermediate elevations, perennial plantation crops, such as tea and minor export crops represent a stable form of land use. In the lowland areas, both perennial tree crops and field crops are grown with paddy dominating in the valley bottoms and level areas where irrigation is available.

The Study area's agriculture is basically dual structured and is characterised by two distinct production systems. On the one hand, the majority of the agricultural population cultivate very small mixed holdings with an average holding size of about 0.6 ha. About 90 % of smallholdings (516,000 holdings) in the Study area are less than 1.6 ha and almost 40 % are less than 0.4 ha. On the other hand, a substantial part of the agricultural sector is taken up by plantations which grow the major export crops. In value

terms, the tea estates sector in particular, plays an important role in the national economy and contributes a share of 7.1% to the GRDP, compared to 3.1% contributed by paddy .

The nonfarm sector has developed little and has been constrained by a dearth of natural resources. The Study area has retained its basic agrarian structure and the value-added processing of the agricultural products from the area has developed little except for the activities of the tea, rubber, and sugar factories. The non-agricultural sectors of the economy are largely concerned with the provision of rural consumer goods, farm sector inputs, and small intermediate goods, as well as public services. Manufacturing is chiefly limited to local market demands, such as rice milling and the small food processing of jam and pappadam making, and some enterprises exploit mineral resources from the area including: potteries, brick making works, a lime kiln, and small quarrying.

(2) Social Situation

(a) Education

There are 3,500 schools in the Study area. The density of schools by district is nearly identical to the national average with no large differences depending on the district. However, on the divisional level, the number of schools per 1,000 persons varies considerably from 0.3 - 1.6. The average literacy rate for the three provinces is 81.9%. The ratio varies depending on the district, however, the ratio of most districts is lower than the national average.

(b) Health

A district Health Office is provided in all districts in the Study area. Hospital services in each district are divided into several regions. Provision on the divisional level includes medical and pharmaceutical services at hospitals and maternity homes as well as dental examination services at schools.

The numbers of hospitals and beds are slightly higher than the national level in several districts, however, those of Matale, Moneragala, and Kegalle districts are lower than the national level; in particular, the number of beds per 1,000 persons in Moneragala district is a half of the national average.

The ratio of people suffering from chronic malnutrition in the whole Study area greatly exceeds the national average. Furthermore, the mortality rates of infants, nursing mothers, and newborns in the Study area are higher than the national average.

(c) Habitations and Sanitary Facilities

The number of permanent structures has increased. However, the number of improvised structures has also increased. Except for Kandy district, 20-25% of the people of the Study area live in inferior habitations.

As a result of the sanitary facilities improvement project by IRDP and the water supply scheme, water-sealed toilets are being diffused and the number of households with no toilet has decreased. However, households without a toilet still account for nearly 20% of all households.

(d) Diffusion of Televisions and Automobiles

TV sets are owned by more than 10% of households in about a half of the Study area. Radios are owned at the rate of one unit per two households in one-third of the Study area. Concerning the ownership of automobiles, including vehicle, jeeps, pickup trucks, etc., one out of 10 households owns an automobile in Kandy, Nuwara Eliya and Pelmadulla divisions. The diffusion of automobiles is higher in the western part of the Study area.

3.3 Agricultural Conditions

(1) Present Land Use

The details of present land use in the area are summarised in the table below (Table 3.3-1). About 11,746 km² or 61.9% of the total land (18,988 km²) is used for agriculture, 5,167 km² or 27.2% of the total land area is covered with forestland, and 1,602 km² or 8.5% of the total land area is covered with grassland at present. The others, urban land, water and barren land account for 472 km² or 4% of the total land

Land	Area (km ²)	%	
Agricultural Land	11,745.6	61.9	100.0
Homesteads	2,487.5	13.1	21.2
Plantation	3,080.8	16.2	26.2
Paddy	1,157.9	6.1	9.9
Sparsely Used	5,022.1	26.5	42.7
Rangeland	1,602.4	8.4	
Forestland	5,167.0	27.2	
Other	471.6	2.5	
Total	18,987.5	100.0	

The proportion of agricultural land held by smallholdings and the estate sector varies depending on the character of each district. Approximately 40% of the total area of the survey falls in the category where over 70% of the agricultural land area is held by smallholders. These districts are Moneragala at the eastern end of the Study area, the northern lowlands in Badulla, northern Matale district, and the north-western part of Kandy and Kegalle districts. Over 70% of the agricultural land area is held by the estate sector in the uplands of Nuwara Eliya and Badulla districts, which occupy approximately 20% of the Study area. The remaining 40% is districts where the ratio of the agricultural area held by smallholdings and the estate sector is 30 to 70%.

(2) Cropping Patterns

The cropping system in the Study area has three major components, namely, lowland cultivation, highland cultivation and chena cultivation.

(a) Lowlands

The lowlands are the low lying areas in the landscape, such as the valley floors and bottom lands and also include the terraced lower slopes of the hills. The land is usually assweddumized for paddy cultivation and the source of the water supply is either rainfall or gravity irrigation. In the Maha season, these areas are cultivated with paddy, but during the Yala season, the upper reaches with good

surface drainage are often used for the cultivation of subsidiary food crops, particularly the high value ones.

(b) Highlands

The highlands are well drained areas where the source of water for cultivation is rainfall or lift irrigation from sources, such as wells, rivers, channels or streams. A variety of crops are grown in the highlands. The tree crops consisting of the plantation crops (tea, rubber, and coconut), export agricultural crops (spices and condiments), and fruit crops are grown under rainfed conditions. High value crops like potato and vegetables are cultivated in the Maha and Yala seasons, and in some areas in Meda season, both under rainfed and irrigated conditions. The growing of chilli and onion in the highlands is largely confined to the drier agroecological regions of the Study area during the Yala season. The highlands are also used for the cultivation of sugarcane by outgrower farmers in Moneragala district, both under rainfed and irrigated conditions.

(c) Chenas

The chena in the traditional sense refers to a rainfed highland that has been cleared of the forest cover by the simple slash and burn method for the cultivation of subsidiary food crops or more recently, tobacco. Cultivation is usually for one or two seasons and the land is then abandoned to clear other land elsewhere for a new cultivation. The chena differs from permanent farmlands in that it is usually an illegal holding (or an encroachment) and is operated seasonally.

The cropping calendar of a particular agroecological region is determined by its rainfall distribution pattern and soil conditions. The timing of crop establishment and selection of the age and class of the crop should be in harmony with the seasonality of rainfall. Crop establishment and plant growth are timed to take advantage of the rainy periods, while crop maturing and harvesting are timed to coincide with the dry periods. The district wise general cropping patterns for paddy in the Study area are given in Figure 3.3-1 and the cropping pattern at identified locations for selected crops are given in Figure 3.3-2.

(3) Crop Production

Agriculture in the Study area leads in the cultivation and production of most of the economically important crops in Sri Lanka. These crops include tea, rubber, export agricultural crops, potato, vegetables, sugarcane and tobacco. The area also substantially contributes to the national production of onion, subsidiary food crops, fruit crops, and chilli. The cultivated area of major crops in the Study area as a percentage of the total cultivated area nationally are shown below:

Crop	Extent %	Crop	Extent %
Tea	82	Clove	82
Rubber	50	Nutmeg	92
Coconut	13	Cocoa	82
Sugarcane	82	Coffee	81
Cardamom	96	Paddy	20

(4) Marketing

(a) Markets

In the Study area, the primary market outlets for agricultural products can be identified in to periodic, institutional and privately operated markets.

An important market, particularly for the locally grown fruits and vegetables, is the periodic market fair called the 'Pola'. Pola is a place where the farmers, traders and consumers gather to sell or buy merchandise and pola days are held on one or two scheduled days every week. The polas in a specific region are operated on a rotational sequence to enable outside traders to visit them conveniently, on separate days of the week. All major polas in the Study area are owned by the relevant Provincial Councils and come under the direct supervision of their local bodies. Total number of Polas in the Study area is 110 listed in Table 3.3-2.

Institutional market outlets operated in the Study area for the small-scale producers are the Multipurpose Co-operative Societies (MPCSs), Cooperative Wholesale Establishment (CWE), and Paddy Marketing Board (PMB).

Except for CWE, the involvement of other institutional outlets in the marketing activity of the Study area is minimal. At best, their presence in the market tends to stabilise the product prices.

On the other hand, the private markets in the Study area play the most active role in the marketing of agricultural products. Broadly, these markets include the following.

- Tea factories and sugarcane factories
- Commission agents and wholesalers dealing in vegetables
- Registered commodity purchase centres handling a variety of products such as export agricultural crops, RSS rubber, and subsidiary food crops etc.

The main wholesale market is the Pettah market in Colombo which also serves as the terminal market for agricultural produce grown in the country. Products, mainly vegetables and fruits, from all the growing areas are brought to the market by assemblers/wholesale traders or directly to the commission agents for sale through commission agents who are the main market operators. Wholesaling also takes place in all other principal cities in the Study area, such as Kandy, Ratnapura, Badulla, etc.

(b) Prices

Prior to 1980, the PMB played the key role in stabilizing the paddy price through the administration of the Guaranteed Price Scheme (GPS). Its activities started to decline from the early 1980s and in 1991, paddy purchased by PMB accounted for less than 2% of the total national production. In 1988, the monopoly held by CWE on rice imports was broken and private sector imports were authorised under government licensing, subject to a quota system. Competitive purchasing of paddy by MPCSs and PMB, and the government imposed import restrictions as a domestic price protection mechanism have together contributed to the maintaining of prices at a satisfactory level. The GPS prices and producer prices are given in the table below:

Year	GPS Price (Rs/kg)	Av. Producer Price (Rs/kg)	PMB Purchase as National %
1988	4.00	4.61	4.2
1989	4.00	6.24	0.2
1990	5.50	7.96	1.2
1991	6.80	8.10	1.7

Source: Central Bank Annual Reports Agrarian Research and Training Institute

There are no government supported price protection mechanisms for fruits and vegetables. The seasonal nature in the production of vegetables and fruits is reflected in the price variation seen throughout the year. The wholesale and retail prices of some selected vegetables and fruits are given in Table 3.3-3.

(6) Agricultural Supporting Services

(a) Agricultural Research

Agricultural research in Sri Lanka is carried out by a multitude of government organisations. The Department of Agriculture (DOA) and Department of Export Agriculture (DEA) under the Ministry of Agricultural Development and Research (MADR) are responsible for organised research into food and horticultural crops and in export crops, respectively. Research into coconut, tea, rubber, and sugarcane is handled independently by the Coconut Research Board, Tea Research Institute, Rubber Research Institute and Sugarcane Research Institute, respectively.

(b) Agricultural Extension

The research divisions of DOA and DEA, the Coconut Research Board, and the Tea, Rubber, and Sugarcane Research Institutes are all linked individually to their separate extension services, and are active in the Study area. In addition to these institutions, extension services are also provided by the private sector organisations, non-governmental organisations (NGOs), and by special donor funded extension projects.

The extension arm of the DOA, the Technology Transfer Division, plays the leading role in providing agricultural extension as the majority of the farmers in the Study area are engaged in growing food crops. DOA in 1979 adapted the T&V extension system under the World Bank assisted Agricultural Extension and Adaptive Research Project (AEARP). The project established close research-extension linkages and strengthened the adaptive research facility and institutional framework for an effective extension system. Each village level extension worker (KVSN) served about 750-1000 farm families and had a single line of command with the DOA through the Agricultural Instructor (AI) at the Agrarian Service Centre (ASC) at the area level and the Assistant Director - Agriculture (ADA) at the district level.

The devolution of authority from the centre to the provinces under the 13th Amendment to the Constitution in 1987, followed by the transfer of 2,400 KVSNs to the Ministry of Public Administration as village level administrators (GNs) further weakened the extension system. This move, cut off the front line

of the extension service and badly disrupted the village level extension activities. Since the agricultural extension function was fully devolved to the Provincial Councils, the Technology Transfer Division of DOA had no control over the extension activities carried out in the field. The Provincial Directors of Agriculture as the heads of the Provincial Departments of Agriculture under the Provincial Ministries of Agriculture/Animal Husbandry have taken over the operational responsibility for agricultural extension.

The Second Agricultural Extension Project of the World Bank under IDA funding (1993-2000), which is being implemented by the DOA, seeks to resolve some of these issues. The project envisages a farmer centred farming system approach which focuses on: (a) consideration of farm family goals; (b) their relation to the adoption of agricultural technology; and (c) the consequent need for close contact between the extension agent and household members within the village community and on the farm. The extension approach is locality-specific and would depend on: (a) identification and use of existing farmers' groups (the reference group) with similar resources and technological requirements for extension activities; (b) use of the problem census technique to identify the extension activities that most farmers need; and (c) applying a holistic approach to extension. Deployment of mass media for extension is stressed and the strengthening of the research-extension linkages at all levels is emphasised.

(c) Input Supply

The Seeds and Planting Material Division (SPM) of DOA produces and supplies paddy, subsidiary food crops, vegetable seeds and seed potato to the farmers through ASC's throughout the country. The SPM also supplies planting materials for a range of fruits in the budded, seedling, and rooted cutting form. The requirements of seed and planting materials on a divisional basis is computed well ahead of the forthcoming season by the respective AI requisitioned for supply to SPM through the district/provincial offices. Seeds materials that are in short supply or are not produced by the SPM, particularly those of exotic vegetables and seed potato, are imported and sold to farmers through numerous outlets in the provinces.

The supply of fertiliser, except for small amounts of Rock Phosphate (30,000 mt) and Dolomite, is carried out entirely through imports. In 1992, 12 wholesalers distributed fertiliser imported by 15 organisations from both the private and public sectors. The retailing of fertilizers to the farmers has been through ASC's, cooperative outlets, and private outlets. The supplies throughout the Study area during the current year, according to the district Agricultural Officers, have been satisfactorily distributed without any major breakdowns.

The importation and distribution of agro-chemicals is handled entirely by the private sector organisations. The network of retail outlets is well established to cater for the farmers' needs effectively.

(d) Agricultural Credit

The Central Bank under the New Comprehensive Rural Credit Scheme (NCRCS) provides 100% refinancing to commercial banks for the granting of cultivation loans for paddy and subsidiary food crops. The refinance loan to the commercial banks carries an interest rate of 8.5% while an interest rate of 16% is presently applicable to the cultivation loan. A cultivation loan is repayable by the farmer within 240 days of the withdrawal of the first instalment. The refinance loan is

advanced for a period of 270 days or for the duration of the cultivation loan plus an additional 30 days whichever is shorter. Paddy and 27 other crops are included under NCRCS. The list is reviewed periodically to add new crops or delete existing ones depending on their economic viability. Term loans are provided for the periodic replacement of the existing assets and for new investments.

Term loans too, are refinanced by the Central Bank under the Medium and Long-term Credit Fund (MLCF) and are granted for the acquisition of agricultural machinery, establishment and rehabilitation of tree crops, etc. Term loans are generally repayable within 3-5 years. This period may be extended up to 8 years in the case of export agricultural crop production projects where the gestation period is longer.

(7) Agro-industries

The agricultural produce of tea, rubber, sugarcane, and tobacco cultivation provides the raw materials for the major agro-industries. There are 451 tea factories, 80 rubber factories, and 2 sugarcane factories in the Study area. Industries based on other crops, with the exemption of paddy, are limited to small scale enterprises.

(8) Constraints and Prospects

(Constraints)

- (i) Arable land in the Study area is a limited resource and substantial production increases by adding additional lands under cultivation cannot be expected. Farm size in the smallholder sector averages less than 0.4 ha., and farms have been subjected to fragmentation due to population growth and land pressure. Land classes not suitable for sustainable agriculture have been brought under cultivation thereby necessitating extensive conservation and consolidation measures.
- (ii) The productivity of lands under most minor irrigation schemes has not reached its full potential due to poor O/M of the storage and/or diversion facility and delivery system.
- (iii) The agricultural extension system operated by DOA has failed following the devolution and decentralisation of its field operations to the Provincial Councils and Divisional Secretariats. The technological information and management skills development has yet to reach the farm level.
- (iv) When collateral is not available, the banks require guarantors who again are difficult to find in rural areas. Further, the banks follow a cumbersome procedure of documentation often incurring high transaction costs to the borrower and delaying loan processing.
- (v) Unstable farm gate prices for agricultural produce, particularly vegetables, arising from local as well as terminal market supply levels and exchange relationships between the producer and the trader has tended to prevent resource optimisation in crop production. Poor produce transportation and handling has resulted in excessive wastage estimated to be in the region of 30-40%.
- (vi) The available facilities at weekly fairs (Pola) and regional markets in the Study area are usually inadequate and unsatisfactory.

- (vii) The non availability of proper storage facilities for farm produce at the farm or community level has compelled the farmers to dispose of their output almost immediately after harvesting.
- (viii) Production is often constrained due to the total lack, shortage, and/or non-availability at the required time of seed material and agricultural inputs.

(Prospects)

- (i) The present average yield level of nearly all crops cultivated in the Study area remains below what is achievable under the farmers' field conditions.
- (ii) An increasing demand is anticipated for locally produced food crops due to the natural growth as well as the increased nutritional awareness among the people. Further, there is the need to produce crops, particularly chilli and onions, for import substitution.
- (iii) There is also a growing demand for vegetables and fruits on the export market. Floricultural export earnings from the export of cut flowers, live plants, leaves, and propagatory materials too have shown a three fold increase from 1985 to 1989.
- (iv) The devolution of power and decentralisation of administration to the Provincial Governments and Divisional Secretariats is viewed as an opportunity to plan and implement area specific development strategies more effectively at the field level.
- (v) Handing over the management of State held plantations to private sector management agencies is expected to revitalize the plantation economy and thereby substantially contribute to the regional economy.
- (vi) The recent policy decision of the government to ban the importation of rice and big onions from 1993, and some grain legumes from next year onward will have a positive effect on the pricing of these commodities in the local market.

3.4 Animal Husbandry

3.4.1 Recent Conditions

The Study area has been traditionally popular for livestock and poultry farming. According to the Livestock Statistics 1991/92, the livestock and poultry resources are shown in Table 3.4-1. In Central Province, cattle, buffalo, goats, and poultry are kept under shifting systems and farmers' income is mainly generated from animal production. In the Uva province, cattle and buffaloes are more popular, while in Sabaragamuwa Province livestock numbers are low, as farmers practice extensive farming systems.

(1) Dairy

Milk is produced in all the districts. The highest production is recorded in Nuwara Eliya, followed by Badulla and Kandy. In the dairy industry, 90 % of the total cattle are the local indigenous breed.

(2) Buffalo and Beef Cattle

The buffalo and local indigenous cattle are the main traction and soil cultivation power sources of agriculture and they are used for some minor milk and beef production. The primary draught animal is the buffalo whose numbers stagnated in recent years. In the Study Area, Matale, Ratanapura and Moneragala districts practice in buffalo farming. Buffalo milk is used for preparing the traditional products, such as curd.

The slaughtering of cattle and buffalo is slightly constrained by sociocultural and dietary practices. There are no organized beef cattle farming systems, and beef for consumption is predominantly obtained from herds in the surplus male stocks and culled stud bulls. The primary uses of cattle and buffalo are dairying and draught power while beef production is sporadic in the Study Area as well as the Islands. In Sri Lanka there are special slaughter regulations which will be described later, these cause a bottleneck for beef production.

(3) Goats

Goats are the most favourable meat source in Sri Lanka. Its popularity lies in the fact that no section of the community discriminates against it on any grounds whether it be religious, social, or cultural. For farmers, particularly the ladles farmers, goats are an important source of income, since the demand of this animals is big enough and it is very easy to keep and sell. Within a decade the goat meat price has increased while producers prices have not increased at the same rate. This is mainly due to the marketing systems.

(4) Pigs

Pork is also constrained by sociocultural and dietary practices. The intensive systems of farming are practised in the Study area. The scale of operation is generally 2 - 5 sows and 1 boar. They all have good housing facilities and management and conduct farrow to finish the operation. Pig farming is the most modernized farming systems.

(5) Poultry

There has been a steady and marked growth in poultry production. In the Study area, Kandy is the highest population density area where access to the market and supporting services such as day old chicks distribution, concentrated feed, and veterinary services are available. The government will continue to assist in providing support

services to meet the expected change from traditional beef consumption to chicken and eggs. The government is encouraging and supporting the development of small-scale poultry operations in rural areas.

With the expansion of the poultry industry, large quantities of maize, soy bean meal and fish meal are imported to meet the needs of the feed industry. In fact, around 60,000 tons of maize was imported during 1991. Domestic production of the raw materials for the compound feed industry should be encouraged otherwise the poultry and pig industries will decline in the very near future.

3.4.2 Marketing

(1) Milk

Milk collection involves a number of systems. Some farmers close to urban centres sell directly to the retail outlets, but the typical systems involve groups of farmers organizing central collection centres where they deliver their milk either personally or through an agent or middleman. The milk is bulked into 40 litter cans, and delivered to a chilling centre or directly to the processor. The processors then collect the chilled milk using insulated milk lorries.

In the Study area, there are two government owned liquid milk plants at Kandy and Nuwara Eliya. The Sri Lankan dairy industry has established a network of some 85 chilling centres throughout the country of which 30 are currently operational in the Study area.

(2) Meat and Live Animals

The marketing channels for livestock and its products in the country as well as in the Study area are not properly organized. The sales are usually through a middleman who is either a licensed livestock trader or the owner of a butchery. Middlemen buy animals from farmers at the farm gate. Livestock sales transactions are made through price bargaining according to external appearance only, not according to the weight of the animals.

(3) Slaughterhouse

Every district except Badulla and Moneragala, has a public slaughterhouse for cattle and goats. However, a high percentage of livestock are slaughtered in non registered small backyard facilities, because most meat is sold warm within a few hours of slaughter, with butchers preferring to slaughter their own livestock in their own low cost facilities in as close to the market place as possible to save on transportation and refrigerated storage costs.

(4) Commercial Feed

In the Study area, commercial feed is mainly obtained from the Colombo private commercial feed mill, but the market prices of this feed are very high for small-scale farmers. As stated before, Sri Lanka still import several foodstuffs for animal feed companies. Fluctuating prices will always influence animal feed prices and at the end they will increase the production cost. More emphasis has to be placed on animal feed grain production, from the research through seed production and good hand tool manufacturing to the extension services for a breakthrough in animal feeding. Unless there is a concentrated effort in this field, all optimistic livestock projections, particularly concerning poultry and pig production will not be reached.

3.4.3 Animal Health Status

Due to the vaccination programs and veterinary inspections, the animal herd has not suffered from heavy contagious diseases in recent years. In the tropic zone, there exist various kinds of epidemics, some of which are controlled, but some diseases still hinder the wholesome development of the livestock industry. Among the variety of animal diseases, the more important are; tick-bone disease, internal parasitism, epidemic diseases such as Foot and Mouth Disease, Rinderpest, Swine Fever, Blackleg, Haemorrhagic Septicaemia, Brucellosis, Newcastle Disease, and new exotic poultry diseases such as Marek's Disease and Gumboro Disease.

3.4.4 Price of Livestock Products

Table 3.4-2 shows the pricing of several livestock products. As for meat, mutton (mainly goat meat) is more popular and it is the most expensive meat in the Study area as well as in Colombo.

3.4.5 Supporting Services

(1) Extension Services

The training and extension services provided by the Department of Animal Production and Health (DAPH) for livestock and poultry were initiated to improve the breeding stocks and technical advice on animal husbandry and disease control programs, and reach the locational levels. These services, however, suffer from the lack of sufficient facilities and equipment.

(2) Animal Disease Control

The veterinary service is a State owned network in Sri Lanka, with a pyramidal organization system. Each provinces has a local veterinary service and a small station is available at the district level. The compulsory vaccination programs which cover some livestock diseases are carried out and subsidised by the provincial veterinary services, but the major part of the cost has to be borne by the farmers. Most of the provincial veterinarian offices need further investment in the short and long term. A better supply of basic equipment and tools is also required.

(3) Central Artificial Insemination Centre (CAIC)

This is the main centre located at Kundsale, 8 km north of Kandy. The centre maintains about 32 bulls of both European and Indian breeds in addition to buffalo, sheep, and goats as semen donors. Semen is available in two forms, namely deep frozen semen in mini straws and chilled semen. This centre is well managed and assisted by the Asian Development Bank, but the available facilities are under utilized because of the shortage of some basic equipment, equipment needs replacing, and more laboratory equipment is needed to upgrade the level of scientific work expected in the future.

(4) Research Institutions

The veterinary and animal husbandry research institutions are concentrated in Kandy. There is the Veterinary Research Institute (basic livestock research institute), Vaccine Production Centre, and Animal Virus Laboratory. These institutions also need basic equipment.