

LB/DON/64/02

56

**LAND USE PLANNING UNDER
MINOR IRRIGATION SCHEMES
IN THE DRY ZONE
OF
SRI LANKA**



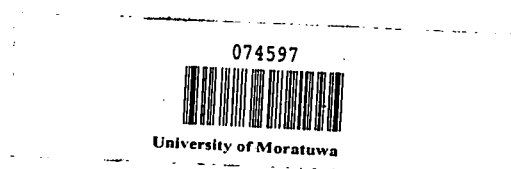
University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

ප්‍රකාශකයා
කොට්ඨාශ විශ්ව විද්‍යාලය, ශ්‍රී ලංකාව
කොට්ඨාශ

A.M.N.BANDARA
M.Sc. Land Use Planning and Resources Management
1993/95


711 "95"
711.14

TH



74597

74597

A dissertation presented to the Department of Town and
Country Planning, University of Moratuwa Sri Lanka,
 Electronic Theses & Dissertations
www.lib.mrt.ac.lk
in fulfilment of the partial requirement for the Degree
of Master of Science in Land Use Planning
and Resources management.

ACKNOWLEDGMENT

I wish to express my gratitude to the Department of Town and Country Planning of the University of Moratuwa for offering me a position as a student to follow the course leading to the MSc Degree in Land Use Planning and Resources Management which permitted me to undertake the study on which this dissertation is based.

I am thankful to the Survey Department, my employer, for nominating me as a candidate for the course and for providing the necessary study leave.

I am also thankful to the Land Use Policy Planning Division of the Ministry of Lands for sponsoring me

My sincere thanks go to professor A.L.S.Perera, Head of Department and Director Post Graduate Studies, Department of Town and Country Planning, University of Moratuwa for his invaluable help, guidance and encouragement at every stage.

My grateful thanks go to professor M.W.J.G.Mendis, Senior Professor, Dept of Town and Country Planning, University of Moratuwa, for readily clearing the many doubts that I often went to him with, and perusing in great detail and for advising me without any hesitation on the drafts pertaining to this report, made by me.

I sincerely thank Mr. K.D.Fernando, Senior Lecturer, Mr.N.G.Karunaratna, Senior Lecturer and Mr. P.K.S.Mahanama, Lecturer, Dept. of Town and Country Planning, University of Moratuwa, who encouraged me in various aspects of the study and for making valuable suggestions.

My heart warming thanks go to Mr. S. Berugoda, Senior Lecture, Course Coordinator, for his valuable guidance and courageous and constructive criticisms that enabled me to activate my conception of the subject area in a meaningful manner.

Several others have helped me during the course of my work and I am grateful to all of them.

I owe my special thanks to the farmers and village officials in my study area for cooperating with me so readily by providing me with the variety of information sought from them.

SYNOPSIS

Sri Lanka is an agricultural country, more than 75 % of the population is engaged in agriculture related activities. In the year 2001 the country will need 37 % additional rice than in 1981. In order to achieve this target it is necessary to use the resources like Land and Water in a planned manner to ensure sustainability.

There are about 30,000 minor irrigation schemes in the country out of which only about 19,500 are in operation at present. This has not received sufficient attention by the authorities. There is a need to introduce Integrated Land Use Planning activities in order to achieve the development desired for these areas.

This study focuses attention on the need to introduce integrated land use planning under minor irrigation schemes. After dealing with the concepts and theories which are applicable for irrigation settlement the study analyses the Global and country experience under minor irrigation settlements. This is further supported by the findings of the selected case study area. In this context traditional land use practices, minor tank farming system and economic, institutional and management aspects have been dealt with in order highlight the need for integration of these. It has been found that there is land available for development but scarcity of water is a major constraint. The settlers are trapped in a vicious circle of poverty.

The study discloses the need for adopting a systems approach to introducing integrated land use planning in areas identified for development under existing minor schemes or those to be identified for restoration of abandoned schemes or even under sites to be identified for the construction of new schemes, which would ensure achieving a high quality of life for the settlers in these schemes.



CONTENTS

Acknowledgment	ii
Synopsis	iii
List of Tables	ix
List of Figures	xii
Abbreviations	xiii
INTRODUCTION	xiv

CHAPTER 1: PLANNING CONCEPTS APPLICABLE FOR

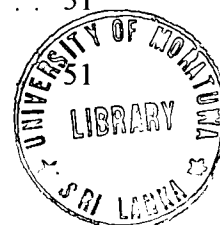
IRRIGATED SETTLEMENTS

1.1 Definition of Irrigation	1
1.1.1 Minor Irrigation Schemes	2
1.2 Planning Region	3
1.2.1 River Basins	4
1.2.2 Agro-ecological region	7
1.2.3 Cascading System of Tanks	7
1.3 Human Settlement	10
1.3.1 Types of settlements	12
1.3.2 Settlement Patterns	12
1.3.3 Settlement Planning	14
1.4 Integrated Approach to Land Use Planning	14
1.5 Water Management	16

1.6	Irrigation Systems	17
1.6.1	Physical System	18
1.6.2	Cropping System	18
1.6.3	Economic System	19
1.6.4	Socio Organisation System	19
1.7	Minor Tank System	20
1.8	Global Experience	22

CHAPTER 2: THE SRI LANKA EXPERIENCE OF SETTLEMENT PLANNING UNDER MINOR IRRIGATION SCHEMES

2.1	Historical Background	28
2.2	Physical and Environmental Aspects	31
2.3.1	Distribution and Density of Minor tanks	31
2.3.2	Rainfall Pattern	36
2.3.3	Topography	38
2.3.4	Soil	41
2.3.5	Physical Infrastructure	42
2.3.6	Deforestation and Soil Erosion	42
2.4	Socio-Economic Aspects	44
2.4.1	Population under Minor Irrigation Schemes	45
2.4.2	Educational Status and Facilities	47
2.4.3	Health Facilities	49
2.4.4	Land Ownership and Tenure	50
2.4.5	Housing Facilities	51
2.4.6	Employment	51



2.4.7	Minor Irrigation Settlers Income	53
2.4.8	Farming System	54
2.4.9	Livestock development and Inland fisheries	57
2.4.10	Importance of Minor Tanks in National Food Production . . .	57
2.5	Institutional and Management Aspects	61
2.5.1	Institutional arrangement	61
2.5.2	Management Aspects	68
2.6	A Comparison analysis of global experience and Sri Lanka experience under irrigation schemes	70
2.7	Concluding Remarks	73

CHAPTER 3: ANALYSIS OF THE CASE STUDY AREA IN THE DRY ZONE

3.1	Criteria for Selection of the Case Study Area	75
3.2	Method of Data Collection	79
3.3	Physical Aspects of the Study Area	80
3.3.1	Location of the Study Area	80
3.3.2	Historical Background of the Study area	80
3.3.3	Rainfall and temperature	82
3.3.4	Topography and Soil	82
3.3.5	Road and Transport Facilities	82
3.4	Socio- Economic Aspects of the Study Area	84
3.4.1	Population	84
3.4.2	Employment	85

3.4.3	Education	86
3.4.4	Housing	88
3.4.5	Health	88
3.4.6	Electricity	90
3.4.7	Post and Telecommunication	90
3.4.8	Land Use Practices in the Study Area	90
3.4.9	Source and level of Income of the Tank Settlement	100
3.4.10	Marketing Facilities	100
3.5	Institutional and Management Aspects of the Study Area	101
3.5.1	Rehabilitation of tanks	102
3.6	Field Observations	103
3.7	Internal and External Linkages of the Study area	105
3.8	Concluding Remarks	108

CHAPTER 4: POTENTIALS AND CONSTRAINTS FOR IMPROVED LAND USE PLANNING UNDER MINOR IRRIGATION SCHEMES

4.1	Potentials	109
4.2	Constraints	110

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1	Conclusions	113
5.2	Recommendations	115



LIST OF APPENDICES

1.1	Name of River Basins of Sri Lanka	122
1.2	Details of Agro-ecological regions	123
2.1	Maintaining of Minor Irrigation schemes by different Agencies by different Time.	124

LIST OF ANNEXURE

1.	Questionnaire for Household Survey	126
2.	Questionnaire for Irrigation Survey	134

BIBLIOGRAPHY	136
------------------------	-----



LIST OF TABLES

Table	2.1	Details of Minor Irrigation Schemes in Sri Lanka by Districts	35
	2.2	Categories of Minor Tanks According to the size of Command Area	35
	2.3	Average Monthly rainfall and Number of Rainy Days per Months at Mahailuppallama from 1931-60, 1960-78 and 1981-85	40
	2.4	Extent of the Major Soil Groups in Dry Zone	41
	2.5	Population by Urban and Rural Sector (1946 to 1981)	46
	2.6	Number of Farmers under the Minor Irrigation Schemes by District	46
	2.7	Percentage Distribution of population by Age and Sex in Tank Settlements	47
	2.8	Educational Status of Sample Population (5 years and over) by Sex in Minor Tank Settlers	48
	2.9	Government School Distribution Pattern 1991	48
	2.10	Percentage Distribution of Population According to the Activities	52
	2.11	Percentage Distribution of Employment According to the Occupation	52
	2.12	Percentage of Household According to the Income Categories	53

2.13 Percentage of paddy Cultivated in Sri Lanka by	
Irrigation schemes during the period 1984 to 1993	59
2.14 Harvested Area under Irrigation Schemes in	
Sri Lanka in Yala season as a percentage	
of Maha season	60
2.15 Average Yield and Production of Paddy 1992\93	60
3.1 Details of Selected tanks	77
3.2 Percentage Distribution of Members of the Household	
by Age and Sex in Case Study Area	85
3.3 distribution of the Activity Status of the Case Study Area . . .	86
3.4 distribution of the Occupational Status of the	
Case Study Area	86
3.5 Educational Status of the Case Study area	88
3.6 Home Garden Land Holding Size in Case Study Area,	
1995	92
3.7 Chena Cultivation Land Holding Size in	
Case Study Area, 1995	94
3.8 Income Distribution of Chena Cultivation per year per family,	
1995 in the Case Study area	94
3.9 Paddy Land Holding Size of the Case Study Area	95
3.10 Distribution of Number of Paddy Land Parcels within	
the Case Study Area	96
3.11 Paddy Land Ownership Pattern in the Case Study area	96
3.12 Paddy Land Tenure Pattern in the Case Study area	97

3.13 Paddy Yield of the Case Study Area in 1994\95 Maha	99
3.14 Total profit from paddy per annum per family in the Case Study	99



LIST OF FIGURES

Figure A	Process and Methodology of the study	xx
Figure 1.1	A Hierarchical Order of Settlement Structure	5
1.2	River Basins Map of Sri Lanka	6
1.3	Agro - Ecological Map of Sri Lanka	8
1.4	Cascading System of Tanks	9
1.5	Diagram for Irrigation System	18
1.6	Flow Chart for Cropping System	19
1.7	Diagram for Minor Tank System	21
2.1	Distribution of Tanks (in used and abandoned)	33
2.2	Distribution of Tanks and Anicuts (in Used) by District	34
2.3	Physical and Climatic Features of Sri Lanka	37
2.4	Elevation Map of The Sri Lanka	39
2.5	Traffic Network of Sri Lanka	43
3.1	Location Map of Case study Area	76
3.2	Study Area Map	78
3.3	Average Monthly Rainfall and number of Rainy days per month at study Area 1981 to 1985	83
3.4	Contour Map of the Study Area	87
3.5	Location of Schools	89
3.6	Land Use Map of the Study Area	91
3.7	Administrative Boundaries of Study Area	106
3.8	Internal and External linkages of the Systems	107
5.1	Proposal Map for Case Study Area	119

ABBREVIATIONS

ADZAP	Anuradhapura Dry Zone Agricultural Project
ARTI	Agrarian Research and Training Institute
Acs	Acres
CO	Cultivation Officer
DO	Divisional Officer
D.S.D	Divisional Secretaries Division
D.S	Divisional Secretary
DAS	Department of Agrarian Services
FFHC	National Freedom From Hunger Campaign of Sri Lanka
ha.	hectares
IRDP	Integrated Rural Development Project
km.	Kilo-meter
kg.	Kilo-gram
LDO	Land Development Ordinance
LUPPD	Land Use Policy Planning Division
mm.	Mile meter
m	Meter
msl	Mean Sea level
Rs.	Rupees