

SUMMARY

Summary

I. Current Status and Issues of the Study Area

The watershed of Middle Shire is located in the north of Blantyre-Limbe, the largest city in Malawi. The watershed area has been served as a satellite area supplying labor force and produce from agriculture and forestry to the urban population. Since the mid-eighties, an excessive clearing and felling of trees and subsequent land reclamation up to the reaching steep hill-slope has occurred due to increased population pressure coupled with the increased climatic aridity, thus hastening the deterioration of the watershed. Given the currently observed rate of environmental degradation, it is a matter of time that the remaining secondary woodlots and bushes will be reduced to bare land. Dwindling vegetation cover and barren surface area fosters soil runoff and erosion, leading to loss of precious crop nutrients and sedimentation of fluvial deposits, together with such detrimental effects as accelerated collapse of stream banks, earlier depletion of well-water and surface water in the dry season which already occurred in the Area. The following are identified as principal problems encountered by the inhabitants based on a socio-economic baseline survey of 27 villages as well through an RRA survey in three villages within the Model Area.

- There is no other alternative for the rural population in the gathering and selling firewood and charcoal which has resulted in the depletion of firewood trees and denuded bare land. Poaching wood is also unavoidable by the reason that land holding size of sedentary farmers is too small to cultivate woodlots for firewood and charcoal production.
- Production of food and firewood cannot catch up with ever increasing demand by rural population in the Study Area. As a consequence of continued mono-culture without applying fertilizers, under the condition that majority of farmers cannot afford to buy costly chemical fertilizers and their land holding size is dwindling, farm production tends to decline year after year.
- Job opportunities from urban to rural area decrease due to economic recession, while in the south of the Study Area land holding size of farmers for crop production lessens as more land is converted into housing quarters, accelerating degree of poverty in rural societies.

Rural poverty is attributed to multiple causes inclusive of high population pressure and primitive, rain-fed farming practices. Forest produce has been threatened to extinction as it has served as last resort for an income source during crop failure. Because of poverty, it has severely been exploited all over the Area. Yet, firewood is still an indispensable energy source for heating and lighting of rural population, so the time has come for rural population to make up for their exploitation and destruction of forest resources. The cadres of villages in the Study Area nowadays increasingly recognize the necessity of taking measures for the restoration of damaged natural resources for their own survival in the future.

The concern of soil loss and sedimentation in river basin triggered the initiation of this Study. The estimation of soil runoff was made by means of site-study and calibration with empirical formulae by SLEMSA, and the results were verified through the measurements at the representative observation sites. The estimated annual soil erosion per hectare amounts to about 6 to 7 tons based on the calculation of erosion hazard by SLEMSA. The reasons why the estimated values appear less than expected by the

Team or as reported in other observations are possibly attributable to the following factors:

- Controlling effect against soil runoff is remarkable through the use practice of box ridges now being propagated and practiced.
- Fairly wide acreage in the Study Area has flat topography.
- There are large size marshy areas (Dambo) in Chileka in the upstream of Lunzu River and in Lilangwe in the upstream of Lilangwe River, spreading over several thousand hectares, where sedimentation takes place thus limiting the flushing out of river deposits down to the streams.

Nevertheless, it is quite likely that erosion augmented by water and wind is more on slope land with sandy soil texture especially when land aridity is coming. Loss of crop nutrients from surface soil layers in farm plots through erosion can readily be identified from the fact that soils in Dambo derived from sediments are fertile, implying that more use of radical measures to prevent soil erosion will become essential for farmers along with the already practiced box ridges

II. Outline of Watershed Rehabilitation Plan (M/P)

(a) Proposed Measures

Possible and sustainable solutions to the above mentioned issues would be limited to solutions that can increase and stabilize self-sufficiency of food and fuel-wood, consistent with environmental care. The countermeasures that must satisfy this condition include short, medium and long term strategies as proposed below:

- 1) Short-term measures to be urgently adopted for the conservation of exploited farmland and to provide income generating activities as a substitute in the sale of charcoal and firewood. To address the problems mentioned above 1) and 2), it is advised to introduce and infuse agro-forestry on the cultivated and fallow land so that replenishment of lost crop nutrients in top-soil, prevention of sheet erosion and supplementary supply of firewood can simultaneously be met. At the same time, wooden resources should be saved by means of introducing improved fireplace or stove design as a measure to decrease energy consumption. To cope with the above 3), it is relevant to ameliorate, extend and activate currently existing income generating activities.
- 2) As medium term measures, once soil erosion from farmland is successfully mitigated, it is recommended to initiate radical watershed rehabilitation, which includes, reforestation, regeneration and expansion of individually held woodlots and village forests along with installation and rehabilitation of social infrastructure. To address problem 1) of the above 1), measures to relieve landless or poverty-stricken farmers must be taken in a way that village headmen provide unallocated land for creating village forests, where reforestation works are organized as participatory practices with labor offered from beneficiary farmers, thus attaining minimum self-sufficiency of fuel-wood within a village. For this purpose, villagers are to be organized into groups for a participatory approach, through which establishment, operation and management of nurseries, reforestation works etc. are carried out.
- 3) In the long term, more basic and overall measures including demographic control like family planning, economic renovation into marketing economy through streamlining of marketing facilities and modern logistic system will be required. As long-term and sustainable practices, it is recommended to periodically regenerate individual woodlots around houses, in which existing tree stands have been damaged by too frequent cutting, resulting in decreased annual stock. Expansion of individual woodlots is also recommended to keep sustainable firewood supply for the years to come. Village-run nurseries can serve as a starting point of all these activities.

The above-recommended activities, may take five or more starting years from the to deployment of short term measures to put a brake on the deteriorating trend, then follows a medium scope, envisaged in 2010 to reverse the trend into augmenting, and eventually up to around 2020 where efforts will be focused on maintenance and balancing between output and consumption of wooden (lignous) resources, as a long term target.

The contents required in a practical feasible watershed rehabilitation plan for its conservation are listed as follows:

- extension of conservation techniques and enlightenment of conservation efforts followed by the formulation of village natural resources management plan to be implemented through participatory works,

- establishing agro-forestry nurseries and rearing of seedlings, improvement of planting practice,
- establishing, utilizing and managing village forests in a participatory way,
- establishing, regenerating and expanding individual woodlots that are mostly degraded, and the acreage of which is currently too small to meet the existing demand,
- income generating activities in the field of agro-related business and processing, improvement and strengthening of resource-saving measures, and
- formation of villagers' organizations and extension / settlement of general concept on environmental conservation..

(b) Zoning, Characteristics of Zones and Measures to be Taken in each Zone

As natural, meteorological and socio-economic conditions in the Study Area vary with location, zoning was made to clarify what measures should be taken in what part of the Area. The entire Area was divided into five zones based on different factors composed of those influencing living conditions of villagers, those related to environment and physiography or industrial activities. Then, priority, necessity and relevance of the proposed project components were examined by zone, taking account of their prominent features.

The following table shows the characteristics and problems of each zone are their corresponding principal measures. Extension of agro-forestry is not included because it has higher priority and it is by far the important measures than what are listed in the table, except urbanized zone A.

<u>Zone</u>	<u>Characteristics and Problems</u>	<u>Principal Measures and Relative Importance</u>
A	Humid climate, urbanized, population pressure, shortage of firewood	Reforestation in reserved forests > greenization of urban quarters
B	Semi-arid climate, population pressure, excessive reclamation, shortage of firewood of firewood	Reforestation/ regeneration of individual woodlots > creation of river bank forests for protecting farmland along streams
C	Medium climate, population pressure, cropping on steep slope, shortage of water and firewood	Prevention of soil erosion > restoration of canopy cover by regenerating individual woodlots > stream head forests
D	Humid climate, remaining estates versus adverse conditions on land held by villagers	Prevention of soil erosion > creation of village forests > creation of river bank forests for protecting farmland along streams
E	Semi-arid climate, sparse population, remoteness from markets, shortage of water	Creation of village forests > reforestation / regeneration of degraded hillside / hilltop forests and woodlots

Extracted from a section map plotted with limiting factors, components of watershed rehabilitation measures to be implemented in short, medium and long term are planned in the following area within the Study Area of 66,700 ha)

Major components	Agro-forestry on flat crop field	Agro-forestry on inclined crop field	Creating orchard and bamboo brush	Reforesting village, river-bank forests	Intensive use of dambo for year round cropping	Regeneration , expansion of existing woodland	Regeneration , ex-pansion of indivi-dual woodlots
Major zones	B, E, C	C, E, B	B, D	C, D, B	D, B	E, B, D	B, E, C, D
Area i(ha)	10,400	5,900	1,100	1,300	350	500	3,850

III. Model Area and Proposed Village Natural Resources Management Plan

(a) Setting of a model area

Certain parts of the practical techniques in the proposed components of water rehabilitation measures to be applied to the Area are not yet firmly established. With a view to affirming the gray areas of techniques, it was proposed to select a pilot, or model area in the watershed, with physiographic conditions, socio-

economic issues and demands commonly found in the watershed, along with the convenience of accessibility to envisage maximum effect of demonstration. A model area was selected in Zone B, the center of the Study Area with a surface area of 3.8 thousand hectares. A village natural resources management plan (VNRMP) was deliberated and proposed for this model area, based on the results of the surveys conducted therein on villager's life, intention and current land use. Effective environmental care as well as improvement in villager's life consistent with watershed conservation are envisaged in the VNRMP.

(b) VNRMP

Since natural resources to be managed have already been seriously deteriorated and depleted, it is essential to resurrect them prior to the planning of management. In this plan, villagers themselves are the planners with necessary assistance from those who instruct them, such as official staff concerned, so that the formulated plan can serve as a blueprint for putting the plan into practice. The following shows the envisaged scope of major work components to be applied to VNRMP.

<u>Major Work Components</u>	<u>Proposed Contents</u>
1. Extension of agro-forestry	Technical instruction, creation and management of nurseries, improvement in related farming practices
2. Village forests with fast-growing/indigenous species	Woodlots for firewood, riverbank protecting forests, forests on hill top, over hillside / escarpment
3. Regeneration of existing, degraded forests/woodlots	Graveyard lots, individual firewood-lots, promnade trees, bamboo brushes for protecting erosion
4. Improvement and promotion of IGAs	Betterment of existing, traditional apiary, domestication of Guinea fowls, vegetable raising in dambo
5. Improving / enlightening activities of village life	Saving of firewood by improved fireplace and store design study tours
6. Organizations/ committees of VNRMP	Organizing villagers, group habituation training to acquire functions for sustainable group activities

IV. Proposed Pilot Scheme in the Model Area

It is relevant to propose a framework for implementing urgently desired, readily adaptable and short-term schemes with higher priority within the Model Area. To this end, a pilot scheme plan was formulated as a specimen for villagers to refer to when they plan their own VNRMP. The plan indicates process and procedures, adoptable techniques, required inputs and institutional systems, instructing regime for implementing major components as listed above in the 24 selected villages in the Model Area, thereby serving as a base of extending the proposed components to the entire watershed through the demonstration and trials in the Model Area.

V. Points to be Considered in Implementing the Measures

Remaining basic issue concerns fuelwood consumption demand in Blantyre City. Though the supply of fuelwood to the urban areas has been increasing owing to BCFP, the supply fails to catch up with growing demand emerging from the rapid urban expansion. As a result, indigenous tree stands remaining over the northern part of the Study Area and adjacent Mwanza district are increasingly felled for producing charcoal for sale. Time has already dawned to urgently cope with domestic fuelwood deficiency through development of substitute fuel. But for radical solution to this pressing issue, it would be difficult to sustain environmental

conservation of the watershed that is located adjacent to the urban metropole and is subject to direct influence from urban life.

Also, there are various supporting activities in and out of the Study Area are being supported on by NGOs and foreign donors. In the Study Area, some tracts of hillside were planted with Eucalyptus for providing woodlots for firewood by the financial assistance of MASAF, under the auspices of World Bank, and a test trial of agro-forestry extension has been carried out by USAID. At the recipient side, the village cadres and local government authority willingly take active efforts to bring in aid projects into their jurisdiction. However, too heavy dependency to the assistance from outside has been growing, while pragmatic attitudes

towards self-help, especially essential to improve or restore living environment, tends to fade away from both inhabitants and local authorities, amidst routine distress and austerity. In this context, the key to success for substantial environment improvement must depend on how people's willingness can be tied up with their day-to-day efforts and practices oriented to care for their own environment/

Because of insufficient capacity of local authorities to direct or influence rural people, it is rather difficult to rationally manage resources for the common good as well as to implement projects through participatory approach by the effort of administrative authorities alone. It follows that an alternative approach of making use of existing NGOs and other assistance groups, that are familiar with local situations, in parallel with the involvement of public authorities concerned, is required to deploy measures to organize rural inhabitants. Hitherto weak liaison or poor coordination among ministries and public agencies, a problem commonly found in most developing countries adversely affect smooth implementation of comprehensive projects, like watershed rehabilitation, that need inter-ministerial approach. Hence, extra efforts would be required to strengthen coordination and cooperation among agencies concerned through the establishment of liaison committees, etc.

VI. Proposal to MNREA on Watershed Conservation

The Team propose the following desirable actions on watershed conservation and for the welfare of the inhabitants in the Study Area, to be undertaken by the Government of Malawi from now onward.

(a) Provision of a framework of environmental measures chaired by MNREA

Rapid exploitation, deterioration and disappearance of commonly available natural resources have been accelerated in proportion to the growing population pressure in the Study Area. It would take considerable time to retrieve the lost resources as much as the elapsed period of their destruction and deprivation. If current deteriorating process will continue without any countermeasures, the sustenance of rural community is getting more and more difficult as the result of disruption of living base and growing disturbance on social stability. Time has come to cope up with this pressing need, through the launching of an action workshop to be chaired by MNREA to review and provide long-term, radical countermeasures for conserving environment of the area concerned. In deliberating conservation measures within the proposed workshop, it is recommended to involve domestic groups assisting the environmental care, international organizations concerned, domestic and international NGOs etc., so that these members can contribute by exchanging views, ideas and tactics in technical and financial dimension in a wider range.

(b) Closer coordination among government agencies concerned

Degradation of resources and natural environment are mostly attributed to the hitherto inevitable destructive deed of the inhabitants themselves just to ease their hardships of subsistence living. Accordingly, their full awareness of what they have committed and their participation to the actions of countermeasures are indispensable to resurrect once lost nature and natural resources. Likewise, actions taken by the administrative and assistance side desirably include measures with aid to alleviate poverty and those for

introducing and settling a paradigm of environmental concern. Target setting and extension activities encompassing all dimensions of daily life ranging

from education, industries and justice, other than environmental sectors must be made. In this connection, it is advised that an institutional coordination framework for scrutinizing measures beyond jurisdictional or administrative section, for instance liaison committee for area rehabilitation measures consisting of representatives from the ministries and agencies concerned, should be provided to fortify mutual solidarity.

(c) Review and implementation of long-term demographic measures

The population density in the Study Area has already exceeded the carrying capacity of land resources judging from the trends in land use and demographic dynamics. While the density in northern part of Malawi remains sparse. From long-term viewpoint, it is desirable to review and implement a long term, nation-wide strategy to balance density distribution among regions.

(d) Exploration of substitute energy resources

Simultaneously, unless firewood and charcoal are substituted by alternative energy sources in the long run, depletion of wood resources and subsequent expansion of denuded patches can hardly be avoided. If ever expanding ligneous fuel consumption by urban population is left uncontrolled, illegal, and endless supply of forestry produce would continue causing precious sacrifice through the loss of ligneous resources. Focusing targets on urban population, it is recommended that a study on the substitution of traditional thermal and light energy sources with modern sources should be launched as early as possible, making use of domestically available lignite resource etc. coupled with improvement in heating efficiency of cooking furnace.

(e) Stable supply of agricultural inputs at reasonable unit price

Rural population in the Study Area relies completely on subsistence farming. However, as environmental distortion proceeds on and physical conditions of farming are becoming more and more adverse, rising costs of input material severely affect degree of food self-sufficiency and output of cash crop through cost-price squeezing. Coping with this issue, it is recommended that rational processing of domestically available apatite deposit into phosphate fertilizers coupled with organic nitrogen supply through the proper practice of agro-forestry should be promoted as interministerial long-term program, for replacing expensive, imported chemical fertilizers.

Location Map

Summary

Contents

Abbreviations

Contents

CHAPTER 1 INTRODUCTION.....	1
1.1 Background.....	1
1.2 Objectives of the Study.....	1
1.3 The Study Area.....	2
1.4 Basic Concept of the Study.....	2
1.5 Scope of the Study.....	2
CHAPTER 2 PRESENT CONDITION OF THE SA.....	4
2.1 Overall SA.....	4
2.2 General Aspect of Natural Condition.....	6
2.3 Water Resources.....	24
2.4 Agriculture.....	25
2.5 Agroforestry.....	33
2.6 Forestry.....	39
2.7 Livelihood Improvement, Education and Extension.....	51
2.8 Lessons learned from Similar Projects.....	59
CHAPTER 3 PRESENT SOCIO-ECONOMIC CONDITIONS IN THE SA.....	61
3.1 Socio-economic Conditions.....	61
3.2 Social Structure and Administrative System.....	67
3.3 Community Organizations and Participatory Development.....	72
CHAPTER 4 INITIAL ENVIRONMENT EXAMINATION (IEE).....	74
CHAPTER 5 ALTERNATIVE ENERGY RESOURCES.....	76
CHAPTER 6 PREPARATION OF TOPO MAP AND REVISION AND VERIFICATION OF EROSION HAZARD MAP.....	78
6.1 Provision of Topographic Map.....	78
6.2 Results of Mapping.....	79
6.3 Land Use · Vegetation Map.....	80
6.4 Erosion Hazard Map.....	80
6.5 Verification of the Erosion Hazard Map.....	84
6.6 Revised Erosion Hazard.....	85
6.7 Re-estimated Erosion hazard.....	86
6.8 Conclusion and Issues.....	88

CHAPTER 7 ZONING.....	89
7.1 Rationale and Objectives of Zoning	89
7.2 Zoning Criteria.....	89
7.3 Zoning of the Study Area.....	90
7.4 Evaluation of the Zones	90
CHAPTER 8 WATERSHED REHABILITATION PLAN.....	93
8.1 Basic Concept of the Plan.....	93
8.2 Extent of Degradation in the SA.....	94
8.3 Methods of Formulating Watershed Rehabilitation Plan.....	97
8.4 Components Proposed as Watershed Rehabilitation Plan (M/P).....	98
8.5 Measures Commonly Applicable to All Zones.....	102
8.6 Core Components Zones.....	103
8.7 Strengthening of Implementing Frameworks for Watershed Rehabilitation and Conservation.....	105
8.8 Proposals on How to Implement Projects.....	107
8.9 Principles of Development and Planning of Components	115
8.10 Provision for the Management of Nurseries and Village Forests in VNRMP	127
8.11 Mutual Cooperation among Related Government Agencies in Implementing Watershed Rehabilitation.....	128
8.12 Estimated Effects of Proposed Measures on Watershed Rehabilitation	128
CHAPTER 9 SELECTION OF A MODEL AREA.....	131
9.1 Criteria for the Selection of a Mode	131
9.2 Selection of Candidate Model Areas	131
9.3 Evaluation of Candidate Model Areas.....	131
CHAPTER 10 THE MODEL AREA (MA).....	136
10.1 The Model Area (MA).....	136
10.2 Location and Natural Conditions of the MA	136
10.3 Current Water Resources	137
10.4 Current Land use.....	141
10.5 Current Agriculture.....	142
10.6 Current Agroforestry.....	152
10.7 Current Forestry.....	153
10.8 Income Generating Activities (IGAs).....	159
10.9 Current Village Organizations	162
10.10Capacity Building and Education	169
CHAPTER 11 SOCIO-ECONOMIC SURVEY IN THE MODEL AREA.....	175
11.1 Objectives	175

11.2 Inventory Survey and Selection of Sample Villages for RRA.....	175
11.3 RRA	179
CHAPTER 12 VILLAGE NATURAL RESOURCES MANAGEMENT PLAN (VNRMP) ...	190
12.1 Factors Considered in VNRMP	190
12.2 Community Participation in the VNRMP	190
12.3 Methodology on Agroforestry Exploitation.....	192
12.4 Forestry Extension Plan	205
12.5 Income Generation Activities	212
12.6 Infrastructure & Use of Water Resources	215
12.7 Community Organizations	220
12.8 Capacity Building and Extension	230
CHAPTER 13 PILOT SCHEME.....	237
13.1 Basic Concept of Pilot Scheme.....	237
13.2 Project Component and Approximate Cost	246
13.3 Rough Estimate of Verification Scheme	277

CONTENTS OF ANNEX

Phase I Stage

- A. Classification Maps for Zoning and Map of Candidates Model Area
- B. Social Forestry
- C. Agroforestry
- D. Agriculture and Animal Husbandry
- E. Watershed Management
- F. Geo-Survey and Mapping
- G. Socio-Economic Baseline Survey & Participatory Development and Organization
- H. Income Generation for Improving Livelihood
- I. Education and Extension Activities
- J. IEE
- K. Study of Similar Projects
- L. Technical Transfer
- M. Organization of Offices / Ministries Concerned

Phase II Stage

- A. General
- B. Agroforestry

- C. Social Forestry
- D. Agriculture
- E. Watershed Management
- F. Watershed Rehabilitation Map
- G. Socio-Economic Baseline Survey & Community Organizations
- H. Income Generation for Improving Livelihood
- I. Education and Extension Activities
- J. Cost Estimation

ABBREVIATIONS

ACU	Area Control Unit
ADB	African Development Bank
ADD	Agricultural Development Division, MAI
ADMARC	Agricultural Development and Marketing Corporation, MAI
APIP	Agricultural Productivity Improvement Project
BCFP	Blantyre City Fuelwood Project
BM	Bench Marks
CAN	Calcium Ammonium Nitrate
CDA	Community Development Assistant
CIDA	Canadian International Development Agency
CU	Concern Universal
CURE	Coordination Unit for the Rehabilitation of the Environment
DANIDA	Denmark's Department of International Development Cooperation
DEA	Director of Environmental Activities
DEC	District Executive Committee
DfID	Department of Foreign Investment for Development
DFO	District Forest Office
EAD	Environmental Affairs Department
EC	European Community
EIA	Environmental Impact Assessment
EPA	Extension Planning Area, RDP
ESCOM	Electricity Supply Cooperation of Malawi
EU	European Union
FA	Field Assistant, EPA
FAO	Food and Agriculture Organization of UN
FD	Forestry Department
FFW	Food for Work
FHA	Farm Home Assistant
FINCA	Foundation for International Community Assistance
FPE	Free Primary Education
FRIM	Forest Research Institute of Malawi
GOJ	Government of Japan
GOM	Government of Malawi
GTZ	German Technical Cooperation
IEE	Initial Environmental Examination
IGAs	Income Generating Activities
JICA	Japan International Cooperation Agency
MAI	Ministry of Agriculture and Irrigation
MASAF	Malawi Social Action Fund
MATAMA	Mineral and Appropriate Technology Applicable in Malawi

MAFE	Malawi Agroforestry Extension Project
MCCI	Malawi Chamber of Commerce and Industry
MCI	Ministry of Commerce and Industry
MK	Malawi Kwacha (US\$1=MK45)
M/M	Minutes of Memorandum
MOWYCS	Ministry of Women, Youth and Community Services
M/P	Master Plan
MRFC	Malawi Rural Finance Company
NABW	National Association of Business Woman
NASME	National Association of Small and Medium Enterprises
NGOs	Non Governmental Organizations
NORAD	Norwegian Assistance for Development
PHN	Population, Health and Nutrition
PLA	Participatory Learning Action
PLAN	Plan International
PMERW	Promotion of Micro Enterprises for Rural Women
PRA	Participatory Rural Appraisal
PROSCARP	Promotion of Soil Conservation and Rural Productivity
Pr/R	Progress Report
RBM	Reserve Bank of Malawi
RDP	Rural Development Project, ADD
RFO (S)	Regional Forest Office (South)
RRA	Rapid Rural Appraisal
RUFA	Rural Foundation for Afforestation
SC	Steering Committee
S/W	Scope of Work
SA	Study Area
SADC	Southern African Development Community
SEDOM	Small Enterprise Development Organization of Malawi
SEBS	Socio-economic Baseline Survey
SS	Suspended Solid
TA	Traditional Authority
TAMA	Tobacco Association of Malawi
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
VDC	Village Development Committee
VNRM	Village Natural Resources Management
VNRMC	Village Natural Resources Management Committee
WB	World Bank
WID	Women in Development

CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 Background

Forests, accounting for 25.3 percent¹ of the territory of Malawi serve as the base of daily life of the population, supplying such indispensable resources as fuelwood, wood for housing and a part for food. However, they are increasingly degraded due to ever-growing demographic pressure in these years. Deforestation seems more serious around urban centers including the SA as well as in the over-populated southern part of the country. Particularly, soil erosion has been accelerated through over-exploitation of land such as reclamation of slope land as well as by improper way of tillage on bare land in the study area where the population density is ever increasing, leading to enormous siltation over the river-bed of Shire and its tributaries. As a result, not only fertility of the land where surface soil has been lost through soil erosion was severely affected, but also the effective dam storage capacity of Nkura Reservoir has been reduced to half of the original capacity due to rapid sediment deposition. The degradation also severely affects power generation, also possibly damaging future plans for water resources for urban water supply projects.

The state of soil erosion in the watershed of Middle Shire was studied through the assistance of DfID, England, but the area was too vast (735 thousand hectares) to establish concrete countermeasures. The study results do not include any solution for environmental conservation through participatory approaches. Though G.O.M. has already adopted long-term measures with technical cooperation, for example BCFP, radical solution thereof has not yet found.

Under such circumstances, G.O.M. requested G.O.J. to carry out a development study for the formulation of Watershed Rehabilitation Plan in Middle Shire, in June 1998. Acting on the request JICA dispatched a preparatory study team (as S/W mission) in March 1999 and it signed the S / W and M / M for the Master Plan on 18 March 1999.

1.2 Objectives of the Study

JICA would conduct a Master Plan Study in the Study Area as described below on watershed rehabilitation with the aim of restoring / conserving the deteriorated watershed. In this Study, JICA would establish a model area where the detailed study on the formulation of village natural resources management plan is carried out by the villagers concerned. Through this study, technical transfer is implemented to the counterpart of the Study, assigned from DF., on methodology of the study, procedure and concept of planning.

The goal of the Study is summarized in the following three points:

- 1) carrying out a MP Study over the watershed area (about 67 thousand hectare) of Lunzu ~ Lirangwe (a tributary of Shire), on the formulation of watershed rehabilitation plan for the purpose of restoring devastated / degraded watershed,
- 2) conducting a Detailed Study over a model area selected within the Study Area (hereinafter referred to as SA) from the result of MP Study, on the formulation of village natural resources management plan,
- 3) transferring techniques to the counterparts, through the course of the Study on MP. as well as Detailed Study on the model area about the methodology of the study, procedure and concept of formulating plans.

¹ official data gives 37% as of early nineties, including game reserves

1.3 The Study Area

The SA is defined as the watershed area of Lunzu~Lirangwe river, a tributary of Shire river, the surface area of which as measured on the 1/50,000 map is around 67 thousand ha, lying in nine Traditional Authorities (hereinafter referred to as TAs) . Of these TAs, seven belong to Blantyre District and the remaining two to Chiradzulu District. It is located at the northern part of Blantyre District and the western part of Chiradzulu District, extending 15° 27'~15° 48' S in latitude, 34° 53'~35° 10' E in longitude. The altitude of the SA ranges from 380 ~ 1,610 m above the sea level. The SA has a typical character of rainfall distribution, higher in the southeast and lower in the northwest where semi-arid types of vegetation prevails. The mainstay of inhabitants in the SA remains in rain-fed, sedentary farming at stony hill-sides although few of them are engaged in commercial activities or wage earning including vegetable or sugarcane cultivation in dimba (crop plots in marshy patches or “dambo”) or in the tobacco or livestock estates that accounts for 8 % of SA but occupying flat, irrigable tracts free from stones. Forest canopy cover remaining in the SA is estimated at slightly more than 2 %, distributed in afforested area of less than 1 % and the rest in village grave-yards and individual woodlots belonging to households. BCFP and other forestry project sites including reserved forests are located outside of SA, or surrounding the SA. Details of the SA is cited in 2.1.

1.4 Basic Concept of the Study

Direct objective of the Study resides in the identification of the area affected by soil erosion and extent thereof, as well as of the effective and sustainable countermeasures to control erosion in the watershed area. It is evident that population pressure ever growing within the SA caused environmental deterioration which resulted in vast transformation from forest to bare land through self-consumption and sale of fuelwood and charcoal, although beautiful natural vegetation still remains in the reserved places like private estates. It follows that the solution to this problem can be found only by the inhabitants themselves who should consider how to minimize / economize fuel consumption, how to self-supply fuelwood by themselves and how to mitigate soil loss from their own crop fields. Consequently, the Study will try to find a solution on how to orient villagers to consider and take actions for conserving their own environment as a social asset to be handed down to next generation. It will also try to identify useful techniques for minimizing soil erosion as well as for resurrecting lost vegetation cover in their villages, efficient procedures or strategies of mobilizing villagers in agroforestry practices and reforestation projects.

The study will make it clear where current issues are found through zoning and how short, medium and long term measures to cope with them are proposed as master-plan components that are to be practiced by the villagers concerned. Based on the Study results, a model area is selected where village natural resources management plans (VNRMPs) are proposed so as to make full use of available resources to the villagers for producing fuelwood as well as for environmental conservation.

1.5 Scope of the Study

The Phase I Study covers the entire SA where current status of natural, social and economic conditions, including state of watershed deterioration like soil erosion is studied. It also deals with present industries including forestry, agriculture and commerce, demand and supply of forest products are grasped. Zoning in the SA is made so that characters of each zone are figured out or problems encountered in each zone is elucidated, thereby measures of watershed rehabilitation are proposed as a master plan.

In addition, some candidate areas for a model area were selected. In the Phase II Study, a model area with a dimension of 1,000 ~ 5,000 ha (equivalent to 5 ~ 20 villages) was chosen referring to the criteria shown below. In this model area, current status of natural, social and economic conditions, including state of watershed deterioration like soil erosion was scrutinized, present industries including forestry, agriculture and commerce, demand and supply of forest products as well as villagers' opinions / intention on environmental conservation were investigated. Thereby a model project for environmental rehabilitation including restoration measures of devastated land, those for soil and water conservation, those for self-

supplying fuelwood and income generation / livelihood improvement activities were formulated and proposed. Then, the Study was finalized with the identification / verification of whether the proposed measures / activities and models are consistent with the real needs of population, whether those can easily be put into practice or not. Selecting criteria of the model area as mentioned above are as follows (refer to Chapter 9 for details):

- Cadres of customary land such as TA chiefs, village headmen have shown keen interest on environmental affairs and they have positive, cooperative attitude towards environmental projects,
- Watershed is seriously deteriorated for which conservation measures are acutely needed,
- The selected area has representative / typical conditions of location thus ideal as worth serving the model of SA,
- Inhabitants of the selected area are fully conscious of the urgency of implementing projects / measures of environmental conservation and are willing to implement them.