

**A POLICY IMPLEMENTATION ANALYSIS OF SOIL CONSERVATION
PRACTICES BY SMALLHOLDER FARMERS IN THE BLANTYRE
AGRICULTURAL DEVELOPMENT DIVISION OF MALAWI**

by

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ABSTRACT

Agriculture contributes about 70 percent of Malawi's Gross Domestic Product and sustains the livelihood of over 85 percent of the rural population. Soil erosion, which has reached alarming proportions, is threatening this resource base. Despite being rated the most serious environmental problem, soil erosion research lags behind in the listing of agricultural research priorities, particularly with regard to factors influencing the implementation of soil conservation policy and legislation. This study aimed to assess the impact of such policy implementation on smallholder farmer soil conservation practices. A postal, self-administered, structured questionnaire was used to interview twenty-three farmers and fourteen agricultural extension staff members. The questions were designed to assess the influence of their perceptions of soil erosion as a problem and its causes. They also sought to assess how effectively relevant policy had been implemented before and after independence. Socio-economic information was additionally elicited from the farmers. After preliminary analysis of these questionnaires, ten days was spent in the field verifying data collected. A Spearman's Rank correlation analysis at 95 percent confidence level was carried out between various components of the farmers' socioeconomic profile data and their responses to the perception questions. Perceptions regarding different aspects of soil erosion and conservation were found to be influenced by the sex, age and educational level of respondents. The study revealed that both farmers and extension staff perceived soil erosion as a problem, had a sound knowledge of the mechanics of the process and attributed it to anthropogenic factors. While both farmers and extension staff attributed declining yields and fertility to accelerated soil erosion, they appeared to have difficulty in identifying physical indicators of such activity in the field. The study also revealed that both believed the top-down approach of the pre-independence period and the post-independence to 1990 period, had been partially effective. Since 1990, policy implementation has become more effective as a result of a more democratic governance and increased extension staff awareness of sustainability concepts which stress the need to incorporate the aspirations of farmers in a bottom-up implementation. This awareness led to the formulation of a new soil and water conservation policy in 1996 which ensures the voices of decision makers are taken into account in policy review. Once legislated, this policy bodes well for further improvements in soil conservation efforts in Malawi. However, the study also revealed that effective implementation of this policy will be dependent on the government providing adequate support and skills to both extension staff and farmers.

PREFACE

The work described in this dissertation was carried out in the School of Life & Environmental Sciences, University of Natal, Durban, from August 2001 to January 2003, under the supervision of Dr Helen K. Watson.

These studies present original work by the author and have not otherwise been submitted in any form for any degree or diploma to any tertiary institution. Where use has been made of the work of others it is duly acknowledged in the text.

DEDICATION

This work is dedicated to the memory of my late husband, Johanns J. Kambauwa for the inspiration he gave me to pursue a higher degree and the encouragement and support for this study; and, to Michael and Felix-Joshua my sons. Michael and Felix please remember **Proverbs 4:7 *Wisdom is the Principal thing; Therefore get wisdom. And in all thy getting, get understanding.***

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CHAPTER ONE INTRODUCTION

1.1 Motivation for the Study

The economy of Malawi, a small land locked country in southern Africa, is very dependent on agriculture. It sustains the livelihood of over 85 percent of the rural population while agricultural products contribute about 70 percent of the Gross Domestic Product (GDP) (Amphlett, 1990; Malawi Government, 2000). The country's land resources, especially soil and water, are the cornerstones of sustainable agricultural production and development. As an agricultural country, Malawi needs to utilise the natural resource base wisely in order to ensure sustainable social and economic development. However, the natural resource base is deteriorating sharply as evidenced by the intensity and extent of soil erosion and degradation, water pollution, siltation of water courses and irrigated areas, pasture degradation and deforestation (Malawi Government, 1999). There is growing concern within the country over the decline in the productive capacity of its resources. The most recent State of the Environment Report ranks soil degradation as the most serious environmental problem facing it. Soil erosion is one of the major types of land degradation and poses the biggest threat to sustainable agricultural production in Malawi. It is estimated that the country loses a total of 160 million metric tonnes (mt) of topsoil per year, averaging 20 mt / ha/ year and contributing to mean crop yield loss of four to eleven percent per year. Results from experimental plots under various cover and farming practices have shown that soil loss ranges from 0-50t/ha/yr (Malawi Government, 1994; 1999). The cost of soil erosion in terms of replacing lost nutrients and organic matter together with other offsite costs is enormous.

Like many developing countries, increasing population pressures on the land coupled with poor cultivation methods as practised by subsistence farmers, has accelerated soil erosion, (Amphlett, 1990). Numerous efforts to implement conservation measures have not succeeded in reversing declining crop yields. As noted by Marcoux (1999) the issues of high population growth rate, poverty and land degradation are related through multiple social and economic mechanisms at various geographic levels. Malawi's National Environmental Action Plan (NEAP) 1994, recognised the set of causal factors common to key environmental issues as population growth, poverty, illiteracy and lack of environmental information and awareness. The land resource is threatened by the demand placed on it by the very poor who, because of low literacy, have little access to information on sustainable agricultural practices. This nexus has led to sub-optimal and unsustainable resource utilisation. Its negative implications on the country's development

represents an enormous challenge which the government is trying to address (Malawi Government; 1994). Unfortunately, inadequacies in development policies as well as in the legislation and its enforcement, have made it more difficult to counteract the negative consequences on the environment. Historically the conservation strategies which have found favour in African states have seldom been based upon the participation or consent of the communities whose life they affect. Anderson and Grove (1987) noted that where measures have been introduced that related directly to systems of land husbandry such as the soil conservation programs and resettlement schemes, have been inspired by European notions and imposed upon an often reluctant population. For this reason, the history of conservation in Africa has a legacy which remains important in framing the attitudes of rural communities towards any conservation initiatives now proposed.

According to the Malawi Government (1999) report the country needs applied or production-oriented agricultural research that will generate information and technologies that can be directly used by the estate sub-sector and smallholder farmers. The research should assist in minimising the deterioration of natural resources, improve the distribution of income and reduce the country's over dependence on a few cash crops to generate foreign exchange earnings. The latter is particularly significant given the volatility of world prices. Despite being rated to be the most important environmental problem, soil erosion lags behind in the listing of agricultural research priorities, particularly factors influencing the implementation of policy and legislation devised to conserve soil. Most research work on soil erosion and conservation is on the processes of water erosion and on the relationship between erosion, land use and vegetation. There is very little work on the social and economic factors which contribute to erosion and influence the adoption of conservation measures. Hence questions regarding the economic consequences of erosion and its relationship to current agricultural policies cannot be answered. Thus the need exists to study the implications or the impacts of the policies on land resources on the prevention of soil erosion against the historical background of conservation policy making and implementation. Findings from this study should represent an important contribution to both soil erosion control and food supply problems, which have wide spread importance in Malawi.

Malawi's agricultural sector is characterised by two distinct farming systems; the smallholder and the estate sectors, which are differentiated by socio-economic conditions such as regulations which define production, marketing and pricing, and land use. The system, inherited from the colonial administration, was perpetuated after independence, based on the understanding that it gave farmers in each sector the opportunity to concentrate on the production of the commodities

over which they have a comparative advantage. As such the estates have been the producers of the country's main cash crops such as tobacco, tea and sugar, whereas the smallholders have produced food crops such as maize, beans, groundnuts just to mention a few. This thesis focused on the impact of soil conservation policy on smallholder farmers primarily because of their dependence on agricultural production for food security but also because theirs is the sector with the most severe soil erosion. It sought to assess whether these policies have been effectively implemented by both extension staff and farmers and what influence this has had on soil erosion and production. Thus, the thesis has examined the role of humans and how they can affect the soil erosion problem positively and or negatively through their relationship with the land resources conservation policy, and its mandatory provisions, which are aimed at promoting the sustainable utilisation of the land resource in Malawi.

1.2 Motivation for Study Area

The country is divided into eight Agricultural Development Divisions (ADDs) aimed at reaching a far greater number of farmers and improving smallholder productivity to meet basic needs. Blantyre ADD is one such agro-ecological area located in the southern region of the country. Efforts by the government to reach out to the smallholder farmers on preventing soil erosion have shown that there is a lot to be done and researching various aspects of the problem may lead to finding new ways of tackling the problem. The ADD has been selected for the study because of the long history of soil conservation dating back from the colonial period which seems to be achieving results slowly. As the farming systems are not very varied throughout the country, the results of the findings can be applied to many of the agricultural divisions. Finally, Malawi was chosen as the study base because as a citizen of the country I am interested in the future of the country. I additionally, had the support of the smallholder farmers and the government, which allowed me to obtain information, needed to carry out this type of investigation.

1.3 Aims and Objectives for the Study

Malawi is typical of most African nations in that agricultural production is not keeping pace with population increases. The agricultural sector is important in the national context due to reasons explained already. Several policy reforms have been undertaken in the agricultural sector. The aim of these reforms has been to stimulate the sector's development. In addition, Malawi has over forty statutes on the management of natural resources and the environment.

Apart from being a signatory to most of the global environmental conventions, the country has legal regimes pertaining to land, forests, water, wildlife and land use planning. The policies, laws and regulations for these legal regimes have been reviewed by the government with the aim of promoting sustainable utilisation of natural resources and to encourage a multi-sectoral approach in natural resources management and conservation. Above all, the reviews form the quest for harmony and an approach which is consistent with the National Environmental Policy (NEP, 1996) and Environmental Act (1996) which provide comprehensive and supporting frameworks for integrating environmental concerns into planning at all levels and across all sectors in any development work.

1.3.1 Aim

Given the above background therefore, the overall aim of the research was to assess the impact of soil and water conservation policy implementation on smallholder farmer conservation practices.

1.3.2 Objectives:

- i) to assess why soil erosion has been on the increase in the country, despite policy and legislation on soil conservation.
- ii) to assess the impact of other policy reforms undertaken by the government on the problem of soil erosion.
- iii) to analyse how the capacity to implement policy influenced the challenges of soil conservation and land use management among small holder farmers and
- iv) to analyse the impact of policy on the farming practices of smallholder farmers.

1.4 Structure of the Thesis

Chapter two gives the description of the study area. This description is presented in two parts. The first part gives a general but brief description of the country. The second describes the Blantyre ADD as the case study area where the primary data was collected. Both parts include information on location; biophysiographic characteristics and land use. In addition the first part includes a brief history of the country as well as its social structure, the economy and the

institutional framework for land management and legislation. The second part additionally includes the extent of soil erosion.

The literature reviewed for the study is presented in chapter three. The broader conceptual framework for the study was that of political ecology. This framework provides a basis for the analysis of human-environment interactions attempting to encompass the multifaceted effects of development on environment and society (Smith, 2001). The role of perceptions and understanding as a necessary part of addressing our ecological crisis is another important aspect for which the concept provides, such that it encourages close interaction of ideology and praxis at the level of everyday activity. Based on this, the chapter then presents the conceptual understanding of policy analysis in general to be understood as the process of producing knowledge of and in policy processes (Dunn, 1981), such that this general formulation permits us to explore the variety of meanings that in past times have been attached to the process of producing relevant knowledge. In addition, it helps to examine the links between knowledge and action. It is at this interface that knowledge and action converge that policy processes come into play. The definition of the term policy in terms of the scope for which it has been used in this study has been given, and it is stated here that the broader definition of the term has been used. Policy processes are very important in policy studies because of the interconnectedness of the components of policy itself. They are often thought of as defining problems or goals, coming up with policy solutions or choices and implementing these. To understand the policy process as a whole, it is necessary to give attention to policy implementation, hence this gives implementation studies a crucial importance in the study of the policy processes.

A continuum of typologies of policy analysis as provided by Gordon *et al.* (1977) also helped to locate the analysis in the current study as that of *information for policy*, given the fact that the researcher is the practitioner in the field of land husbandry. The presentation of the top-down and bottom-up policy implementation analysis models provides the basis for the service delivery perspective analysing this study's findings. The presentation of the framework for policy analysis from a sustainable livelihood perspective which follows, likewise motivates the more people centred approach used in the analysis. The chapter concludes with a review of literature that has interrogated the relationship between the perceptions of soil erosion and policy.

Chapter four provides the bulk of the secondary information needed to assess the impact of soil and water conservation policy implementation on smallholder farmer conservation practices. The chapter commences with a general overview of the soil erosion problem from a global,

regional and national perspective. It then goes on to examine the perception of the status of and causes of the problem and consequent policy and legislative responses in Malawi during three distinct time periods viz, before 1964, between 1964 and 1992 and after 1992.

Chapter five describes the methods used to collect the primary data needed for the study. Two structured questionnaires were designed, one for the extension staff and the other for the smallholder farmers. Both sets included questions designed to elicit information on the respondents (a) perception of the status and causes of soil erosion, (b) knowledge of policy requirements, and (c) the effectiveness of extension staff in policy implementation. The latter set additionally obtained socio-economic profile and land use information. The chapter describes how the respondents were selected, the procedure used to administer the questionnaires as well as the field data verification procedures. As the database obtained was non-parametric the Spearman's Rank Correlation Coefficient test at 95 percent confidence level was used to analyse the influence of the farmers' socio-economic profile on their perception and land use practices. The database was additionally analysed in terms of the models and frameworks described in chapter three and secondary information in chapter four.

The findings of the study are discussed in chapter six. The major findings from the results show that both the farmers and the extension staff agree that there is a problem of soil erosion in the country and that urgent attention is required to address the situation. It was also found that a greater awareness concerning the problem has been created with the implementation of the policy – information about the causes and how to control it. Most farmers have also adopted the strategies to control soil erosion. The policy has also made a positive impact by leaving the livelihood strategies undisrupted and allowing for the innovation by farmers to grow crops which would increase their livelihood capabilities in a sustainable way. In fact, it has also led to adoption of wider understanding of conservation to include land resources in general.

A high degree of association has been found between sex, age and educational level and farmers' perception of causes of soil erosion and the effectiveness of implementation. This is important because it leads to the conclusion that the problem of soil erosion in the country is not as a result of the failures in implementation since the farmers indicated that it is effective. However, there is need to improve the skills of staff and also to encourage networks at implementation level to achieve results. Finally, other factors need to be investigated to check why soil erosion still remains a highly rated environmental problem in the country.

Chapter seven presents the conclusions of this study in relation to the objectives. A brief discussion to consolidate the findings is included. The implications which can be derived from the findings to the issue of soil and water conservation policy implementation in the country in general and the ADD in particular have also been given.

CHAPTER TWO

DESCRIPTION OF STUDY AREA

2.1 Introduction

This chapter is presented in two parts. The first part gives a general description of Malawi's history, biophysiographic characteristics, land use and the institutional framework of land resource management, and aims to place the description of the study area in the country context. The second part gives a detailed description of the location, biophysiographic characteristics and land use in the Blantyre Agricultural Development Division (ADD) case study area.

2.2 Geographic Location and Brief History of Malawi

The Republic of Malawi is located in southern central Africa between latitudes 9° 22' and 17° 03' S and longitudes 33° 40' and 35° 55' E. The total area is 118, 483 sq km of which 94, 275 sq km is land and 24, 208 sq km is water. Malawi is land locked by the following countries shown in Figure 2.1 Tanzania, Mozambique and Zambia (Malawi Government (MG), 1994; SDNP Website, 1999; Mkanda *et al*, 2001).

Pike and Rimmington (1965) reported that the earliest evidence of human settlement was by middle stone-age hunters and food gatherers who had followed the larger animals as they migrated to Malawi's grazing areas. The prehistoric climates of central and southern Africa were marked by an alternation of very dry and wet periods. It was during the dry periods that the country offered conditions most congenial to human settlement.

Pike and Rimmington (1965) further noted that later groups who entered the country were predominantly agriculturalists, who brought with them the simple and shifting cultivation from the dense forests of the Congo Basin, in which they had probably sought refuge for a time from more warlike neighbours. The Bantu incursion into the country brought major ethnographic changes over considerable areas of southern Africa. During the eighteenth and nineteenth century, the country was inhabited by various branches of the Malawi (Maravi) tribe. With no strong tribal organisation, the country soon became subdivided into three main groupings; the Sena, the Nyanja and the Chewa.

The Ngoni were warlike pastoralists who had fled from the Zulu, moved northwards in two distinct groups across the Zambezi River, both entering Malawi near Domwe mountain. The Yao's original tribal home was the east of Lake Nyasa (Malawi) where they stayed together with the Lomwe.

Following a period of famine in the nineteenth century and a defeat by the Lomwe, a number of Yao sections broke away and moved westward into Malawi settling around the southern shores of Lake Malawi. The Yao invaded the Chewa and Nyanja tribes and enslaved them, and sold them to the Arabs. The Slave trade was to a large extent counteracted through the introduction of Christianity and commerce in cash crops through the activities of Dr David Livingstone, the first European to Malawi. By the end of the nineteenth century, the Ngoni and Yao were contained in the areas they had conquered. The Chewa, Nyanja and Tumbuka and other peoples were freed from the fear of slavery. New developments in the twentieth century overshadowed and modified this earlier human geography.

With the boundaries defined and the administrative set up in 1891, Nyasaland came into existence as a state in the modern sense. According to the SDNP (1999) report Malawi had been under British rule for 73 years from 1891 when it gained independence in 1964. It became a commonwealth Republic in 1966. After nearly 30 years of independence, under one party rule, the first democratically elected government came to power in 1994. Malawi has a tri-cameral system of government, which comprises of the executive, legislative and judicial branches. The president is the head of state and elected to a five-year term of office.

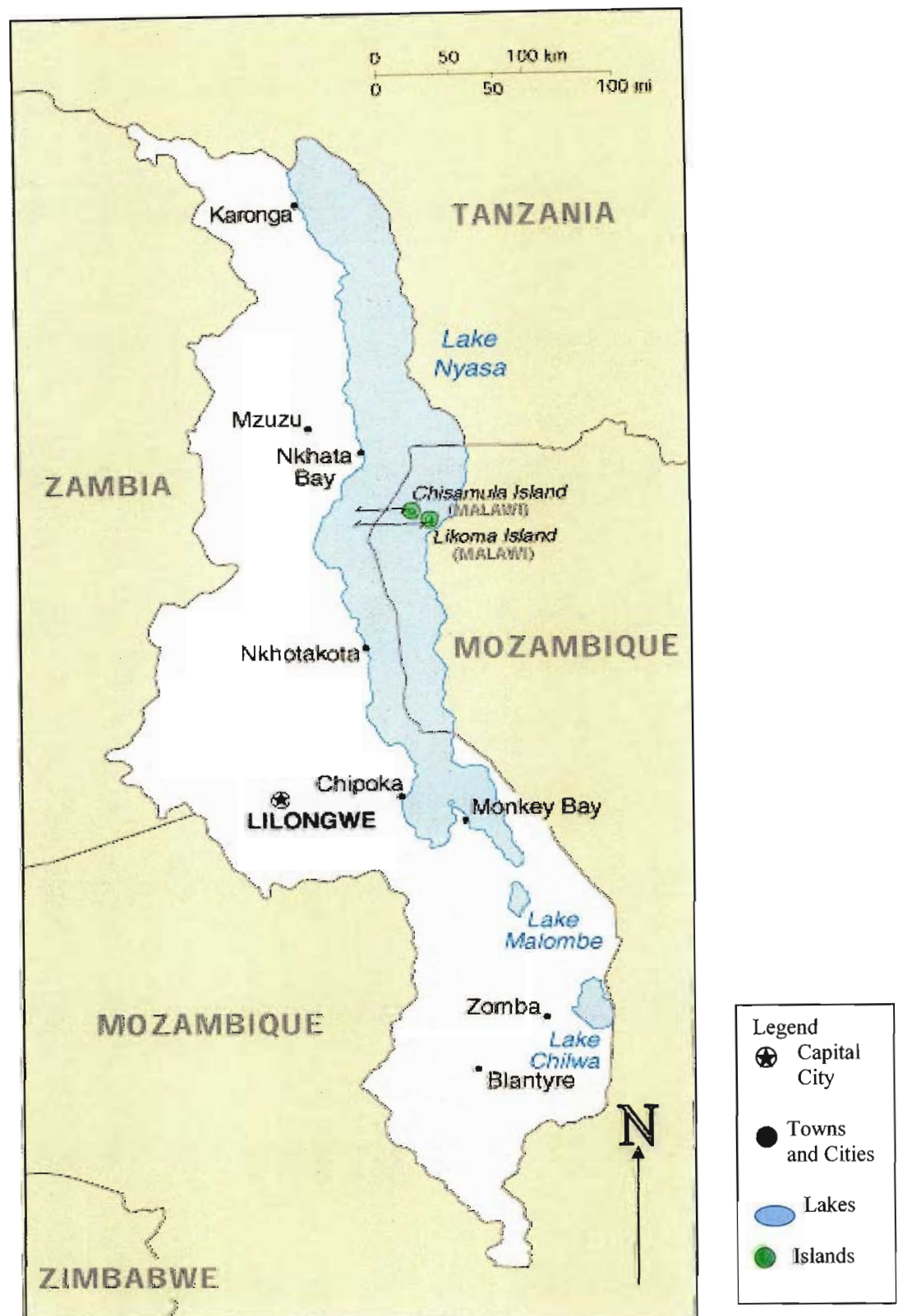


Figure 2.1: Map of Malawi with neighbouring Countries

Source: SDNP Website, (1999)

2.3 Physiography

The landscapes of Malawi date from the late Mesozoic period to the present. The various plateaus have been uplifted and denuded in successive cycles of erosion resulting in the stripping of large areas of later sediments and softer rocks, thus exposing the ancient shield of Pre-Cambrian rocks some of which were originally very deep-seated. These ancient surfaces evolved slowly through 130 million years until earth movements associated with rift faulting brought radical changes that have affected the relationship between the land surfaces and have changed the relative altitudes. Malawi is essentially a vast continental shield which has been persistently moving in a vertical direction giving a structural pattern of basins and swells that rise towards the east to form a system of coalescing plateaus extending from Abyssinia to the Cape Province. Lister (1972) noted that five principal erosion surfaces occur in Malawi. The Gondwana of Jurassic age; the post-Gondwana developed between early and mid-Cretaceous times; the African, late-Cretaceous to early Miocene; the post-African which evolved from the late Miocene through to the Pliocene and finally the Quaternary surface which has been evolving from the end of the Pliocene to the present day.

Malawi's major relief features consist of the rift valley occupied by lake Malawi and the Shire River, the middleveld and the highveld. The lake is the third largest freshwater lake on the African continent. The coasts of the lake vary from narrow strips of land, swampy in part to wider areas which rise by a series of escarpments to the middleveld (refer to Figure 2.2). There are also scarps which rise to about 1,520m above the lake representing the faults which are on the borders of the rift valley. The outlet of the lake is the Shire River, and it is 480km long. It has a lake on its course and a wide flood plain through which it forms ox-bow lakes (Kadzombe, Michie and Naidoo, 1981).

The middleveld comprises several plateaus which in the central and southern region contain most of Malawi's population. It includes the land between 600m and 1,200m in altitude, and it is most extensive in the central region. Wetlands locally known as *Dambos* are a common feature of this surface providing valuable winter grazing for cattle. To the north of the country, lie both the plain and hilly areas.

The highveld is made up of several widely separated areas at altitudes from 1,200-3,000m. The Mulanje Massif which is 2,734m high and most impressive, has peaks which rise above it, one of which is the highest in central Africa and rises to about 3,000m. Other areas of highveld are also found in the central and north regions. The Nyika, the largest plateau at 1,980m in central Africa, has steep scarps. The Figure 2.2 shows the physiography of the country.

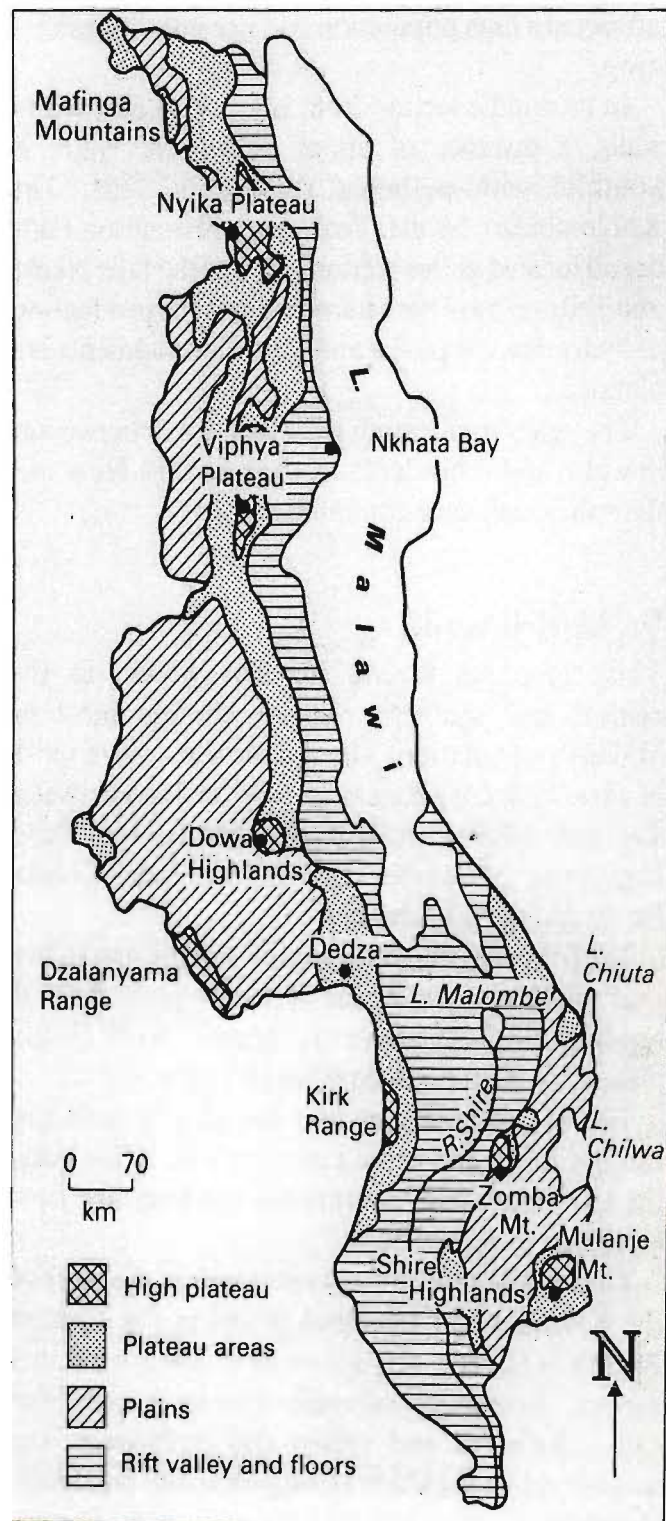


Figure 2.2 Map of Malawi showing the Physiography of the Country
Source: Kadzombe et al. (1981).

2.2.4 Geology

According to Pike and Rimmington (1965) there are three major geological systems present in Malawi: the Pre-Cambrian; Post-Cambrian and Intrusive rocks which are depicted in Figure 2.3.

The Pre-Cambrian system or Basement complex are the most wide spread rocks in Malawi and comprise various gneisses, schists, metamorphosed sediments and igneous intrusions of Pre-Cambrian age. Two broad divisions have been recognised, the Mozambique system underlying much of southern and central Malawi and the Mafingi system occurring in isolated areas of northern and central Malawi (Figure 2.3).

The Post-Cambrian system comprises the Karoo and post-Karoo formations. The Karoo occurs in scattered areas over a large part of central and southern Africa and is typically a horizontal formation. Two main areas of Karoo rocks occur in the Lake Malawi basin on the north-western shores of the lake and in the Zambezi – Shire basin of southern Malawi on the south-western border of the country. In the north these sediments are derived from the local Pre-cambrian quartzites. The post-Karoo formation are the pale to grey shales, sandstones and conglomerates of late Jurassic or Cretaceous age. These sediments occur in two main areas along the north-western shores of Lake Malawi and in the Zambezi – Shire area where they overlay the Karoo sediments to the west of the Shire River.

According to Petters (1991) the intrusive rocks are a complex, deeply eroded and deeply exposed mid-Proterozoic orogenic belt in which high-strain granulite zones with interleaved slices of basic and ultrabasic ophiolitic rocks represents the remnants of plate collision sutures.

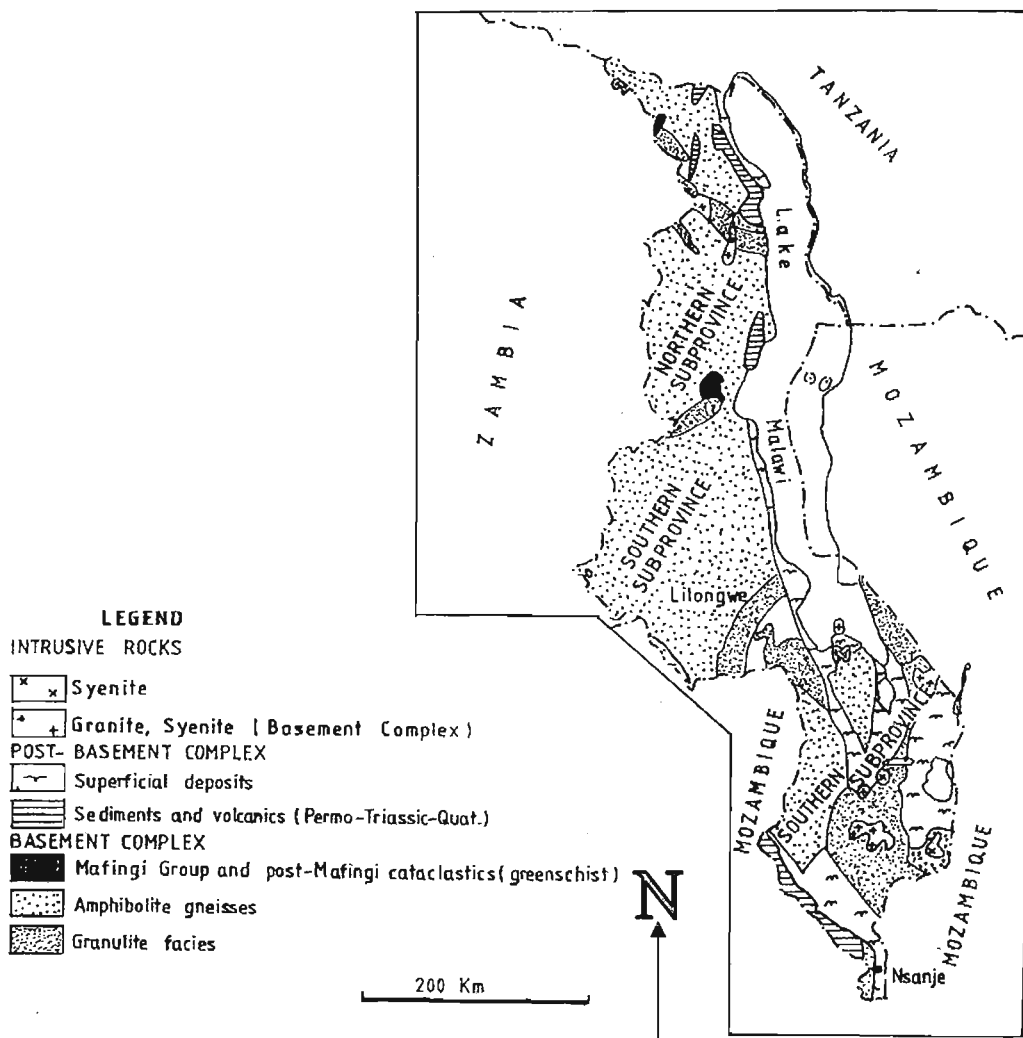


Figure 2.3 The Geology Outline of Malawi
Source: Pike and Rimmington (1965)

2.5 Soils

The soils of Malawi (refer to Figure 2.4) show a close resemblance to the nature of the underlying parent rock, but the interactions of climate, topography, age, soil drift and locations have all played their part in the formation of the complex soil pattern of the country. Pike & Rimmington, 1965 describe the following ten main groups:

Latosols

The most commonly encountered soils fall into the red earth category together with those soil types of different colours which are found in catenary association. A catenary sequence is formed from the weathering of the rocks on hills and watersheds, the soil being transported down the slope to the valleys and deposited in bands of differing composition. The plateau red and yellow red soils (latosols) are of peneplain origin and have become lighter in colour through prolonged leaching. These soils are mainly derived from the gneisses, schists, granulites and syenites and coupled with their arrangement in catena heterogeneous groups of soils occur in comparatively small areas resulting in necessarily patchy cultivation. Although these soils are generally poor, they are cultivated on a comparatively large scale.

Red Brown, Yellow Clays

The red-brown and yellow gritty clays are found throughout the country but are limited in extent. At the surface, the soils are dark yellowish brown, coarse, sandy loams and in the sub-soil reddish – brown, gritty clay loams. The main feature of these soils is the tendency to erode easily.

Brown Soils

Brown soils are a distinct soil type with a uniform brown clay loam sub-soil and a dark greyish brown clay loam surface.

Colluvials

The colluvial soils of various types are widely spread because the country is hilly with a long history of earth movements. Textures vary greatly but the soils are generally related by a common grey-brown to brown colouration. These soils are often very deep and textures vary within the profile.

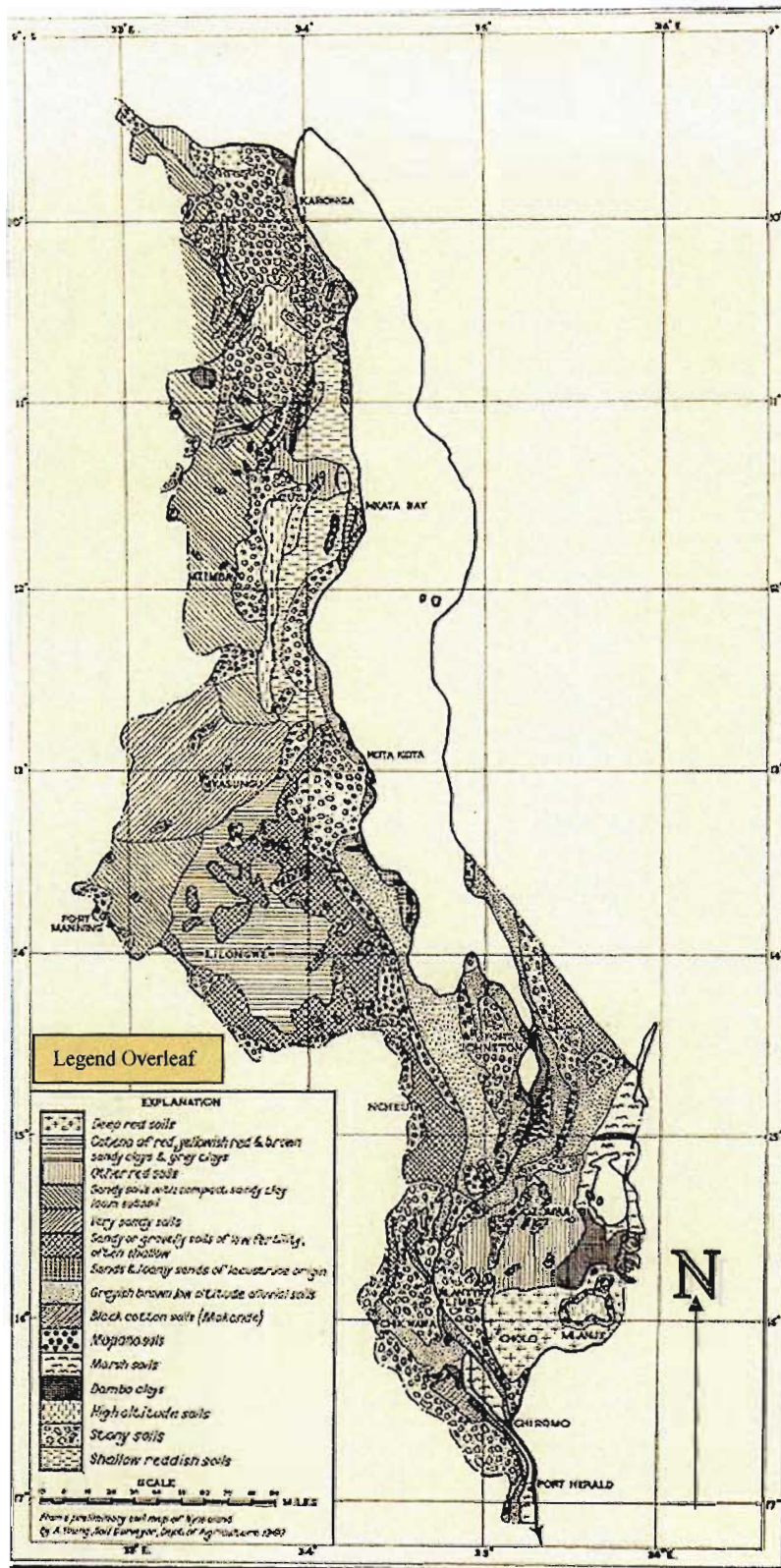









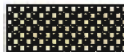







Figure 2.4 Soils of Malawi

Source: Pike and Rimmington (1965)

LEGEND

	Deep red soils
	Catena of red, yellowish red & brown sandy clays & gray clays
	Other red soils
	Sandy soils with compact sandy clay loam soil
	Very sandy soils
	Sandy or gravelly soils of low fertility often shallow
	Sands & loamy sands of lacustrine origin
	Grayish brown low altitude alluvial soils
	Black cotton soils (Makande)
	Mopanosols
	Marsh soils
	Dambo clays
	High altitude soils
	Stony soils
	Shallow reddish soils

Alluvia

The rivers draining the plateau areas have laid down alluvia in narrow fluvial zones in parts of the lake littoral and the Shire valley. In tone, the soils are grey-brown, the profiles showing marked stratification with a variation in texture from pebbly sands to silty clays, often with a great deal of apparent muscovite mica.

Kawinga Grey Sands

The Kawinga grey sands are soils which although no longer seasonal swamp soils, retain the profile characteristics of such soils and to a certain degree do become waterlogged in the rains.

Hydromorphic Soils

Hydromorphic soils are sands impregnated with clay, grey in colour with mottle developing at depth. The mottle is immediately apparent beneath the topsoil of humus stained sand as brown flecks in the grey.

Black Clays

Black soils occur in two main areas and often referred to as 'black cotton soils' or margalitic clays (*makande*), similar in many respects to the *regur* of India. This type of clay forms under conditions of high alkalinity and also from the underlying basaltic lavas (Stromberg lavas) in the areas where they are found. The common factor of these clays is their montmorillonite content which causes them to dry out and crack resulting in the phenomenon of self-plough and self-mulching.

Mopanosols

Mopanosols is a term given to those soils which carry an almost exclusive mopane (*Colophospermum mopane*) vegetation found in many of the warm, drier areas of the country. The soils are alkaline and have been described as shallow sands to gravelling sands, ill drained in the early rains.

Dunes and Beaches

Finally, a distinct type of sandy dunes or beaches are found along the lake. These overlie fossil soils which continue into the lake and usually are covered in dense *bango* reed (*Phragmites mauritianus*).

However, Young (1972) reported that there are four main soil groups in Malawi which differ markedly from each other in terms of the environmental conditions under which they developed, the processes of soil formation and in profile characteristics and analytical properties. This account seems to be just a summary of what has been described above because it groups the different soil types under bigger names. This author noted that these are the Latosols, the Calcimorphic soils, the Hydromorphic soil and the Lithosols. The Latosols are red to yellow, leached acid soils in which water movement within the profile is predominantly downwards. They occupy freely drained sites, mainly on the gently sloping plains but also in some steeply dissected hills. The Calcimorphic soils are grey to greyish brown with a weak acid to weak alkaline reaction in which water movement is upward during at least part of the year. They occur on nearly level depositional plains with imperfect drainage. The Hydromorphic soils are black, grey of mottled and waterlogged for all of part of the year. The fourth group comprises Lithosols that are shallow or stony soil and regosols that are immature soils developed from sand.

2.6 Climate

Kadzombe *et al.* (1981) reported that under the general classification of world climates Malawi falls within the tropical continental climate with dry winters. This is also called tropical savanna climate. This climate has one main wet season in summer when the country comes under the influence of the southward movement of the Inter Tropical Convergence Zone (ITCZ) and is mainly dry during the rest of the year. The climate is generally influenced by the lake and elevation.

According to the African Conservation website, the great variation in altitude and latitudinal extent is responsible for a wide range of climatic, soil and vegetation conditions within Malawi. There are three climatic seasons. During the cool season, from May to August, there is very little cloud and mean temperatures in the plateau areas are 15.5 – 18 °C and in the rift valley 20-24.5 °C. The coldest month is July, when the maximum temperature is 22.2 °C and the minimum is 11.7 °C. Light rain may fall occasionally on the higher south-eastward facing slopes during this season (refer to Figure 2.2).

In September and October, before the rains, a short hot season occurs when humidity increases: mean temperatures range from 27-30 °C in the rift valley and from 22-24.5 °C on the plateaus. During October/November temperatures exceeding 37 °C may be registered in the low-lying areas (refer to Figure 2.2). The rainy season lasts from November to April and over 90 percent of the total annual rainfall occurs during this period. Most parts of the country receive an annual rainfall of 760-1,015mm but some areas in the higher plateaux receive over 1,525mm.

2.7 Vegetation

Mwafongo (1999) noted that the country has a very rich natural resource base, mainly composed of forest reserves, woodlands, national parks, game reserves and wetlands. Natural forest and woodland constitutes up to 3.4 million ha (or 36 percent) of the country, while plantations cover 111,650 ha (or 3.2 percent). He further reports that there are five national parks and four game reserves, where a significant amount of natural forest resource is found, which represent thirteen of the nineteen biotic communities found in the country, and are generally not exploitable. The aim of setting aside these areas is to preserve selected examples of Malawi's biotic communities and conserve watersheds/catchment areas. The different vegetation communities are a habitat to diverse wildlife.

The natural vegetation pattern reflects the country's diversity in altitude, soils and climate. Savanna occurs in the dry lowland areas. Open woodland with bark cloth trees, or *miombo* (leguminous trees unsuitable for timber) is widespread on the infertile plateaus and escarpments. Woodland species of acacia tree, cover isolated and more fertile plateau sites and river margins; grass-covered broad depressions (*dambos*) and the plateaus. Grassland and evergreen forests are found in conjunction on the highland areas and on the Mulanje and Zomba massifs.

Malawi's natural vegetation however, has been altered significantly by human activities. Swamp vegetation has given way to agricultural species as swamps have been drained and cultivated. Much of the original woodland has been cleared and at the same time, forests of soft woods have been planted in the highland areas. High population density and intensive cultivation of the Shire Highlands have also hindered natural succession there, while wells have been dug and rivers dammed to irrigate the dry grassland for agriculture.

Game animals abound only in game reserves, where antelope, buffalo, elephants, leopards, lions, rhinoceroses and zebras occur; hippopotamuses live in Lake Malawi. There are substantial water bodies too and fishing is part of the various land uses practised. The lakes and rivers contain more than 200 species and 13 families of fish. The most common and commercially significant fish include the endemic tilapia or *chambo* (nest-building freshwater fish); catfish or *mlamba*; and minnows or *matemba* (<http://www.africanconservation.com>).

2.8 Land Use

The agricultural potential of Malawi was noticed in the early days of explorers and missionaries (Nambote, 1998). The colonialists found no minerals and the high cost of transporting crops for

export discouraged agriculture. Indeed finding any suitable export proved difficult and costly attempts were made with various crops such as coffee before tobacco, tea and groundnuts proved successful.

The northern, central and southern regions of the country comprise 28, 38 and 34 percent of the land area, respectively. The distribution of present and potential land suitability for rain-fed agriculture is affected by factors such as topography, slope, rainfall, temperature, soil type and depth. While the description of Malawi's soils given in section 2.5 indicates that most are generally not very fertile, they are nevertheless capable of supporting a wide range of crops. Although spatially restricted Malawi possesses some of the most fertile soils in south-central Africa. Of particular importance are those derived from recent sediments-alluvial, lacustrine and aeolian- in the lake-shore plains, the Lake Chilwa – Phalombe plain and the upper and lower Shire valley. Good plateau soils occur in the Lilongwe-Kasungu high plains and in the tea-producing areas of Thyolo, Mulanje and Nkhata Bay districts (<http://www.africanconservation.com>). The major crops grown on a large scale are maize, tobacco, tea and cotton. Pachai (1978) reported that, of the total land area in 1974, only about 28 percent could be considered suitable in terms of soil and gradient for arable agriculture. At least a third of the total area seemed unfit for sustained cropping without major advances in technique, and much of the balance was only usable for occasional cropping. According to data extracted from Malawi Government (1994) and presented in Table 2.1, nationally, only 31 percent of the country's total land area is suitable for rain-fed agriculture at traditional level of management¹ and another 31 percent is marginal. However, the amount of suitable land almost doubles from 2,954,500 ha to 5,741,950 ha (61 percent) with an improved level of management². At present cultivated land exceeds the suitable land for rain-fed agriculture at traditional level of management. The Malawi Government (1994) report further observed that since cultivable land and human population are not evenly distributed, there is a good chance that not only marginal land but also unsuitable land is being rapidly brought under cultivation. Mwafongo (1999) asserted most smallholder cropping is under traditional management and a substantial proportion of is taking place on marginal land.

¹ Traditional Management is defined as “the growing of traditional crops using local varieties, manual labour with simple tools, no use of fertilizer or pesticides, traditional cultivation practices and no use of extension and credit facilities”.

² Improved Traditional Management is the growing of crops which assumes the availability of improved cultivars, the application of fertilizer and pesticides when required, hired labour or ox-drawn implements may be used, extension advice is frequently applied. These farmers obtain credit if required and are market oriented” (Malawi Government, 1994).

Table 2.1 Present and Potential Land Suitability by Region (ha).**Source: Malawi Government (NEAP) 1994**

Quality of Land	Northern Region		Central Region		Southern Region		Malawi	
	Tm	Itm	Tm	Itm	Tm	Itm	Tm	Itm
Suitable	623,500 6.6%	1,515,15 0 16.1%	1,658,75 0 17.6%	2,650,30 0 28.1%	672,250 7.1%	1,576,50 0 16.7%	2,954,50 0 31.3%	5,741,95 0 60.9%
Marginal	799,750 8.5%	507,600 5.3%	956,150 10.1%	399,000 4.2%	1,208,25 0 12.8%	745,100 7.91%	2,963,45 0 31.4%	1,651,70 0 17.5%
Unsuitable	1,283,65 0 13.6%	684,150 7.3%	1,057,85 0 11.2%	623,450 6.6%	1,168,60 0 12.4%	727,500 7.7%	3,510,80 0 37.2%	2,035,10 0 21.6%
Total	2,706,90 0 28.7%	2,706,90 0 28.7%	3,672,75 0 38.9%	3,672,75 0 38.9%	3,049,10 0 32.3%	3,049,10 0 32.3%	9,428,75 0 100%	9,428,75 0 100%

Tm= Traditional management

Itm= Improved traditional management

The proportions of different divisions of land reflected the distribution of land since 1891. As reported by the Malawi Government (SOER, 1998) there are three categories of land tenure in the country, which help explain the scale of agricultural production:

- a) Customary Land : which forms the bulk of land in Malawi, is held, occupied and used under customary land and excludes all public and private land
- b) Public Land: is land that is used, occupied or acquired by government and also any land that is not customary or held under freehold or leasehold title. Public land consists mainly of forests and wildlife reserves and any other public places
- c) Private Land: land held, occupied or used under a freehold, or a leasehold title, or a certificate of claim or which is registered as private land under the Registered Land Act.

The importance of the figures as well as of land was also underlined by the further fact that as late as 1973 agriculture accounted for almost 50 percent of the GDP, of which the share of the smallholder was over 80 percent. Previously there were different laws for the different categories. A consolidated land law providing for the control and use of all categories of land was established in 1965 through the Malawi Land Act. The principal object in the act was to bring the three categories of land under the control of the government to ensure that land would be properly and profitably used (Pachai, 1978).

The only indication of proportions of the three categories of land shows that ten years after independence, 0.1 percent constituted freehold land; 2.5 percent was leasehold; 16.7 percent was public land and 80.7 percent was customary land. It is therefore difficult to compare the relative proportions of the three categories of land to see how they have changed over time. However, Banda (1997) reported that statistics for the amount of land that is held under customary tenure vary from 70 percent to 80 percent of the total land area of the country. It is however, clear that land under customary tenure occupies the single largest category. This is the tenure under which most smallholder farmers hold their land. They produce mainly subsistence crops such as maize, beans, groundnuts and other crops although some do produce cash crops such as tobacco.

In addition, he noted that there is a lot of customary land on which government has built schools, hospitals and other office infrastructure which has not been converted into public land. This implies that the proportion of public land would increase if government would take the necessary legal procedures for conversion. The freehold land is planted up by estates mainly with cash crops which earn foreign exchange for the country. This may imply that the proportion has not changed much since 1974 (*this year is significant in this study because it provides the figures for the different categories of land*) because most of these estates were carried over from the settler farmers. Lease hold land can be created out of public, customary or freehold land. In this case it can be said that there is a possibility that the proportion has increased especially during the estate sector development.

Most food production is by smallholder farmers whose fragmented plots averaged 1.09 ha in 1990. Table 2.2 shows the mean Agricultural Development Division (ADD) holding size. Many farmers' use of such plots has negative implications on sustainable land management, particularly given the fact that they operate mostly through traditional practices. Thus intensive farming is encouraged, particularly in view of the 'scarcity' of cultivable land, with emphasis on training, extension, farm mechanisation, soil conservation and diversification of crop production.

Table 2.2 ADDs' Mean Land Holding Sizes (ha)**Source: Mwafongo, 1999**

ADD	Mean
Karonga	0.75
Mzuzu	1.4
Kasungu	1.4
Lilongwe	1.4
Salima	1.0
Machinga	0.9
Blantyre	0.6
Shire Valley	1.0
NATIONAL MEAN	1.01

The problem of soil erosion in Malawi has not been dealt with in this chapter but will be covered in chapter four. This is because as this study was looking at soil and water conservation policy, it was necessary to examine Malawi's response to 'the soil erosion problem' in the context of evolving thinking about soil conservation in the world. Therefore, the discussion of the response to soil erosion logically fits into that chapter where it is considered from the global to the country level.

2.9 Social structure

In 1998, Malawi's population was estimated at 9.8 million people with 13 percent being in the urban areas. The birth rate was 3.2 percent while the death rate has been drastically reduced because of improved health services (Kambauwa, 2000). Population distribution does not conform to the natural resources availability. In the north of Malawi where there are abundant forests, the population is sparse because of accessibility and shortage of employment. There is more industrial development in the south and the centre, and this has attracted more people to work there, resulting in heavy pressure on the surrounding natural resources.

According to a FAO (2002) report, HIV/AIDS can no longer be considered solely as a health problem. Because of AIDS, decades of development have been lost in Africa, and the countries' efforts to reduce poverty and enhance living standards have been greatly undermined. Vigorous action is needed to address the social, economic and institutional consequences of the epidemic. Increasingly, HIV/AIDS is having a major impact on nutrition, food security, agricultural production and rural societies throughout the African continent.

Mbaya (2002) noted that Malawi is one of the countries that is hard-hit by the HIV/AIDS epidemic. There has been a steady increase in HIV prevalence since the first case was reported in 1985. The most affected age group is the 15-49 year group. Most infections occur among the 15-24 years age group. Infection rate among girls is four times higher than that among boys of the same age. A variation in rural, semi-urban and urban prevalence shows that the HIV prevalence varies between 2.9-25 percent in rural areas, 21.6-35.5 percent in semi-urban and 23.3-27.9 in urban areas. HIV/AIDS has the potential to negatively impact the quality and quantity of land held by those affected and this impact is greater in the case of vulnerable groups in communities in the country.

According to the National Statistics Office report of 2000, literacy implies that the people are able to read and write. The male-female disparity in literacy in Malawi has been an area of policy concern. According to this, 72 and 49 percent of the country's male and female population respectively, is literate. Female literacy rates are generally lower than those of males in all regions of the country. A comparison of the urban and rural literacy rates shows that the urban population is more literate than the rural population. The difference by sex in the rural areas shows that male literacy rates are significantly higher than that of females.

The main ethnic groups are the Chewa, Tumbuka, Yao and Ngoni. English is the official and business language while Chichewa is the national language and is widely spoken throughout the country, although Tumbuka is the dominant language in the northern region. Malawi still enjoys its cultural values and the traditional leaders and village elders play a very significant role in the socio-economic development of the country. Land and other natural resources like forests are still being distributed and controlled by the traditional leaders although government restricts most utilisation practices by these local leaders (Kambauwa, 2000).

2.10 Economy

Agriculture is the backbone of Malawi's economy with almost all (90 percent) of its exports being agriculturally based. Table 2.4 compares the GDP contribution from agriculture with that from other sectors.

Table 2.3 GDP by Sector (million Malawi Kwacha; constant 1994 prices)

Sources: NEC; NSO; Reserve Bank of Malawi; and Treasury.

	1994	1995	1996	1997	1998
Agriculture	2,302.4	3,182.2	4,297.6	4,464.8	4,633.2
Small-scale	(1,607.2)	(2,253.9)	(3,276.7)	(3,328.9)	(3,628.3)
Large-scale	(695.2)	(928.6)	(1,020.9)	(1,135.9)	(1,004.9)
Mining and Quarrying	43.2	47.2	100.2	106.7	111.9

The per capita income is less than US\$156 (SADC Website, 1999). There is very little industrial development at the moment and for this reason Malawi has become a chief importer of manufactured goods from neighbouring countries. Until the mid 1980s when Structural Adjustment Reforms/Programs (SAR/SAPs) of the World Bank were introduced, government and private companies operated in all key sectors of the economy, often enjoying monopoly status. Government control and regulation of the private sector was also significant. The SARs led to countries engaging in macro-economic and sectoral reform to bring their economies back on line with international economies and to set the conditions for sustained long-term economic growth. Measures adopted included privatisation policies which is being referred to here. A description of the SAP is given more attention in chapter four.

Between 1979-82 Malawi's economy went into recession. To get the economy back on track, government believed that the smallholder agricultural sector needed to grow, management of public resources needed improvement and price and wage controls needed to be relaxed. Further liberalisation of the foreign exchange market, an overhaul of the monetary and tax systems, lifting of import and export licences, and improved incentives for foreign and local investors were introduced. Since the early 1990s, economic reforms aimed at, among other things, attracting foreign investment, have been stepped up. Privatisation of government companies was introduced in December 1995. Malawi's main economic activity today continues to be in the agricultural sector. The major export crops include tobacco, sugar, tea, cotton and coffee. In 1998, the contribution of the agricultural sector to the GDP was 36.5 percent (SADC Website, 1999).

Malawi gets her energy from four major energy sources. However, 93.1 percent of the energy used comes from wood (Kambauwa, 2000). Most rural households use firewood. In addition to forest

sources, two percent energy is also produced from other bio-mass, especially agricultural residues. Biogas, wind and solar energy are technologies that are picking up of late. Only 32 percent of the urban population use electricity while eight percent uses it for both cooking and lighting. The main source of fuel for most urban poor is apparently paraffin. In the industrial sector, coal and electricity are the main sources of energy (SDNP website, 1999).

2.11 Institutional Framework for Land Management and Legislation

The realisation that land is the most important economic asset, led to the establishment of regulations and rules governing the use of land. The Land Act of 1965 was promulgated based on this and the Department of Lands and Valuation administers it. Banda (1997) asserted that this is the wrong place for agricultural land use and management legislation. Land use is a cross-sectoral issue and it must be covered under an umbrella policy to take care of land use issues in the country. As far as the present legislation on land use is concerned, the Land Act 1965 is the only legal instrument available in the country. The Ministry of Agriculture and Irrigation Development (MoAID) through the Land Resources Conservation Department (LRCD) is the appropriate arm of the government, which can and does oversee agricultural land use issues in the country. Although this situation has not yet been reversed, the MoAID through the LRCD has the primary responsibility of promoting long-term sustainable use of natural resources with particular emphasis on agriculture. Its mandate is also to render extension services offering specialised support to farmers' land use planning and management. A proposal for agriculture land use and management act was then prepared following a recommendation from a study of land use and management.

The Government of Malawi (GoM) developed a National Environmental Action Plan (NEAP) in 1994, to provide the framework for integrating environment into the overall socio-economic development of the country. To promote sustainable social and economic development of the country through sound management of the environment, the National Environmental Policy (NEP) was prepared in 1998. Within this framework, many specific sectoral policy issues have been identified for attention and resolution in the quest for harmony and an approach which is consistent across sectors and institutions. Implementation of environmental programs in the country is now based on plans developed following the framework. So far a number of policies have been revised in the light of these developments and legislation to enforce them has also been included to support them. A good example is the Forestry Act of 1998.

2.12 Location of Blantyre Agricultural Development Division

Blantyre ADD is situated in the southern region of Malawi, covers an area of 10,231 sq km and is geographically located between latitudes 15°12' and 16°25' S and longitudes 34°21' and 35°51' E. It shares borders with Mozambique to the west and east, Machinga and Lilongwe ADDs to the north and Shire Valley ADD to the south (LREP, 1992). The ADD comprises six administrative districts namely; Blantyre, Chiradzulu, Mulanje, Mwanza, Phalombe and Thyolo, each headed by a District Commissioner. Within Blantyre ADD there is a total of 41 Traditional Authorities, headed by Chiefs and Sub-Chiefs, and with Village Headmen at a lower level (LREP, 1992). For agricultural administration, Blantyre ADD with headquarters in Blantyre, headed by the Programme Manager, contains five Rural Development Projects (RDPs) (two districts make one RDP at the moment) (Figure 2.6). The administrative and RDP areas are the same. Each RDP has Extension Planning Areas (EPA) headed by a Development Officer (DO) and are subdivided into Sections manned by extension field staff. These staff at the section level are in direct contact with the farmers on a daily basis. Extension messages are conveyed in block meetings and by demonstrations.

The various divisions in the ADD apart from general management and administration, are Planning and Evaluation, Animal Husbandry, Extension and Training, Crops General, Irrigation Development and Land Husbandry. Subject Matter Specialists are placed in hierarchical order at Ministry Headquarters, ADDs, RDP and EPAs

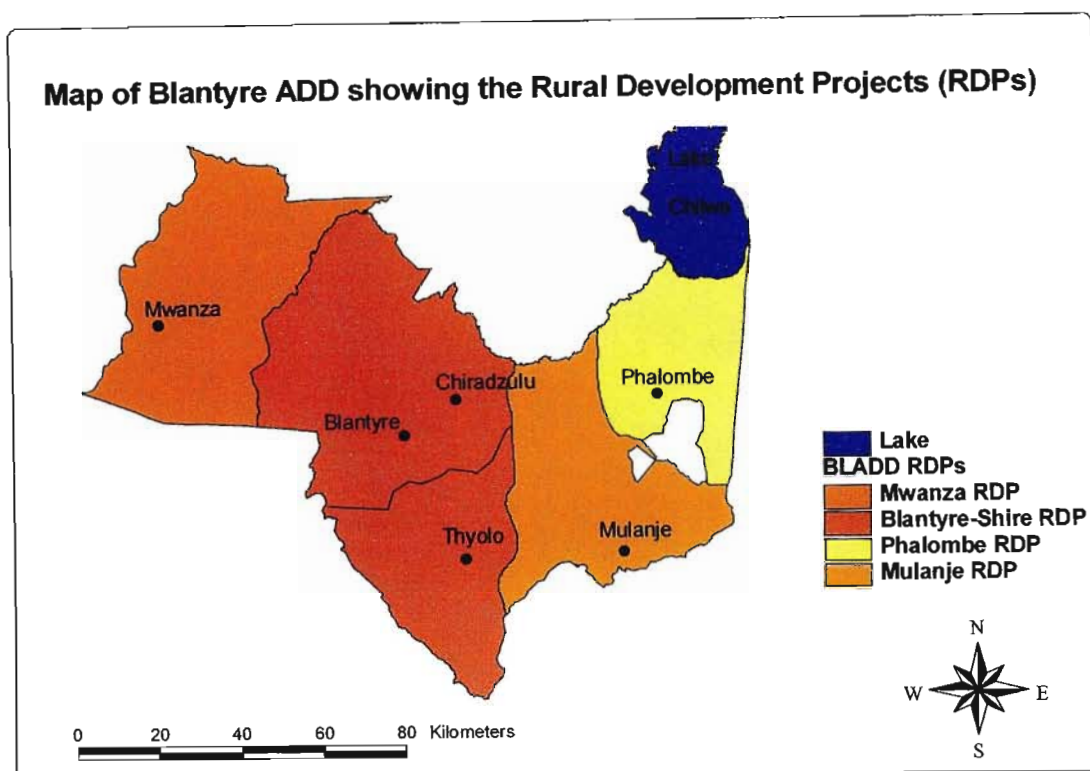


Figure 2.5 Map of Blantyre Agricultural Development Division

2.13 Physiography

The macro relief of Blantyre ADD comprises undulating and rolling upland plains at altitudes between 600 and 1,200 metres above sea level (m asl), rugged lowland areas and escarpment zones between 200 and 1,000 m asl in the Middle Shire Valley, alluvial plains between 450 and 750 m asl in the Chilwa plain and part of the Shire Valley, and Mt. Mulanje at 2,000-3,000 m asl in the eastern part of the ADD (LREP, 1992). In summation then most of the ADD consists of undulating, rolling and in some places hilly plains while inselberg and pediment relief occurs frequently.

2.14 Geology

According to the LREP (1992) report, most of Blantyre ADD is underlain by Pre-Cambrian metamorphic rocks (also known as the Basement-Complex) consisting of gneisses and granulite. Other rock types of Pre-Cambrian age are perthitic syenite and metapyroxenite, which occur in a few isolated areas and dolerite which occurs frequently in dykes in the southern Shire Highlands. Syenite and granite from the Jurassic and Cretaceous Eras underlay the Mulanje Massif. In the Chilwa plain,

Upper Shire Valley and Lisungwe Valley, the Basement-Complex rocks have been largely covered by Quaternary unconsolidated sediments of lacustrine, fluvial and colluvial origin.

The geology of much of the area has been influenced by extensive tectonic movements which took place during the Mesozoic and Tertiary Eras and which have led to the formation of the Great African Rift Valley. The Rift Valley traverses the ADD and coincides with the Middle Shire Valley.

2.15 Soils

The LREP (1992) report describes the soils of Blantyre ADD as being variable. In the Shire Highlands soils are usually very deep, well drained, reddish brown medium textured and relatively high in nutrients. Other areas have very deep, well drained, reddish brown to red, fine textured soils which are strongly leached and low in nutrients. In the relatively dry zones, soils are moderately deep well drained brown and medium textured with weathered rock in the subsoil and gravel and stones throughout the profile. The alluvial areas have very deep medium or coarse textured soils which are subject to flooding.

Reaction is acid to slightly acid in most soils, but in strongly leached soils, very strong acid reaction is common. The nutrient status of many soils in the highland areas is moderate due to high inherent fertility, but low nutrient status mainly due to exhaustion by prolonged cultivation, with wide spread deficiencies of nitrogen and phosphorus is also common throughout the ADD. The structure of most cultivated topsoils is weak, owing to cultivation practices of intensive hoeing and not returning enough organic waste to the soil. Topsoils are therefore highly erodible, and sheet erosion is rife in many areas.

The LRCP (1992) reported that soils are most commonly classified under FAO (1988) as Chromic Luvisols and Chromic and Eutric Cambisols. Ferralsols, Alisols and Lixisols occur in high rainfall areas in the south-eastern parts of the ADD. Vertic Cambisols, Fluvisols and Gleysols commonly occur in alluvial areas (LREP, 1992).

2.16 Climate

Blantyre ADD experiences a warm tropical climate characterized by one continuous rainy season of four to five months, lasting from November to the end of March, and dry weather in most areas during the other months of the year. Annual rainfall varies from less than 700 mm in the Middle Shire Valley to well over 2,000 mm on Mt. Mulanje. Rainfall distribution is highly influenced by orographic effects: windward slopes or mountains and areas with high elevation receiving more than the leeward

of hills or low lying areas. Mean annual temperature is highly correlated with altitude, varying from about 24 °C in the lower parts of the Middle Shire Valley to about 13 °C on the plateau of Mt. Mulanje. Most of Blantyre ADD experiences mean annual temperatures between 20 °C and 23 °C. Relative humidity varies with the seasons, being around 40 percent during dry season and 70-80 percent during the rainy season (LREP, 1992).

2.17 Vegetation

According to the LREP (1992) about 41 percent of Blantyre ADD remained under natural or derived vegetation. Because of the very high population pressure in the ADD the only remaining natural vegetation is found in land which is unsuitable or very marginal for cultivation. The overriding influences on vegetation type are climate and soils, particularly soil drainage. The low altitude, rather dry land of the Middle shire Valley has groups of woodland and savannas which are distinct from the escarpment and hill woodlands at higher altitude. There are small but important remnants of montane forest associated with some mountains and hills. The Chilwa plain has significant areas of grassland associated with poorly drained land.

2.18 Land Use in the ADD

The economy of Blantyre ADD relies heavily on agriculture. More than 85 percent of the population depends on agriculture for a subsistence living or employment. Agriculture also feeds the urban population of the city and is a major source of export earnings (tea, tobacco and coffee) for the country. Of great concern are overpopulation and high pressure on the land in the Shire Highlands and Mulanje district.

Three types of land tenure exist: customary land, public land and private land. Data on the area covered by different types of land tenure in the ADD is presented on a Rural Development Program (RDP) basis in Table 2.4 below.

Table 2.4 Land Tenure Data
Source: LREP (1992)

RDP/ Land tenure category	Blantyre/ Shire RDP ³ (ha)	Mulanje RDP (ha)	Mwanza RDP (ha)	Phalombe RDP (ha)	Blantyre ADD (ha)
Customary land	359,800	141,800	213,200	114,600	829,400
Public land	13,400	48,200	8,200	9,600	79,400
Private land	53,400	21,600	5,500	1,300	81,800
Urban areas, villages and infrastructure	22,800	5,500	2,600	2,400	33,300

As of 1992, the total area under smallholder cultivation was estimated at 511,900 (50 percent) of Blantyre ADD. Then it could be concluded that fallow land and other non-cultivation types of land use occupied slightly more land than crop cultivation. The situation has since changed as has been described in section 2.8 above. The average land holding size is 0.7ha for the ADD as a whole. The pressure on customary land is increasing rapidly due to high and still increasing population densities.

According to the LREP (1992) the smallholder sector can be subdivided into three major groups according to holding size and related socio-economic aspects:

- Smallholder farmers with less than 0.7ha grow subsistence food crops but also depend on off-farm income. More than 50 percent of holdings in the Shire Highlands fall in this group
- Smallholder farmers with 0.7-1.5ha grow mainly subsistence food crops and are largely able to sustain themselves
- Smallholders with over 1.5 ha are able to grow cash crops in addition to subsistence food crops.

The high pressure on the land in many areas is evident by the signs of over cultivation, overgrazing and depletion of fuel wood and timber. This over utilization of land has led to increased erosion and reduced yields.

³Includes Thyolo RDP. It was part of the Shire Highlands

A large number of crops are grown in Blantyre ADD but the major crops are maize (local, hybrid and composite types), rice, millet, sorghum, roots and tubers, groundnuts, pulses, cotton, tobacco and tea. At certain sites along watercourses, in valley bottoms and at the foot of escarpments crops can be grown in the dry season (LREP, 1992). This is referred to as dimba cultivation. Use is made of high water tables or residual moisture and sometimes water is carried to the crop by means of buckets. Dimba cultivation does not cover much land but provides a very valuable source of fresh produce during dry season. Crops are grown both for home consumption and for cash. Other important land use include livestock grazing, fishing using traditional methods from small ponds in some of the districts, plantation forestry and reserved land set aside to maintain biological diversity of both flora and fauna, and to protect heard water areas from soil erosion.

2.19 Socio-economic profile

The total population of the ADD is approximately three million (3,000,000). Settlement in the rural areas is of scattered nature with most people living near their fields in small villages, but concentrations of people are found in Blantyre City, a few other towns and on some larger estates. As in the rest of the country, people in the ADD make a living as smallholder farmers. Few have paid employment in manufacturing, services and construction in the city, as well as working in agriculture - in tea and tobacco estates.

2.20 Extent of Soil Erosion

The major forms of land degradation in the ADD are cutting and burning of natural vegetation and soil erosion (LREP, 1992). Soil erosion is a problem of considerable magnitude throughout the Shire Highlands, in most of the Mwanza highlands and in a few areas in Mulanje district. In some areas, notably the Thyolo Escarpment, slopes of up to 50 percent are cultivated with no other conservation practices other than contour ridging. Erosion is rapid in such situations and large areas with only a short history of cultivation are already in badly eroded state. According to Malawi Government (1994) the actual estimated soil loss for Blantyre ADD is 29t/ha/yr.

Water erosion is a major problem on customary land and on tobacco estates. Sheet and rill erosion are the dominant forms but gully and stream bank erosion also occur. Sheet and rill erosion lead to removal of plant nutrients, decrease in soil depth, deterioration of soil structure and lowered infiltration rates. Susceptibility to erosion is highest during the beginning of the rainy season when little or no ground cover exists on cultivated land and rainfall intensities are often high. Gully and stream bank erosion are of localised importance. Existing small waterways are often enlarged and deepened under the influence of the effects of vegetation removal and cultivation of valley bottoms

and stream banks. This erosion is clearly noticeable along the downstream sections of some rivers in the ADD.

CHAPTER THREE

POLICY: CONCEPT, PROCESSES AND IMPLEMENTATION ANALYSIS

3.1 Introduction

This chapter presents the literature review on policy, legislation and policy implementation analysis and also perceptions of soil erosion and policy. It aims to give the conceptual framework on which the thesis was based and starts by giving the broader perspectives of policy and the policy processes. Models of the policy implementation analysis have also been discussed.

The problem of soil erosion in Malawi has been looked at from different research angles much of which has been on modelling the erosion hazard. In this thesis the questions which were asked were 'why' is soil erosion still a problem in the country, and 'how' implementation of the soil conservation policy, has influenced the problem of soil erosion in the country. The following questions were also asked to answer the above concerns; has the policy failed? has the capacity to implement it been the cause of the erosion problem? what has been the impact of other policy directions taken by government in influencing the problem and finally what has been its impact on farming practices? It is hoped that the background provided in this chapter assists in answering these questions.

3.2 Conceptual Framework

The thesis was based on the broader framework of human-environment relationships of political ecology. Smith (2001) stated that the genesis of the study of human – environment relationships is rooted in ecological anthropology. In the 1960s, anthropology began to highlight the adaptive complex livelihoods of indigenous communities. A fundamental weakness of the anthropogenically-centred approach was the narrow focus that it employed. The community and household level research focus of anthropology did not contextualise communities and households within a broader framework. Interest in how communities and their resource use were being integrated and transformed through the influence of a global economic system was growing and a broader perspective proved necessary to analyse this. In response, a new Marxist inspired form of analysis emerged; political ecology.

Smith (2001) still noted that the discipline of political ecology is central to any meaningful analysis of human-environment interaction. It emerged as a response to the need to integrate the

study of land use practice within a broader political economic framework. Blaikie (1985), sought to place the concerns of ecology within a political economic framework. In accordance with this, soil erosion in the developing world was not necessarily a result of overpopulation, ignorance and bad management practice, but rather one of political economic constraint. Central to Blaikie's (1985) analysis was the 'land manager' who must be considered within a historical, political and economic context.

Political ecology provides a useful framework for the analysis of human-environment interaction attempting to encompass the multifaceted effects of development on environment and society. It however, draws on post-structuralist theory which stresses that environmental perceptions and experiences are wholly unique to the individual. Notions that the environment itself may be manifested as, for example an object of both alienation and desire or a source of conflict and contentment, are explored. In short, the way in which the environment is shaped by, and shapes society is acknowledged. Perceptions and realities of the environment and relationships with environment are contested, complicated and socially constructed and this must be incorporated into any meaningful analysis.

Citing Clark (1992), Cooper (1996:161) noted that 'developing a policy orientation starts with perception and needs' and she argues that if individuals perceptions are not taken into consideration in formulation of policy at its conception, then the chances of realising policy objectives must be significantly reduced. Cooper (1996) further reported that perceptions are an extremely complex concept. A study of human perception can be an indisputably valuable tool in the understanding of real world decisions. Perceptions form an integral part of the decision making process. The author further cites Viljoen (1980) (Cooper, 1996:3-4) as having defined perception as 'a phenomenal experience resulting from man-environment interactions and consisting of both *a source of information* (knowledge) about the environment and providing man with a directive for action in the environment'. On this point she reported that Viljoen (1980) stated that an awareness of man-environment's critical interrelationship was stimulated by the conspicuous results of exploitation of the natural environment. This awareness gave rise to the conception of a new and broadly defined field of psychology, which concentrates largely on environmental perception and the cognition of the environment. It is known as environmental psychology and takes the entire range of psychological phenomena in direct relationship to the large-scale environment as its subject matter. The manner in which humans perceive and form cognitions of their environment is now understood to be determining factor

in one's attitudes towards and behaviour in the physical environment. As such it provides social scientists with a new way of thinking about human behaviour in an environmental context.

Ittelson (1976) concurs on this point that perceiving is both phenomenal experience and directive for action. An understanding of the total environmental network within which perceiving takes place, both as a source of information and as an arena for action is an essential first step in unravelling the complexity to understand perception. Every organism lives out its day in relation to and as part of a large environmental context. All organisms receive information from this context through sense organs and process it, together with information from other sources in the nervous system. The reception and processing of information from the environment constitutes the area of study designated as perception. It is important as an area of study because it is the source of information about the environment which is ultimately related to the adaptive functioning of the organism.

Ittelson (1976) further noted that the relationship between perceiving and the situation, that is the role of the stimulus, shows that the stimulus is involved in perceptual process. It is the physical energy outside the organism which when it impinges on the organism, initiates processes, the end product of which is a response wholly determined, and predictable from the nature of the stimulus. The stimulus information is from and about the environment within which the individual lives and functions. Understanding the environment as a source of information is an essential and necessary part of the study of perception.

Environments are not and cannot be passively observed, they provide the arena for action. They define the probabilities of occurrence of potential actions, they demand qualities which call forth certain kinds of actions, and they offer differing opportunities for the control and manipulation of the environment itself. Environments call forth actions, but not blind, purposeless actions. Of course, what an individual does can be expected to be largely influenced by the particular purposes which he brings to the situation; at the same time however, the environment possesses the property of providing symbolic meanings and motivational messages which themselves may affect the directions which action takes.

Ittelson (1976) additionally wrote that it does seem clear that the individual cannot be separated from the environment. He is part of the system he perceives, and in turn experiences as being external to himself. The way one views the environment is thus a function of what one does in it including what strategies are used in exploring and conceptualising it. And what is done in the

environment represents in turn, a choice among many alternatives, the nature and scope of which are progressively restricted by previous, frequently irreversible decisions.

The fore-going discussion has helped to describe the role of environmental perception in decision-making. A decision is a choice between alternatives. Rational decision-making involves the selection of alternatives which maximise the decision makers values, the selection being made following a comprehensive analysis of alternatives and their consequences (Hill, 1997). Policy is an outcome of decision-making processes. Its definition and how it has been used in this study is explained under policy and legislation below. However, the next few paragraphs discuss policy making, analysis and processes as a direct output of the decisions made as a result of perceptions.

According to Cooper (1996) it is generally accepted by social psychologists that decision-makers, formulators of state policy, make decisions pertaining to the environment as they perceive it to be, not necessarily as it is. This is done against an informed background of their own personal beliefs and values. In this work therefore, the political ecology framework is appropriate because of the links it makes between man-environment relationship and how decision-making culminating in policy is arrived at. On that premise then, an analysis of the implementation of policy, which in essence is not differentiated from the policy making activity itself, can be made. In addition, the perceptions of those representing the decision makers and decision takers, can also be investigated.

According to Dunn (1981) policy analysis may be understood as the process of producing knowledge of and in policy processes. The characteristic feature of policy knowledge, apart from how it may have been produced, is its fundamentally practical orientation: knowledge is a guide to action rather than an end in itself. The aim of policy analysis throughout history has therefore been to provide policy makers with information that could be used to exercise reasoned judgement in finding solutions for practical problems. The advantage of this general formulation is that it permits us to explore the variety of meanings that in past times have been attached to the process of producing policy relevant knowledge.

Dunn (1981) further noted that the term 'policy analysis' need not be restricted to its contemporary meaning, where analysis is either equated with the separation or breaking up of a problem into its basic element or constituent parts, or is identified with the use of particular quantitative techniques associated with systems analysis, econometrics and applied

mathematics. On the contrary, there are many different ways to produce knowledge of and in policy processes. Understood in its widest sense, policy analysis may be traced to that point in the evolution of human societies where knowledge of and in policy processes was consciously cultivated, thus permitting an explicit and self-reflective examination of links between knowledge and action. Policy as a specialised activity therefore followed changes in social organisation that accompanied new forms of production technology and relatively stable patterns of human settlement. The age of the industrial revolution was also that of the “Enlightenment”- a period in which the belief in common human progress through science and technology became ever more dominant among policy makers and those advising them. It is in this period that the development and testing of scientific theories of nature and society are gradually seen to constitute the only possible objective means to understand and resolve social problems. In the realm of policy analysis, this meant the production of policy-relevant knowledge according to the canons of empiricism and the scientific method.

Policy analysis is an applied social science discipline which uses reason and evidence to clarify, appraise and advocate solutions for public problems. Yet to use reason and evidence is to follow certain procedures in an effort to produce rational arguments about policy; and it is in the area of the logic of inquiry where the most important methodological problems of policy analysis are found. Once we consider policy analysis as a way to use operations of the human understanding to resolve problems, it becomes apparent that there are many ways to practice policy analysis. The scope and methods of policy analysis are partly descriptive, and factual information about the causes and consequences of policy is essential for understanding public problems. The aims of policy analysis extend beyond the production of ‘facts’; policy analysis seeks also to produce information about values and preferable courses of action. Policy analysis therefore includes policy evaluation as well as policy advocacy (Dunn, 1981).

3.3 Policy and Legislation

Garland, Robinson and Pile (1994) noted that the term ‘policy’ is often used in a vague and ill-defined manner, such that it might refer solely to legislation or could embrace a far broader field. According to Park (1986) policy can be defined as a plan of action adopted or pursued by government. It may also refer to a set of guidelines or principles against which possible cause of action can be evaluated. Pasteur (2001) noted that policy is complex and dynamic and its making is conditioned and shaped by the political, social and economic environment as well as historical factors. Policy does not happen in isolation and the processes by which policy is

informed and formulated are also highly significant. Park (1986) also noted that policy decisions are not neutral or value free. The value system underlying decisions is a very important influence on how the decisions are made, and what factors are taken into account and how alternatives are evaluated. Policies shape how people pursue different livelihood strategies.

Thomson (2000) noted that the term policy can be used to include projects, programs, strategies, plans and their implementation, in fact, every element of public or collective decision-making. Policy can be divided into content and the process of formulation – the way in which content is arrived at. The author further asserted that the way policy is implemented can change the effective content of policy either because policy interactions have not been fully understood or because the policy is subverted by those responsible for implementing it. Clark (1992) reported that most professionals especially those working for government agencies implement policy, that is, they work to achieve objectives set forth in prior decisions. Policy most simply defined is a broad strategic statement of intent to accomplish aims. Policies are solutions formulated to solve problems and of course must be successfully implemented. Programs must be established, administered and many other decisions made in order to carry out stated aims.

Garland *et al.* (1994) further defined the understanding of policy as used in their research to describe a hierarchical grouping of goals, objectives and strategies. Goals are stated intentions with broad issues, whose realisation requires input from a number of fields, one of which may be conservation; objectives are precise targets which contribute to the attainment of goals; and strategies, if successfully implemented will achieve the objectives. In this work, the definition of policy is broadly defined as both the determination of a course of public (government) action and to the process of putting it into practice, including the description by Garland *et al.* (1994) given above.

Legislation provides a framework within which policy goals are translated into legal mandates to be implemented. It covers parliamentary acts, provincial ordinances, local by-laws and ministerial regulations (Schwella and Muller, 1992). Hooke (1988) noted that policy can be enacted at a variety of levels and in a number of different ways, exerting different degrees of control varying from binding legislation to vague guidelines and incentives for certain practices to be adopted. This author further noted that the national context generally provides the overall framework in which the general aims of the policy are identified, and the instruments of implementation articulated. Public policies are implemented through a range of measures,

though most of the basic frameworks are laid down at national level in accordance with the policies of the government in power.

In recent years, the notion that 'story lines' have a profound structuring effect on development policy and programming has become influential. Narratives can be seen as highly programmatic cause and effect stories that are strongly compelling – they shape perceptions of a problem and subsequently exert a strong pull on the behaviour of individuals and groups. These narratives are a part of a larger discursive understanding of policy problems. Discourses can be understood as the interaction of linguistic framings of issues and institutionalised practices (Keeley and Scoones, 2001).

3.4 Policy Processes

According to Keeley (2001), the term 'policy processes' covers several things: it emphasizes processes of making policy, of decision making and ways of putting issues on the agenda as matters of public concern, along with often other intangible processes of shaping the way issues are thought of and talked about. Policy processes are often thought of as defining problems or goals, coming up with policy solutions or choices and implementing these. Any process of policy change is inherently political, and can include or exclude the interests and perspectives of poor people. To understand the policy process as a whole, it is necessary to give attention to policy implementation. Implementation must be seen as a part of policy making because of its ability to transform policy often fundamentally. Hence this gives implementation studies a crucial importance in the study of the policy process.

Keeley and Scoones (1999) stated that the traditional starting point for defining policy is that policy constitutes the decisions taken by those with responsibility for a given policy area, and these decisions usually take the form of statements or formal positions on an issue, which are then executed by the bureaucracy. Conceived in this way, policy is a product of a linear process moving through stages of agenda setting, decision-making and finally implementation. However, in practice, policy is notoriously difficult to define. Rather than seeing policy as simply a single decision implemented in linear fashion, observers have noted that in practice, policies generally consist of a broad course of action (or inaction) or a web of interrelated decisions which evolve over time during the process of implementation. Policy also needs to be seen as an inherently political process, rather than simply the instrumental execution of rational decisions.

Keely and Scoones (1999) further noted that in attempts to understand the policy process three broad approaches can be characterised. First, the linear model, based on assumptions of rational and instrumental behaviour on behalf of decision takers. The focus is on the decision and the subsequent stages of implementation that follow. Such linear staged models offer a prescriptive, essentially top-down solution as to how things should work. These approaches make an important distinction between processes of decision and processes of execution. They have a long history in social science but as societies have become more complex and differentiated into specialist areas, the assumption that the organisation of all aspects of human life would become progressively smoother and more efficient, has proved problematic. The linear scheme is commonly only useful up to a point.

The second approach to understanding the policy process is to focus on policies as a course of action, part of on-going processes of negotiation and bargaining between multiple actors over time. In such a view, policies may not even be associated with specific decisions, and they are almost always multiple and overlapping. An incrementalist perspective on policy process which focuses on the action of policy actors and bureaucratic politics of the process is advocated in this case. Such a perspective suggests a more 'bottom-up' view of policy whereby agency of different actors across multiple 'interfaces' is emphasized. Here an analysis of practitioners and their day-to-day dealings with policy issues is key as is an insight into the timing of 'trigger events' and the role of policy entrepreneurs in pushing policy discussions in new directions.

The degree to which the classic linear model is useful in understanding policy processes depends on the policy area being considered. In the context of environmental policies, a top-down, instrumentalist perspective may be appropriate for analysing simple easily monitored and controlled regulatory policy issues set within a well-enforced legal framework. However, when looking at the complex, uncertain and variable context of rural resource management, by contrast, an emphasis on local negotiation and incremental field-level action may be more appropriate. However, both the two approaches outlined above, that have dominated the policy science literature over several decades, remain surprisingly silent on issues on power.

A third approach to understanding policy processes then can be added which takes the relationship between knowledge, power and policy as the centre of analysis. In this view, by mobilising a legitimising discourse and the associated metaphors, labels and symbols of scientific authority – support is granted to 'official' policies. Through the power of expertise, certain assumptions are normalised and subsequently internalised by individuals. By seeing

policy as a discourse, analytical attention is turned to the webs of power underlying the practices of different actors in the policy process, as well as the discursive and non-discursive practices which are invested in policy negotiation and contestation (Keeley and Scoones, 1999).

Keeley and Scoones (1999) additionally noted that these different perspectives on understanding policy processes assume different relationships between state authorities, bureaucrats, various forms of expertise and broader civil society. In the largely top-down decision oriented linear model, a privileged role for expertise is granted, and rational actions in the implementation process are assumed. Science creates a 'technocracy' and rational decisions are implemented in a clearly defined way by administrators, bureaucrats and field agents with the process of implementation seen as unproblematic – merely a matter of good administrative management – the key political focus is on agenda setting. By contrast, a bottom – up more implementation oriented perspective problematises the multiple incremental and complex processes of policy formulation and implementation to a far greater extent.

This background on policy processes has been given here because of the realisation that in this study policy needed to be viewed holistically. Policy as a tool of natural resources management can only be understood or established by considering the way the executive interprets its duties, implements and enforces specific pieces of legislation, and affords priorities to resource objectives along side all other societal goals. In addition there is need to distinguish the formal expressions of policy from the policies as implied by out comes and the ostensible decision process from the hidden decision agendas, and the covert influences on choice. Once the idea of a rationally staged management process is discarded, analysis becomes much more complex (Rees, 1990).

3.5 Policy Analysis

Clark (1992) noted that the policy sciences offer a way to improve decisions, programs and policies through scientific inquiry. The premise of the policy sciences is that there is often a significant gap between the limited effectiveness of many policies and existing knowledge available to improve the policy process. The policy sciences are a primary form of inquiry with practical applications and useful because they seek to augment by scientific decision methods and the behavioural sciences, the process that humans use in making judgements and taking decisions.

Patton and Sawicki (1986) stated that policy analysis is the process through which we identify and evaluate alternative policies or programmes that are intended to lessen or resolve social, economic, or physical problems. However, the term policy analysis is also commonly used to refer to the product or outcome of the analytical process. The process and the product is oral and written persuasion through which the analyst seeks to inform others about the insights gained during examination of the policy problem. The term policy analysis continues to evolve. Over the years, policy analysis has also been defined as:

- a) a means of synthesizing information including research results to produce a format for policy decisions (the laying out of alternative choices) and of determining future needs for policy-relevant information;
- b) a complex process of analysing, intervening in and managing the political conflict that is inextricably related to urban change;
- c) the systemic investigation of alternative policy options and the assembly and integration of the evidence for and against each option. It involves a problem-solving approach, the collection and interpretation of information and some attempt to predict the consequences of alternative courses of action;
- d) the choice of the best policy among a set of alternatives with the aid of reason and evidence;
- e) an applied discipline which uses multiple methods of inquiry and argument to produce and transform policy-relevant information that may be utilized in political settings to resolve public problems;
- f) a form of applied research carried out to acquire deeper understanding of socio-technical issues and to bring about better solutions. Attempting to bring modern science and technology to bear on society's problems, policy analysis searches for feasible courses of action, generating information and marshalling evidence of the benefits and other consequences that would follow their adoptions and implementation, in order to help the policy makers choose the most advantageous action

(Patton and Sawicki, 1986).

According to Gordon, Lewis and Young (1993), the most obvious distinction in varieties of policy analysis is in terms of explicit purpose and / or client, separating analysis *for* policy from analysis *of* policy. In terms of established lines of research this is probably the most important

distinction and also reflects a division of disciplinary concerns. Yet within this dichotomy lies a continuum of activities from policy advocacy at one end to the analysis of policy content at the other. The typology of policy analysis continuum is shown in Table 3.1.

Table 3.1 Typology of Policy Analysis Continuum
(Source: Gordon *et al.* 1993)

Analysis for policy		Analysis of policy		
Policy	Information	Policy	Analysis of	Analysis
Advocacy	for Policy	Monitoring	Policy	of Policy
		and Evaluation	Determination	Content.

The following sub-sections discuss the various components of the depicted continuum in more detail. The information is drawn from the same reference source.

3.5.1 Policy advocacy

Gordon *et al.* (1993) stated that this term is used to denote any research that terminates in the direct advocacy of a single policy, or of a group of related policies, identified as serving some end taken as valued by the researchers. The connection of such research with the decision network may be rather less direct. It may be aimed at policy-makers or it may serve to challenge existing policies and appeal to rival groups or public opinion at large. In some cases policy advocates argue from their findings toward a particular conclusion, which is offered as a recommendation.

3.5.2 Information for policy

In this mode, the researcher's task is to provide policy-makers with information and perhaps advice. It assumes a case of action, in terms of either the introduction of a new policy, or the revision of an existing one. It may be carried out within the research branch of a government department or by outside researchers funded by that department; by unfunded individuals or associates who have simply chosen to address their scholarly activities to policy issues. The activity itself may be confined to the provision of data for consideration in policy making. It

may however go beyond this to elucidate casual relationships and thereby to suggest definite policy options.

3.5.3 *Policy monitoring and evaluation*

Policy monitoring and evaluation frequently take the form of *post hoc* analysis of policies and programs. In an obvious sense, all public agencies perform monitoring and evaluation functions in respect of their own activities. Evaluation for policy *review* is, on the other hand a more self-conscious business, particularly where the policy or program in question has an experimental aspect. Monitoring and evaluation can be aimed at providing direct results to policy makers about the impact and effectiveness of specific policies. But it can do more than this. Post hoc review of policy impact may be used for feasibility analysis in future policy design, via the specification of a feasible set of actions. In this mode, the object of policy analysis is to inform policy-makers of the limits of possibility. 'Better' policies might then be those which are more closely tailored to the constraints of feasibility imposed by the intractable world of the policy-makers.

3.5.4 *Analysis of policy determination*

The emphasis here is upon the input and transformational processes operating upon the construction of public policy. Attempts to analyse the policy process are inescapably based upon explicit or implicit models of the policy system.

3.5.5 *Analysis of policy content*

This category of activity includes many studies which have been carried out within the social administration and social policy field of the origin, intentions and operation of specific policies. While their results may help to inform policy-makers, this is not usually an explicit aim of such studies for they are conducted for academic advancement rather than public impact.

The analysis carried out in this study falls in the typology of *information for policy*. The rationale for this was that given that the researcher is a practitioner in the field of land husbandry, the information will provide useful data for consideration in future policy revisions as noted in section 1.1 (Motivation for the study).

The above sections have helped to locate the typology of the analysis for this work. However, it is also necessary to review the different types of implementation models which have been used in different settings of policy implementation.

3.6 Policy Implementation Analysis

Sabatier (1993) noted that an enormous amount of research on policy implementation had been done and the early work was primarily American – motivated in part by perceived failures in Great Society programs. The second generation of studies were more analytical and comparative in perspective, but they maintained the same top-down perspective as earlier writers, that is, they started with a policy decision (usually a statute) and examined the extent to which its legally mandated objectives were achieved over time and why. Later, a quite different approach emerged, in response to the perceived weakness of the ‘top-down’ perspective. Rather than start with a policy decision, these ‘bottom-uppers’ started with an analysis of the multitude of actors who interact at the operational (local) level on a particular problem or issue. In the process, the familiar policy stages of formulation, implementation and reformulation tended to disappear. Instead, the focus has been on the strategies pursued by various actors in pursuit of their objectives. Such studies have shown that local actors can often deflect centrally-mandated programs toward their own ends.

3.6.1 Top-down Approaches

Sabatier (1993) noted that Sabatier and Mazmanian (1979)’s work forms a good basis for top-down approach. The essential features of a top-down approach are that it starts with a policy decision by government (often central government) officials and then asks:

1. to what extent were the action of implementing officials and target groups consistent with the objectives and procedures outlined in that policy decision?
2. to what extent were the objectives obtained over time, that is, to what extent were the impacts consistent with the objectives?
3. what were the principal factors affecting policy outputs and impacts, both those relevant to the official policy as well as other politically significant ones?

4. how was the policy reformulated over time on the basis of experience?

A variety of legal, political and tractable variables affecting the different stages of the implementation process (Figure 3.1) were identified.

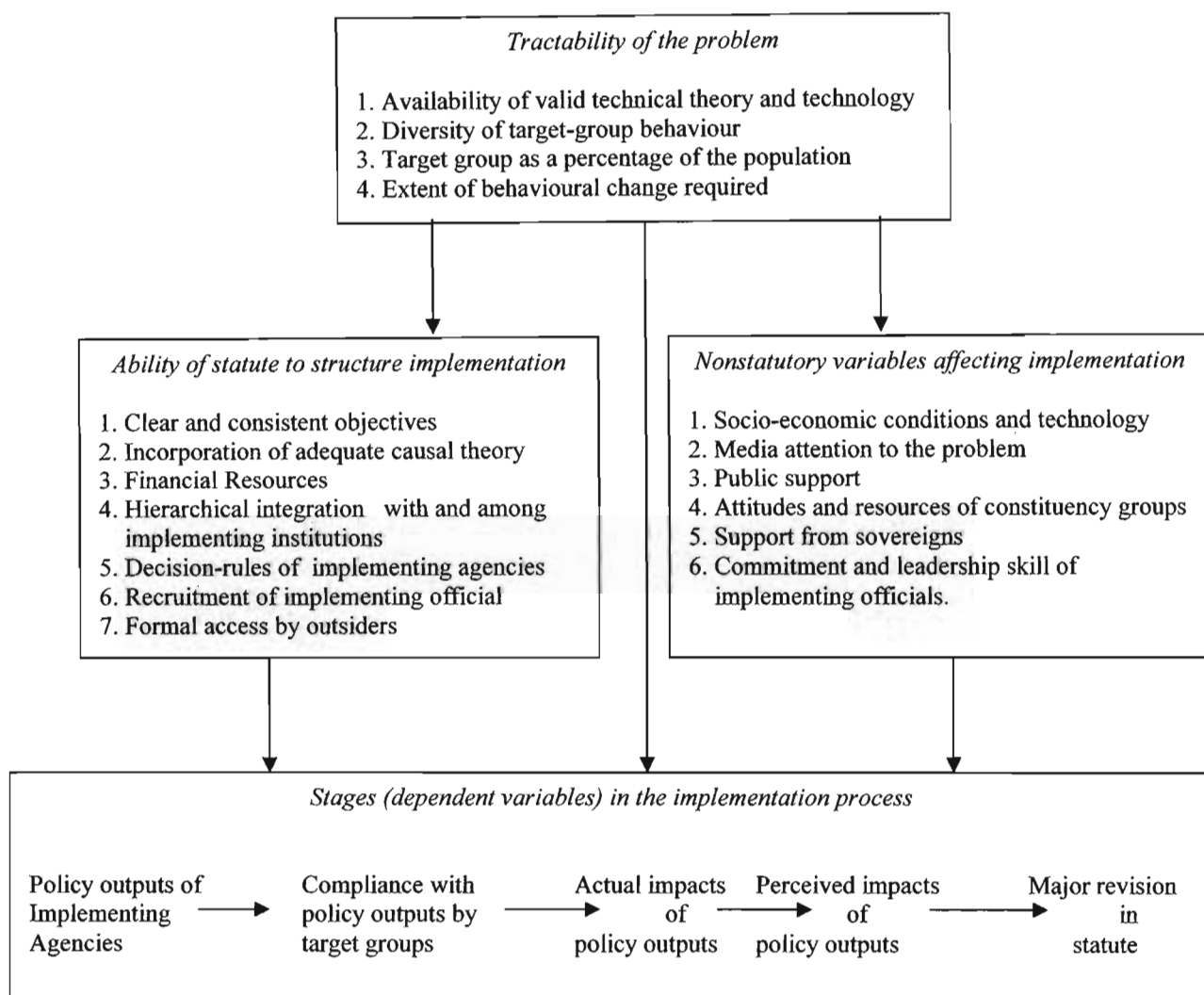


Figure 3.1 Skeletal Flow Diagram of the Variables Involved in the Implementation Process (Source: Sabatier, (1993))

Sabatier (1993) stated that a synthesis of this large number of variables was made into a shorter list of six sufficient and generally necessary conditions for the effective implementation of legal objectives. These were:

- **Clear and consistent objectives**
 - *Officials implementing the policy have a standard of evaluation and legal resource for implementation.*

- **Adequate causal theory**
 - *Policy intervention incorporates an implicit theory about how to effectuate social change.*

- **Implementation process legally structured to enhance compliance by implementing officials and target groups.**
 - *A variety of legal mechanisms in program delivery, sanctions and incentives included to overcome resistance and different actors involved to give it priority.*

- **Committed and skilful implementing officials**
 - *Discretion by implementing officials, commitment to policy objectives and skills in utilising available resources is very critical to implementation.*

- **Support of interest groups and sovereigns.**
 - *Maintaining support from interest groups and legislative and executive sovereigns throughout the whole implementation process should be encouraged.*

- **Changes in socio-economic conditions which do not substantially undermine political support or causal theory.**
 - *Important to take note of the changes which could have repercussions on the political support or the causal theory.*

In short, the first three conditions can be dealt with by the initial policy decisions (e.g. statute), whereas the latter three are largely the product of subsequent political and economic pressure during the implementation process.

3.6.2 Bottom – up Approaches

According to Sabatier (1993) the bottom-up perspective began with an acute awareness of the methodological weakness of the top-down approach, a commitment to develop an inter-personally reliable methodology, and a concern with policy area – e.g. manpower training – involving a multitude of public and private organisations. In contrast to the top-down approach, the bottom-up approach starts by identifying the network of actors involved in service delivery in one or more local areas and asks them about their goals, strategies and activities, and contacts. It then uses the contacts as a vehicle for developing a network technique to identify the local, regional and national actors involved in planning, financing and execution of relevant governmental and non-governmental programs. This provides a mechanism for moving from street-level bureaucrats (the ‘bottom’) up to the top policy-makers in both public and private sectors. The strengths of this approach include: that they have developed an explicit and replicable methodology for identifying a policy network (implementation structure).

3.6.3 Comparative Advantage

The top-down approach is useful in cases where there is a dominant public program in the policy area under consideration or the analyst is solely interested in the effectiveness of a program. In a policy area such as manpower training and employment development, which necessarily involves a multitude of public and private actors, the bottom-up approach is more appropriate. On a more general note, the top-down approach is more useful in making a preliminary assessment of which approach to use: to the extent that the scores on the six conditions of effective implementation (summarised from the flow diagram of implementation, refer to section 3.6.1) are relatively high and the investigator is primarily interested in the *mean* policy outputs and outcomes, then the top-down approach is appropriate. On the other hand, in cases where the scores on the six conditions (refer to section 3.6.1) are relatively low and one is interested in inter-local variation, then the bottom-up approach should be employed. When scores on the six conditions are moderate or mixed, the appropriate methodology depends on whether one is primarily interested in mean responses or on assessing inter-local variation. The top-down is more appropriate for the former because it focuses on the extent to which the overall system is structured or constrained. The bottom-up focuses on local implementation structures, and this is better for assessing the dynamics of local variation.

In summary, the top-down approach appears to have a comparative advantage in situations in which (1) there is a dominant piece of legislation structuring the situation or (2) research funds are limited, one is primarily interested in mean responses, and the situation is structured at least moderately well. In contrast, the bottom-up is more appropriate in situations where (1) there is no dominant piece of legislation but rather large numbers of actors without power dependency or (2) one is primarily interested in the dynamics of different local situations.

3.6.4 Synthesis

Sabatier (1993) additionally reported that there have been efforts to synthesize the best features of the two approaches. One of these developed by Richard Elmore (1985) attempts to combine his previous work on 'backward mapping' – one of the bottom-up classics with what he terms 'forward mapping', essentially a top-down perspective. He argues that policy-makers need to consider both the policy instruments and other resources at their disposal (forward mapping) and the incentive structure of ultimate target groups (backward mapping) because program success is contingent on meshing the two. Elmore's paper is primarily concerned with aiding policy practitioners by indicating the need to use multiple perspectives in designing and implementing policies. While Sabatier (1993) acknowledges that it is excellent at a practical level he argues that it does not purport to provide a model of the policy process which can be used by social scientists to explain outcomes in a wide variety of settings.

Sabatier (1993) further reported that, the other approach, by Mazmanian and Sabatier (1983), explicitly attempts to develop such a general model of the policy process which combines the best features of the bottom-up and top-down approaches, while also applying them to a longer time-frame which is the case in most implementation research. Sabatier (1993) noted that it was contended that the relatively short time span used in most implementation studies did not only lead to premature judgements concerning program failure but also missed some very important features of the policy process, namely the extent of policy-oriented learning. In the approach consistent with the bottom-uppers, one needs to start from a policy problem or subsystem rather than a law or other policy decision – and then examine the strategies employed by relevant actors in both the public and private sectors at various levels of government as they attempt to deal with the issue consistent with their objectives.

The concerns of top-down theorists with the manner in which legal and socio-economic factors structure behavioural options needs to be incorporated into the synthesis as do their concerns

with the validity of the casual assumptions behind specific programs and strategies. This leads to a focus on (1) the effects of socio-economic (and other) changes external to policy network subsystem on actors' resources and strategies; (2) the attempts by various actors to manipulate the legal attributes of governmental programs in order to achieve their objectives over time; and (3) actors' efforts to improve their understanding of the magnitude of and factors affecting the problem - as well as the impacts of various policy instruments – as they learn from experience. Attention thus shifts from policy implementation to policy change over periods of 10-20 years. This leads to focus on advocacy coalitions i.e. actors from various public and private organisations who share a set of beliefs and who seek to realise their common goals over time.

As will be apparent from the information provided in chapter 4, the type of implementation adopted by the government of Malawi has been that of the top-down approach. Only recently is the government in the process of accommodating bottom-up approaches. Therefore in this study, the top-down approach provided the framework for analysis. However, this study was not only concerned with analysing policy implementation from a service delivery perspective but also from a livelihoods one. Therefore a framework which incorporates a livelihoods perspective in its analysis would be appropriate because the information created in such an analysis would then assist in future programmes. In addition, given that the current environmental management emphasis is on sustainability, the framework for analysis should also incorporate this. The Sustainable Livelihood (SL) framework was therefore adopted for analysis of policy in this study.

3.6.5 The Sustainable Livelihood Framework for Policy Analysis

Shankland (2000) asserted that while the top-down policy analysis often ignores the realities of how policies affect people, bottom-up approaches such as sustainable livelihood analysis often generate information that is locally too specific to be useful in policy making. The SL framework (Figure 3.2) links bottom-up analysis with the traditionally top-down business of analysing processes and proposes a number of ways of responding to these changes. In the context of the SL, policy is broad because the entry points for policy based intervention may be located anywhere between the formulation of policy and its implementation. It is also the way policy is implemented as much as its formal content which determines its ultimate effect on livelihoods. The translation of policy into practice is itself an inseparable part of policy making.

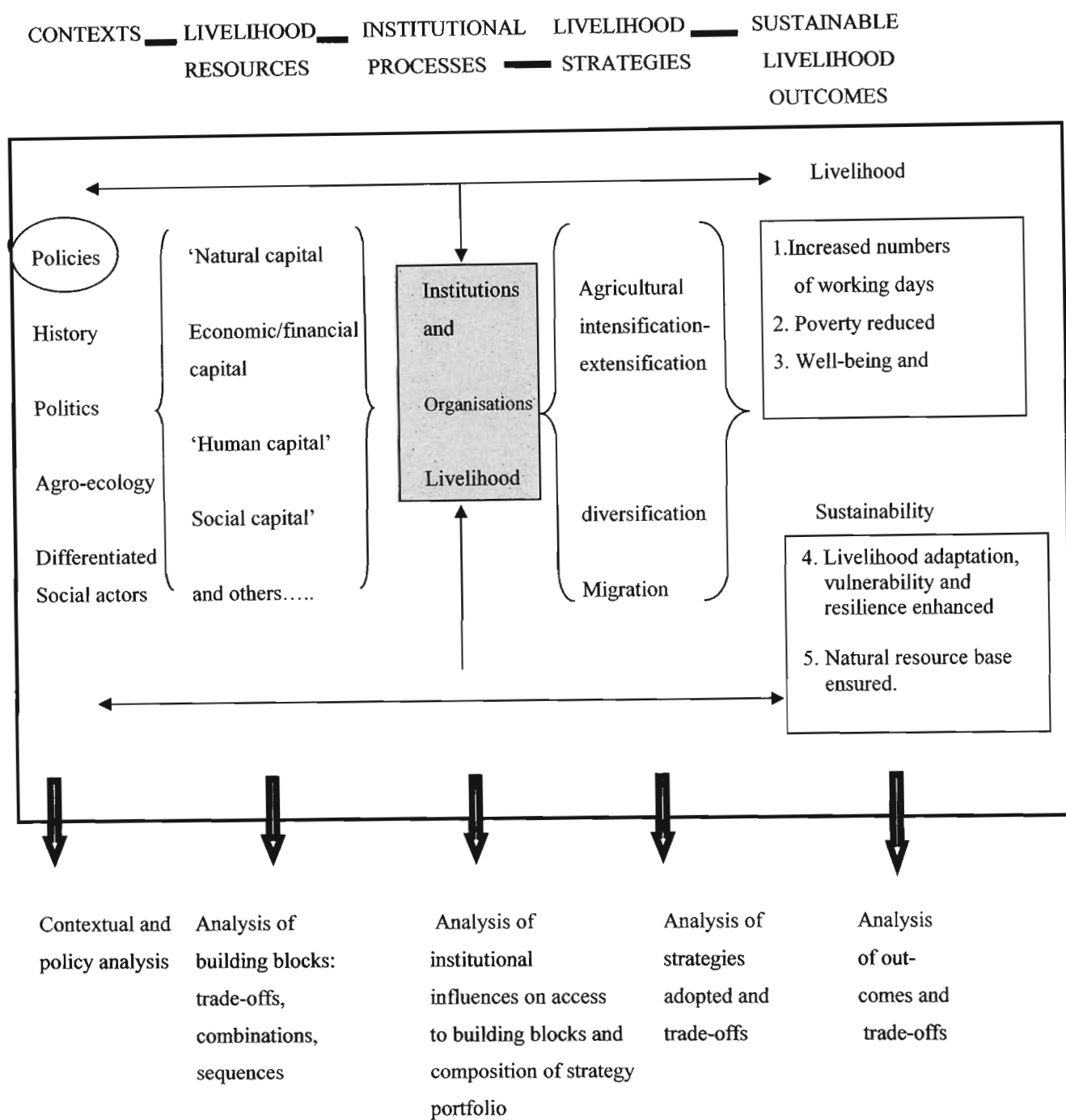


Figure 3.2 The Sustainable Livelihoods Framework
(Source: Shankland (2000))

Policy analysis in this context then refers to investigation of both policy content and policy process, linked by an examination of the institutions, organisations and actors which influence policy measures from their formulation to the point where they impinge upon people and their livelihoods. Shankland (2000) noted that this approach is supported by much recent work on the

policy process which in emphasising the multiplicity of decisions, actors and interests involved has demonstrated that the world of policy is as complex and dynamic as the micro-level reality within which poor people themselves map out their livelihood strategies. A key strength of the SL approach is held to be its potential for 'linking the micro to the macro', that is for establishing connections between local realities and the level at which policies intended to change these realities are formulated.

SL analysis is by definition contextual, (since the specific context is an integral part of the framework), and its findings will therefore tend to bear out the general rule that there is a trade-off between accurately reflecting complex local conditions and generating data which can be easily aggregated and/or compared with information from other localities. There is potential in the SL focused policy analysis both to generate widely applicable findings about policy content and to guide the design of well targeted intervention in the policy process. This is because it enables a disaggregated understanding of the resources available to, and the strategies pursued by, different individual households and social groups within a particular context. Policy is conceptualised as part of this context, or confined to the 'grey box'. This box contains the factors which mediate the ability of different groups to pursue particular livelihood strategies. These factors are labelled differently by different authors, e.g. institutions and organisations; transforming structures and processes; policies, processes and structures; and policies, institutions and processes (Shankland, 2000).

Shankland (2000) goes on to show that the *framework's usefulness as a tool for policy analysis*¹ is constrained by three specific limitations. The first is that by including policy alongside other contextual or institutional factors it fails to recognise the distinctive ways in which policy influences livelihood strategies and outcomes. The second is that by concentrating on the contribution of 'social capital' to livelihood strategies rather than its relationship with power and empowerment, it does not leave room for exploring the opportunities and constraints for poor people themselves to engage in the policy process. The third is that by putting people and their livelihood resources and strategies at the centre of analysis, it limits the space for examining policy in its own right since to do that would necessarily imply that a 'policy-centred' is required rather than a 'people-centred' approach. He further stated that addressing each of these limitations requires a different strategy. The first requires the development of a model of 'how policy affects livelihoods' which is compatible with the logic of the framework,

¹ Note from the researcher: As a framework, it would only be useful for the intended outcome after a few changes have been made- not restricted to the framework. In this case, for policy analysis, the three limitations addressed should be taken into consideration before applying the logic of the framework. Therefore, Figure 3.3 takes into consideration this important factor.

so that the findings of SL analysis and policy analysis can be usefully combined within a single frame of reference. The second requires that the framework takes into account the people's political resources in examining the assets on which they are able to draw. The third requires the recognition that policy analysis for sustainable livelihoods must include investigation of higher level processes operating outside the scope of the 'people-centred' SL framework. It is therefore necessary that it must be a distinct process from a livelihoods analysis itself, albeit one that is designed to complement rather than substitute for bottom-up analysis.

As Shankland (2000) further asserts, policy analysis for SL should complement SL analysis but cannot restrict itself to the SL framework. A parallel approach of 'policy-centred' analysis is therefore required combining rigorous examination of policy-specific factors with careful attention to the need both to inform and draw in the findings of the 'people-centred' examination of livelihoods which SL analysis provides. Therefore, Figure 3.3 explicitly locates the components of policy analysis from the sustainable livelihood framework.

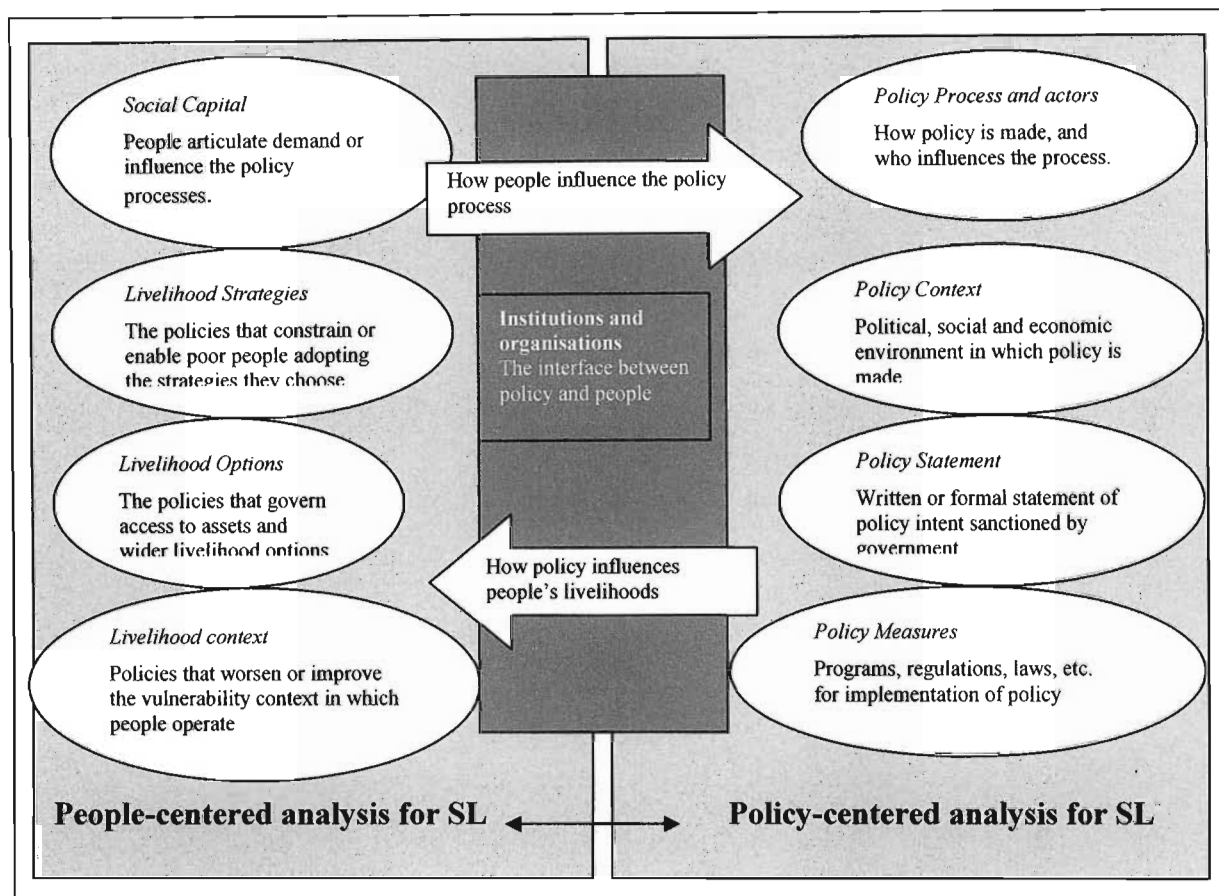


Figure 3.3 Components of Policy Analysis for Sustainable Livelihoods

(Source: Pasteur (2001))

Furthermore, Shankland (2000) noted that, the absence of complementary data on local livelihood realities is unlikely to prove a serious barrier to the effective application of policy analysis for SL. Table 3.2 shows how this study accommodates Shankland's (2000) checklist for analysing policy for sustainable livelihoods.

Table 3.2 Analysing Policy for Sustainable Livelihoods: A Checklist (Source: Shankland (2000))

Characteristic of Policy	List of questions	For this work
Livelihood Priorities	<ol style="list-style-type: none"> 1) who are the poor? 2) what are their livelihood priorities? 3) what policy sectors are relevant to these priorities? 	This part has already been identified in chapter 4 hence, it will be discussed as has been presented.
The policy context	<ol style="list-style-type: none"> 1) what is policy in those sectors? 2) who makes policy in those sectors? 3) what is the macro policy context? 	The main policy under consideration is the soil and water conservation policy, hence, the information provided on this policy in chapter 4 forms the basis for the context.
The policy measures	<ol style="list-style-type: none"> 1) what measures have been put in place to implement each policy? 2) what are the characteristics of these policy measures? 3) through what institutions and organisations are these measures channelled? 	The policy measures put in place for implementation of the soil and water conservation policy will be analysed.
Policy in the local context	<ol style="list-style-type: none"> 1) in what shape do these institutions and organisations exist locally? 2) what other institution sand organisations affect local responses to policy? 3) what other local institutions and organisations might policy affect? 	The local context in which the soil and water conservation policy is implemented will be analysed.
People and policy	<ol style="list-style-type: none"> 1) what resources can poor people draw on to influence policy? 2) what opportunities exist for poor people to influence policy directly? 3) what opportunities exist for poor people to influence policy indirectly? 	This part will also be analysed using information provided in chapter 4.

The above section has described policy analysis using the SL framework. In policy analysis, another important component is that of perception of the issues for which a policy was developed, and in this case the issue of soil erosion. The next section therefore presents a review of the perceptions of land users and officials on soil erosion and the soil and water conservation policies.

3.7 Perceptions of Soil Erosion and Policy.

As noted in section 3.2 above, perceptions play an important role in decision making. Kinlund (1996) noted that it is important to ask why damaging land use practices are not changed apart from the structural aspects which contribute to land degradation. Attention should be directed at the perceptions and decision-making strategies of the land user. One explanation given is that the land user is often unaware of what scientists or administrators perceive as being a problem. A substantial amount of research has shown that land users all over the world have a fine-tuned knowledge of the environment. In fact, land degradation which goes unnoticed does not necessarily mean that the farmer lacks knowledge of the environment and is ignorant in a pejorative way. Indeed many changes in soil quality are very difficult to notice. Even early stages of actual erosion are often not easy to detect by the farmer or any observer. The land user may not be aware of the effects of low rates of erosion until a critical level of accumulated loss is reached, and this may take many years. In addition, it is shown that African farmers often refer to site fertility rather than soil fertility. It may be the case that ash, vegetation or manure rather than soil gives a place fertility.

In addition to the above factors, the above named author further noted that another factor that influences the perception of and response to land degradation in most developing countries is the increasing dependency on non-farm incomes. Soil conservation measures may therefore become less economically attractive. Furthermore soil erosion may not even necessarily be perceived as a negative process, because it could be perceived as being counteracted by soil formation. Even where land degradation processes are evident to land users or decision-makers, they may not necessarily be regarded as serious. Studies from Australia for example, show that farmers often underestimate levels of erosion. Additionally, it is difficult to show a correlation between land degradation and productivity. A farmer may therefore notice soil erosion occurring on his or her fields but not see any impact on productivity – if indeed there is any impact.

Soil erosion may remove nutrients from soils, sort out fine particles and thereby reduce water holding capacity and limit the rooting depth, it may cause surface crusting and compaction which prevents plant germination and reduce infiltration, it may also affect the structural stability of the soil. Nevertheless, soil erosion figures or visible soil erosion may be poor indicators of the impact of erosion on crop yield. Ten tonnes of soil loss on some tropical soils may have a far greater impact on yields and extremely sensitive to even minor losses of material. The initial soil loss may have a great impact upon yield, but when the A-horizon has been lost any further soil loss may have little additional impact. Soil conservation measures in such cases will thus have little impact on productivity.

Kinlund (1996) asserted that a further reason for land degradation not being perceived as a serious problem by decision makers may simply be that they have other more urgent things to worry about. In addition, even where land degradation processes are regarded as being serious by the land user, they may still be left unchecked. The land user may not know what to do about it, or may not be able or willing to carry out any measures. Despite the use of traditional sound farming practices, such as contour cropping, live fences and mixed cropping, farmers may not be aware of their value as measures of conservation. Established land use practices may no longer be appropriate or possible social-economic and political change in society can influence local knowledge in various ways. Knowledge of traditional land use practices may have been lost but new knowledge about markets, non-farm incomes, and the outside world may have been acquired instead.

The possibilities available to a household to combat land degradation depend to a significant degree upon its social characteristics. Female-headed households usually have lower incomes and are often unable to obtain the necessary inputs for agricultural development including soil conservation. Soil conservation is more likely to be implemented on land where short-term economic benefits can be gained i.e. on land cultivated with cash crops, usually an area of male responsibility. Recommendations from extension workers or foreign 'experts' may be inappropriate. It may simply be that extension workers usually talk to male farmers, when in fact it is the female farmers who have the knowledge, see the problem or are aware of the amount of time that has to be spent on a particular conservation measure.

The age of a farmer can also play an important role in decision making. Scepticism to conservation measures on the part of land users can be caused by the knowledge that some measures will have a negative effect on the farm economy as a whole. It has also been shown

that conservation measures or 'modern' agricultural practices in many cases do not increase yields sufficiently to make them attractive to farmers. Consequently, more interest has recently been focussed on agronomic conservation methods such as grass strips, mulching and multi-cropping. A problem lies in the differing perspectives, goals and ambitions of the farmer and the extension worker, planner or donor of funds. From the farmer's point of view, minimising risk rather than maximising profit is often the guiding principle. The planner can define the problem as being one of achieving sustainable growth. Few land users are interested in soil and water conservation from the stand point of controlling or preventing erosion.

Garland *et al.* (1994) reported that some studies have shown that those in need of soil conservation often do not realise it. Citing Hallsworth (1987) Garland *et al.* (1994:5) noted that in an empirical analysis embracing ten developing countries, the perception of erosion and awareness of its effects was highly variable amongst subsistence and small scale farming communities. Most farmers with eroded land realised that yields were falling, but often did not relate this to soil loss. Despite the obvious presence of gullies and sheetwash many did not perceive erosion to be something that some way affected their well being. The likelihood of such communities implementing conservation farming techniques which demand additional materials and labour, and take land temporarily or permanently out of production is therefore slight.

According to Brinkate and Hanvey (1996) soil erosion is seen by most people to be caused by the natural processes of rainfall and wind. While this shows an astute perception of the physical process of erosion amongst the respondents it also shows that human-induced or accelerated erosion is often not perceived. Generally, local people are aware of degradation but it is certainly not regarded as the most serious problem in day to day to living. Studies on perceptions of people who are direct land managers show that they do regard it as a serious problem in day to day living because it impinges on their ability to grow crops and food. Education and socio-economic factors, people's needs and their immediate interests govern the way in which they assess the deterioration of their environment. Education leads to greater understanding and thus greater awareness of the problem. Historical and social processes at work in the community may affect and formulate their terms of reference and their perceptions of soil erosion phenomena. Furthermore, these authors note that soil erosion is therefore generally only regarded as a problem by the people when it creates a significant and noticeable practical problem which affects their day to day routine and not because of any concern for the degradation of their immediate environment. Most other literature on people's perception of

soil erosion does not take into account the perception of different erosional forms, however, there is an awareness amongst the people regarding different erosional forms, but that gully erosion is the form most often perceived and considered as a problem.

As little is known of the economic costs of land degradation, the economic benefits of soil conservation are also difficult to assess. To individual land users, figures of soil loss are abstract and of little interest. The problem is that the cost of conservation measures to the farmer are often higher than the cost of land degradation, especially measures involving the building of physical structures. It is also important to remember that it is not only the initial cost and benefits of soil conservation structures that need to be considered, often overlooked by outsiders are the costs and labour needed for maintenance of these structures. Consequently it has been shown that agronomic methods may not only be cheaper, but also more sustainable than mechanical measures. Even where soil conservation measures are effective, the approval of land users may not be assured, and there may be other negative aspects of more direct concern to the farmer for example – it is reported that in hedges planted along gully edges or grass planted on terraces harbour rats and snakes. It is not easy to explain the different aspects of land degradation and generalisations are difficult to make (Kinlund, 1996).

Many factors influence a farmer's decision to adopt soil conservation measures. Anderson and Thampapillai (1990) noted that on and off-farm income, access to low cost credit especially when targeted to conservation, are the factors that are positively associated with soil conservation. In addition, a low rate of discount or a long policy planning horizon, a high level of education, access to sound technical advice and secure land tenure. Barriers include the negatives of these factors (insecure tenure) low subsidies on inputs such as fertilizer and irrigation water and high population pressures. These authors also asserted that nearly every relationship in soil erosion between type and status and land conservation system is either difficult to define or is inherently random.

Much erosion is associated with extreme events that occur rarely, but cause the bulk of the damage. Furthermore, the recognition of soil conservation as an input in production leads to two concepts. Firstly, the effect of soil conservation on output and income. Secondly, the factors influencing the adoption of soil conservation such as technology, use of fertilizers, education and policy incentives. A point should be made that not all soils are equal. Fragile soils are typical of many tropical areas and robust soils are more typical of temperate regions. Many soils are inherently poor that a soil improvement program is a necessary prelude to any work on

production. Anderson and Thampapillai (1990) further asserted that such considerations should be kept in mind because literature on soil erosion and conservation is dominated by work on relatively well-buffered soils of North America. Furthermore, farmers attitude to risk also influence their willingness to invest in soil conservation. Farmers' receptiveness depends on their beliefs about the short and long term net returns associated with these practices. Conservation practices generally lead to modifications of farm operations and could create additional presumably, undesirable uncertainties. Uncertainty may be particularly worrying for farmers who operate at the margin of economic survival.

3.8 Conclusion

This chapter has described the theoretical background upon which the study was based. The Political ecology framework provides a good basis for examining human-environment relationships. Decision-making is conceptualised in this framework through understanding the environmental perception which is the process of reception and processing of information from the environment. The environment provides the arena for actions and calls forth for actions. What is done in the environment represents a choice among many alternatives. Policy is an outcome of decision-making processes.

In this study, the environment as a source of information, displays the problem of soil erosion and provides the arena for action which are the various responses to it. However, since the way one views the environment is a function of what one does in it, the decisions by farmers to implement conservation measures or not are as a result of their perception of what information they receive or view from the environment. In short, perceptions are important in decision-making.

Policy is complex, and as such using scientific enquiry to produce knowledge in and for policy processes, leads to identifying the scope and methods of policy analysis which extend beyond production of facts to produce information about values and preferable courses of action. Policy processes cover several things, but to understand the policy process as a whole it is necessary to give attention to policy implementation. Hence implementation studies are important in policy processes.

Policy implementation analysis should achieve either it being for the *analysis for policy* or *analysis of policy*. However, two predominant models of implementation analysis still dominate

in policy implementation studies. Their synthesis seems to be a good balance and provides the best of the two methods making it effective.

In policy implementation it is also important to consider the livelihood of the people on whom the policy intends to derive a social change. An understanding of the issues which concerns them would be appropriate for the betterment of their lives. Sustainability is another component which should also be given priority when dealing with issues of human-environment interaction.

Perceptions play an important role in decision making, and studies conducted in soil and water conservation have shown that the land users usually have a different perception from that of the implementing agency, such that an understanding of the views of the land users would be a crucial step to the success of a conservation policy.

The next chapter provides the background information on soil conservation in Malawi. This formed a basis for policy implementation analysis.

CHAPTER FOUR

SOIL CONSERVATION IN MALAWI

4.1 Introduction

This chapter reviews the problem of soil erosion facing the world in general and Malawi in particular as an important context for understanding soil and water conservation policy as a response. The global overview of the problem and its response has been given through discussing the concept of and factors which control soil erosion, as well as the two broad approaches to soil erosion. It is important to look at the problem of soil erosion in the whole world in this study in order to trace the history of conservation thinking. This thinking led to the development and establishment of conservation theories, policies and laws to conserve natural resources in general and control soil erosion in particular.

In addition to exploring the general overview of the problem, the perception of its status, its causes and the response to it in the country is made for three distinct periods. These periods, though chosen arbitrarily for ease of presentation, have shown that they are significant in the history of soil and water conservation history for the study. These are the period before 1964, between 1964 and 1992 and after 1992.

The pre-1964 period is important because it forms the basis of the history of soil conservation policy and legislation implementation. The 1964-1992 period has been a period of economic growth and expansion, which was to a greater extent agro-based such that agricultural policies were in many cases affected. By implication, the soil conservation practices by smallholder farmers and policy implementation were affected too. This period also forms a watershed for the changes experienced in the post-1992 period. The post-1992 period is marked with the changes in natural resource management following the increased awareness of sustainable development issues in the country as well as the developments from the Earth Summit held in 1992. In addition, it was the time when the new democratic governance and implementation of the Structural Adjustment Programs (SAPs) exerted an influence on the problem, its perceptions and responses. Therefore, this chapter provided background information which was compared to the findings from the primary data sources.

4.2 Defining Soil Erosion

Soil is basic to life. It is the primary means of food production, directly supporting the livelihood of most rural people and indirectly everyone. The soil resources of landscapes vary widely in their suitability for use. In physical terms, soil is merely the unconsolidated material on the earth's surface, yet it is the hub for a host of life supporting processes as testified by the natural environment (Stocking, 1995). Lal (1990) asserted that it is **the** most basic of all resources and is effectively not renewable. Once lost, it is difficult to replace within the foreseeable future. According to Holy (1980) the intensive exploitation of soil for agricultural production and capital construction in almost all branches of the national economies of most countries have gradually disturbed the natural soil cover and have exposed the soil surface to the action of erosion agents.

There are many definitions of what constitutes soil erosion that have been put forward by many authors which are conceptually similar. Kirkby (1980) stated that soil erosion is the removal of surface material by wind or water. Zacchar (1982) reported that the word *erosion* is of Latin origin and was first used in geology to describe the wearing away of solid material by the action of river water. Zacchar (1982) further noted that many authors use the term erosion to encompass any form of destruction of soil or the earth's surface by water. He defined soil erosion as generally meaning the destruction of soil by the action of water and wind, and further noted that many authors dealing with problems of soil erosion include those phenomena related to the activity of man with the meaning of soil erosion.

Lal (1990) noted that in general terms, soil erosion implies the physical removal of topsoil by various agents including falling raindrops, water flowing over and through the soil profile, wind velocity and gravitational pull. Wild (1995) stated that soil erosion is the removal of part of the soil, or the whole soil by the actions of wind or water. According to Stocking (1995) soil erosion consists of physical detachment of soil particles by wind and water and their transport elsewhere in the landscape, to rivers and water storages or to the sea. It is one of the major processes of degradation. Soil degradation is the decrease in soil quality as measured by changes in soil properties and processes, and the consequent decline in productivity in terms of production now and in the foreseeable future. However, Cooper (1996) noted that textbook definitions of soil erosion concur in their conclusion that degradation will take place when disaggregating forces and the forces of removal overcomes the forces of internal resistance within the soil.

According to Morgan (1995), soil erosion is a two-phase process consisting of the detachment of individual particles from the soil mass and their transport by erosive agents such as running water and wind. When sufficient energy is no longer available to transport the particles, a third phase, deposition occurs. Rain splash is the most important detaching agent. As a result of raindrops striking a bare soil surface, soil particles may be thrown through the air over distances of several centimeters. Continuous exposure to intense rainstorms considerably weakens the soil. Kirkby (1980) noted that soil erosion by water is most active where solution is least active. Where rainfall cannot infiltrate the soil, but flows over the surface, it travels relatively fast and is able to carry soil materials through the hydraulic force of its flow. Thus, where overland flow is dominant, soil erosion by water is likely to be the main process of denudation, and solution to be slight.

Soil erosion in this study, is understood along the same conceptual lines as has been described above. However, as will be discussed below, the accelerated erosion is the one which is of major concern to the conservation efforts in the country and hence the focus of the research.

The soil mass removed from one place is often deposited at another location when the energy of the erosion-causing agent is diminished or too dissipated to transport soil particles (Lal, 1990). Soil erosion (*then*) refers to the gross amount of soil dislodged by raindrops, overland flow, wind, ice or gravity. Soil loss is the net amount of soil moved off a particular field or area; the difference between soil dislodged and sedimentation.

As noted by Lal (1990), soil erosion is the result of perturbations in the land-vegetation-climate equilibrium. Perturbations may be natural or caused by humans. The magnitude of the effects of perturbations on erosion is influenced by different phenomena. The phenomena or forces are conveniently grouped into agents, factors and causes of erosion. Agents of erosion are the carriers or the transport system in soil movement. Factors of erosion are those natural or artificial parameters that determine the magnitude of perturbation, e.g. climate, topography, soil, vegetation and management. Erosion may not occur even when the agents and factors are present. It is the causes of erosion that enhance the effects of agents and factors of erosion and accelerate the various processes involved. The causes of erosion primarily include human activities e.g. farming practices such as seedbed preparation, deforestation and cropping systems.

According to Morgan (1995) the causes of soil erosion are still poorly understood. Whilst considerable research, particularly since 1940, has resulted in better knowledge of the mechanics of soil erosion processes and their relationship with the physical environment, only recently has systematic research been undertaken into the social, economic, political and institutional factors that influence where and when erosion occurs. However, he noted that the factors controlling soil erosion are the erosivity of the eroding agent, the erodibility of the soil, the slope of the land and the nature of the plant cover.

When and where soil erosion occurs is determined by the mutual interaction of the erosivity of the eroding agent and the erodibility of the soil surface. These variables of erosivity and erodibility change through time and space, at varying rates and differing scales, so that the relationship between the variables is in a constant state of flux. Erosivity includes rainfall and runoff factors while erodibility includes factors like soil properties, vegetation, topography and land use practices. Most of the numerous human activities that affect the erosion system do so by altering the erodibility of the soil surface (Middleton, 1995).

The next section discusses the factors controlling soil erosion as noted by Morgan (1995) above. It should be pointed out that these factors have been used in predicting soil loss through empirical studies in soil erosion research. Morgan (1995) additionally noted that before planning conservation work, it is helpful that the erosion hazard assessment results be transformed into a statement of how fast soil is being eroded. Estimates of the rate of soil loss may then be compared with what is considered acceptable and the effects of different conservation strategies can be determined.

4.3 Factors Controlling Soil Erosion

4.3.1 Erosivity

According to Barrow (1995) erosivity is the capacity (potential) of precipitation to cause erosion in given circumstances; that is aggressiveness of climate. It is a function of intensity, duration, timing and amount of precipitation.

Soil loss is closely related to rainfall partly through the detaching power of raindrops striking the soil surface and partly through the contribution of rain to runoff particularly to erosion by

overland flow and rills where rainfall intensity is also an important characteristic (Morgan, 1995).

4.3.2 Erodibility

Erodibility is the vulnerability of soil to erosion, i.e. a soil property – its liability to have particles detached and then transported away. It is dynamic and changes during a storm, during the year or from year to year. Soils can vary in moisture content and with this resistance to erosion (Barrow, 1995). Morgan (1995) reported that large particles are resistant to transport because of the greater force required to entrain them and that fine particles are resistant to detachment because of their cohesiveness. The least resistant particles are silts and fine sands. Thus soils with high silt content are highly erodible.

Soil erodibility therefore is influenced by organic content, aggregate structure, distribution of soluble and exchangeable ion content, moisture content and surface soil texture particularly over short time periods. The most significant seasonal variations on agricultural land are associated with tillage operations which alter the bulk density and hydraulic conductivity of the soil.

Stocking (1995) noted that in the tropics especially, erodibility is greatly enhanced not only by the physical and chemical properties of the soil, but also by management factors which allow the soil to crust, increase in bulk density or reduce in organic matter.

4.3.3 Slope

Morgan (1995) stated that erosion would normally be expected to increase with increases in slope steepness and slope length as a result of respective increases in velocity and volume of surface runoff. Further, whilst on a flat surface raindrops splash soil particles randomly in all directions, on sloping ground more soil is splashed down slope than upslope. The proportion increasing as the slope steepens. Therefore there is a net down-slope movement of material. Wild (1995) also noted that the angle of the slope affects both raindrop splash and the velocity of water moving over the surface, the effect of both becoming greater as the slope increases. The volume of runoff increases with the length of slope and the soil loss becomes greater.

4.3.4 Plant Cover

Ground cover, usually in the form of vegetation is the key to understanding the processes involved in soil erosion. In general terms, there seems to be an increase of erosion with rainfall, and a decrease with vegetation cover (Kirkby, 1980). Vegetation acts as a protective layer or buffer between the atmosphere and the soil. The above ground components such as leaves and stems, absorb some of the energy of falling raindrops, running water and wind, so that less is directed at the soil, whilst the below ground components, comprising the root system contribute to the mechanical strength of the soil (Morgan, 1995).

Thorne (1990) noted that soil is strong in compression but weak in tension. Plant roots are weak in compression but strong in tension. When combined, the soil-root matrix produces a type of reinforced earth which is much stronger than the soil or roots separately. Roots are effective both in adding tensile strength to the soil and, through their elasticity, distributing stresses through the soil, so avoiding local stress build-ups and progressive failures.

Watson (1990) noted that vegetation is a key variable controlling soil erosion as well as the variable most readily altered by land use practices. Senahoun, Heidhues and Deybe (2001) stated that vegetation and the existence of conservation practices are the consequences of human action, and thus they are affected by policy.

4.3.5 Land Use

Lal (1990) reported that a relatively small proportion of the total arable land area of the world can be intensively cultivated without causing severe soil erosion. Erosion and land use changes are very strongly related. Rates of soil loss accelerate quickly to unacceptably high levels whenever land is misused. Erosion is a natural process, but its rate, spatial and temporal distribution depends on the interaction of physical and human circumstances (Morgan, 1995). The rapid erosion of soil by wind and water has been a problem ever since land was first cultivated. Soil is disturbed by tillage operations and by the trampling of people and livestock. These processes loosen the soil so that it is easily removed by the agents of transport.

The above section has discussed some of the most important factors controlling soil erosion. However, soil erosion can be accelerated by both natural and human factors. Of the most important factors influencing soil erosion, people are often the most active factor in soil erosion.

Through their activity, people can either accelerate soil erosion by land misuse or curtail it by adopting proper soil and crop management. The next section therefore defines the difference between natural and anthropogenically accelerated erosion.

4.4 Natural and Anthropogenic Erosion

4.4.1 Natural Erosion

Watson (1990) stated that there are two approaches to the broad level classification of soil erosion. The first approach distinguishes between 'geological' and 'accelerated' erosion. Geological erosion refers to the natural soil removal in a system unaltered by human activities. It occurs at 'normal' rates that are conducive to development of a 'normal' soil profile. Various land use practices increase the rate of normal soil removal. This human accelerated erosion is perceived as the 'soil erosion problem', and the term soil erosion is commonly used in exclusive reference to it.

The alternate approach recognizes that soil erosion rates are also accelerated by natural phenomena. Naturally induced events such as climatic changes also cause an acceleration of normal erosion rates but are not usually prolonged as is the inhabitation of the earth by human beings.

'Natural' erosion is not easily distinguished from 'accelerated' erosion on every soil. A distinction can be made by studying and understanding the sequence of sediments and surfaces of the local landscape as well as by studying soil properties.

The rate and distribution of natural erosion in time controls the age of land surfaces and many of the internal properties of soils on the surfaces. Natural erosion is an important process that affects soil formation and, like man-induced erosion, may remove all or part of soils formed in the natural landscape (www.irim.com/ssm/ssm00050.htm). Under geological soil erosion, new soils can become very deep given sufficient time with protective plant cover and soil formation in these cases greatly exceeds the natural erosion. Unfortunately, these geologic processes are very slow and are often overshadowed by the activities of man.

4.4.2 Anthropogenic Erosion

As has already been pointed out in the preceding section, it is widely acknowledged that the rates of soil erosion have been accelerated for decades due to human activities. The main activities responsible for this are overstocking and consequently overgrazing, incorrect layout and preparation of land for cultivation, and poor cultivation practices (Lal, 1990; Cooper, 1996).

Plant cover can play an important role in reducing erosion provided that they extend over a sufficient proportion of the soil surface. Overall, forests are the most effective but a dense growth of grass may be almost as efficient and quicker to obtain (Morgan, 1995). According to Middleton (1995) deforestation removes the protection from the raindrop impact offered to soil by the tree canopy, and reduces the high permeability humus cover of forest floors, a permeability which is enhanced by the many soil macro-poles produced by tree roots. Vegetation may be cleared for agriculture, fuel, fodder, or construction.

Cultivation also removes the natural vegetation cover from the soil which is particularly susceptible to erosion when bare after harvests and during the planting stage. Some crops such as maize and vines usually leave large portion of the ground unprotected by vegetation even when the plants mature (Middleton, 1995). Agricultural crops vary in their effectiveness depending on their stage of growth and the amount of bare ground exposed to erosion. For adequate protection at least 70 per cent of the ground surface must be covered, but reasonable protection can be achieved with 40 percent cover (Morgan, 1995). Regardless of climate and ecological factors, soil erosion can be a severe problem in any region where the land is misused and exploited for quick gain.

Cooper (1996) noted that soil erosion is a global natural phenomenon, and that the problem is as old as the earth itself. It is not just a problem of modern times; it began with the dawn of agriculture when people started using the land for settled and intensive agriculture. In fact, soil erosion has been a quiet crisis and has plagued the land since people began practicing agriculture by removing the protective vegetation cover and growing food crops on the disturbed soil surface (Lal, 1990). Soil erosion is considered to have caused some of the once thriving ancient civilizations to vanish for example in Mesopotamia, Syria, China and elsewhere. As reported by Holy (1980) the settlement of North America, led to serious erosion in the largely untouched virgin land of the western hemisphere. Dust storms lasting many days became a common phenomenon and it prompted considerable concern for land degradation

avoidance in the United States of America (USA). The dust bowl is not unique, there have been similar experiences in the Mallee wheat lands region of Western Australia, in the 'Virgin lands' of the Kazakhstan and the Southern Ukraine, in parts of the Sahel, South Africa, Argentine and Nigeria.

The magnitude of global soil loss from arable land around the world is greater than ever before in human history. Davidson (1995) noted that soil erosion continues to degrade the global land resource base with approximately 30 percent of the present cultivated area having been substantially affected. Soil erosion is a major environmental issue. The need for greater as well as more reliable agricultural yields is a continuing and ever-increasing global challenge. A wide range of economic, social, environmental, demographic and political factors interact to cause the dire situation that exists in many countries. Current concerns associated with the erosion of soil are the long-term impacts on such topics as soil quality, agricultural productivity, movement of pollutants, ecological diversity in streams and wetlands, river channel changes and effects on flooding.

Davidson (1995) further noted that sometimes it is thought that erosion is confined to tropical and arid or semi arid regions, but it is increasingly realized that a range of insidious processes also exists in cool temperate regions. As reported by WRI (1999) one analysis of global soil erosion estimates that, depending on the region, topsoil is currently being lost 16 to 3000 times faster than it can be replaced. Stocking (1995) asserted that soil degradation may manifest itself in many forms. What often masquerades as drought is more of the reduction in the ability of soils to contain sufficient water for plant growth between quite gaps in rainstorms. Stocking (1995) additionally noted that in a study conducted by the Food and Agriculture Organization (FAO) (1982), the two major changes between 1975 and 2000 are the interrelated factors of population increase and declining quality of the soil resource base, and further showed that 25 percent of highly productive land will be lost because of erosion and of the soil degradation processes, whereas forest and grassland will decrease by 24 percent and the most productive land class by 33 percent. This 33 percent is the result of soil degradation, describing a process of the increasing marginalisation of land and people. As productivity and the per capita productive land declines, farmers are forced on to unsuitable or vulnerable land – steep slopes, wetlands and tropical forest. Land quality rapidly diminishes and the cycle of degradation and the pauperization of the peasantry continues ever after.

According to Zacchar (1982), of all continents, the African continent is the most affected by soil erosion as a result of much of the landmass being equatorial. Ascending air currents in the equatorial belt give rise to a high rainfall whereas in the tropics, descending air currents and high pressures result in a lack of rainfall. Huge deserts and semi deserts are constantly extending their margins in the later regions. Of Africa's total land area of 29,820,000 square kilometers (sq.km), deserts occupy 40 percent, the equatorial forests occupy about 7 percent, about one-third of Africa on either side of the equator is accounted for by the savanna with its long drought spells, and the remainder consists of steppe and semi-desert country and the subtropical belts in the north and south. Under these conditions, erosion inevitably spreads rapidly in almost all regions, assisted by increasingly extensive land utilization. The author further states that much of the evidence for the acceleration of soil erosion comes from North Africa and recently South Africa also. He further notes that according to the FAO, 57 percent of uncultivated soil in Africa is impaired by erosion. The difficulties of erosion and drought are perhaps most pronounced in Egypt, Lybia, Tunisia, Algeria, Morocco, Northern Sudan, Chad, Nigeria, Mali and Mauritania.

Ker (1995) reported that it is generally recognised that the greatest threat to sustained rainfall agricultural production and indeed to the continuing prosperity of many of the developing countries in Africa and elsewhere, is probably uncontrolled erosion. The situation in Western African savannas shows that in higher rainfall areas, water erosion is the most important cause, whereas in the Sahel, although water erosion can be severe in the southern sub region during the occasional storm, wind erosion also occurs and is particularly severe in the north.

In addition to the details of the problem explained in the preceding two paragraphs, Middleton (1995) noted that Africa in particular, faces the greatest challenge of breaking the vicious cycle of erosion induced soil degradation and the resultant decline in crop yield. According to Chenje & Johnson (1994) the main causes of soil degradation in Africa are overgrazing which accounts for 243.1 million hectares (m ha); poor cultivation techniques accounting for 121.4 m ha; clearing of land for cultivation constituting 66.8 m ha and domestic subsistence collection of vegetation accounts for 62.7 m ha.

Most of the countries in southern Africa which form the Southern African Development Community (SADC) fall under the equatorial belt and the savanna where erosion inevitably spreads rapidly in almost the entire region as pointed out earlier by Zacchar (1982). Studies on soil erosion conducted in the SADC region illustrate that erosion is a serious problem. Dahlberg (1996) cites studies conducted in Zimbabwe (Wibon, 1995) and Lesotho (Showers and

Malahleha, 1992) which revealed that causes of observed land degradation (e.g. soil erosion) previously attributed solely to local mismanagement of land were more complex than presumed. She further reports (1994) that for Botswana, studies of erosion and rangeland degradation are common. Cooper (1996) found that soil erosion in the context of colonial Africa has been examined by numerous authors to date.

An overview of the state of the erosion problem in the SADC region was another important aspect of the review of the soil erosion problem in this study because it helped to comparatively locate Malawi in the global picture through this region, hence its coverage in this section. This information was based on Chenje and Johnsons' (1994) State of the Environment in Southern Africa. This report provides an important and comprehensive overview of the environmental status in southern Africa.

According to Booth and Timberlake (1994) less than half of the region's soils are suitable for cultivation, being relatively infertile and difficult to manage. A combination of inequitable land allocations leading to high population densities in specific areas and poor farming methods, have led to declining productivity of grazing lands, falling crop yields and diminishing water supplies. This has been aggravated by increases in livestock numbers without a commensurate increase in land area for grazing. Overgrazing causes more than half of the soil degradation with cultivation responsible for most of the remainder in southern Africa. Domestic subsistence use of trees for fuelwood, fencing and other purposes is a relatively minor cause. Crop yields can be increased and maintained by using improved seed varieties and fertilizers for a time, but eventually real productivity declines due to soil degradation. Experts predict that crop yields in the region will be halved in 30-50 years if degradation of cultivated lands continues at present rates.

Additionally, Booth and Timberlake (1994) noted that the loss in productivity set in motion by soil erosion is a self-perpetuating process. Soils that have been degraded become more vulnerable to further degradation. The process is difficult to control because it is complex, with a number of causes. Soils take a long time to renew themselves. In most parts of the region the amount of soil formed every year is less than a third of a tonne depending on the soil type. The most extensive serious degradation is found in grazing lands in central and western southern Africa. Booth and Timberlake (1994) identified four main types of degradation which are water and wind erosion, chemical and physical degradation. These are not mutually exclusive.

Booth and Timberlake (1994) reported that water erosion is the most important factor in the decline in agricultural productivity in this region. About 15 percent (45.4 m ha) of southern Africa's land is degraded because of water eating away at the land. Wind erosion is less well studied and documented than water erosion, though it is significant in some areas, accounting for about nine percent (25.9 m ha) of the soil degradation in the region.

Physical degradation which accounts for two percent (6.4 m ha) of southern Africa's soils, includes changes in sealing and crusting of topsoil, loss of water-holding capacity, compaction of topsoil, waterlogging and aridification. Most physical degradation is related to rainfall. Crusting impairs oxygen and carbon dioxide exchange between the soil and the air, necessary for plant growth, and makes it difficult for seedlings to grow. Less water seeps into the soil, decreasing groundwater recharge (Booth and Timberlake, 1994).

Chemical degradation which accounts for 2.6 m ha, refers to changes in soil chemistry resulting from human activities especially input-intensive agriculture and irrigation. They include salinization, nutrient and organic-matter loss, acidification and pollution (Booth and Timberlake, 1994).

Livestock are said to upset the balance of the southern African ecosystems more than wild animals do because wild animals eat about twice as many different kinds of plants as cattle and eat more shrubs and trees. Overgrazing in the southern African context includes loss of overall plant cover with a corresponding increase in erosion by water and wind; decline in palatable types of grasses; increase in unpalatable grasses, poisonous plants and thorny shrubs and physical degradation from trampling (Booth and Timberlake, 1994).

According to Booth and Clarke (1994) deforestation is another important aspect in southern Africa's erosion problem. Its major cause is conversion of land to non-forest uses such as agriculture, through thinning of trees due to fires, overgrazing, selective timber-cutting and fuelwood collection. Woodlands and forests fulfill a number of vital ecological functions. They are also an important source of natural resources for both commercial enterprises and subsistence farmers. There is an indication that there has been an increase in the rate of deforestation in the region. Southern Africa has one of the fastest growing populations in the world and faces the challenge of trying to increase food supplies by some three percent per year. This is normally done by bringing large areas of wooded land under cultivation. Tobacco estates consume a quarter of all woodfuel used in Malawi because they clear about 100 square

kilometers (sq km) of woodland and now occupy 3,000 sq km annually. The percent annual deforestation for the country is 3.5, and is the highest in the region. The regional loss of woodland cleared annually to supply fuelwood for tobacco curing is 1,400 sq km of indigenous woodland. Rural subsistence of forests and woodlands is a different matter from collection of fuelwood for urban customers and rural-based industries.

In Malawi, soil erosion remains one of the greatest problems and threatening agricultural production as noted in section 1.1. According to the National Environmental Action Plan (NEAP, 1994) soil erosion in the country is the key environmental issue and one of the major types of land degradation that poses biggest threat to sustainable agricultural production. The on-site effects of soil erosion are greatest in the country because fertile low-lying areas may become unproductive due to the deposition of infertile sand. Analysis of social costs associated with soil erosion in Malawi show that Malawi Kwacha (MK) 1,55 million is lost due to that. The land resource degradation in general and soil erosion in particular is also attributed to institutional and legal constraints. The rapid expansion of agriculture from mid 1970s to the late 1980s, led to the extensive deforestation. The current rate is as indicated above (3,5 percent). The major causes of deforestation are agricultural expansion, followed by wood-fuel demands from household and other sources including tobacco leaf curing, brick burning, fish curing and beer brewing. Most tobacco estates have failed to comply with the obligatory establishment of woodlot on ten percent of estate .

Mohamoud (1998) noted that recent studies have demonstrated that population pressure is causing people to exploit resources on public lands. There is increasing soil erosion and degradation of watersheds but the long-term trends have not been recognized. In a large catchment study, the results showed that runoff is increasing and vegetation cover is decreasing in the middle Shire basin to the south of the country. As was noted in section 2.8, the cultivated area exceeds the amount of suitable land for the country, showing that there are chances that unsuitable land is being rapidly brought under cultivation.

Soil erosion has a large number of environmental impacts which can affect farmers and other sectors of society. These effects or costs are exacerbated in areas where rates are accelerated by human activity. The costs of soil erosion may be divided into direct (on-site) and indirect (off-site).

4.5 Effects of Accelerated Erosion

4.5.1 On-Site Effects

The main direct cost is decline in crop productivity. Watson (1990) asserted that accelerated soil erosion decreases soil productivity. The magnitude of the decrease is dependent on the original thickness and quality of the topsoil, as well as the nature of the subsoil. According to Stocking (1995), soil productivity is affected. First, nutrients are lost in sediment and run-off. Generally, those nutrients associated with organic matter (N & P) and the cation exchange of soil colloids (K & Ca) are most at risk. Nutrients in sediment are approximately ten times the quantity of those dissolved in run-off. Values may be attached to lost nutrients through the equivalent cost of fertilizer containing the same elements. Second, water is lost to the soil and to plant growth in run-off. As soil degrades, its infiltration capacity worsens. Typically, with surface sealing and crusting on a tropical soil, water losses in run-off may increase from 20 to 50 percent of total rainfall. Finally, because water erosion is selective of finer, more fertile fractions of the soil, the eroded sediments are usually always richer in nutrients and organic matter than soils from which they were taken.

These on-site physical processes affect crop production and have economic consequences. Garland *et al.* (1994) reported that recent research has clearly established the link between degraded land caused by soil erosion, falling agricultural productivity and increasing costs of food production. In Zimbabwe, erosion costs are estimated to be approximately equal to three percent, and in Malawi between 0,5 and 3,1 percent of Gross Domestic Product (GDP). Notwithstanding this national significance, in developing countries the effects of soil erosion are often most acute in local communities dependent on the land for a large part of their livelihood. Such groups invariably have limited access to capital, they can ill-afford the fertilizers which could offset declining natural fertility, nor can they contribute the additional land or labour required for effective soil conservation.

Morgan (1985) stated that the on-site effects are particularly important on agricultural land where the redistribution of soil within a field, the loss of soil from a field, the breakdown of soil structure and the decline in organic matter and nutrient result in a reduction of cultivable soil depth and a decline in soil fertility. Erosion also reduces available soil moisture, resulting in more drought-prone conditions. The net effect is a loss of productivity which at first restricts what can be grown and results in increased expenditure on fertilizers to maintain yields, but

later threatens food production and leads, ultimately to land abandonment. It also leads to a decline in the value of the land as it changes from productive farmland to wasteland.

4.5.2 Off-Site Effects

According to Stocking (1988; 1995), soil erosion exacts direct costs on national economies. Private costs become public costs. In developing countries soil erosion may play a part in declining yields necessitating the import of food; a familiar situation through out sub-saharan Africa. The deteriorating condition of the soil, especially organic matter status, surface crusting, and compaction, increase susceptibility to drought. Loss of nutrients with erosion reduces the national stock of resources, fertilizer imports become essential and maintenance of agricultural production gets more costly. Off-site impacts have received publicity because of the disruption to society. Sediment derived from most agricultural land cause damage to canals, water storages, irrigation schemes, ports and hydro-electric power plants.

Barrow (1995) noted that indirect costs include siltation of reservoirs, canals, streams (with associated loss of water supplies, power generation capacity, flooding, increased dredging costs), landslide damage to roads, infrastructure, housing and land holding. Morgan (1995) reported that sediment is also pollution in its own right, and through chemicals absorbed to it, can increase the levels of nitrogen and phosphorus in water bodies and result in eutrophication. Erosion control is now a necessity in almost every country of the world under virtually every type of land use.

4.6 General Response to Accelerated Erosion

According to Morgan (1995) soil erosion is a response to the breakdown of farming systems. The three major periods in history associated with extensive soil erosion all reflected the inability of existing farming systems to deal with population growth and the intensification of agriculture. Firstly, the expansion of agriculture into China, the Middle East and the Mediterranean some 1,000 to 3,000 years ago. Secondly, the migration of Europeans to develop colonies some 50 to 150 years ago. Finally, the expansion in the last 30 years of people on to marginal lands in Latin America, Africa and Asia. He further noted that whatever the environmental context, there is still a need to control erosion and the design of control measures requires a thorough understanding of the processes of erosion and their controlling factors. The prevention of soil erosion, which means reducing the rate of soil loss to approximately that

which would occur under natural conditions, relies in selecting appropriate strategies for soil conservation and this in turn, requires a thorough understanding of the process of erosion (Morgan, 1995).

The aim of soil conservation is to obtain the maximum sustained level of production from a given area of land whilst maintaining soil loss below a threshold level which theoretically, permits the natural rate of soil formation to keep pace with the rate of soil erosion. In addition, there may be need to reduce erosion to control the loss of nutrients from agricultural land, to prevent pollution of water bodies and other things. In the longer term, erosion must be controlled to prevent land deteriorating in quality until it has to be abandoned and cannot be reclaimed, thereby limiting options for future use. As Morgan (1995) observed since erosion is a natural process it cannot be prevented. It can however be reduced to a maximum acceptable rate of soil loss tolerance. He also observed that the response of governments seems to be limited to crisis management and it is largely based upon soil conservation thinking in the United States of America (USA). Blaikie (1985) was also of the opinion that the USA is in many senses the country on which much of the methodological, legal, technical and institutional aspects of conservation policies of other countries have been modeled.

Morgan (1995) goes on to state that erosion must be controlled to prevent land deteriorating in quality until it has to be abandoned. Strategies must be based on covering the soil to protect it from raindrop impact; increasing the infiltration capacity of the soil to reduce runoff; improving the aggregate stability of the soil and increasing surface roughness to reduce the velocity of runoff and wind. The various conservation techniques are agronomic measures, soil management and mechanical methods. Agronomic measures utilize the role of vegetation to protect the soil against erosion. Soil management is concerned with ways of preparing the soil to promote plant growth and improve its structure so that it is more resistant to erosion. Mechanical or physical methods often involving engineering structures, depend upon manipulating the surface topography, e.g. by installing terraces of windbreaks to control the flow of water and air. Agronomic measures combined with good soil management can influence both the detachment and transport phases of erosion, where as mechanical methods are effective in controlling the transport phase but do little to prevent soil detachment.

Generally, preference is given to agronomic measures. These are less expensive and deal directly with reducing raindrop impact, increasing infiltration, reducing runoff volumes and decreasing wind and water velocities. They are also more easily fitted into an existing farming

system. Mechanical measures are largely ineffective on their own because they cannot prevent the detachment of soil particles. Their main role is in supporting agronomic measures being used to control the flow of any excess water and wind that arise (Morgan, 1995).

The above section has outlined the soil erosion issues in the social context at global level, how the response has been at that level. The next section looks at the soil conservation in Malawi.

4.7 Soil Conservation in Malawi before 1964

4.7.1 Perception of the Status

Malawi did not escape the colonial official concern about the destruction of natural resources in southern Africa. Using historic official documents drawn mostly from the Transkei and Nyasaland, Beinart (1984) explored how conservationist ideas were constructed in southern Africa. He established that the conservationist concern in the region did not arise out of the relationship between state and peasantry (*i.e. the state intervening to assist in an erosion problem identified by African farmers*)¹, but rather from the perceived difficulties facing settler agriculture. Officials responsible for settler and peasant farming tended to look initially beyond the region for their inspiration and techniques. Although African agriculture was generally perceived as destructive, there was a counterthrust from some officials who saw African methods as insufficiently intensive to be a major threat even if they did not recognize them as sympathetic and careful. For example, Beinart (1984) cited an article which presented soil erosion as the result of the activities of the settlers. It argued that Africans on the other hand chose ground more easily worked and less fragile, they also ploughed shallow and tended to leave land fallow after a few years when grass would protect the soil. It is certainly possible to point to certain effects of colonialism which may have led to more intensive or more careless use of land.

Mlia (1987) reported that the attitude of colonial experts was that there was nothing to be learned from African traditional farming methods. The period 1890-1915 was viewed by both Europeans and Africans as a time of ecological crisis for various reasons, with the former blaming the latter for causing extensive soil erosion through their traditional farming methods and the latter on the other hand blaming the former for disrupting their whole way of life through their intrusion, land alienation and various restrictions on economic activities. The

¹ Explanation from the researcher

European perception of the 'ecological crisis' led to the 'colonial conservation mania'. As early as 1901, the Europeans were advocating the creation of limited reserves on the grounds that forcing Africans to use less land would improve their agricultural techniques.

Beinart (1984) further noted that in Nyasaland, cash cropping of tobacco which demanded clean cultivation was also thought by officials to spell danger for the soils. Tobacco extension workers in Nyasaland were amongst the first to press for anti-erosion measures. The increase in maize cultivation throughout the region was thought to have similar effects although it was often grown in mixed cropping systems. Beinart (1984) noted that this official concern was infused with a new urgency stemming from the ideology and practice of American conservationists who rose to power in the depression. The new ideologies of conservation were taken up by increasingly receptive officials in the colonial service and the settler states. And by the late 1930s the colonial office itself had moved erosion up in its list of policy priorities.

Mwendera (1989) asserted that the problems of soil erosion in Malawi were not a serious threat at the end of the 19th Century. This was so for a number of reasons. Firstly, the people practiced shifting grazing and cultivation which allowed the land to regenerate. Most tribal groups except the Ngoni, did not own large flocks and herds. This is why deleterious effects of overgrazing never manifested themselves. Secondly, human population was low and hence there was no need to extend cultivation into erosion prone marginal areas. Thirdly, the level of mechanization did not involve heavy machines which are partly responsible for soil structural deterioration in today's agriculture. In addition to this, Nanthambwe and Mulenga (1999) reported that during the pre-colonial period, cultivation was done on flat surface or mounds and there is no record to suggest that there was some form of extension service to advise on crops or methods of land preparation.

4.7.2 Perception of the Causes

Mlia (1987) reported that conventional wisdom was that runoff water, responsible for transporting detached soil particles was the main cause of erosion. Thus in the 1920's the recommended soil conservation methods were intended to either (a) decrease the velocity of surface runoff or (b) increase the absorptive capacity of the soil. To achieve the former, the construction of storm drains, silt pits, terraces, contour stonewalls, contour hedges and use of cover crops were recommended. Later, starting from the 1930s to 1950s, emphasis increasingly shifted to contour and box ridging.

Beinart (1984) noted that the 1930s and 1940s it was commonplace for both settlers and officials in southern Africa to describe African agricultural methods as careless and dangerous to the environment, thus the concern about soil erosion grew essentially out of perceptions of inadequacies of peasant farming.

With the arrival of Europeans in the late 19th Century, the lives of the Malawians changed; their freedom of movement became curtailed and when in 1902 there was a general setting aside of land as “native reserves”, the first step was taken on the road that led to overgrazing and general land misuse in many areas. Under the more settled conditions, the African population increased rapidly. Use of heavy machines in areas farmed by Europeans, injudicious bush fires, monoculture and persistent overgrazing together conspired to bring about soil erosion on a large and ever increasing scale (Mwendera, 1989).

In addition to the fact that colonial farmers contributed to the problem of soil erosion noted earlier on above, Mwendera (1989) asserted that although most of the blame for soil erosion problems fell on the native farmers during this time period, it can be seen that the European settlers were also largely to blame for a number of reasons. Firstly, they forced the natives to live in concentrated groups thereby creating conditions conducive to soil erosion. Secondly, their conservation measures were unacceptable to the native farmers. Thirdly, they emphasized physical measures which did not tackle the hearth of the problem or erosion, namely soil detachment by raindrop impact. Fourthly, most of their conservation measures were applicable on estate farms not smallholder farms. Lastly, the European settlers totally ignored any soil conservation practices embodied within the farming system of the African farmers. Heavy mechanization which was introduced was in some cases responsible for erosion and land degradation problems.

4.7.3 The Response

The growth of conservationist thinking coincided with the growth of agricultural departments assigned to change peasant farming. These were initially established in order to stimulate more general improvement and cash cropping, rather than as a result of conservationist concern. But their field officers were instrumental in drawing attention to the conditions in the African occupied areas. From the early 1930s, the focus of agricultural interventions switched increasingly to conservation. Mixed farming, rotational cultivation, manuring and composting, which were stressed in British agricultural schools and became important planks in extension

work elsewhere, contributed to and could be incorporated into the more strictly conservation interventions. In Nyasaland (Malawi) the Forestry Department initiated stream bank protection and controls over cultivation of sensitive hillside areas in the 1920s. The early extension service, less developed than in the settler countries further south, was largely employed in tobacco producing districts under the Native Tobacco Board. But by the late 1930s, conservation work was shifted to center stage as the Department of Agriculture itself expanded its operations and a Soil Erosion Officer was appointed in 1937 (Beinart, 1984).

Thus during the 1930s, agriculture and forestry departments persuaded central governments of the urgency of the situation and adopted their extension programs, initially introduced for other purposes to deal with erosion. The task that such officials saw themselves to be engaged in whatever the broader political context within which they worked, was primarily to expand and improve peasant agriculture. Conservation work now became seen as a necessary preliminary step in production, even if it was sometimes to be at the cost of short-term declines. The soil had to be saved if peasant agriculture was ever to prosper. Central governments although they differed in their ideas about the role of peasant agriculture, tended to accept this principle when called on for financial backing and expanded agricultural services in the African rural areas. The notion of development in both the settler states and British colonial territories, became more generally accepted as a description and justification of colonial endeavors although its precise content differed. Conservation thinking and solutions still presented in technical terms, came to be an important and common element in that concept. Mlia (1987) reported that conservation measures were made necessary largely by the presence of Europeans.

Nanthambwe and Mulenga (1999) stated that the government soil conservation campaign during the period 1945 to 1960 was characterized by three overlapping phases. The first phase (1945-1949) aimed to introduce contour ridging to replace planting on flat surface. The second (1949-1956) aimed at reinforcement of the ridges by contour bunds and the third (1956-1960) involved the use of more sophisticated methods of conservation concentrated in areas of greatest potential. The Mechanical Soil Conservation Unit established in 1955, helped in the construction of dams and terracing of steep slopes. The emphasis on mechanical conservation measures partly reflected the thinking that erosion was caused by surface runoff and partly by the fact that most European farmers were growing estate crops such as tea, tung, coffee and rubber on land where physical measures were a necessity at that time. After a short spell of the campaign to combat the 'recklessness' of the Africans in the use of the country's natural resources through extension and education work, it was concluded that legislation was

necessary to prescribe soil conservation methods. This led to the enactment of the Natural Resources Ordinance of 1946, which was revised in 1949 and again in 1962.

Nanthambwe and Mulenga (1999) and Mwendera (1989) reported that in 1936, the first soil conservation officer was appointed and ten years later in 1946, the first National Resources Ordinance was enacted. According to Mlia (1987:5) the ordinance was enacted 'to make provision for the conservation and improvement of the natural resources of the protectorate', including soil. Nanthambwe and Mulenga (1999) authors further noted that national, regional and area boards, councils and committees were established under the ordinance. These were empowered to enforce the prescribed land use practices and punish any offenders. The farmers who did not follow the recommended soil and water conservation measures were put in prison and any crops growing in their fields were destroyed. An improvement over the coercion methods of transferring technology to the smallholder farmers was the 'Master Farmer System' a part of the variety of special schemes formed in the 1950s with the objective of promoting good land use which will be discussed in more detail later.

In 1946-47, the growing of crops on ridges between contour bunds was the main soil conservation campaign message aimed at preventing soil erosion. This caused resentment among the smallholder farmers due to the hard work involved and the use of force by the administration to enforce agricultural legislation. In contrast to this situation, in a study of soil conservation in Lesotho, Showers and Malahleha (1992) reported that when contour banks were installed and their location in the field determined, it was without any concern for an individual farmer's operations and 'reduced the fields' sizes. People did not like their fields to be in pieces. The transformation of a field to a series of oddly shaped plots caused inconvenience and difficulties in ploughing, planting and other farming activities. Then, the water concentrated behind the contour banks caused damage in two ways: scouring of the furrow on the upslope side and overtopping or breaching the contour bank. When that happened, the water dug down behind the contour destroying the soil from behind. Then rills started forming which later developed into dongas. Where the contour banks did not break, the outlets invariably became gullies. Showers and Malahleha (1992) then found out that initially farmers were generally receptive to the idea of a new and modern technology when contour banks were installed in Mobu valley. Some farmers agreed that the contour banks helped to collect water for the crops in the fields. However, as they evaluated the contour banks' performance, opinion diverged. Most people's initial disapproval was based upon the amount of farmland that was taken out of

production, and the change of their field's shape. Subsequent criticism was based upon the contour banks' function of concentrating water into a destructive force.

In the 1950s, as far as the approach of agricultural extension was concerned, it was aimed at more responsive individual farmers and cooperative communities in the hope that others would follow. Farm institutes were opened to provide training on agricultural subjects to selected farmers and community leaders. The selected 'progressive' farmers led to the formulation of a Master Farmer Scheme. The Master Farmers were given preferential treatment ordinarily reserved for European farmers including farm inputs. They were expected to be models and demonstrative to the neighboring farmers (Nanthambwe and Mulenga, 1999). The scheme was not as successful as was hoped and another scheme – the Smallholder Scheme was introduced in 1956-59 as an alternative to the Master Farmer Scheme. Under the Smallholder Scheme was the Village Land Improvement Scheme by which villages were reorganized into large population units for better implementation of soil and water conservation and land use practices (Mwendera, 1989). As noted by Beinart (1984), these ideas had deep roots in technical thinking about improvement and soil conservation although there were other advantages to be gained from developing a stable rural peasantry, because they were closely linked to such concepts of rural planning. This was because when concentrated, it was easier to provide services e.g. water, schools; but also easier to control African uprising.

Cooper (1996) reported about the Betterment Scheme in South Africa, which can be compared to the Master Farmer, Smallholder and Village Land Improvement Schemes in Malawi at that time. The Betterment Scheme was introduced on Trust Land, which had previously constituted white-owned land in the (former) homelands. This land was purchased by the South African Native Trust, in a bid to alleviate the problem of overcrowding and among other things to combat erosion in rural 'black' settlements. The rationale for this program was that land use would be promoted whilst providing economic benefits to the population. However, the program did not achieve its intended objectives because an evaluation of the socio-ecological impact of development schemes in the (former) 'homelands' of South Africa concluded that as a consequence of the reorganization of land-use and resource utilization, was environmental, economic and social destruction. The major reasons were that the procedures were imposed against the will of the 'black' farmers; the demarcated areas were typically too small to accommodate the numbers of families resettled and that agriculture extension was not planned on what was familiar to them.

According to Nanthambwe and Mulenga (1999), the early 1960s saw African politics focusing against colonial agricultural policies. Farmers aimed at frustrating the government and resorted to their pre-1945 cultivation practices. The African politicians struggling to gain independence from the colonial masters, discredited mainly the conservation policies and the use of force. This was a very strong anti-colonial campaign tool as it touched the very policies that were disliked by Africans. The transitional government following the general elections of 1961, which produced an African majority in parliament, passed the Land Use and Protection Act in 1962 (the revised Natural Resources Ordinance of 1946 and 1949). This Act outlawed the use of force to get people to comply with agricultural regulations. Agricultural development was broadened beyond European estates and Master Farmer as manifested by the renewed emphasis on the development scheme strategy adopted during this period. There was a deliberate attempt to shift to group and mass methods of extension with emphasis on demonstrations.

In terms of research, Mwendera (1989) noted that prior to the advent of the Europeans in Malawi, there was no research on soil and water conservation. When they came and established farms in the country, they set up a few experimental stations where soil and water conservation research was conducted. Most of this research was geared for estate farming and very little research was done to study and solve the problems of soil erosion on smallholder farms owned by the Africans.

It should be pointed out at this juncture that Beinart (1984) noted that whereas in the American situation, complex social forces underlay the first phase of their conservationism, such forces were by no means so developed in southern Africa, where it was more a concern of officials.

However, there were tangible and permanent results of the conservation campaigns of the 1930s to early 1950s in that there was the wide acceptance of ridges as an alternative to mounds and planting on the flat surface. By 1949, virtually all sloping arable land was cultivated on contour ridges except where cassava was grown as a staple food and where water logging conditions would be induced by the conservation structures and cause the tubers to rot (Mlia, 1987). Mwafongo (1999) reported that by 1956, an estimated three-quarters of a million acres of land were conserved and that as a result gross erosion was checked.

The review presented under this period, has described the perceptions of soil erosion as well as the response to the problem at that time. The next section will examine the perceptions and response during the period between 1964 to 1992.

4.8 Soil Conservation in Malawi from 1964 to 1992

4.8.1 Perception of Status

When Malawi got independence in 1964, soil conservation was still viewed as an important part of good farming (Mwendera, 1989). Few changes occurred in the immediate post-independence period. In fact, the colonial policies of 1945-1960 were entrenched hoping that the same policies would be acceptable (Nanthambwe and Mulenga, 1999).

According to Nanthambwe and Mulenga (1999), as a way to improving the soil and water conservation extension, the Land Husbandry Branch adopted three main areas of focus. These were catchment conservation, strip cropping and conservation farm plans. The catchment conservation aimed at enabling a number of small gardens in a catchment to be surveyed and planned together. A catchment could encompass 100-200 families and varied within ADDs. Emphasis was on ridge alignment and other complementary soil conservation and fertility improvement technologies. Strip cropping aimed at encouraging farmers to practice crop rotations. Farmers who had adequate land could request for conservation farm plans. This would be done by extension staff on those farmers' plots of land. Through special funds, an annual soil conservation month campaign program was introduced. It was aimed at raising public awareness on issues of conservation through lectures and field visits.

A number of low cost technologies were also promoted among smallholder farmers to overcome the problem of dependence on government extension staff who were few. These included a number of technologies which were: contour vetiver planting, use of A-frame in pegging marker ridges, organic matter technologies including agroforestry. Although the history of vetiver grass planting in the country can be traced back to the colonial era, it was not until the late eighties when aggressive campaigns on this technology started. To date, the department combines the vetiver technology and contour ridging although it has been established that a well-developed vetiver hedge is an effective barrier against runoff and soil erosion. The issues of soil fertility decline became an issue due to continuous decline of crop yields and increasing prices of inorganic fertilizers. The application of inorganic fertilizers masked the effect of soil erosion and declining soil fertility. The use of organic technologies including agroforestry, has since become part of the land husbandry program.

Mlia (1987) noted that during this time the 'conservation mania' of the colonial era was replaced by an agricultural policy which stressed the maintenance of self-sufficiency in food; the expansion of agricultural exports and improvement of rural incomes as its main objectives. Conservation had not been abandoned but that the government was not driving hard to promote soil and water conservation programs, hence conservation was treated as one facet of the agricultural development effort.

In addition, just like in Zimbabwe (Policy that Works for People, No 5), this period saw the emergence of decentralized governance to manage natural resources. Evidence showed that the state on its own did not have the capabilities to manage all natural resources at the local level, such that it strongly promoted the decentralized governance of natural resources. But major tensions could still arise from the simple fact that although the state needed to create conditions to enable the local empowerment, the state reduces its *capacity* for local control in doing so.

4.8.2 Perception of Causes

Mwendera (1989) reported that during this period however, soil erosion problems needed to be tackled carefully. This was so because population pressure on land was increasing with inevitable consequence of cultivation creeping into erosion prone areas. The other factor is that the old way of coercing farmers and punishing non-adopters did not offer a solution to the problem of erosion. Estate farming by Africans was increasing in order to boost agriculture exports.

Agriculture was divided into two distinct farming systems; smallholder and estate. The two systems were characterized by different land use patterns. The smallholder sub-sector, comprised families cultivating about 82 percent of the total agricultural land under customary tenure. According to Ministry of Agriculture and Irrigation Development (MoAID, 1999), in 1996, 56 percent of all smallholder farmers in Malawi cultivated less than one hectare (ha) of land, 31 percent had one to two hectares and the remaining 13 percent had more than two hectares. Within these categories, average landholding sizes are 0.55ha, 1.40ha and 2.91 ha respectively, with a national average of 1.11 ha.

Heavy dependency on fuel wood amongst smallholder farmers is causing severe deforestation and land degradation throughout the country. Furthermore, the expansion of crop production is limiting the land available for grazing and other uses, such that due to these factors, agricultural

production is greatly affected and there is shortage of cash in rural farm households leading to a variety of smallholder agronomic practices that contribute to sub optimal use of land resources. Poverty often leads the poor to trade-off long-term sustainable resource use for short-term consumption of stocks. The estate sub-sector on the other hand provides the bulk of export production and cultivates about 18 percent of the total arable land primarily on leasehold tenure. Land use practices on the estates have reflected several problems. Tobacco production accounts for 60 percent of estate land, tea 20 percent and sugar 18 percent showing limited diversification in estate sub-sector.

According to Nanthambwe *et al.* (1999), the period 1969-1989 witnessed unprecedented expansion of estates. The agricultural policy encouraged the opening of tobacco estates many of them in central and southern regions. The expansion of estates was so drastic that there was scramble for land to open new estates and most of them were opened on very marginal and unsuitable areas. The Land Husbandry Branch, became involved in this activity through surveying of land for leasing purposes, carrying out land capability classification, planning and layouts on the ground. Long after the exercise was completed, the extension on soil and water conservation of smallholder framers suffered because staff still had bias towards working with estates. In addition, the estates were well planned but badly managed because as a precondition to get a loan from a bank, expatriate managers had to be employed on a specific farm. This led to most estates collapsing because the expatriate managers considered soil and water conservation activities a waste of time and money since they were only concerned with short-term gains. This led to the establishment of the estate extension service to allow staff from the Land Husbandry Branch to concentrate on smallholder extension.

Land use practices are influence by several factors among which is the large population growth combined with limited availability of arable land resulting in smallholding size, particularly in the densely populated central and southern regions. More than half of the population of Malawi cultivates plots less than 1.0 ha in size. Planning on this size of land holding is difficult, and in addition, crop yields are extremely low due to mono-cropping and limited use of both organic and inorganic fertilizers (Land Husbandry Branch, 1992). The report further stated that many smallholder farmers face labor constraints particularly at the peak labour demand periods such as at the beginning of the growing season. Mwafong and Kapila (1999) noted that smallholder farmers with limited financial resources have no ability to spare labour for their gardens. This is exacerbated by seasonal employment, which brings many small holder farmers to sell their labour in favor of wages. Smallholder farmers do not get loans to invest in conservation, but

rather loans are provided in form of seed other than money. The net effect is a disregard for conservation as farmers aim to maximize productivity at the expense of the land in order to meet loan requirements.

Stocking (1988) noted that there is a strong interdependence between farming systems that evolve in developing countries and environmental conditions. A growing awareness now exists that farmers in long-settled parts of the tropics have progressively developed sensitive indigenous conservation systems that allow sustainable use of land. The farming system is a response to the environment as well as an expression of individual preference and the means to secure a livelihood. However, indigenous systems are vulnerable. Rural living in the tropical areas is more at the mercy of the weather and the condition of the soil than in temperate areas. Erosion influences the susceptibility of the tropical areas by changing the soil physical characteristics (less organic matter, fewer clays and silts, and poorer aggregate stability) and altering the nutrient status (greater acidity and lower nutrient availability). This, in turn makes the farming system more prone to drought. For a developing country, drought is not just a lack of rainfall. It is a deficiency in plant-available water. The deficiency is brought about in part, by soil erosion. In response, farmers may adopt a number of strategies, each have heavy costs - land use may be intensified; more land cultivated; changing agricultural practices and crops. Poorer diets, child malnutrition and increasing susceptibility to disease and death are all familiar consequences. Soil erosion also affects the structure of the local society and the nature of farming.

4.8.3 The Response

The Master Farmer Scheme was renamed Achikumbi Program. Farmers who had employed 'good' conservation practices in developing their land and had target levels of yield, were awarded certificates. Perhaps the main difference between these is that the latter did not involve inputs and were chosen on the basis of their own efforts to improve agricultural production. The soil conservation regulations were re-introduced, but persuasion rather than force was used in accordance with the 1962 Land Use and Protection Act. It is also important to note that the same soil conservation regulation which were disliked were maintained much to the disappointment of farmers who were promised changes in regulation after attainment of self government. Even without force, farmers continued to ignore extension advice on soil conservation.

In 1968/69 as a result of the recognition of the government to manage its land resources for the expanding population, the Land Husbandry Branch (now known as the Land Resources Conservation Department) was set up within the Ministry of Agriculture and Natural Resources. The main mandate of the branch was 1) to ensure sustainable utilization of land based resources for agriculture development through promotion of sound land use practices; 2) to provide services in land use planning, capability assessment, designing and construction of soil and water conservation works to combat soil erosion and promote good land use planning and environmental conservation (Amphlett, 1990; Mwendera, 1989).

As reported by Nanthambwe and Mulenga (1999), since the creation of the Land Husbandry Branch to late 1978, the branch functioned through field teams and regional units based in the three major cities of the country (Blantyre, Lilongwe and Mzuzu) including two other strategic districts. The field teams were responsible for the collection and analysis of field data and planning. The regional units were responsible for the implementation of soil and water conservation programs which at that time had put much emphasis on estate development and conservation. Due to this fact, perception of the Land Husbandry Branch was synonymous to estate planning and conservation and this therefore meant that land husbandry activities (soil and water conservation) took a long time to be featured in the mainstream extension.

Included in this extension were the Conservation and Planning Assistants (CPAs) who in addition to their normal work were required to emphasize the need for either full farm plans or conservation farm plans. They were also engaged in perimeter survey of farmers' plots. They advised farmers on correct crop rotation, composting and ridge construction methods. Because they were dealing with large areas, their influence was minimal.

In addition to establishing the Land Husbandry Branch, the Land Husbandry Training Center (LHTC) was established to provide in-service training to soil conservation personnel in the Ministry of Agriculture at all levels. It also played an important role in manpower training for other SADC countries. It has since been incorporated into the main agricultural training institute in the country.

Apart from the institutional changes which were effected after independence, there were also changes in the conservation policy characterized by a number of shifts in conservation strategies from the old colonial approach. There was a move to include certain conservation aspects in the Land Act and also the shift of emphasis from mechanical to agronomic conservation techniques

(Mwendera, 1989). As noted by Nanthambwe and Mulenga (1999) one of the main reasons for this change was the relatively recent realization that raindrop splash rather than run-off is the main contributor to soil erosion in Malawi, and the measures employed included those as discussed in section 4.8.1 above. To minimize the devastating impact of raindrop splash, increasingly vegetative, biological or agronomic methods were recommended to improve ground cover. Slowly with time the physical and biological methods have been seen as complementing each other. Another apparent change in emphasis has been from advocating graded structures like graded bunds to contour structure like contour bunds and marker ridges. This change was justified firstly by the realization that graded structures needed constant maintenance to function properly which smallholder farmers could not manage. Secondly, the government staff using sophisticated equipment pegged these structures and farmers looked at them as belonging to government. Thirdly, the graded structure spilt water into other farmers' gardens which were not protected and had the potential to cause a lot of damage.

According to Nambote (1998) at the attainment of self-government in 1963, a new approach to agricultural extension for the smallholder farmers was undertaken. The political leadership emphasized that agricultural extension workers should go to the smallholder farmer's fields and homesteads to advise farmers on better agricultural practices instead of farmers visiting the agricultural offices for advice. The agricultural services operated at four levels: the Ministry of Agriculture Headquarters, Regional, Area and Field Assistant. The Field Assistant was and still is, the front line extension officer who is in day to day contact with farmers. At the same time, when the extension approach was to visit smallholder farmers, a complementary system of agricultural extension operated under major agricultural development projects. Four agricultural potential districts were selected to receive development funding from donor countries and agencies. These major agricultural projects were more rural development projects than purely agricultural projects.

Nambote (1998) additionally noted that the two complementary systems of advising farmers to boost agricultural production employed the basic agricultural extension of contact namely: individual, group and mass media. The mass media method of contact was found to be effective in setting the agendas for agricultural extension, large numbers of people were made aware of the availability of agricultural advisory services. Much as they were effective in reaching the general public and farmers, the mass media methods fell short of the direct personal relationship of farmer-extension worker which enhances adoption of recommended improved agricultural practices through persuasion. The group method of contacting farmers through demonstrations,

field days and tours was seen to be advantageous since a wide spectrum of farmers were covered and they learnt more through practical demonstrations. The individual method was and still is, the most effective method in passing technology to the farming community. The farmer enjoys a personal relationship with the extension officer, s/he can ask questions and request a practical demonstration of the technology in question. Moreover the persuasive power of the extension officer is most effective on a one to one basis.

In 1978, Malawi embarked on a National Rural Development Program, designed on the basis of the lessons drawn from previous major agricultural development projects concept. Its emphasis was on activities that had an immediate impact on agricultural production while providing some infrastructure to facilitate it. As such emphasis was put on staff and farmer training, supply of agricultural inputs, provision of credit facilities to farmers and market infrastructure for inputs and agricultural produce. The country was divided into eight Agricultural Development Divisions (ADDs) and thirty Rural Development Projects (RDPs). The technology transfer methods were still the three basic ones; individual, group and mass media with more emphasis on group method of contact.

Nambote (1998) goes on to report that in 1981, an official policy guide was issued that the group method of agricultural contact should be emphasized. The Training and Visit System (TVS) of extension supported by the World Bank and other developing countries was adopted. It was slightly modified and coined the Block Extension System (BES). This system encouraged each Field Assistant to divide s/his section into eight sub-section called blocks. Farmers in each block were visited once every fortnight at a specified place, date and time where the Field Assistant teaches and demonstrates to farmers better methods of farming in a block garden. This system also advocates updating Field Assistant training once every fortnight.

Although this system had its limitations, it remained the main system of reaching the farmers. Some of the criticisms against the program include the fact that the Field Assistants' work is mainly controlled and follows the government's bureaucracy of top-down trickling of information. The Field Assistant has thus been seen as a mere purveyor of agricultural 'message packages' to farmers instead of engaging the farmers in dialogue of felt needs and grass-root problem-solving strategies with top management and policy makers. Although this approach is ideologically worthwhile it is not conducive to bringing farmers felt needs to the attention of top management and policy makers. This often led farmers to believe that all their problems could be solved by the government and not by themselves (Nambote, 1998). In addition to this, a

number of field level constraints identified by other research (e.g. Gompho and Kainja, 1993) show that the state of smallholder agricultural extension in the country is facing a multitude of constraints. The euro centric view of regarding illiteracy as being synonymous with lack of intelligence has often perpetuated the prescriptive approach of policies for the grass-root peasantry. This has often led to an apparent rejection of the prescribed 'message packages', and has had a big negative impact on the extension program and soil conservation suffered the greatest. The realization there was little to be achieved with limited number of field staff, poor resources to support their programs and other field level constraints, led to the decision to teach farmers to peg their own ridges.

In terms of research, Mwendera (1989) reported that after independence, uncoordinated research into strip cropping and agroforestry using runoff plots was carried out in various parts of the country. Most of this research did not make headway predominantly because of lack of equipment, financial support and coordination. Large-scale soil and water conservation research started in 1982 in the southern region involving monitoring soil and nutrient losses and surface runoff from fully instrumented catchments under different land use and conservation practices. To date a number of studies have been undertaken the major one being the Malawi Environmental Monitoring Program (MEMP).

4.9 Soil Conservation in Malawi after 1992

4.9.1 Perception of Status

Perception in this period was influenced by the sustainable development agenda which reached the climax at the Earth Summit in Brazil in 1992. Barrow (1999) observed that sustainable development like environmental management is not easily defined. The concept, although it had appeared in the 1970s, was widely disseminated in the early 1980s by the *World Conservation Strategy*. It called for the maintenance of essential ecological processes; the preservation of biodiversity and sustainable use of species and ecosystems. The Brundtland Report, *Our Common Future* placed it on the world's political agenda and helped rekindle public interest in the environment. It also spread the messages that global environmental management was needed and that without a reduction of poverty, ecosystem damage would be difficult to counter. Environmental management is thus clearly interrelated with socio-economic development.

Oelofse (2001) reported that the United Nations Conference on Environment and Development (UNCED) was a follow up meeting to the Brundtland Commission and sought to move towards the achievement of the aims of sustainable development. At the conference it was stated that what was needed was a strategy for sustainable development which was action orientated: a strategy which could be implemented. Agenda 21 was developed at the Rio conference as a non-binding program that indicated what actions should be taken to achieve sustainable development. Agenda 21 is a global program that hopes to change economic, environmental and community development in such a way that development will be far more sustainable. The catch phrase of Agenda 21 is to '*Act Local and Think Global*'. It is a forty chapter document which has four main sections: social and economic environment; conserving and managing resources; strengthening the major groups of key role-players and the means of implementing Agenda 21. Sustainable development provides goals and principles necessary to design an integrated approach to sustaining life on earth. It therefore requires a strategic rather than piecemeal approach; and involves trade-offs. Barrow (1999) further noted that the goals and targets enunciated in the Earth Charter has already had some policy influence on policy making in Europe, North America and other countries and a number of international agencies. It is an important and effective catalyst for environmental management and sustainable development.

It was based on this understanding that the Malawi government embarked on the National Environmental Action Plan (NEAP) in 1994. As a result, there was more awareness of ecological and social problems and the interrelationships among them. Essentially, the status of the problem was increasing because of increasing human population which meant that people were cultivating marginal land as noted in section 2.8. In addition, the perceived effects of the Structural Adjustment Program (SAP) and the coming into power of a new government in the new democratic dispensation, influenced the nature of how the problem became to be interpreted and tackled. It should be pointed out also that with the sustainability linkages becoming clear, the problem became to be linked to more of a multi-sectoral environmental problem than for the Land Resources Department of Ministry of Agriculture and Irrigation Development only.

Malawi as one of the Least Developed Countries (LDCs) experienced the SAP of the World Bank when it commenced. Studies on the effects of the structural adjustment policies show that the effects on the countries which participated are similar because they drew from the same framework. According to Redclift (1995), when the structural adjustment policies were first introduced in the 1980s, little attention was paid to their environmental consequences. The

structural adjustment lending in the 1980s did not incorporate environmental factors for several reasons which include:

- The World Bank and other multilateral development banks did not view the environment as a priority investment at the time.
- Borrowing countries had not requested financial support to deal with environmental problems.
- Public concern with global environmental problems had not reached the point at which policy changes were considered necessary. In the 1980s, environmental costs were seen, on balance, as a natural consequence of economic growth.
- The connection between economic policy instruments and their environmental impacts was only poorly understood by the World Bank. Often it was thought necessary to 'get the prices right' and no more.
- Environmental spending appeared to require more budgetary outlays – increased public expenditure, which ran counter to whole thrust of adjustment lending

(Reed, 1992 cited in Redclift 1995: 58).

Environmental issues were left out of this policy reform. This in turn presented a problem: *if the environment was left out of economic calculations, then, adjustment policy could be held responsible for unforeseen consequences*. Redclift (1992) cautions that it is important to acknowledge that structural adjustment policies did not arrive in a political vacuum. The specificities in the linkages between poverty and the environment should alert us to the dangers of setting environmental policy objectives in a vacuum.

Conway and Barbier (1990) noted that as part of the SAP reforms advocated by the International Monetary Fund (IMF), World Bank and other international lending agencies, many developing countries were being urged to reorientate their economies towards production of tradable commodities including agricultural exports. At the same time they were being urged to forego policies which promote self-reliance, for example increasing domestic food production to achieve self-sufficiency. Indebted African countries were being encouraged to specialize in export crops in which they enjoy a comparative advantage, as it was believed that their agricultural labour productivity was generally substantially higher in export than in food production. It was also widely acknowledged that food security needs could be met without a country having to be completely self-sufficient in food production. However, high dependence

on agricultural export commodities and on food imports and / or aid can leave a low or lower-middle income developing country vulnerable to external stresses and shocks imposed by the vagaries of international markets.

Binns (1994) noted that the SAP reform was advocated to make economies more efficient and more flexible and better able to use resources and thereby to engineer sustainable long-term growth. The policies involved such measures as currency devaluation, major expenditure cuts and reorientation towards agriculture, rehabilitation and maintenance. Taxes on consumer goods have been increased, wage rises restricted, price controls reduced and producer prices for cash crops raised.

It is for these reasons that in this thesis, apart from looking at implementation of the soil and water conservation policy by government, these other areas play an important indirect role in the problem of soil erosion and how the response to the policy will be, based on the perceptions of the farmers as decision makers.

Senahoun *et al.* (2001) reported that during the 1980s, many African countries had engaged in macro-economic and sectoral reforms and SAPs to bring their economies back into line with international economies and set the conditions for sustained long-term economic growth. Measures adopted included the devaluation of national currencies, changes in trade and macroeconomic policies, reduction in government spending, changes in price and subsidy policies and privatization and liberalization of domestic markets. All these measures may induce change in the functioning of farming systems (cropping patterns, inputs use, labour allocation). The impact can also be important on soils because cropping pattern is one of the major determinants of soil degradation. Erosion is one of the main causes of the soil degradation in African agriculture. Policies can affect soil erosion in two ways: first by modifying investment and input use (technologies) and second through its effect on the cropping pattern. A crucial issue for land degradation is the extent to which price-induced substitution encourages farmers to move away from less erosive crops and cropping systems to more erosive crops and systems. As a market orientated approach, economic reforms under SAP were intended to speed up structural changes in the agricultural sector and to stimulate the export oriented sector.

4.9.2 Perception of Cause

Soil erosion during this time was still considered the number one environmental problem. In addition, the increased population numbers of the country, was perceived to contribute to the problem of soil erosion because people started cultivating marginal lands. Government priorities were not on soil and water conservation *per se*, due to lack of enforcement of laws and the coming of democracy which was understood differently among the people, and in terms of natural resources management, more damage was made to the environment in the name of democracy.

Development of agriculture is an integral part of economic development. Few countries have experienced sustained economic development without growth of the agriculture sector. Similarly, all countries that have experienced significant growth in agriculture have also achieved a more rapidly growing economy. The development of the agriculture sector is therefore not just an end in itself, it also has a direct and beneficial effect on overall economic development. Farmers' reactions in managing their farms and in deciding between production alternatives depend on the infrastructure and the economic incentives of the agriculture sector (Benor, Harrison & Baxter, 1984). As governments pursue this objective to achieve economic development, the most important consequences on the environment have usually been left unattended such that soil erosion and other environmental problems have arisen which have had a negative impact on especially the poor who are mainly the smallholder farmers for the case of Malawi. As noted by Redclift (1995), economic growth frequently fails to accommodate conflicting human aspirations, and environmental costs are a necessary consequence.

The effects of the SAP which indirectly affected the agricultural policies, also had different implications on the status of the soil erosion problem during this period. These would in many cases be difficult to pinpoint but the effects can still be felt to this day, for example, the reduced expenditure of government activities, meant that less financial resources were made available for implementation of policy issues in agriculture including soil conservation.

Redclift (1995) noted that the environment, the principal resource of livelihood for the poor, cannot be accessed 'over the heads' of the poor. An emphasis on the role people can play in managing their own environments more sustainably will work best if it is supported by changes in macro-economic policy. It is difficult to achieve environmental benefits when the social fabric itself has been damaged as discussed in the section 4.9.1 above. Restoring the social

fabric, through an attack on poverty, is the main thing for effective environmental action. One of the connections between SAP and the environment show that there are several ways in which adjustment policies affect the resource base on which economic development rests. This is done by changing the relative prices for inputs through the elimination of subsidies, and through changes in import tariffs and export taxes. The cumulative effect of decisions about what to produce, and what to consume, has an important, if indirect, effect on the environment. The importance of this environmental impact depends on the fragility of the stock of natural capital, in itself dependent on the extent to which existing patterns of resource use place burdens on the ecological system. The stock of natural capital determines the capacity of the environment to continue to carry out its source, sink and service functions. This capacity is influenced, critically, by technological change, the distribution of resources and the overall scale of resource use. Whether adjustment policies stimulate more sustainable practices, particularly in agriculture, depends upon the way that prices affect the management practices associated with specific crops, and the conservation of biotic resources by farmers and others.

Redclift (1992) additionally noted that another way in which SAP policies have an indirect effect on the environment is through shifts in the pattern of government expenditure. Some argue that these cuts in public investment have often had environmentally beneficial consequences, while others argue that allocations to protect the environment are affected.

4.9.3 The Response

Malawi participated in the United Nations Conference on Environment and Development (UNCED) in 1992 in Brazil. As a consequence of becoming a signatory to the outcomes of the summit, produced the National Environmental Action Plan (NEAP) in 1994. As outlined in section 1.1, the NEAP is an overarching framework for all environmental related issues in the country. Based on this, a number of changes have been effected to foster harmony among environmental protection and management, quality of life and sustainable development for the present and future generation through the more integrative National Environmental Management Policy (NEMP).

The mandate for the NEMP is derived from the constitution of Malawi (Mwafongo & Kapila, 1999). As noted by Mwafongo (1999) the constitutional reform process is a landmark in innovative environmental management. Malawi has achieved a remarkable transition from a single party to a multiparty society. He further noted that policy choice, legislation, adjudication

or mediation in the constitutional framework are the most basic issues of development. This is because the development agenda, which is basically a political one hence judicial is closely interlinked with the environment. Bright prospects for sustainable development therefore were seen through the constitutional reform process. In addition, Mwafongo and Kapila (1999) stated that the mandate of NEMP, specifically covers both cross-sectoral and sectoral policy objectives, principles and strategies, legislation, environmental planning, environmental impact assessment, audits and monitoring, environmental education, public awareness and many other sectors.

The NEMP is not intended to usurp powers and responsibilities of sectoral ministries, but instead to reinforce them and highlight national priorities. Based on this framework, the Department of Land Resources Conservation had to adapt its extension focus to smallholder farmers based especially in the changes to democratic dispensation in 1994. This was achieved by strengthening the block extension system with participatory approaches, which enhanced farmer participation.

Dependence on donor financing is evident particularly in the case of land husbandry extension where scattered donor supported sites have formed 'islands' of conserved areas since field assistants tend to be active in donor supported sites because funds are available to support them. Concerning policy focus, the Land Resources Conservation Department has developed a National Land Resources Management Policy and Strategy in line with the NEMP and has taken into consideration the recent reviews of a number of other sectoral policies.

The decentralized governance over natural resources management during this period played a very important role. Many Non Governmental Organizations (NGO) came forward to assist the government through different programs whose major components included soil and water conservation through different activities like afforestation, agronomic measures and other soil erosion prevention methods. Many of these even as in response to the Agenda 21.

4.10 Conclusion

This chapter has looked at a number of important issues and how they all related to the problem of soil erosion. Soil erosion is an important environmental process. It is not only an ecological problem but also a political one because it concerns people and their livelihoods. There are few areas where it naturally occurs when it is not influenced by other natural events. It is the

accelerated erosion which requires urgent attention from governments all over the world. The best way to control it is to understand its processes of detachment and entrainment. This can lead to the choice of the right techniques which can be implemented to control it. In addition, the people, who are the causal agents as well as the affected should be involved in design of such conservation programs if they are to be successful. This is because, as discussed in section 3.2 their perceptions are important in decision making. The linkages between the perception of the status of soil erosion, its causes and its response are very complex, but an understanding of the linkages is very critical if any conservation work is to be meaningful. Stocking (1995) noted that there is no blueprint for land restoration. The process will always be dictated by the rhythms of cultural experience, political expectation and investment capital from aid agencies and philanthropic foundations.

It has been noted that during the colonial period, African farming systems were considered to be the cause of soil erosion, such that the colonial administration instituted conservation strategies to control it from spreading to large areas. The methods which were used did not take into consideration the processes of soil erosion since no deliberate attempt to understand its processes was made. The perception of soil erosion from the colonial times to the present day led to differing approaches to implementation. The extension service was the vehicle to implement the soil conservation policy. The conservation efforts of the world have largely been modeled upon the experiences of the United States of America which began as early as the 1930s.

According to Beinart (1984), during colonial period the extension service was part of the department of agriculture's main operations. The mode of contact with farmers at that time is generally perceived to be that of visiting and contact through coercion. As indicated in section 4.7.3 extension programs were initially introduced in the colonial government's agricultural departments to change peasant farming, and were to stimulate more general improvement and cash cropping rather than conservationist concerns. However, later on the programs were introduced to deal with erosion. Thus from as early as the 1930s, soil conservation policy implementation has been through extension service. This led to conservation work becoming a necessary step in production.

In addition, it has also been noted that the conservation measures were introduced to protect settler agriculture and not much for the local farmers, and this led to coercion as a means of enforcing the policy. These facts are well known in the history of soil conservation in the

country such that they formed a basis for comparing the efforts of soil conservation in the country in the periods of pre and post-independence for this study. It should be pointed out that regardless of how the policy was implemented, achievements were made and their advantages documented. For example, Mwafongo (1999) reported that by 1956 an estimated three-quarters of a million acres of land were conserved and that virtually all sloping arable land cultivated in contour ridges, it checked gross erosion.

When the country became independent in 1964, the perception of the causes of soil erosion did not change immediately. This meant that the approach to conservation did not change. However, the extension system adopted a persuasion approach and not that of coercion, through visiting the farmers, and the approaches employed were individual, group and mass media (Nambote, 1998; Nanthambwe and Mulenga, 1999,). The method of contacting farmers through demonstrations, field days and tours was seen as advantageous because a wide spectrum of farmers were covered and they learnt more through practical demonstrations. The individual method was also used and was the most effective method of passing technology (Nambote, 1998). Later on the Training and Visit (T&V) method was adopted though it was modified. This has been the way of contact between farmers and staff. According to Benor, Harrison and Baxter (1984) the training and visit extension system is a professional system based on frequently updated training of extension workers and regular field visits. A basic principle of effective, professional extension for the training and visit system is that farmers should be visited regularly by able and qualified extension workers.

The approach taken by the government to implement the soil conservation policy was essentially top-down and there was no incorporation of the local knowledge from the farmers into the policy process. This is confirmed by Mlia (1987) who reported that the methods used for promoting conservation were however typically top-bottom approaches without any serious attempts being made to understand and learn from traditional farming methods and to involve the local people in the decision making process. The erosion process itself was also not fully understood for a long time and consequently the emphasis in soil conservation was to control runoff as opposed to minimizing the effects of raindrop splash.

The period from 1964 to 1992 proves to have been a time of learning in policy implementation such that the new information from understanding the erosion processes was then incorporated into the soil conservation techniques advocated by government. Pasteur (2000) noted that policy implementation is incremental in nature, that is, through implementation more knowledge is

discovered and it is incorporated into the existing policy to achieve the desired results. This policy orientated learning is an important aspect which contributed to the change in approach. Research results are an important source of policy information. Thus the understanding of soil erosion processes led to the shift in emphasis on mechanical to agronomic measures to control erosion. As noted in section 4.9.1, much of the implementation was based on policy learning. In addition it has also been noted that other important factors have now come into play in perceiving the causes of soil erosion. Increased population and poverty among the people have been cited to be leading factors contributing to the problem of soil erosion through causing secondary impacts like deforestation to increase farming land and also to get energy sources for household use.

The SAP in Malawi caused economic setbacks. Although the program was intended to benefit the economy in the long run, in the short term it brought with it many problems. Their effect on soil erosion is explained through their link to farmers' decision making concerning the cropping pattern in order to sustain their livelihoods. Just like the environmental effects were not taken into consideration by the World Bank and the IMF, governments went ahead to implement it without considering it too since it was a framework which had to be adopted by them. The consequences of those policy directions are being felt to this day through the effects on environmental damage.

The concept of sustainable development led to a new direction in thinking about resource conservation in the country especially after realizing the effects of the SAP. Malawi became a signatory of the UNCED in 1992 and immediately set out to implement some of the agreements contained in the charter. One of these - the Agenda 21, is another framework which contributed to this change in thinking concerning implementation of the soil conservation policy. Stocking (1995) noted that Agenda 21 argued for both capacity building and the promotion of ecologically and culturally sensitive schemes of land restoration.

CHAPTER FIVE

METHODOLOGY

5.1 Introduction

In this chapter, the methodology which was used to conduct the research is presented based on the theoretical background provided in the previous two chapters. The first part describes the research approach for this work, and the other part looks at the research design. The description of the study design includes sampling, the data sources utilised, the methods of data collection and analysis. In addition, the section also discusses the concepts of validity and reliability for the data sampling and instrument used. It should also be pointed out here that the selection of the methodological approach used in this study was influenced by the following considerations: (i) aims of the study as listed in section 1.3, (ii) the available data source and (iii) practical constraints on data collection for the study.

5.2 Research Approach

A research approach outlines the way in which the research was done. In this work, the approach followed was the case study. Case studies are used when the research is directed towards specific cases in real-life settings. Rather than studying a phenomenon in general, a specific example within time and space is chosen for study. In the main, case studies are qualitative in nature, but can also be quantitative or use a mix of both sorts of data (Kitchin & Tate, 2000).

A case study approach was chosen because soil erosion is a general problem in the country and the soil conservation policy implementation is done countrywide. The area chosen is highly populated and displays many characteristics which are important in a study like this one. Therefore, based on this, the case study would be representative of the true picture in the whole country.

In addition, a questionnaire survey was designed to generate primary data which was used to make comparisons with the secondary data. Secondary sources of information were also a major source of data for this work. The objective of the survey was to collect information on perceptions regarding the nature and causes of soil erosion as well as effectiveness of implementation of policy in the country. The participants in the survey were smallholder farmers and agricultural

extension staff who are directly involved in implementation of the soil and water conservation policy. The recruitment process of respondents and related information is discussed under sampling below.

Surveys require planned data collection in a standardized format from subjects. Because of the combination of the case study approach and the survey design, both quantitative and qualitative methods of research were employed in this work. The quantitative methods lead to collection of quantitative data or things which can be counted. They often use statistical manipulation of numbers to process data and summarise results (Locke, Silverman & Spirduso, 1998). In this study quantitative data was generated by dividing responses into categories and allocating numbers to these categories.

Qualitative research is carried out when we wish to understand meanings or look at, describe and understand experience, ideas, beliefs and values – intangibles such as these (Wisker, 2001). The responses to the various questions regarding their perceptions, provided the qualitative data which was used in this study. In analysing these responses, a combination of descriptive and interpretive approaches was followed. Kitchin & Tate (2000) noted that description is central to any study, whether using qualitative or quantitative data because it concerns the portrayal of data in a form that can be easily interpreted. Interpretation comes from classification of data and here an interpretive analysis seeks to understand the data generated more fully and make it more meaningful to others.

The theoretical background provided in chapters three and four, has located the issues of soil erosion and the need for policy interventions in the broader context of land use. Soil erosion, especially the erosion accelerated by human activity is represented in the human-environment relationships as has been described in section 3.2.

The secondary data sources included a literature review of the theory on policy, its processes and implementation as well as review of historical account of the problem of and response to soil erosion in Malawi. Extensive review of literature on the subject from a diversity of sources such as the publications and reviews compiled by researchers in the fields of soil science, agriculture, conservation and agricultural extension as well as government reports, historian accounts including the world wide web, were used to establish a framework within which to carry out this analysis of policy implementation. A multidisciplinary investigation incorporating aspects of the fields of economics, agricultural extension, environmental history, law, human ecology, politics as

well as physical and human geography, was used as a base from which to draw literature for this study.

The following sections on sampling, methods for data collection, sampling validity and questionnaire validity, describe the study design.

5.3 Sampling

At the outset a clearly identifiable population, which would constitute the right respondents, proved impossible to define. Various sampling methodologies have been used in previous studies to select samples of people each with their own merits and shortcomings. Each one to a limited extent justified by the means to which they are applied. The method used in this study is described by Stephan & McCarthy (1958) cited in Cooper (1996), as a selection by 'taking what is readily available' and was supplemented by the procedures referred to 'selection by searching and matching'.

This procedure involved selecting two groups of respondents: (a) serving members of staff of the Ministry of Agriculture and Irrigation Development (MoAID) who were directly involved in implementing the soil conservation policy, and (b) literate smallholder farmers. As noted in section 2.9 of chapter two, illiteracy levels in Malawi are very high, especially among the female population who ironically constitute the bigger proportion of the farming community in the country.

The sample was drawn from the Blantyre Agricultural Development Division (ADD) (Figure 2.6) of the southern region of the country. The division has five Rural Development Projects (RDPs) which in turn have Extension Planning Areas (EPAs) and Sections, manned by extension field staff. The sample for staff was drawn from both the RDP and EPA, and that for farmers was drawn from the section level, since that is where the frontline staff (F/As) are functional. There are twenty-seven (27) EPAs and 201 sections in the division. A total of 15 staff, five at RDP, five at EPA and five at section level, and 30 farmers (at least six farmers per section in an RDP) were involved to make up the total sample. Figure 5.1 below, shows the functional structure for Blantyre ADD and locates the sample for the study. Figure 5.2 shows the location of the areas from which the respondents were chosen.

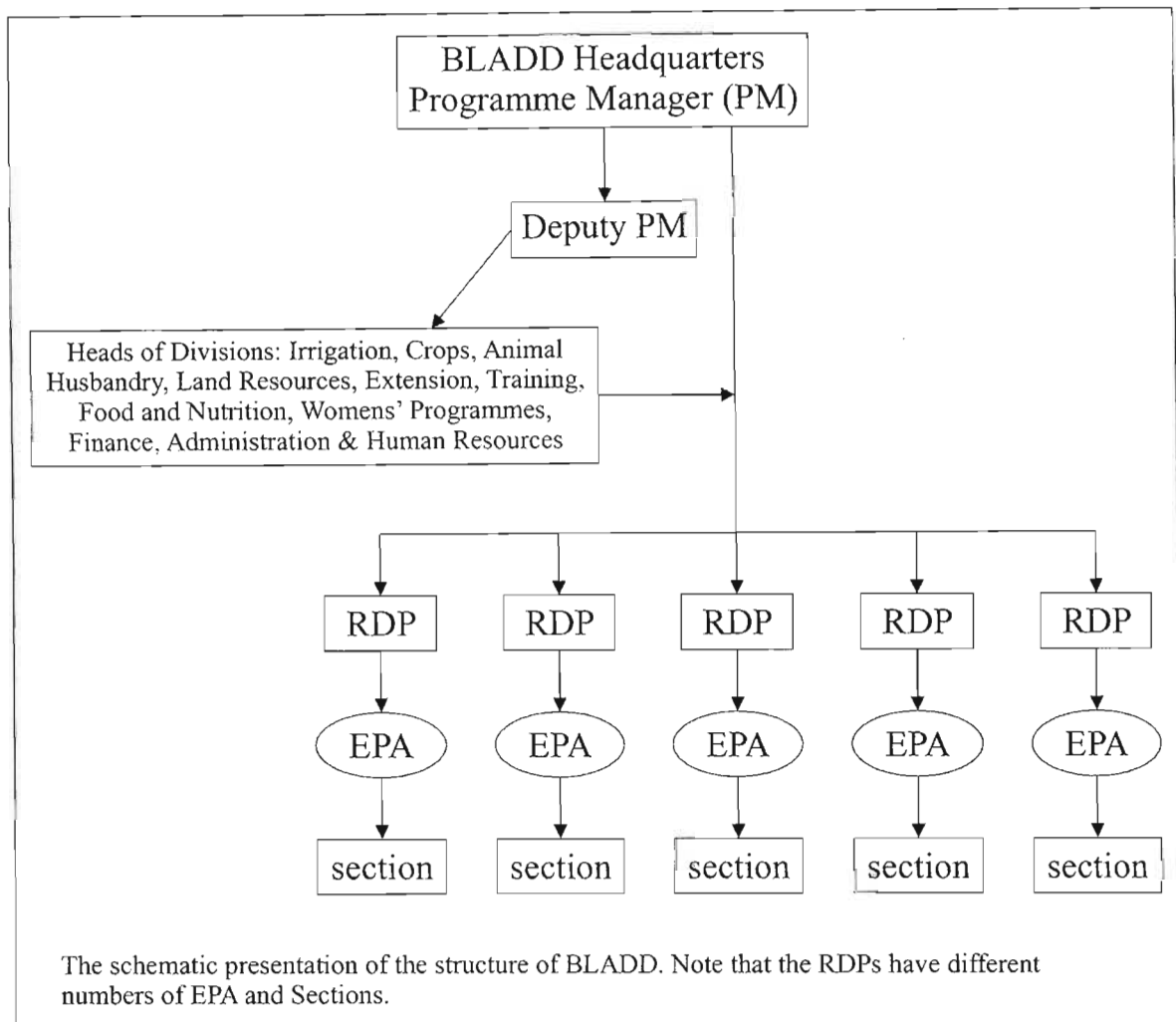


Figure 5.1 Functional Structure of Blantyre ADD and Sample Location

Lovett (1997) noted that when planning to undertake testing of hypothesis to determine whether trends apparent in a sample of data are also likely to exist in a wider population, it should be kept in mind that the size of the sample has a considerable influence on the outcome. In effect, the larger the size of the sample, the weaker any trend need be to qualify as statistically significant. It is therefore vital to give some thought to the sample size required before embarking on data collection. However, due to the reasons stated in section 5.1, the study ended up in dealing with only a small sample. Therefore, when the analysis was done, care was taken to ensure that the interpretation of the results only shows the type of association to which the variables being investigated pointed. The results of the statistical analyses were not presented for the same reason that the sample was too small as has been explained in section 6.3.5.

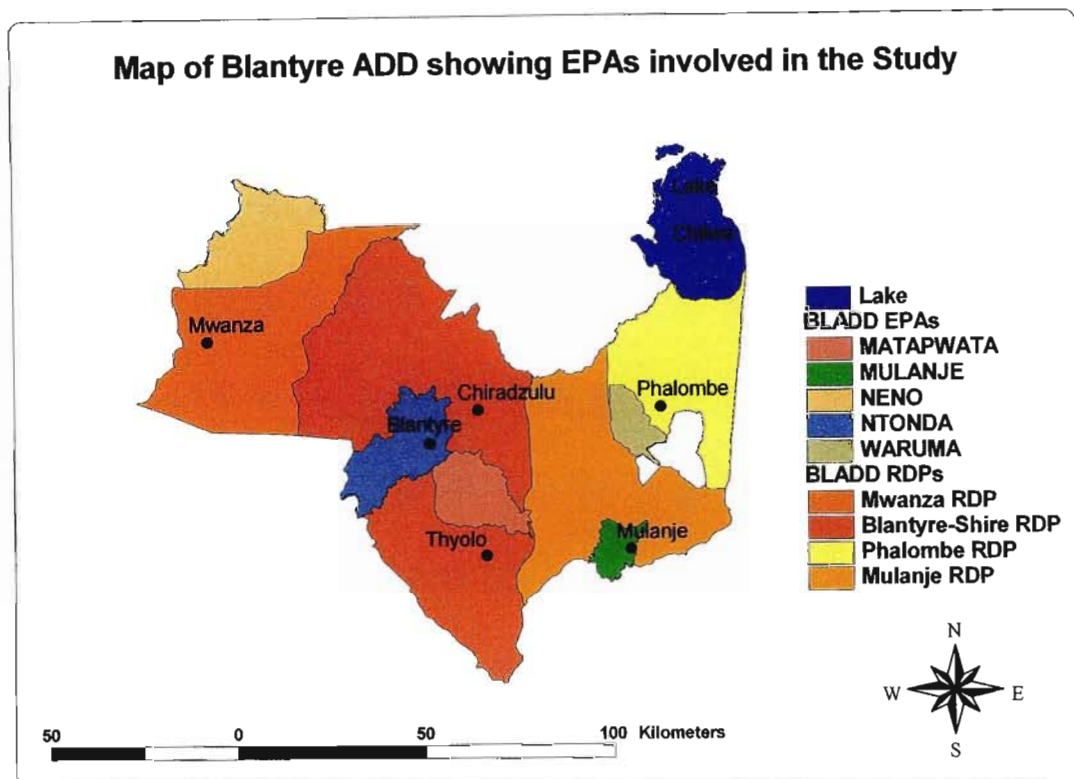


Figure 5.2 Blantyre Agricultural Development Division showing Location of Study Sites

5.3.1 Value in Accuracy

Stephen and McCarthy (1958) cited in Cooper (1996:37, 38) stated that accuracy is important in any attempt to measure attitudes over a large population. However, constraints of time and money or available resources tend to prejudice the necessity for some compromise and sampling provides part of the solution. The value of impact of impression made as a result of obtaining information on attitudes or opinions by sampling, will depend not only on the accuracy with which the information was obtained, but also on how well it serves its purpose. For this reason, it is asserted that the sampling procedure employed in this study can be 'trusted' to represent contemporary realities, at least according to the perceptions of those sampled, regarding the extent, causes and nature of soil erosion in Malawi and furthermore, that the results of this work as such,

significantly contribute to the knowledge and understanding of the 'thinking' of the large population on an important issue of the day (Cooper, 1996).

5.4 Questionnaire Design

Both primary and secondary data were collected for the study, and as pointed out in section 5.2 above both quantitative and qualitative data were gathered too. There are many methods of data collection in social research but the concern in gathering the primary data was through a questionnaire as the major instrument. The following sections provide the details of the instrument used in gathering primary data as well as its validity.

Primary data is the data which is generated through the research. In survey design, the most appropriate instrument to use is the questionnaire. The questionnaire can be structured or semi-structured, and contain both open ended and closed questions. The questionnaire survey is an indispensable tool when primary data are required about people, their behaviour, attitudes and opinions and their awareness of specific issues (Parfitt, 1997). In this study, two sets of questionnaires were designed, one set for farmers and another for extension staff (refer to Appendices 1 & 2). There was a component common to both sets. The questions in the component common to both the staff and farmer questionnaires sought to identify factors that have influenced their perceptions on:

- a) Causes of soil erosion.
- b) Whether soil erosion is a problem.
- c) Knowledge of soil conservation policy.
- d) Whether the policy has been effectively implemented or not.
- e) How it can be more effectively handled in the future.

The farmers' questionnaire had an additional component on land use. The questions in this component sought to examine their perception of soil erosion on productivity. In addition, socio-economic characteristics were collected from the farmers. The smallholder farmers of Malawi have been involved in a number of surveys and research activities which were conducted for different purposes at different times. Asking the respondent's name therefore was not a very sensitive matter. The farmers' questionnaire had to be translated into the local language. The method used for these structured questionnaires was postal and self-administered. Due to practical constraints on data collection, pre-testing of the questionnaire was not done.

Given that the focus of this study was on the efficacy of implementation of a policy devised to address the soil erosion problem, it was important to establish if the implementers were aware of the theory behind the advocated strategy. It was based on this understanding that the above mentioned variables formed the basis of measurement to determine the impact of policy implementation. These were collected once; no intervals for collection of measurements were included in this study.

It was important to ask both staff and farmers these questions to capture their understanding of objectives of soil conservation. The extension staff were expected to understand the policy objectives in relation to the theory underlying the conservation strategy. The farmers were expected to provide a mirror reflection the work done by the staff. This gave an indication of the capacity of staff in handling the policy through carrying out their day to day activities. The farmers' responses to these questions therefore necessarily gave the clues on the effectiveness of the implementation of the policy as well as the capabilities of the staff.

Control groups are an essential component to any research. The function of a control group is to show what would have happened to the experimental group if it had not been subjected to the experimental variable (Oppenheim, 1992). However, in this study no control group was used because extension is administered uniformly throughout the region (country) therefore no control, i.e. no area in which no attempt to administer policy.

5.4.1 Questionnaire Validity

Cooper (1996) reported that with regard to the structure of the questions, it is acknowledged generally, that closed questions tend to sharply restrict frames of reference by focussing attention on the alternatives offered. She further noted that research undertaken in the 1980's drew attention to the concern that 'open' questions too can be shown to exercise their own form of constraint. In compiling the questionnaires for farmers and staff (refer to Appendices 1 and 2 respectively) used in this study, great care was taken to not only combine both types of survey questions, but that where possible respondents were provided the opportunity to 'give the main reason why', comment or justify their choice of answer. According to Parfitt (1997) the content of the questionnaires needs to be firmly rooted in the research question or hypothesis under investigation. In addition, the questionnaire content must also set out to measure what is practicable and relevant to respondents and to give them the maximum opportunity to respond.

The questionnaire designed for this study took these requirements into consideration as can be established from the results. The advantage with this type of questionnaire administration was that there was no interviewer bias. Garland *et al.* (1994) stated that community perceptions of erosion could only have meaning when interpreted within the context of the socio-economic circumstances governing the life of the community members especially the sources of income and economic activities of residents. This is also in line with the sustainable livelihoods analysis approach explained in section 3.6.5.

5.4.2 Field Data Verification

After the preliminary analysis of the data collected through the questionnaire survey, field data verification exercise which took ten days was conducted. This involved going back to the respondents to confirm some of the responses given as well as filling in missing data in questionnaires.

A total of 14 out of 15 questionnaires sent out to extension staff were returned to the researcher. It was established that the failed returned was from a staff member who had left the country to further his studies and whose position had not been filled. A total of 23 out of the 30 questions sent to farmers were returned. The household heads at the failed returns addresses were not available when the call-backs were made. Efforts to include new respondents proved difficult. The major reason given was that due to the hunger situation in the country, most people were food hunting and therefore not interested in attending to the questionnaires. Given time and financial constraints in extending the stay in Malawi, it was decided that the returned questionnaires would have to suffice.

5.5 Data Analysis

Data analysis for the study focussed on the identifying factors that have influenced the perceptions of the farmers regarding the variables mentioned under section 5.4. above. These factors were level of education, age, sex, type of employment and level of education that other members of the household have, whether they have a radio or regularly read a newspaper, magazines and distance from the main road.

The socio-economic data of the farmers (mainly their age, sex and educational level) was correlated with their perceptions described in section 5.2 above. The Spearman's Rank correlation

coefficient at 95 percent confidence level, was used because the data was found to be non-parametric. Policy implementation analysis was carried out using the theory provided in secondary data sources. However, because the issue of sustainability was relevant to this analysis, it was conducted from both service delivery and livelihood perspectives.

5.6 Conclusion

This chapter has described the methodology used in the study. A case study approach was suitable for this study because soil erosion is a country wide problem with uniformly applied implementation of policy. Both primary and secondary sources of data were utilised generating quantitative and qualitative data. A multidisciplinary investigation of aspects of different fields was used as a base from which to draw literature for this study. Policy implementation analysis was done from two perspectives: the service delivery and livelihoods, based on the frameworks from the theory of the study. Sampling was based on 'taking what was readily available' supplemented by procedures of 'selection by searching' (Stephan & McCarthy, 1958 in Cooper, 1996:37-39) but which serve the purpose for which the study was designed. The instrument used to collect the primary data were postal, structured self-administered questionnaires to extension staff and farmers, which contained both open and closed questions. The analysis of data was done using the Spearman's Rank Correlation Coefficient because the data was found to be non-parametric. The results of the study are presented in the next chapter.

CHAPTER 6 RESULTS AND DISCUSSION

6.1 Introduction

The results and findings of the study are presented and discussed in this chapter. These were collected and analysed as discussed in section 5.4 and 5.5 respectively. The farmers' and extension staff questionnaires (refer to Appendices 1 & 2) are discussed separately starting with the farmer questionnaire. Beginning with the socio-economic profile of farmers followed by the land use components, the discussion proceeds to present the perceptions of the farmers on the causes and status of soil erosion, extension and policy issues. The sequence of discussion is then repeated for the staff questionnaire. The results are presented and discussed both quantitatively and qualitatively with regard to the findings. The literature review cited in chapters three and four complements the discussion. In addition, the analysis of policy implementation from service and livelihood perspectives has also been discussed drawing mainly from both sources of data used in the study. Both models of implementation analysis including the synthesis of these models have been used.

6.2 Socio-economic Profile of Farmers

The farmer questionnaire (refer to Appendix 1) comprised two sections as already discussed in section 5.4. The first section (refer to Appendix 1, Part A) dealt with land use, soil erosion and extension and policy issues, while the second section (refer to Appendix 1, Part B) was mainly on the socio-economic characteristics of the farming families identified. In this second section information concerning household composition, education levels, age, marital status and economic activities was requested from the respondents and is presented in Table 6.1.

Table 6.1 Socio-economic Profile of the Farmers who Responded to Farmer Questionnaire

Description	Male	Female	Total¹	Number²
Number of Farmers	20	3	23	
<i>Age of Farmers</i>				
21-30 years				5
31 years and over				18
<i>Characteristics of whole sample</i>				
<i>Numbers</i>	88	91	179	
<i>Age Ranges</i>				
0-5 years	9	12	21	
6-20 years	42	35	77	
21-30 years	20	28	48	
31 years plus	17	16	33	
<i>Educational levels</i>				
Old standard 1-3	10	14	24	
Standard 1-5	18	20	38	
Standard 6-8	17	20	37	
Secondary school	29	12	41	
Adult literacy	0	7	7	
<i>Occupation</i>				
Farming only				18
Farming including other occupation				5
<i>Other assets owned</i>				
Radios				21
Bicycles				18

¹ Refers to the total number of individuals in households of the smallholder farmers interviewed.

² Refers to the smallholder farmers interviewed only.

As described in the Table 6.1, most respondents were males older than 31 years whose sole income was derived from farming and who owned both a radio and bicycle. The 23 households supported 179 people the gender distribution of whom was approximately equal. Most of these people were between the ages of six and twenty years. It is only at the secondary school educational level where a major gender discrepancy becomes apparent with the proportion of males being 2,4 times that of females.

All the farmers had stayed more than 10 years in the villages where they are at the time of the survey. All households produce most of their own staple food requirements. The only income generated by 18 of the households was from selling their agricultural produce. One household supplemented this income by producing handicrafts. The income of four others was supplemented by a member of each being employed as a teacher, watchman, labourer and tea plucker, respectively. This is confirmed by their response to a question on their sources of income (refer to Appendix 1, QB15).

Most households (15) were less than a kilometre from a main road, while six and two were two to four and five to ten kilometres from such a road respectively. Most listen to the national radio station although a few are also able to access the other radio channels available in the country. Most of them do have access to the local agricultural and farming newsletters distributed by the Ministry of Agriculture and Irrigation Development (MoAID) namely *Za Achikumbi, Tikambe, Tikolole, Tilime* and other extension leaflets which are distributed to them from time to time on particular subject matters, as well as the other news papers and magazines when they have access to them.

This socio-economic information typifies the general trend among the population in the country as has been discussed in section 2.9, and which is representative of the smallholder farmers of Malawi. Of importance to note would be the demographic trends, educational levels and livelihood opportunities. According to the Malawi Government (1994) out of the population of ten million people, the country has a young growing population with 46 percent below the age of 15 years. This has brought a high dependency ratio of 1.01 for each economically active adult. The total fertility rate is 6.7 and it is due to low literacy levels among the female population. Only 42 percent of the population is literate.

6.2.1 Land Use

According to Bockstael and Irwin (2000) land use denotes human's employment of the land for example, crop production, grazing, logging and urban development. Land use determines

land cover to a large extent. In addition, it is important in assessing ecological impacts because it signals the nature of human interaction with the environment. Even the very act of land use change can have systematic effects. Examples include biomass burning which generates air pollution and greenhouse gas emissions, and clearing and excavation which contribute to soil erosion and sedimentation. The authors further note that almost every conceivable public policy has some effect however indirect, on land use decisions.

As pointed out in section 2.8, high pressure on customary land is a major problem in the country. The tenure under which most farmers hold their land is the customary land, which also occupies the single largest category (Banda, 1997), hence land use would be determined by the size of land which the farmer owns (refer to Appendix 1, Question (Q) A1). In this work, the main land use option considered was cultivated arable land only, owned by the respondents interviewed. An indication of production results for the 2000/2001 season was identified and has been discussed later in the chapter. The method of cultivation is quite uniform across the country, with the hoe as the only technology used. The Figure 6.1 shows the different sizes of land owned by the farmers.

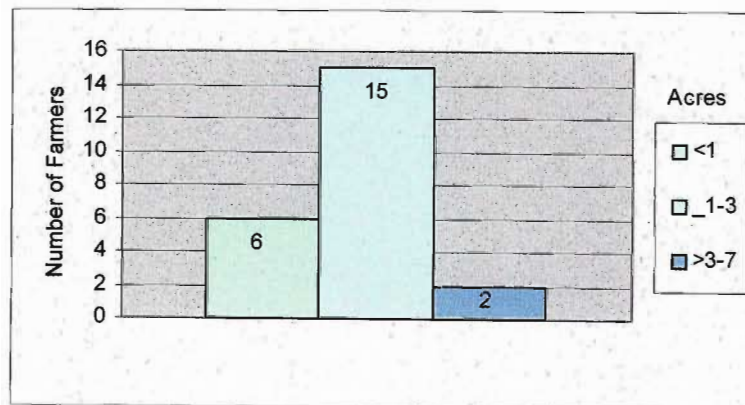
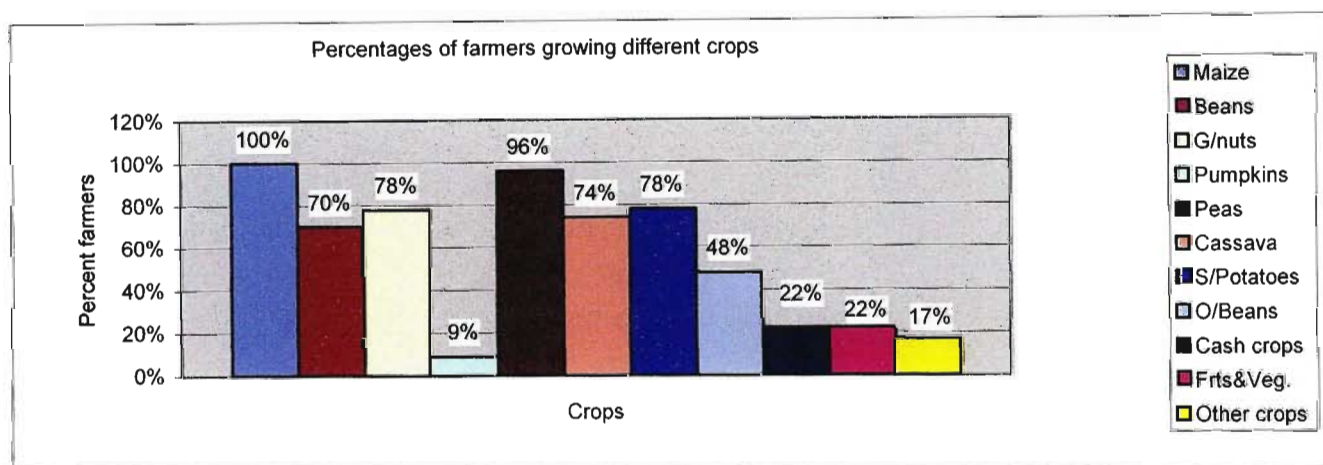


Figure 6.1 Land Holding Sizes of Farmers

As can be seen from the graph, six farmers indicated that they own less than one acre of land (>0.4 hectare (ha)), 15 between one to three acres (0.4-1.2 ha) and only two greater than three to seven acres (1.6 –2.8 ha). This depicts the true situation of land holding among smallholder farmers in the country where the national average of land holding for them is one to three acres (1.11 ha), as well as the trend at ADD level where the average land holding size is 1.75 acres (0.7ha). However, this land may not constitute one contiguous piece of land owned by the farmers, but a summation of different plots of land located in different places in the same

village. Errors can also not be discounted for, though the farmers are fairly conversant with measuring fields in acres rather than hectares.

As noted in section 2.8, generally, crops grown by smallholder farmers are food crops and some farmers do produce cash crops such as tobacco. Maize is grown by almost all farmers since it is also a staple food in the country. Figure 6.2, shows the different types of crops grown by the farmers interviewed.



[G/nuts _ Groundnuts; S/Potatoes _ Sweet Potatoes; O/Beans _ Other Beans; Frts & Veg _ Fruits and Vegetables]

Figure 6.2 Proportion of Farmers Growing Different Crops

The profile presented in the Figure 6.2 is representative of that for smallholder farmer cultivation generally throughout the country. All farmers grew maize in addition to a number of other crops the most common being beans, groundnuts, cassava, sweet potatoes, peas and other beans. The other beans included soyabeans, ground beans and velvet beans, while peas included pigeon peas and cowpeas. It should be pointed out that the ADD is located in the southern region of the country where peas and other beans are part of the farming system in addition to the major combinations noted above. In addition, due to the agro-ecological region, the other crops shown in the Figure reflect the diversity in the zone, and they include yams, sorghum, and sugarcane. The fruits and vegetables mentioned were okra, tangerines, garlic, pineapples and cabbage. The cash crops were rice and tobacco.

The season within which the survey was conducted was a drought year. The question on yield levels achieved (refer to Appendix 1, QA3) was therefore designed to assess the current situation regarding the drought as well as to indirectly indicate whether soil erosion was a problem on the farmers' fields. Responses to this question were compared with those more directly addressing soil erosion as a potential problem. Figure 6.3, shows the farmers' assessment of their harvests in the 2001/2002 crop production season. The season is from planting in October to harvesting in April.

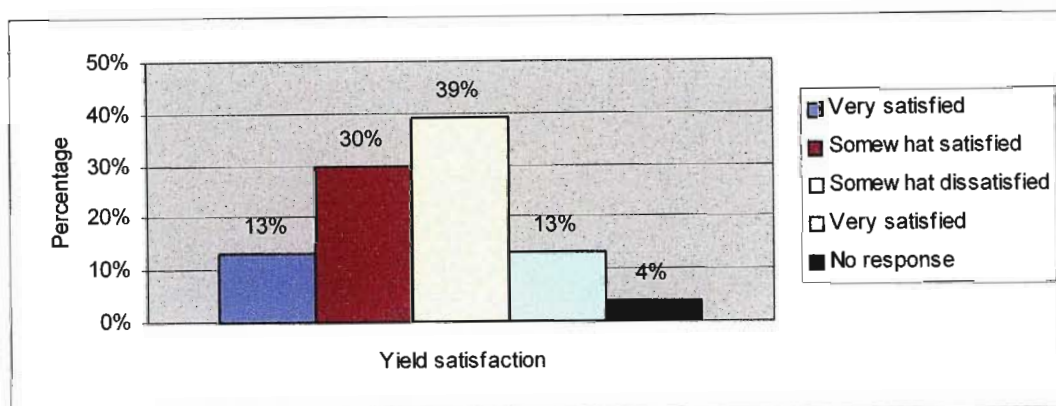


Figure 6.3 Yield Levels Achieved in 2001-2002 Season

Figure 6.3 shows that while 43 percent (ten) of the farmers were satisfied with their yield, 52 percent (13) were not. Mwafongo (1999) maintained that it is usual for smallholder farmers to get inadequate yields and attributes this to soil erosion. However, the effects of drought cannot be excluded as noted in section 4.8.2, Stocking (1988) noted rural living in the tropics is at the mercy of the weather and the condition of the soil physical characteristics. For a developing country, drought is not just the lack of rainfall. It is a deficiency in plant available water. The deficiency is brought in part by soil erosion. In this case therefore it can only be said that the drought situation was felt much more because of soil erosion since a big region of central and southern Africa was affected in this season.

In addition, it can also be said that the high population increase has been characterised by multiple livelihood strategies. Most notable of these is the crop diversification by the farmers, which is both a response to climatic changes as well as livelihood strategy. Other income generating activities are also done.

6.3 Farmers' Perceptions

The questions pertaining to soil erosion (refer to Appendix 1, QA5, A6,) sought to ascertain:

- a. The farmers' perception of, its influence on productivity, its causes and its status as a problem nationally;
- b. Information on the nature of consequent problems experienced and responses to these problems;
- c. Perception of extension service delivery and
- d. Their knowledge of policy and legislation

The extension related questions focused on the nature and degree of contact with extension staff; and their perception regarding the relevance of what they were taught and what they considered the way forward to be.

6.3.1 Soil Erosion and Land Productivity

Productivity is the most commonly used measure of agricultural performance. It is defined as the output of valued product per unit of resource input (Conway and Barbier, 1990). The three basic inputs are land, labour and capital. Common measures of productivity are yield or income per hectare, or total production of goods and services per household or nation; but a large number of different measures are possible depending on the nature of the product and the resource being considered.

As noted in section 3.7, a farmer may notice soil erosion occurring on his or her field but not see any impact on productivity. To find out about the farmers' perception of soil erosion in relation to productivity, they were asked whether they had noticed any changes in the productivity of their land from the time they started using it to the present (refer to Appendix 1, QA4). Twenty noticed change, two did not and one was unsure. All those who noticed change maintained that the productivity had declined. Six attributed this to decreased fertility and claimed that to now get a good harvest they need to apply fertilizers and manures. Twelve farmers indicated that applying the extension advice on soil and water conservation through construction of contour marker ridges, planting vetiver grass and agroforestry tree species had led to improvements. Four could not point to the changes noticed.

In section 3.7 it was noted that many changes in soil quality are very difficult to notice. Even early stages of actual erosion are not easy to detect by the farmer or any observer. The land

user may not be aware of the effects of low rates of erosion until a critical level of accumulated loss is reached, and this may take many years. In addition, African farmers often refer to site fertility rather than soil fertility. These responses show that it can be argued that productivity of the land is diminishing due to erosion processes. In addition, the farmers are becoming aware of the erosion processes going on in their fields, but this did not come out as explicitly as was expected. The farmers could not pinpoint soil erosion as a cause of reduced productivity. This is similar to what was reported by Garland *et al.* (1994) in section 3.7, that awareness of the effects of erosion is highly variable and that most farmers with eroded land realised that yields were falling, but did not relate this to soil loss.

The failure to link productivity and soil loss was checked against the number of years stayed in the village (refer to Appendix 1, QB12). It showed that all the farmers involved in the study had been in their villages for more than ten years, such that it is time sufficient enough to conclude that the change in the productivity of the land is as a result of soil erosion and hence their mentioning that the situation has changed because they are implementing soil and water conservation measures. The benefits of soil and water conservation measures would only be appreciated after a number of years.

Decreased fertility is a reliable indicator of soil erosion problems. The reasons why they were not able to pinpoint the linkage with accelerated soil erosion could be that by implementing the soil and water conservation practices or application of fertilizers, the effects of soil erosion were masked. In addition, a very important reason for this could be that they have not been trained to identify indicators of soil erosion in the field. Extension service delivery aims to impart knowledge to aid the decision making of the farmers in the absence of the field staff. This is an important finding in this study as it has pointed to an area which needs emphasis when training of farmers is conducted.

Blaikie (1985) noted that the potential productivity losses are masked by new technologies such as chemical fertilizers and improved crop varieties. The question of judgement over the extent to which land users can mask or make good soil degradation and erosion, depends upon their present and future access to chemical fertilizers, improved seed, credit, government assistance in land erosion works, soil conserving crop rotations and tillage methods. Serious doubts arise whether induced innovations will be able to cope with soil erosion. Fertilizer usage in the country cannot be avoided. The ALDSAP (1995) reported that per capita food production had been falling rapidly and therefore a major thrust of a food strategy was required. Diversification of the sources of food while raising food crop productivity and availability and to get the farmers to shift to high yielding varieties along with improved plant

nutrition technology was adopted. This was meant to significantly improve both national maize production and food security at the household level.

However, the fertilizer prices have gone up since the government removed the subsidies such that most farmers are not able to apply fertilizers in their fields. The LRCD started promoting compost (refer to Figure 6.4 a & b) and other manure usage, and agroforestry tree planting to renew the soil structure while at the same time providing fertility (refer to Figure 6.5) for the nutrients to the crops. This has since become part of the soil and water conservation package for extension.



Figure: 6.4 (a) Compost manure in preparation in the field



Figure: 6.4 (b) Compost manure heap almost ready for application in the field



Figure 6.5 Agroforestry with Tephrosia vogelii and Pigeon Peas; A vetiver hedgerow on a contour marker ridge.

6.3.2 Causes of Soil Erosion

As has been discussed in section 4.4.2, accelerated soil erosion is the increased rate of normal soil removal through various land use practices. The farmers' understanding of the nature and causes of soil erosion obviously influences their decisions to implement soil conservation measures.

When asked to define soil erosion (refer to Appendix 1, QA5) nine described it as the loss top fertile soil by water, exposing the roots and leading to degradation. Six said is the removal of soil by running water. Eight answered by explaining the factors that lead to soil erosion. Half mentioned that it involves the movement of soil to a lower elevation - a river. Figure 6.6 summarises these responses.

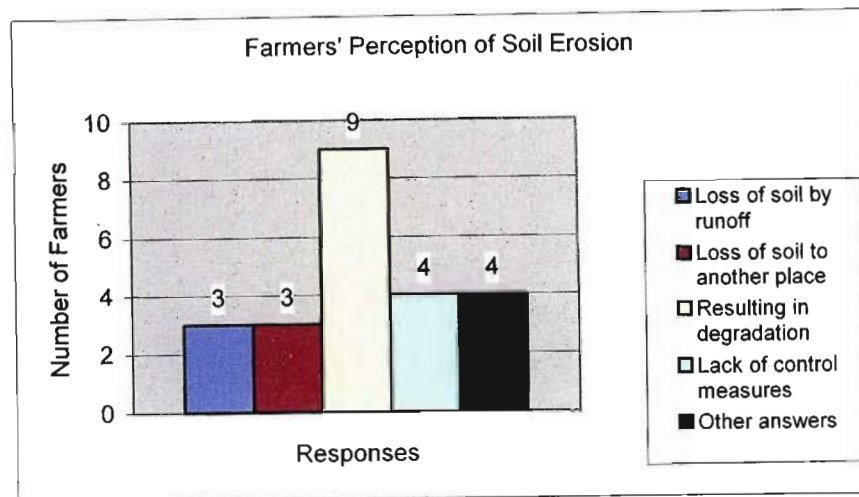


Figure 6.6 Farmers' Perception of Soil Erosion

From the responses given by the farmers, it can be seen that there is good knowledge of the physical processes of erosion. Erosion is one of the main causes of soil degradation in African agriculture. Soil erosion by water is one of the factors seriously affecting crop production in the country. Therefore the farmers should be able to identify this problem in that context.

The farmers gave a number of responses to the question about the causes of erosion as shown in Table 6.2.

Table 6.2 Causes of Soil Erosion

<i>Causes of Soil Erosion</i>	<i>Number of Farmers</i>
Cutting down trees and bushes carelessly	10
Cultivating along river banks and steep slopes	7
Cultivation without following recommended soil and water conservation practices e.g. contour marker ridges, box ridges, contour ridging and planting tree or grass	20
Other answers e.g. Heavy rains	3

As has already been noted above, the farmers seem to understand the physical processes of erosion, but in addition, they also are able to notice the human-induced or accelerated erosion. From the responses in the Table 6.2 it can be seen that farmers are aware of the effects of the combination of factors which will eventually lead to soil erosion. The high rate of awareness on anthropogenic causes of soil erosion in the country forms an interesting contrast to findings of surveys conducted by Brinkate and Hanvey (1996) and Pile (1996) in the Madebe

community of North-West Province and Cornfields in South Africa respectively, where for the former, only 20 percent of their sample attributed soil erosion to anthropogenic factors while for the latter the residents attributed the problem of soil erosion to natural causes and lack of rainfall which led to reduced ground cover among other reasons.

It is for these reasons that the strategies in the soil and water conservation policy encourage farmers to keep vegetation intact. It can be seen from the farmers' responses that they are well informed about the causes of soil erosion. This is so because the soil and conservation strategy adopted by the department, is based on the theory that was described by Morgan (1995) as discussed in section 4.6.

In addition, it can also be seen from the responses given above that another important cause of soil erosion identified by the farmers is the lack of soil and water conservation measures in the fields and also the cultivation of marginal land. The policy strategies do emphasize the campaigns against bush fires and wanton cutting down of trees. The protection of riverbanks was another strategy on stream bank conservation, which was done through intensive campaigns to discourage people from cultivating in those areas (Malawi Government, 1999). The mention about cultivation without recommended soil and water conservation practices is an indication that the efforts to conserve the soil and other natural resources have made a positive impact. The few farmers who gave other reasons, noted that too much rainfall is a problem. Considering these responses it can be argued that when it comes to soil erosion issues, the awareness and sensitisation campaigns on the problem have attained an achievement which can be measured. However, the possibility that respondents would give answers which they think are required, cannot be ruled out.

As was noted in section 4.3 there are many factors which cause soil erosion. It was therefore necessary to establish the nature of the problems which these farmers experience. When asked whether they experience soil erosion problems in their fields (refer to Appendix 1, QA14), 13 replied that they do, nine that they do not and one farmer did not respond.

When asked to describe the type of problem experienced (refer to Appendix 1, QA15), seven indicated runoff water from neighbouring fields, six indicated decreased yields and one noted that the loss of the root anchoring medium resulted in plants being blown over by the wind. All the farmers with the problem of their neighbour's runoff attributed this to their lack of soil conservation measures. The responses given by the farmers were just a summary of the main effects which are as a result of erosion. As noted in section 3.7, Kinlund (1996) reported similar outcomes caused by soil erosion that it removes nutrients from the soil, sorts out fine

particles and thereby reduce water-holding capacity and limit the rooting depth. Furthermore, soil erosion may cause surface crusting and compaction which prevents infiltration and may affect the structural stability of the soil.

The 13 farmers who had a soil erosion problem were asked to explain if they had done anything to address it. Eleven had employed both physical and agronomic control measures. The other two were aware of what is needed to be done but had not done so.

Five of the nine farmers who claimed soil erosion was not a problem in their fields had accurately explained the physical process. The description of the causes of erosion given by the other four clearly revealed that they fully comprehended what soil erosion is. Responses by these farmers to questions regarding extension revealed that they had been frequently visited by agricultural extension staff and that they had implemented the soil conservation measures recommended to them. These findings clearly show that the soil and water conservation extension staff have achieved a far-reaching awareness of the problems and consequences of soil erosion, leading to the adoption of policy strategies by most farmers.

When asked whether soil erosion nationally is a problem (refer to Appendix 1, QA18), all farmers agreed that it is. When asked to substantiate their responses 12 said it is a problem because extension advice is not followed. Poor harvests, poor soil fertility and the development of hard pan surfaces were given as indicators of it being a problem by six, three and three farmers respectively. Hence it can be seen that generally there is agreement among the farmers that soil erosion is a problem in the country. The results also show that most believe soil conservation measures recommended by extension staff are effective in that they are saying the absence of these is the cause or reason for the problem. Also, the results show that they have a good understanding of the on-site effects on accelerated soil erosion as have cited valid indicators. Figure 6.7 summarises the responses given.

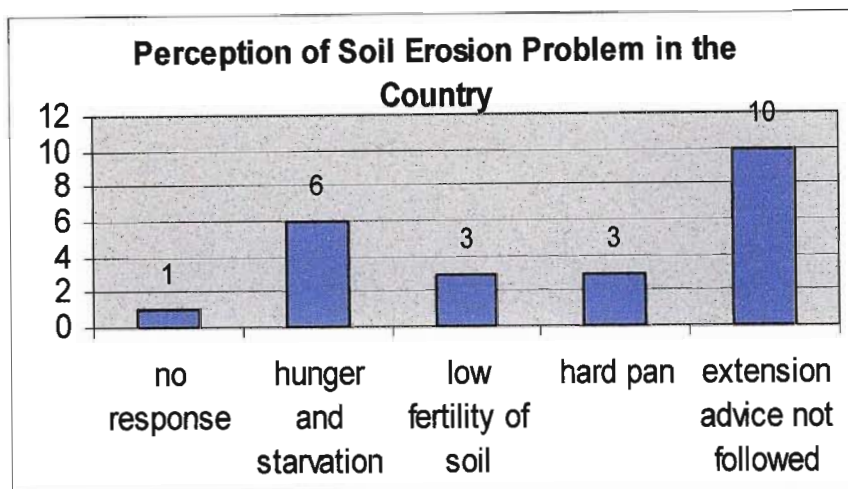


Figure 6.7 Perception of Soil Erosion Problem in the Country

The soil and water conservation extension advice the farmers are referring to here includes construction of contour marker ridges, planting vetiver grass along the contours (refer to Figures 6.5 (p.120) & 6.8), planting agroforestry tree species, planting trees, catchment conservation, intercropping legumes with cereals (refer to Figure 6.9), use of manures or composting (refer to Figure 6.4 a & b (p.119)). This also goes hand in hand with other agricultural practices offered by the crop production department regarding agronomic practices of the various crops grown by the farmers as noted in section 4.8.1.



Figure 6.8 Vetiver grass planted along a contour marker ridge in a field with realigned ridges



Figure 6.9 Pigeon Peas left in a field after maize harvest under intercropping legumes with other crops for soil fertility improvement- falls under Agroforestry techniques

From the findings in the discussion under this section, it can be argued that the farmers perceive that soil erosion is a big problem and that they are in a position to do something to prevent and control soil erosion in their fields and marginal lands (steep slopes and river banks), especially through following recommended soil and water conservation practices delivered to them through extension staff. In addition, the problem is perceived as a threat to food security, and other livelihood advantages. This is because, most farmers depend on farming, such that they grow a number of crops as noted in section 6.2.1 so that the other crops can be sold to generate incomes which meet other livelihood requirements.

The findings which show that the farmers' perception of soil erosion is related to food security are similar to Brinkate and Hanvey's (1996) findings that direct land managers do regard soil erosion as a serious problem in day to day living because it impinges on their ability to grow crops and food.

According to Smith (2001) a livelihood in its simplest form is a means of gaining a living. One of the central components of a livelihood is the notion of capability. Capability refers to the ability of a person to perform certain basic functions. This includes the ability to secure adequate nourishment, to be comfortably clothed, to avoid escapable morbidity and preventable mortality and to lead a life without shame. Capability encompasses a person's

skills, knowledge, creativity and labour. Hence it can be shown that these farmers, having the capability, aim to gain a living.

Adoption of soil and water conservation practices as portrayed in these findings is positive – that is most farmers have some form of soil erosion control measure, as well as for the restoration of soil fertility through agroforestry. Mwafongo and Kapila (1999) reported that it has taken three decades of relentless efforts by the LRCD to persuade farmers to adopt them, and it is limited largely because the low cost solutions advocated are labour intensive. The reason it has taken so long could be due to the approach used to implement policy. The policy maker's perception of the problem has been the driving force behind the programs put forward to the farmers for soil conservation which and has had an effect on the implementation of the policy as a whole.

6.3.3 Extension Service Delivery

As has been discussed in section 4.10, the main changes in approach to extension which have been utilised in implementing the soil and water conservation policy have been the farmer visiting, no coercion to implementation of policy as well as the change in approach to addressing the problem, from just controlling runoff to agronomic measures.

The focus of this work was on policy implementation, such that extension service delivery was a crucial factor to be considered concerning whether the problem of soil erosion in the country was as a result of failed implementation. Extension service delivery was and still is the method of communicating the policies to farmers through the various programs which are specifically set up to meet specific requirements. The effectiveness of such a delivery program as tool for successful implementation of policy objectives becomes an important aspect both to the extension staff as well as the recipients of the programs. A number of factors need to be taken into consideration for the objectives to be achieved. These may include the institutional and human capacity to implement the service and the policy respectively. The recipients, who in this study were the farmers, can be important sources of information for analysis of the effectiveness of these issues. It was based on this factor that the farmers were asked to indicate if they had heard about the soil and water conservation efforts by government; whether they had been visited by agricultural extension staff, and if so the duration and frequency of the visits, the relevance to them, the degree to which they complied with what they were taught; and what they thought needed to be done to make the extension service delivery more effective (refer to Appendix 1, QA7-12). As has been pointed out earlier in section 4.8.3, there is no parallel extension service for soil and water

conservation programs to the normal agricultural extension service of the MoID. Areas of speciality are the ones which are emphasised; for example: crop production, land resources conservation specialists.

The responses showed that they have heard about the program from both the radio and the extension staff who visit their areas. The radio was the source mentioned for the country wide program. On the frequency, duration and purpose of the visits made by extension staff (refer to Appendix 1, QA9; A9.1-9.4), all except one farmer who did not respond, said they were visited by extension staff. Seventeen farmers indicated that they were visited regularly while only five said they were not. One farmer said the visits were less than an hour, sixteen said they were for several hours and five said they were for half a day. All of them said the purpose of the visit was clear to them and only twenty-one had implemented what was recommended to them. Table 6.3 summarises the information.

Table 6.3 Extension Service Delivery Assessment

Attribute	Answer	Responses
Visited by extension staff		22
Frequency	<ol style="list-style-type: none"> 1. Very often – once a week 2. Somewhat often – twice a month 3. Rarely – once in two months 4. Very rarely – once in three months 	<p>11</p> <p>6</p> <p>2</p> <p>3</p>
Duration	<ol style="list-style-type: none"> 1. Less than half an hour 2. More than an hour 3. Several hours 4. Half the day 	<p>1</p> <p>12</p> <p>4</p> <p>5</p>
Clarity of purpose for visit	<ol style="list-style-type: none"> 1. Yes 2. No 3. Not really 4. Don't Know 	22
Implemented recommendations	<ol style="list-style-type: none"> 1. Yes 2. No 	21

Furthermore, the farmers were asked to indicate whether what they are involved in during extension meetings was relevant (refer to Appendix 1, QA11). All the farmers indicated that the extension activities were relevant because it would help to restore the soil so that they can

get good harvests. In addition, they indicated that the messages were easy to understand and implement.

The farmers were also asked to explain what could be done to make conservation effective (refer to Appendix 1, QA12). In response, two farmers said they should be given extra training; two said they need incentives; five said the number of both the staff and the visits to them should be increased. Two said all farmers should follow advice and one said punishment to be given to those who do not follow advice. Ten did not give relevant responses.

Looking at the responses of the farmers above, it can be seen that the extension service delivery is somewhat uniform across the different EPAs in the ADD. Despite the variances in frequency of visits and duration, the most important thing is that the farmers are clear about the purpose and objectives of the visits made by the staff. The other important thing is that they have implemented what was recommended to them. The inadequacies on time and frequency of visits can be noted in the farmers' responses regarding how the service should be effective. Here, the fact that there is shortage of staff and hence fewer visits by staff because they cover large areas, as well as the need to have well trained staff in matters of soil and water conservation stands out.

The indication by the farmers that they need more visits from the extension staff show that the T&V method is still at work although participatory methodologies have recently (from the early 1990s) started to be encouraged in the extension system in the country. Generally, the participatory approaches would call for the farmers' participation in the setting of the T&V system or depending on the need by the farmers, be demand driven.

Finally, in response to what in their opinion would be the best way to promote soil and water conservation in the country (refer to Appendix 1, QA26), seven said the government should give more support to extension staff in the soil and water conservation activities, because the staff will improve their skills. Another seven said that extension staff should frequently visit the farmers to monitor the implementation of recommendations together with the farmers. Two said that government should provide incentives to farmers who follow extension advice, and two others said government should pass laws to punish offenders. One farmer gave no response, while four gave reasons which were directly addressing their fellow farmers to follow extension advice. From these responses, it is not surprising to still notice that their perception of soil erosion and policy is tied to their livelihood priorities. In addition, they perceive that the government is a partner to help them in their way of life, which by implication it entails that government should provide a means by which their views should be

heard and incorporated in the policy. This is in essence why they have been able to put their views as responses. They would be willing to accept government policy as it comes in that context. However, even with the shortfall in the implementation, they have been willing to follow the advice given because they have felt the need to do so. The Figure 6.10 summarises the information.

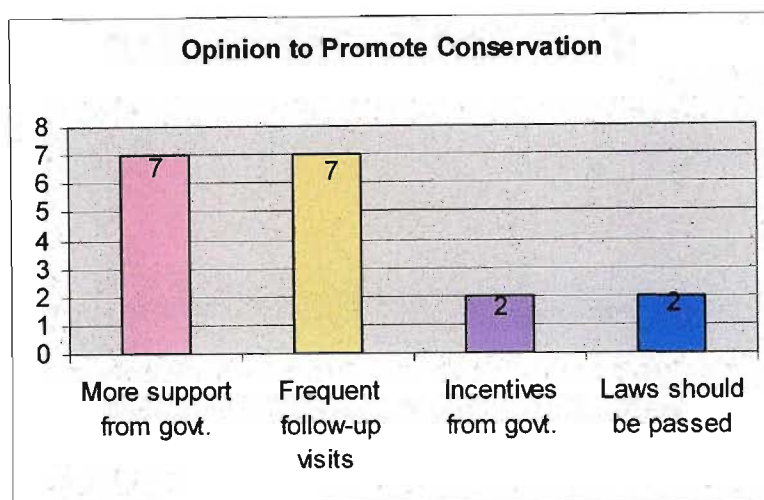


Figure 6.10 Farmers' Opinion on Better Soil and Water Conservation

Generally there was no sense of strong dissatisfaction with the way government delivers the soil and water conservation activities. Although implementation of the measures is demanding, the farmers have shown a willingness to ensure that they control soil erosion on their plots of land. This is similar to what Tiffen, Mortimore and Gichuki (1994) found that in 1990 farmers in Machakos District were well aware of the erosion hazard, the need to control it and the ways in which this could be done. They were therefore putting much more effort into soil conservation than in the past. This is another important finding of this study. Although persuasion is a difficult means for a program like soil conservation, it shows that the farmers are responding to the extension delivery through the methods used.

As noted in section 3.7, farmers' adoption of soil conservation recommendations is based on their perception of the problem, and in many cases it is different from the perception of the government or donor agencies. This may lead to non-adoption of the recommendations. The sample which was used in the study showed that the soil conservation policy is being implemented with success. However, the problems experienced in implementation cannot be discounted in the present case. It can therefore be argued that problems perceived by farmers on soil erosion and soil conservation cited in the wider soil erosion studies do hold true for Malawian farmers as well. However, just as those studies define the broad picture of what is

happening all around the world, there are some farmers who still adopt the measures. They adopt them either immediately they have received the extension training or as laggards. Progress made in such programs is recorded as achievements. The sample used in this survey could be representative of those farmers who are doing something on the problem of soil erosion in the country. One farmer indicated that he has heard about the program of soil and water conservation but he has not done anything yet. Therefore, even as small as the sample was, there is still an indication that some farmers have not started doing anything on their fields yet, not because they do not see the problems but for some of the reasons explained in section 3.7 they have not.

In addition it is also surprising that only two farmers think that strict legal actions should be enforced to non-adopters. This was what was done before independence. With the coming of democracy in the middle part of the 1990s in the country, it may not operate well if it comes from the government, but if government would only play a supporting role to efforts originating from the local level.

6.3.4 Policy and Legislation

As noted in section 3.2 perceptions and needs lead to the development of a policy orientation. If the individuals' perceptions are not taken into consideration in policy formulation, chances of realising policy objectives are reduced. Since policies cannot be understood in isolation from the means of their execution, it follows therefore that perception would also play an important part in implementation.

Establishing the farmers' perception of policy and legislation was another important aspect of the study because of the orientation they as individuals can have towards the soil and water conservation policy. The farmers were asked about their knowledge of the soil and water conservation policy in the country, the specific strategies and practices which are forbidden and allowed in accordance with the legislation, as well as their knowledge of punishment to non-adopters (refer to Appendix 1, QA19-A24). In response to these questions, it was found out that, out of the 23 farmers, 22 farmers knew that there are laws devised to control soil erosion in the country, only one did not know. Eighteen farmers knew the specific practices which are forbidden in accordance with the laws regarding soil erosion, and four farmers did not know them. Fourteen farmers knew that there is punishment to anyone who is found not conforming to the laws, while nine did not know. Eleven farmers indicated that they had heard about someone who was punished because of not following the recommended practices while 12 said they have not heard. Twenty-two farmers stated that they knew the specific

practices which the law says should be done to control soil erosion, while only one farmer did not know, and did not give a reason for it. This information is depicted in the Figure 6.11.

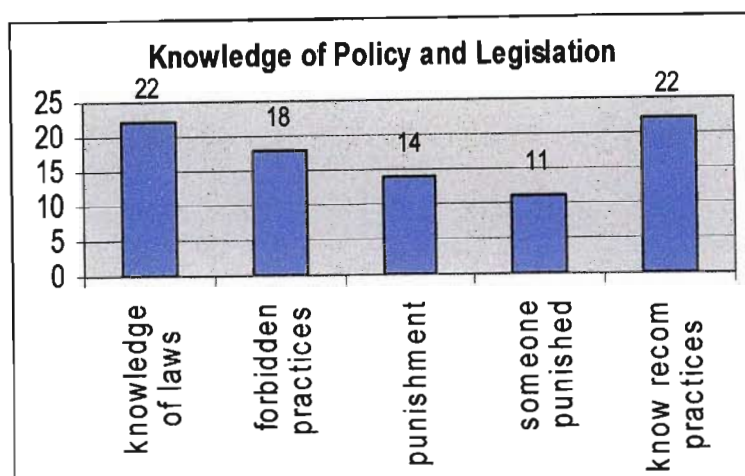


Figure 6.11 Knowledge of Policy and Legislation by Farmers

In response to the question to explain the specific practices which are included in the laws, 17 mentioned the soil and water conservation structures, four noted that planting trees and following recommended cultural practices to provide ground cover. In addition to these responses, some also noted the need for increasing soil fertility through incorporation of crop residues (especially those which remain after harvest), applying manures and planting agroforestry tree species. As can be seen from these results, the farmers' perception of laws and policy are synonymous. This is not surprising because as noted by Garland *et al.* (1994), policy may also refer to a piece of legislation.

Responding to the question concerning the approach on soil and water conservation which the government is using to reach out to farmers (refer to Appendix 1, QA25), the responses were that generally it is good, and nine of them mentioned that at the least there is something in place and should continue. One mentioned that they need more visits by extension staff, seven see it as an opportunity where soil can be conserved and its fertility restored to its original state, while six mentioned that the country can become self food sufficient if the recommended strategies are followed and implemented.

6.3.5 Influence of Socio-economic Profile

As noted in section 5.5, the analysis of data required that the correlation of the factors which influence perception of farmers on issues of soil and water conservation be conducted. Under this analysis, the socio-economic profile factors of sex, age and educational level (refer to Appendix 1, Qs B7; B8 and B10) and the farmers' perception to the following questions:

- a) Soil erosion and its causes
- b) Knowledge of the existence of the problem in the country
- c) Knowledge of specific practices on soil and water conservation contained in the policy
- d) Effectiveness of implementation of policy

(refer to Appendix 1, QsA5 & A6 for (a); A17 for (d); A18 for (b) & A23 for (c)) were the ones to be considered under this. A frequency distribution was plotted and the data base was found to be non-parametric and therefore the Spearman's Rank Coefficient at 95 percent confidence level was used to determine whether the socio-economic parameters were significantly associated with the farmers' perception.

The results of the correlation conducted showed that there is a high degree of association as implied by the high positive correlation coefficients amongst all the variables tested for correlation. However, much cannot be said about these results because the sample was too small and the socio-economic characteristics of the sample were similar.

The above sections have presented and discussed the results and findings from the farmer questionnaire (refer to Appendix 1). As it was explained earlier, the staff questionnaire (refer to Appendix 2) is also presented separately. This was done in order to get the mirror effect of the implementation style of the government.

6.4 Extension Staff Perceptions

As has been explained in section 5.4 and 5.4.2, the staff questionnaire was administered along side the farmer questionnaire. There were 14 staff who returned their questionnaires. Of these, four were at the RDP level and ten at the EPA and in contact with the farmers. The minimum education level they have is Junior Certificate (five of them) and seven have a senior certificate equivalent to O-level on the international education scale, and one of them has a Diploma. Out of the whole sample, 12 of them were male and two female. This is the true

representation of the work force in MoAID, where there are more males than females in technical assistance positions. The minimum qualification at time of employment changed from the Junior Certificate to the O-level, such that most of those in the extension service have the O-level as a minimum educational qualification. This is very important because it has a bearing on the work which they are involved in considering the technological advancements in agriculture hence education becomes an important prerequisite.

These extension staff are very crucial in implementation of all programs in the ministry. In essence, their work entails implementation of agricultural policies including the soil and water conservation policy. Just as it was important to establish the perception of the farmers on soil erosion and other issues because they are the important link in the whole cycle, the staff were also asked to give their perceptions of soil erosion, an issue which they deal with in their day-to-day work. The staff are therefore crucial in policy implementation analysis because in addition to just providing information to the decision takers (in this work the farmers) they are also required to provide the technical expertise due to the nature of the policy strategies. As noted earlier, perceptions will influence the way policy is orientated in its implementation. Most questions were similar to those of the farmers since as the service providers they are supposed to know better than the people they work with.

6.4.1 Soil Erosion

In response to the questions designed to get their understanding of soil erosion and its causes (refer to Appendix 2, Q7 & 8), seven of them said that it is the detachment and removal of the productive topsoil and its fertility to another place by runoff water or wind and other agents. Seven of them added that the soil loses its properties leading to degradation. Thus, it can be seen that through their training, they theoretically know what soil erosion is. Concerning its causes, ten said it is caused by lack of conservation measures in cultivation, four said it is caused by raindrop splash on bare land which detaches soil particles and cause them to be transported by water. To these responses some added that cultivation on marginal lands, overstocking of animals, deforestation and uncontrolled bush fires was a cause of soil erosion. From these responses it can be seen that they are aware of the accelerated erosion taking place, although the four cited rainfall as a cause and not a factor influencing the causes as has been discussed in section 4.2.

Soil erosion is a serious problem in the country, but until the staff who implement the soil conservation policy are convinced of the magnitude of the problem and hence the need to prevent or control it, the implementation process is bound to suffer some setbacks. It is for

this reason that it was necessary to find out if they perceive soil erosion as a serious problem in the country (refer to Appendix 2, Q12). Responding to this question, half perceived it to be very serious requiring immediate coordinated action. The other half considered it to be serious requiring priority attention by farmers and government. The Table 6.4 presents the results of the ranking of the extension staffs' perceptions discussed.

Table 6.4 Soil Erosion Problem Ranking

Value Label	No of Responses
Lack of importance given to soil	2
National level control of soil erosion problems	6
Inadequacies in the implementation of policy	3
Lack of information on real nature and extent of the problem	1
Non-uniform application of law and legislation enforcement	2

From the Table 6.4, it can be seen that after ranking the soil erosion problem in order of importance, that is the issue requiring most attention, the staff think that the national level control of erosion problems should be addressed first. This is seconded by the inadequacies in the implementation of policy. On third position they think that the lack of importance given to soil and non-uniform application of law and legislation enforcement should be addressed as third. Finally, lack of information on real nature and extent of the problem needs to be addressed.

These factors are very important in relation to both the problem of soil erosion as well as the policy. The ranking of these very important factors by staff depends upon their perception of the problem and hence it further portrays that individuals will hold different views. However, the ranking made is a good indication of their collective perception on the problem of erosion in the country. It is encouraging to note that the concern for the national level of soil erosion problems features as a priority because it gives an indication that they are aware that their role in implementation contributes to the bigger country picture.

In response to the question about whose responsibility it is to nationally address the problem of soil erosion is (refer to Appendix 2, Q18), 12 maintained it is every body's responsibility because we all depend on agriculture. Two maintained it was the farmers' responsibility. The implicit reference to the economic base of the country (agriculture) implies that the state is expected to take a bigger role in the responsibility shared with the land users and other stakeholders. The extension staff represent the state at implementation level.

The questions about when people became aware of soil erosion as a national problem (refer to Appendix 2, Q14), the factors responsible for this awareness (refer to Appendix 2, Q15), and compliance with soil conservation advice and laws (refer to Appendix 2, Q16), were designed to complement and verify their opinion regarding the best way and also meant to solicit the staffs' motivation to ensure optimum compliance (refer to Appendix 2, Q17)

Through this study it has been learnt that the period of greater awareness to the problem of soil erosion was generally before independence because law enforcement at that time was harshly implemented. Eight of the staff indicated this as their response, while six of them said that it was the period after independence because of high population leading to land pressure. The later response indicates the multiplicity of factors which come into play when the problem of soil erosion is considered as has been noted in sections 1.1 and 4.4.2.

Staff were required to evaluate the present implementation strategy being employed by the government (refer to Appendix 2, Q19). This was considered necessary because their views would provide an important input to policy review. Six rated it effective because farmers and other land users are involved but emphasis is required, five rated it ineffective because the resources allocated by government do not reach the target groups and implementation is not successful, and two rated it partially effective because control over farmers is difficult.

In addition, they were asked to give their opinion on the best way to implement the soil conservation program (refer to Appendix 2, Q20 and Q22). In response, one stated that farmers should be provided with adequate information on soil and water conservation. Three said that the government should follow the pre independence style of law enforcement for soil and water conservation and set up new laws and regulations. Seven said government should provide the required support to staff, farmers and stakeholders and that these should be involved at all levels. One suggested more research on soil and water conservation should be conducted and a new way developed to encourage the farmers. The responses show that implementation would be better if a network of implementation with other actors at the field level is established. However, the government should provide the required support. Although

there is still an indication that the top-down approach followed by the government should be continued, bottom-up approaches would be important in identifying a developed, explicit and replicable methodology for identifying a policy implementation structure as was noted in section 3.6. However, care should be taken not to deflect centrally mandated programs.

The next section looks at the perception of policy by extension staff. In addition, the section discusses their perception with regard to how effective it has been and ought to have been.

6.4.2 Policy and Legislation

When asked to define the word 'policy' (refer to Appendix 2, Q9) all staff indicated that it is a guiding principle for planned course of action in a program proposed by government, to achieve certain goals. To this statement, some staff added that it was for safeguarding and sustainable use of natural resources.

The extension staff were asked if they knew that there was a national soil and water conservation policy and if so to what extent their work complies with it (refer to Appendix 2, Q10). Twelve of the 14 staff were aware of the existence of the national soil and water conservation policy, one did not know about the policy and one was not aware of the policy.

Generally, an action plan would accompany any policy implementation, and as such the staff members should be able to relate their work to policy implementation. The focus of work at ADD level is mainly implementation of various policy guided activities which though not labelled as such are translated into action on the ground through provision of the required resources as outlined in annual work plans. When asked how they link their work to policy implementation (refer to Appendix 2, Q11), one person indicated that an annual work plan would show how the soil and water conservation activities are carried out, four said they create awareness to farmers of the values of land and the need to conserve it, three said they advocate it through farmer meetings, trainings and mounting demonstrations on the practices. Six gave no response. From the responses given by staff members, it is important to know that six members of staff were unable to relate their work to implementation of policy. This is an important finding which needs to be considered by policy makers in policy processes as well as staff training. When checked against the staff's area of specialisation at the Rural Development Project (RDP) and Extension Planning Area (EPA) level. It was noted that those who responded in terms of what is contained in the policy strategy were staff with land resources conservation specialist knowledge. This does imply that there are bound to be differences of implementation due to area of specialisation. The F/A as the point of contact

with the farmers is expected to understand and implement the strategies. However, it has shown that linking this work to implementation of policy would only be understood if mentioned to them in training. Perhaps it would even carry a certain level of significance.

Finally, the staff were asked whether or not they believed that the policy has failed to control soil loss and degradation of land in the country (refer to Appendix 2, Q21). Four said it had failed, six said it had not and another four that it had not completely failed. The reasons for its failure were given as: it was top down, lack of law enforcement, and that neither government nor farmers were committed to the program. Those who said it had not failed noted that the Department of Land Resources Conservation had taken some measures to control soil loss and that farmers do appreciate the importance of conserving the soil to improve and maintain soil fertility. They observed that if all stakeholders were actively involved and more resources made available, the adoption rate would improve. Those who felt it had not completely failed indicated that there is at the least something in place but noted that the reasons why many people do not follow soil and water conservation policies need to be addressed.

Although most staff were of the opinion that the policy is not achieving its objectives, but the study has shown that it is not the case. Other factors have contributed to the increased rate of land degradation due to the changing times as noted in sections 4.8 and 4.9. This is because the implementation of the policy went on while assimilating new information from research conducted within and outside the country. In addition, sustainable development thinking and the decentralized governance in natural resources management led to new developments which because of the new information which entered the policy process at the level of implementation, it lead to the change towards favourable approaches without changing the original policy statement.

The lack of seriousness given to the soil in its management is a major contributing factor to the problem of soil erosion. The main reason which can be cited is because of the agricultural technologies which masked the status of the problem as noted in section 6.3.1. However, this was not only a problem in the country because many third world countries were involved, especially through the green revolution and the extension staff were heavily involved in this since they were required to give specific recommendations to the farmers. At that time, emphasis on crop husbandry practices to increase productivity, superseded that for soil conservation and water conservation. This is one of the major reasons to the partial effectiveness policy implementation during the period before 1990. Although the aim was to increase food security at household and national level, but when the access to such technologies was abruptly stopped due to the removal of subsidies in the macro-economic

reforms instituted through the Structural Adjustment Program, then the real soil erosion situation was seen and felt by the smallholder farmers who produce much of the maize in the country.

6.5 The Case Study: Policy Implementation Analysis

This section looks at the case study regarding the analysis of implementation of policy. It is presented in this section in two separate components of service delivery and livelihood perspectives. The policy analysis of the service delivery perspective draws from the models in approach to implementation discussed in section 3.6, while that of the livelihood perspective from SL approach for policy analysis. As has also been described in chapter 4, the implementation of the soil and water conservation policy in the country has basically been top-down such that these models present a good basis for the analysis of the implementation of the policy. The inclusion of the bottom-up approach in the analysis is considered essential too because of the changes which the government was able to incorporate while implementing the policy.

6.5.1 Service Delivery Perspective

6.5.1.1 Top-down Approach

As has been noted in section 3.6, there are three main models of policy implementation analysis, one of which is the top-down approach. This approach starts with a policy decision by government and through a consideration of six variables which were a synthesis of the main concerns in this approach (refer to section 3.6.1), an analysis of the implementation process is achieved. These variables have been considered in this work and are discussed below:

- **Clear and consistent objectives-** *Officials implementing the policy have a standard of evaluation and legal resource for implementation*

The ADD is part of the hierarchy of the ministry's organisational structure where implementation starts from before it gets to the Field Assistant (F/A) who is in constant touch with the farmers. At that level, the staff are involved in interpreting the strategies in the policy into what can be translated into practice at the field level. This is then passed on to the RDPs and EPAs and finally through a training session to the F/A. Basically the objectives were clear and clarified to the staff involved in implementation. Due to the fact that the approach to

implementation of policy is persuasion, the objectives did not really form a legal resource but provided a standard for evaluation whereas in the period before independence when the policy was formulated it provided a legal resource for the implementation. In the former case therefore the field staff produced a report on achievements made at the field level and this would be compared to the planned activities of the same variable at EPA, RDP and finally ADD level.

In addition, as it has been noted from the responses by both the staff and farmers that they agree to the existence of the problem of soil erosion in the country, it only confirms that the objectives so far have been understood though the problems of implementation were noted.

The staff and farmers were also asked a number of questions on policy including if they knew any policy existed on soil and water conservation in the country, as well as on the effectiveness of its delivery because it could not be divorced from its existence since its formulation (refer to Appendix 1, QA19-23; A25; Appendix 2, Q10, 19 &21). It should be stated that their knowledge has been because of the role the government has played in bringing the awareness of the problem to them and also explaining how it intended to control and prevent the problem through the objectives.

In general the objectives of the policy were clear as confirmed by the farmers' response (refer to Appendix 1, QA11) regarding the relevance of the extension delivery on soil and water conservation measures. However, the weak legal requirements have been noted with regrets especially among the staff (refer to Appendix 2, Q17 &21).

- **Adequate causal theory** – *Policy intervention incorporates an implicit theory about how to effectuate social change.*

As noted by Mwendera (1989) the policy developed in the country before independence, had been based on the understanding that poor farming practices lead to soil erosion and also on the scientific understanding of the impact of surface runoff on bare ground. This led to the development of mechanical soil erosion control measures because of the technical approach underpinning their understanding of the soil erosion problem and not the agronomic measures which take into consideration the erosion processes. These technical solutions were meant to prevent more land from becoming eroded especially when the peasant farmers' ways of farming were curtailed and they were given their own native areas. However, because other factors were not clearly understood, it turned out that when the people were concentrated in small areas, soil erosion increased due to increasing population and overgrazing.

Immediately after independence, not much was done to change the policy, but after some time certain conservation aspects were included in the Land Act of 1965 which was mainly to shift emphasis from mechanical to agronomic conservation techniques based on scientific information from research findings. Only recently (1996) another policy and legislative endeavour was initiated and this based on the research that had been going on in the country and also through information which detailed the nature, extent and severity of the soil erosion problem. Once this policy is legislated it will take a new outlook.

Although there was research on soil erosion before and after independence, it has generally lagged behind. However, the research results were fed into the implementation at ministerial level. One notable achievement was about the findings which formed the basis for the adoption of agronomic measures and broadening the scope of conservation to include land resources. Based on the ministerial interventions there has been a shift in understanding of the theory of the causes of soil erosion and this has also been communicated to the farmers through the extension staff. The agronomic measures can also be adapted to the local conditions of the farmers such that the choice of the measure adopted has become an acceptable practice with regard to the agro-ecological zone as well as farmers' preference.

In order to check whether both the farmers and staff understood the link between the objectives and the action proposed to combat the problem of soil erosion in the country, the same questions (refer to Appendix 1, QA5 & Appendix 2, Q7 & 8) that sought to establish their perception of the problem were also meant to check on this fact because the objectives of soil conservation are based on such theory. It has been established from the findings that the farmers have embraced the issues in soil conservation such that most of them have also confirmed to having seen the benefits of the measures they chose to employ. It therefore can be seen that there has been social change due to the theory which is expressed in the cropping patterns of the farmers.

- **Implementation process legally structured to enhance compliance by implementing officials and target groups** – *A variety of legal mechanisms in program delivery, sanctions and incentives included to overcome resistance and different actors involved to give it priority*

Banda (1997) reported that the Ministries of Agriculture and Physical Planning have the expertise for monitoring and enforcing compliance with the various covenants and regulations which touch on land use and management under the Land Act of 1965. It can therefore be noted that there has been and still is a legally structured implementation process in place, but

that it was not strong enough on legal enforcement. However, the MoAID has tried to give priority to the implementation of the agricultural land use and management in which a major component has been the soil and water conservation and this through the ADDs. As Mwafongo (1999) reported, active environmental management policy making began in the 1940's as part of a package of agricultural farming methods. Strict regulations were laid down to prevent soil erosion and ensure compliance. Unfortunately, the post-independence measures were watered down in favour of persuasive approaches to agricultural technology extension and adoption.

At both the national and ADD level, there have not been any legal mechanisms or sanctions to overcome resistance. Before 1994, the system of government in the country as a single party state, made it difficult for implementing agencies to perform innovatively especially if considered contrary to the political ideology of the time. Cooper (1996) concluded in her study that historical development (both spatial and temporal) in the context of land use and degradation, was shown to have contributed to the contemporary extent of soil erosion. The economic environment posed a number of constraints to attaining conservation goals, as did the complexity of dynamics represented in the political environment. This same observation can be applied to Malawi such that the implementation of policy at ADD was equally affected in this regard.

There were many programs which were introduced to provide incentives to the farmers to adopt soil and water conservation measures. In the pre independence period the most notable one was the Master Farmer Scheme, which was also entrenched even after independence. In the post independence period many of these programs were under donor funded projects which phased out once the donor stopped funding the projects and the government could not sustain the level of resources which such projects would use. Therefore, the major form of incentives by government have been to use the three main focus areas on conservation like the catchment conservation, strip cropping, conservation farm plans and a number of low cost technologies as discussed in section 4.8.1.

With the advent of sustainable development, and consequent sectoral reviews of policies in almost all governments in the world, the ministerial initiatives to undertake conservation seriously were also increased, such that a number of programs were instituted with support from donors. The target groups being the smallholder farmers mainly unlike the estate farmers, have been responsive to these interventions with measurable success.

The farmers are as important in the implementation of the measures as are the staff such that their perception of policy objectives is translated into their perception of extension delivery and subsequent adoption of recommendations (implementation) given to them by staff. As has been presented in the findings on the farmer questionnaire above, the response to whether they understood the purpose of the staff's visits (refer to Appendix 1, QA9 & A9.3) showed that the general expression is that it is understood. In response to what in their opinion should be the way forward to improve on the current status (refer to Appendix 1, QA12) they pointed out the need to have more staff on the program, increased visits as well as training of staff and incentives given to farmers for compliance. To this end, it can be seen that despite the lack of the legal mechanism, the program has been given priority both at national as well as ADD level such that from the sample in the study most of the farmers reported to have implemented what they were advised.

- **Committed and skilful implementing officials** – *Discretion by implementing officials, commitment to policy objectives and skills in utilising available resources is very critical to implementation.*

From the case study, it can be seen that through training given to staff to reinforce their skills and motivate them to be committed to policy objectives has been substantiated through their response to their knowledge of their soil conservation policy as well as how they link their work to implementation of policy (refer to Appendix 2, Q10 & 11). As has been noted in section 4.8.3 to mainstream extension of soil and water conservation in the country, training of staff formed an important activity. Although the responses to the questions noted above did not directly mention the specific items which the policies stipulate, the staff have not been aware of what is expected of them. The main limiting resource to effective implementation was cited as being financial, in that the resources have not enough to benefit the smallholder farmers through the adequate support given to the staff.

Skill is another important factor in the implementation process especially as has been established in this study through the farmers' response to how the extension delivery can be effective (refer to Appendix 1, QA12). In response two farmers mentioned that there is need for the staff to be given extra training on delivery of extension programs. This in itself indicates that there are gaps in knowledge and skills which the farmers can take notice of though they may not be as educated as the staff themselves, and may lead to their being not satisfied with the delivery of the services. This is to be expected because as noted in section 4.8.3 most staff do not come from a land husbandry specialist extension background but had to be re-orientated on the job. This can be a hindrance to successful implementation of the

policy. Such issues therefore need to be considered when policy is evaluated or reformulated. It should however be pointed that the extension staff have been prudent in a way in implementing the policy through using the limited resources which have been at their disposal.

- **Support of interest groups and sovereigns** – *Maintaining support from interest groups and legislative and executive sovereigns throughout the whole implementation process should be encouraged*

As noted in section 4.7.3, the colonial administration instituted a way of maintaining political support from the major category of the interest groups - the farmers themselves through establishment of the Master Farmer System to encourage other farmers, and the creation of the national, regional and area boards, councils and committees as a form of legislative arm which were empowered to enforce the prescribed land use practices and punish any offenders. This arrangement was carried forward after independence but as noted by Mwafongo (1999) was altered such that the enforcement was not supported as in its original plan and the Master Farmer System only led to the alienation of the poorer farmers from the objectives of the soil conservation program.

Throughout the implementation process since the ADD structures were set up, the lessons from policy implementation have shaped the way in which the ADD operates. However, because of the top-down implementation, the support to interest groups has been one way only, that is from the government to the farmers because the farmers' views would not be incorporated immediately after being identified. In relation to the involvement of stakeholders it was a requirement that support rendered to such had to be approved at ministerial level. As a result a number of problems arose due to the many cited problems of lack of institutional coordination which, although identified at the ADD level, required to get approval from the ministry headquarters. Only recently has the government realised the need to involve different stakeholders and accommodate other interested groups' views at the level of implementation at ADD. This also applied to the field level of implementation, although at this level the coordination problems were long addressed with the advent of Non Governmental Organisations (NGOs) operating directly with the farmers and also the donor agencies, which noted that the 'trickle down effect' to the smallholder farmers was not working.

The support towards interest groups would only last as long as the resources required were available and that is the reason the farmers indicated the need for more visits by extension staff. However, the government tried to meet the requirements of the program through

different ways, the major one being through the media. Both the radio and through the agricultural extension newspapers and other extension messages leaflets on soil and water conservation issues strategies have been used in the country. The strength with this approach has been the high rate of readership, as has been noted in section 6.2. The radio has also played a very important role in the dissemination of general agricultural extension services. However, this study did not try to include an assessment of the major programs aired on the agricultural slots to conclusively state whether soil and water conservation was given the importance it now calls for.

- **Changes in socio-economic conditions which do not substantially undermine political support or causal theory-** *Important to take note of the changes which could have repercussions on the political support or the causal theory*

In the current study, the data was specific enough not to have captured enough information on the relationship between changes in socio-economic conditions with the causal theory of the soil conservation program in the country especially when considered through the period which has been under consideration. However, from the case study, it can be seen that the global changes on environmental issues have been represented even at this local level, such that although the data collected concentrated on soil erosion and adoption of the soil conservation policy, the problems experienced by smallholder farmers cannot be overruled. This is because the changes taking place at macro economic level affect the farmers indirectly as has been noted already, with the example of the structural adjustment programs.

In essence, the changes in the socio-economic conditions have not undermined the causal theory *per se* but, a number of issues have been understood to impact on the theory of soil erosion, mainly forming what has been referred to as the nexus of poverty-population growth-illiteracy and lack of environmental education identified in the NEAP (1994) in the country. This has therefore led to the strengthening of the political support to the policy itself leading to many farmers expressing the need to adopt soil and water conservation measures because they have experienced the problem of soil erosion when they could have done something earlier. However, there is evidence too that the nexus mentioned above has led to some farmers employing sub-optimal practices of environmental resources use though not out of choice but because they are forced in the situation. The ADD has seen much of these problems because it is highly populated but the interest in the farmers to adopt the policy is also high.

From this analysis it can be seen that the major problems experienced has been on the implementation without a legal mechanism. The original intent of the soil and water conservation policy for the country was to enforce it with legislation. However, this was altered with changes in governance. In addition the government's top-down approach did not allow for much flexibility to involve other stakeholders early enough to support its cause to control soil erosion. Hence it affected the implementation of policy which only improved when this situation was changed. Finally, the soil conservation policy implementation is faced with challenges which originate from a global perspective and therefore should more and more look at sustainability of livelihood resources and strategies. For a country like Malawi, agriculture remains the strong economic base and hence the policy should incorporate the more challenging sustainable strategies which not only meet the national requirements for economic growth but also the wellness of the smallholder farmers who are usually forgotten.

The next section looks at the policy implementation analysis under the bottom-up and the synthesis of both approaches.

6.5.1.2 Bottom-up Approach

As noted in section 3.6, bottom-up approaches emphasise network of actors involved in service delivery in one or more areas and this is achieved when the goals and objectives of the different stakeholders are worked out and amalgamated. Under this approach, it can be seen that at the implementation stage a number of actors were present and networks could have been established. However, this has only been possible over the past few years in the country when NGOs were allowed to work in areas and concerns which the government had monopolised, especially after realising that its resources could not be stretched due to among other things rapid increases in population and consequent utilisation of the land resources.

The political environment of the time from after independence to early 1990s did not offer room for innovation and besides, the government priorities would change with need such that although some NGOs are very old in the country, they could not do much to help in forming networks. The period after the earth summit, can be seen as a watershed period for bottom-up approaches in the country where issues of community based projects on natural resources management came up, and many donors were interested in funding these. The efforts by the different donors and NGOs were not without struggles because of the problems of orientation of such projects where local people became active participants in managing their own development. The major problems experienced were institutional coordination such that even though the intentions were to be bottom-up, the various donors and NGOs still had the top-

down mentality on implementing their projects. Through these arrangements, the MoAID had other donor funded projects which were supposedly to adopt the bottom-up implementation strategies, but did not work out as had been planned at the level of implementation such that the top-down approach continued to dominate although a synthesis of both can be seen in operation now.

The synthesis can be noted in that as pointed out earlier, the minor modifications brought about through the learning in policy implementation as well as political support in the implementation process has allowed the ministry, hence even at ADD level to be able to adopt other implementation strategies without necessarily having to go back through the steps of policy making and planning implementation such that starting with the policy problem, it has been possible to link up with other levels of government in implementing policy for example – the MoAID and Ministry of Natural Resources, Forestry and Fisheries working together in reaching the same target groups, the farmers.

From these analyses it can be seen that the top down approach has lived up to its life cycle. It is time the government looked at implementing policy through the synthesis of both because the strengths of both can be combined. It is therefore not surprising that the responses from staff show that the incorporation of other stakeholders including the local leadership is advantageous to the success of the policy implementation in the country, at least from the service delivery perspective because it is the only way the government can contribute to the control of the problem in the country.

The next section presents the policy implementation analysis from a livelihoods perspective.

6.5.2 Sustainable Livelihoods Perspective

Pasteur (2001) pointed out that the SL framework aids policy analysis in drawing attention to the possible ways in which policy impacts on different aspects of poor people's livelihoods: their livelihood assets, the vulnerability context within which they operate; and their capacity to choose effective livelihood strategies. Direct relationships between policy and impacts on these areas are hard to prove, but insightful linkages can be made. The SL framework was the appropriate tool for the policy-centred analysis because, as outlined in section 3.6, sustainability and livelihood issues are a very important aspects of policy in recent times. This tallies with what has been noted in section 4.8.3, that the Malawi government embarked on a National Rural Development Program whose main focus was to make improvements in agricultural productivity. It included within it integrated rural development, and sought to

provide facilities and services such as markets, roads, health centres, crop extension, farmer training, agricultural research, credit, land husbandry, livestock development and disease control, water supplies, and forestry (Nanthambwe and Mulenga 1999). Implicit in this arrangement was the need to provide the smallholder farmers with livelihood resources and strategies.

This section presents the analysis of policy from a sustainable livelihoods perspective and discusses the components of the policy-centred analysis as outlined in Figure 3.3 (p. 55) in relation to the soil conservation policy implementation in the country.

6.5.2.1 Policy Process and Actors and Policy Statement

As noted in section 4.7 the policy development in the country led to the development of a formal statement by the colonial government and it was enacted in 1946 as the Natural Resources Ordinance whose aim was 'to make provision for the conservation and improvement of the natural resources of the protectorate including soil' (Mlia, 1987:5). However as noted in section 3.4, 'policy processes' look at the complex process by which policy is understood, formulated and implemented, and the range of actors involved. It can be established that the policy making in the pre independence period was solely made by the officials as they perceived the need for soil conservation. The involvement with the local smallholder farmers was minimal such that it is not indicated in the history of soil conservation in the country. The only time when the people were involved in any way was through the enforcement of the conservation when at least the involvement of local people is cited and this only to implement what was already agreed upon. Thus, the officials in the agriculture development and the extension service were the ones who influenced the process which as can be noted in 4.7.3 they achieved by persuading the central government of the urgency of the situation. Although there is recorded achievements of the manner in which the program was implemented, for example Nanthambwe and Mulenga (1999) reported that through the government soil conservation campaign during the period 1945 to 1960 saw the introduction of contour ridging to replace planting on flat, which continues to be the main soil conservation message to this day; reinforcement of ridges by contour bunds and construction of dams and terracing on steep slopes most of which have been replaced; the omission of the land users in the decision making process leading to the formulation of policy has shown to have affected the success of the implementation of the policy from that time to even the period after independence. The approach taken by the colonial administration was only slightly modified after independence and it is the reason why even after independence, the implementation was partially effective.

6.5.2.2 Policy Context and Policy Measures

The context under which policy was formulated in the period from the colonial to pre-independence, related much to the economic environment at the national level, although the officials also looked to the progress in other settler states in the region. The need to produce economically viable crops for export required that the land is protected from soil erosion perceived at that time to be caused by the peasant farmers. The history of resource use at that time shows that the peasant farmers were practicing methods which allowed for conservation of natural resources because the rates of exploitation were not exceeding the environment's capacity to resilience. One of the factors which enabled this situation was the low population among the peasant farmers.

The political context also played an important role. Due to the power differences between the colonial government and the people in the protectorate, the formulation of policy and subsequent implementation using coercion was instituted. It was as a result of the coercion that there was pressure from the farmers leading to the amendment of the policy at that time. Thus the main measure put in place to implement the policy was the legislation. After the country became independent, much of the amended law of 1962 was the same that was used in implementation of soil conservation. The amendment at that time did not incorporate either the farmers' views or scientific information regarding the causes or extent of soil erosion. Therefore the approach to address the soil conservation activities remained technical and mechanical in nature. The mode of reaching out to farmers was changed and an approach which was persuasion was followed and has since been the mode of delivery of government objectives to this day. The policy measure also shaped the service delivery of soil conservation strategy to the African and settler farmers. Basically the current extension delivery was established based on this.

The analysis of the components of the policy-centred analysis have only assisted in pointing to the structural factors of policy just like in the top-down approach to policy implementation analysis. However, the reason a livelihood perspective on implementation analysis would be necessary is because of the link it makes between the micro-level realities and the level at which policies intended to change these realities are formulated as noted in section 3.6.

The government through the agricultural extension service provides the link through which policy developed from a top-down approach would be taken to the people (in this case farmers). The way policy influences people's livelihoods requires to be taken into

consideration if the objectives of policy are to be achieved. According to Adato & Meinzen-Dick (2002), the livelihood outcomes are shaped by the interaction between assets and policies. Policies affect how people use their assets in pursuit of different livelihood strategies. Livelihood activities may be composed of year-round or seasonal formal sector employment, informal trading or sale of labour, food processing and home gardens, livestock production or cultivation or use of natural or common property resource.

In response to the main sources of income for the home (refer to Appendix 1, QA 14 &15), most of the livelihood activities cited here were given as options. The question sought to find out about income because livelihood also relate to economic activities which poor people undertake in their totalities.

From a livelihood perspective it shows that policy implementation has not impacted negatively on their livelihood strategies because most of the farmers have implemented the measures but still benefit from the farming systems. This is also confirmed by their perception of policy effectiveness. In addition, the introduction of a flexible adoption of agronomic measures to suit agro-ecological requirements and farmer preferences shows that the implementation has been sensitive to these needs through allowing for livelihood adaptation to capabilities. As regards their livelihood resources, the implementation through the Block Extension System (BES) encourages that farmers should benefit from the social capital networks from the farming communities when they interact.

Shocks and stress are important aspects to consider when dealing with livelihood issues. Smith (2001) noted that shocks are typically sudden, unpredictable and traumatic. Examples of shocks include wars, drought, fires, floods or the collapse of a market. Stress generally increases vulnerability more than shocks and can result in resources being whittled down over time eventually denying the opportunity and ability to adapt. The discrete nature of shocks may although not always the case allow recovery periods. He further noted that in reality it is often difficult to differentiate between discrete shocks and continuous stress and their impacts at household level, and consequently it is difficult to isolate the impacts of a shock or stress from the complex reality that rural livelihoods exist within. In this study, the drought is an example of a shock which definitely has left an impact on the farmers. It was not possible to establish the level of vulnerability and of resilience attained after the shock on their perceptions. It would be an important area for further research.

6.6 Conclusion

The results of the information gathered in the primary data source show that, to begin with, there is a general consensus between the staff and farmers that soil erosion is a big problem in the country and that it requires to be dealt with as an urgent matter because it is threatening the resource base upon which agriculture the major contributor to the economy of the country, depends. This can be seen from the response to the questions of the problem of soil erosion in the country.

It can also be established from the responses on what soil erosion is by both the staff and farmers that the physical processes of detachment and transportation caused by raindrop impact and runoff respectively are better understood. This automatically leads them to relate that soil erosion is caused by factors that will expose the soil to these physical processes – for example, deforestation which leads to lack of trees to intercept the raindrops and hence reduce the kinetic energy; removal of ground cover through overgrazing and other related anthropogenically induced activities which lead to exposure of soil to detachment of soil particles and transportation by runoff later. Disturbances to fragile and marginal lands was cited as another major cause of soil erosion.

Although it was not included in this study, it still should be mentioned that the various forms of soil erosion can easily be noted by the farmers though the gully erosion is the one that is easily noticed by most people including farmers. As noted in section 1.1, soil erosion is a big problem in the country such that all land which is under cultivation is in danger or already experiences soil erosion. This is why all the farmers have had an experience of the problem in their fields at one time or another. Those who constructed the soil and water conservation measures earlier enough seem to appreciate their importance in controlling soil erosion. However there are some who still experience the problem to date because of problems in their neighbours' fields or because they have not implemented the conservation measures in their fields.

Lastly, the implementation of the soil and water conservation policy has lead to greater awareness of the problem of soil erosion in the country, and the response to implement the measures has been positive from the farmers' side. The extension staff play an important role in delivering the services which the farmers need and hence should be knowledgeable of the subject matter and have the necessary skills to implement the policy. The government should provide the necessary support to both the staff and farmers including other stakeholders to ensure that the implementation is smooth and hence the objectives realised. The livelihood

strategies of the farmers have not been adversely impacted upon, but the implementation has actually allowed for innovation to the farmers' choices of crops which would enhance their income base and hence improve their well-being.

The chapter as a whole has presented and discussed the results which were found from the primary and secondary data sources. A number of important facts have been recognised from this work from which conclusions can be made and recommendations arrived at for better implementation of the soil conservation policy in the country. The next chapter presents the conclusions which can be drawn from the study.

CHAPTER SEVEN

CONCLUSIONS

7.1 Introduction

The chapter presents the key conclusions drawn from the study in two parts. The first describes the implications of key findings. The brief discussions around each of the conclusions in the second part is structured following the objectives outlined in section 1.3.2. The first being to assess why soil erosion had been on the increase in the country despite policy and legislation. The second objective was to assess the impact of other policy reforms undertaken by the government on the problem of soil erosion and the third was to analyse how the capacity to implement policy influenced the challenges of soil conservation and land use management among smallholder farmers and finally to analyse the impact of policy on the farming practices of smallholder farmers.

7.2 Implications of Key Findings

A number of important findings were identified from the results of the analysis of primary data. It was found that the farmers were not explicitly able to link loss of productivity to soil loss from their fields. The farmers were able to identify loss of fertility which is a valid indicator of diminishing productivity but were not able to relate it to soil loss since nutrients are lost together with the soil. However, it has pointed to the fact that the farmers are aware of on-site effects of soil erosion but they need to be taught more on this. Thus the importance of this is that it has pointed to an area which needs reinforcement during extension staff training of soil and water conservation, so that they in turn are better able to help the farmers.

Another important finding of the study was the farmers' sound knowledge of physical processes of soil erosion and their awareness of anthropogenically accelerated erosion. This is an area which directly relates to policy implementation. It has helped to show that the extension work in soil conservation policy is achieving some of the objectives of providing information for the knowledge as well as for action to the farmers. Furthermore, the farmers' perception of soil erosion is also highly related to food security and other livelihood strategies.

The farmers and the extension staff agreed that soil erosion is a national problem which needs urgent attention to address it at national level. Most farmers see that soil conservation measures are effective in controlling the soil erosion, and they are willing to implement the soil conservation measures

recommended to them. In addition, they see the government as a partner to help them in controlling soil erosion.

The use of enforcement to implement policy was not emphasised by many in the responses although if a piece of legislation on soil conservation were passed, it would contribute to the success of the program. The persuasion method to deliver extension services on soil and water conservation should be reinforced with a piece of legislation. Caution should be taken to avoid adopting the failed pre-independence failures in emphasising it. The farmers and / or their local leaders should be actively involved in this matter at all the times.

These are the key findings which were identified in the analysis of data and are important to the program of policy implementation. The next section will discuss some of these findings as well as the manner mentioned in 7.1.

7.3 Conclusions relative to Objectives

The aim of the study was to assess the impact of the soil and water conservation policy implementation on smallholder farmer soil conservation practices. Particular attention was paid to the influence of their perceptions on the problem of soil erosion and its causes as well as on the effectiveness of policy implementation. In addition, a comparison of how the implementation of the policy was prior to as well as after independence in the country was made.

It has been established from the study that soil and water conservation policy has made a positive impact. It has brought an awareness of the soil erosion problem to the general public and the smallholder farmers in particular. This awareness has led to the subsequent implementation of the policy through the adoption of strategies outlined in the policy. Most farmers have heard and have done something about the soil erosion problem.

Despite the fact that the Land Act of 1965 was not as effective in enforcing the soil and water conservation policy implementation, with the coming of the 1996 National Land Resources and Management Policy, it was noted that even though it has not been legislated, the message in the policy has been well received by the farmers. This policy has incorporated all the lessons from the failures of the failed colonial style of implementation. In addition, the change in governance of natural resources management and the sustainable development issues have also contributed to the success in implementation in the post-1992 period. There is starting to be the bottom-up implementation approach to soil and water conservation. Despite the lack of resources, the government has made achievements in implementing this policy, and the coming of stakeholders serves to boost the

implementation. The emphasis on soil and water conservation measures has made positive impacts on the farmers in that they now have a better understanding of what the problem is and its processes, such that the policy stands a better chance of being effectively implemented and followed even without enforcement now than ever before. The reason for this is that in the period after 1990 when issues concerning sustainable development became the most important factors in any natural resource management, a lot of learning took place in the area of policy implementation. Despite the bureaucratic constraints to adoption of new concepts, this period has achieved the awareness and the response which leads to action on the ground.

Once this new policy has been legislated, coercion can no longer work but if the legal requirements are laid out to help implement the policy, greater emphasis should be placed on involving the local leadership because the top-down approach to enforcement has not achieved its objective. In addition, a civic education exercise on legislation and what it will accomplish should be incorporated into the implementation to ensure that the farmers are aware of the consequences of their action.

The study has shown that soil erosion is not as a result of poor extension delivery. Other factors other than the non-compliance by the farmers to implement the policy recommendations is the main reason why soil erosion is still a problem in the country. It has been seen from this study that most farmers are implementing the soil and water conservation measures, and therefore the continuation of soil erosion would be due to other things.

The policy has achieved its objectives, but the approach put in place to implement it in the pre-1990 period, rendered it to be partly ineffective. As noted in section 3.7, one of the other factors which could be leading to this problem may include the soils of the country. Anderson & Thampapillai (1990) noted that fragile soils are typical of many tropical areas such that many soils are inherently poor that a soil improvement program is necessary prelude to any work on production. This is the reason for the observation by LREP (1992) that the structure of most cultivated topsoil is weak owing to cultivation practices of intensive hoeing and not returning enough organic waste to the soil making the topsoil highly erodible. That is the reason that as long as production precedes soil improvement, then the problem of soil erosion will continue in the country despite the presence of policy in the country. Hence, this is not an implementation problem, but other structural problems which have led to the perpetuation of this cycle. But Anderson & Thampapillai (1990) asserted that nearly every relationship on soil erosion and land conservation system is either difficult to define or is inherently random.

Agricultural policies have been modified from time to time to allow for government to achieve economic growth. Some of the changes in the decisions arrived at by the government especially the

SAP had an impact on the problem of soil erosion. From the secondary data source in chapter 4, it can be seen that the extent of soil erosion in the country can also be attributed to the economic policies which the government had been pursuing. Agriculture was used as a vehicle to finance economic activities such that the agricultural processes were the most influential factors. As noted in section 4.9.1 the environment was usually left out in pursuit of economic policies such that even soil as an important non-renewable resource was not given the attention it requires. This led to lack of management of soil resources as a priority such that the concern to conserve the soil became fragmented.

The SAP in particular made a big impact on the economic policies of the country which indirectly have a bearing on the farmers' decision making. Senahoun *et al.* (2001) noted that the changes brought about by the structural adjustment programs induced change in functioning of farming systems (cropping patterns, inputs use, labour allocation) which have an impact on soils because cropping pattern is one of the major determinants of soil degradation. Policies can affect soil erosion in two ways: first by modifying investments and input use (technologies) and second through its effect on the cropping pattern. A crucial issue for land degradation is the extent to which price-induced substitution encourages farmers to move away from less erosive crops and cropping systems to more erosive crops and systems.

In this study, it has been seen that when the implementation of the SAP began, its effects on soil erosion began to manifest. These SAPs made a very big impact on the agricultural production through the economic policies. As noted above, the major link between the adjustments and soil erosion was in the modification of farm operations. Redclift (1995) noted that whether adjustment policies stimulate more sustainable practices, particularly in agriculture, depends upon the way that prices affect the management of practices associated with specific crops and the conservation of biotic resources by farmers and others. During the period from 1969–1989 there was unprecedented expansion of estates. The agricultural policy encouraged the opening of tobacco estates. Some were opened on marginal lands and some could not follow soil conservation practices. In addition, when the sector was being established, the priority for extension service delivery was shifted to this sector leaving the smallholder farmers. When the attention shifted back to them much soil erosion on the smallholder farmers' land holdings had taken place, though the situation improved after some time.

In addition to influencing the farmers' decision making, the adjustment policies caused reductions in government expenditure. This explains why there were inadequacies in implementation of policy due to financial constraints affecting implementation of the soil conservation program. It was only after government started involving other stakeholders in implementation of natural resource management

that an improvement in implementation was made since the other stakeholders would buffer the government's shortfalls through provision of their resources where applicable.

In conclusion therefore it can be said that the general trend in macro-economic policy change impacted on the problem of soil erosion especially when it concerned markets because the farmers' livelihoods do depend on the economic activities which can give them financial requirements. They therefore followed the market signals even when there was going to be an impact on their fields.

The third objective in the study was to analyse how the capacity to implement the policy influenced the challenges of soil conservation and land use management among smallholder farmers. Capacity to implement policy was very important in this study because it incorporated the ability, skill and commitment to implementing the policy from the staff involved as well as the response of the farmers to take up the recommendations afterwards. In addition to this, it also looked at the extension staff's responsibilities under the general extension service and the farmers' (as stakeholders) perception of the implementation.

The results of the study showed that there is capacity to implement the policy in that the staff are able to carry out their work as is required of them under the general extension. There is also commitment to implement the policy such that even with the few resources which government gave, they have been able to show results through the achievements expressed by the farmers. In addition, the farmers themselves have indicated that they have perceived the service delivery to be without major problems. The problems mentioned included that they get few visits made by the staff. This is as a result of shortage of staff and inadequate resources to support their mobility. In addition, the farmers also mentioned the need to provide reinforcement to the skills of some extension staff. Although there has been an indication that skill and knowledge is lacking in some of the staff in implementing the policy, the general picture is that there is good capacity to implement the policy but there is need for mechanisms to be put in place by the government to provide the support which they need. That is the staff have the ability, skill and knowledge needed to implement the policy. In addition, more farmer trainings should also be done.

There is a big difference in terms of enforcement of the legislation during the periods which were under consideration in this study, such that the legacy of the pre-independence enforcement of the statute still lingers in the minds of the general public – including the staff and farmers. In the sample of the respondents involved in this study, it can be established that they have been receptive of the policy even without the coercion of the past. This approach of persuading the farmers to adopt soil conservation is not an easy one, and may therefore partly explain why there is still a problem of soil erosion in the country. It would be necessary to find out if this approach has had adverse effects on

implementation, that is if part of the reason for the partial effectiveness of implementation in the pre-1992 period could also be attributed to the approach apart from the other reasons already cited in this study.

As noted already in this work, perceptions are very important in decision making because they are an integral part of the decision making process especially as it is 'provides man with a directive for action in the environment' (Viljoen (1980) cited by Cooper (1996:3-4)).

The soil conservation policy was a response to the problem of soil erosion in the country from before independence to the present time. It has been established from these findings that both the farmers and the staff are aware of the policy on soil and water conservation. The measure that was put in place to implement it was the legislation enacted in 1946 and revised in 1949 and 1962. It called for the sustainable utilisation of natural resources in general, but also laid emphasis on soil conservation.

The perception of policy by farmers can better be established by assessing their perception of the extension service delivery by the staff. The problem of soil erosion is understood to be shared by both the state and the farmers as can be seen from the response by staff (refer to Appendix 2, Q18) as well as by the farmers themselves (refer to Appendix 1, QA26) where in response to these questions they indicate that both the state and farmers' involvement can lead to betterment of the current situation. The farmers in general, perceive that the system of extension delivery which is in operation at the moment as good. However, from the responses by staff, it can be deduced that they also consider involving a number of stakeholders at the implementation level where they stated that the government should consider the ministry of education to take up soil and water conservation policy issues in schools for effective implementation in future, and that to help enforce it, local leaders should be involved.

The policy has not had a negative impact on the farming practices of the farmers because as it has been established, it does not impinge on their livelihood strategies and that to a certain extent it has increased their awareness to tap into social capital as a major livelihood resource as they implement policy through learning from fellow farmers who have implemented the soil and water conservation measures.

In conclusion, therefore, capacity to implement has not had an effect on soil conservation, rather it has helped to increase farmers' attention to soil erosion and environmental degradation in general as noted by their perception of cause of soil erosion.

It has been noted though that for some period of time after independence the implementation was partly ineffective due to among other things the quest for economic growth and development leading to government unwittingly adopting policies which led to environmental degradation. There has been tremendous improvement in the implementation with regard to accommodating the farmers' requirements.

From the results of this study, it has become apparent that the recommendation should be that there should be an evaluation study to generate more up to date information and more special extensive information on the current soil erosion status in the country. This evaluation study should also look at the effects of the SAP. In addition, high population increases have generally been cited by the media and research reports as being another cause of the soil erosion problem in Malawi. However, Tiffen *et al.* (1994) showed from their study that, high population increases was the reason for adoption of soil conservation strategies and hence reduced soil erosion. It is argued here therefore that the evaluation study of this kind would show the true picture on the ground concerning the problem of soil erosion.

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APPENDIX 1

FARMER QUESTIONNAIRE

SOIL CONSERVATION POLICY IN MALAWI

It is important that the respondents recognize at the onset that this exercise is **not** measuring right or wrong answers but it is attempting to assimilate information on the opinions of individuals involved in policy implementation regarding the extent and causes of soil erosion as well as the extent to which the soil conservation policy has achieved its intended objectives in Malawi. This exercise should take no more than 45 minutes to complete. Your input is **vital** to this research project and your participation is sincerely appreciated. *(The soil conservation policy referred to in this questionnaire concerns all the work under land resources conservation)*

APPENDIX 1 PART A

A Land Use, Soil Erosion and Policy Issues

1. What is the size of your field? *(circle the number of your choice)*
 - 1 Less than 1 acre
 - 2 1-3 acres
 - 3 4-7 acres
 - 4 8 acres and more

2. What are the crops which you usually grow in your field? *(list them all)*
 1. _____
 2. _____
 3. _____
 4. _____
 5. _____
 6. _____
 7. _____
 8. _____

3 Looking at your harvest from last season, were you satisfied that the harvest is sufficient to keep your household secure in food until you reach the next harvest? (*Circle your choice*).

- 1 Very satisfied
- 2 Somewhat satisfied
- 3 Somewhat dissatisfied
- 4 Very dissatisfied

4. Do you think the land on which you grow your crops is still as productive as when you started using it? Have you noted any changes? (*Please explain*).

5. What do you understand by the term soil erosion? (*please explain briefly*)

6. What causes soil erosion? (*please explain briefly*)

7. The government has been trying to help farmers control soil erosion in their fields through encouraging soil and water conservation programmes. Have you heard anything about this programme in:

a) In the country? (*circle only one*)

- 1. Yes
- 2. No

Please explain your answer to this question.

b) In your area? (*circle only one*)

- 1. Yes
- 2. No

Please explain your answer to this question.

8. How did you hear about this programme of soil and water conservation? (*circle the number of your choice*)

1. From agricultural extension staff
2. From other extension staff (*please specify*)
3. From your neighbours
4. From the radio
5. From the newspapers
6. From extension leaflets
7. Other
(*specify*) _____

9. Have you been visited by government agricultural extension staff in your area? (*circle your choice*)

1. Yes
2. No (If No, go to question 13)

If your response is to 9 is **Yes** then please answer 9.1 to 9.4

9.1 How many times do they visit you? (*circle your choice*)

1. Very often once a week
2. Somewhat often twice a month
3. Rarely once in two months
4. Very rarely once in three months

9.2 How long are the visits? (*circle your choice*)

1. Less than half an hour
2. More than an hour
3. Several hours
4. Half the day

9.3 Is the purpose of the visit very clear to you? (*circle your choice*)

1. Yes
2. No
3. Not really
4. Don't know

9.4 Have you implemented what they recommended? (*circle your choice*)

1. Yes
2. No

10. If your answer to 9.4 was **No**, please explain

11. Do you think what you are involved in during you extension meetings concerning soil and water conservation is relevant ? *(please explain briefly)*

12. What do you think should be done to make the extension services on soil and water conservation effective? *(please explain briefly)*

13. If your response was **No** to question 9, that is you have not been visited by government agricultural extension staff, give reasons why you think this is.

14. Do you experience the problem of soil erosion in your field? *(circle your choice)*

1. Yes
2. No (If response is No, go to question 18)

15. What is the nature of the soil erosion problem that you face in your field? *(circle your choice)*

1. Surface is hard, and crusted and water runs off
2. Roots exposed and weakened plants blown over
3. Yield decrease
4. Water running off from your neighbour's field (answer question 16)
5. Other *(please specify)* _____

16. If any problems in your neighbour's field lead to and cause the problem of soil erosion in your field, please explain how and why it happens.

17. What have you done about the problem of soil erosion in your field? *(please explain briefly)*

18. "Soil erosion is a problem in the country". Do you agree with this statement? *(circle your choice).*

1. Yes
2. No

Please elaborate giving reasons how you understand this issue according to the choice of your answer above.

19. Do you know that there are laws devised to control soil erosion in the country? *(circle the number of your answer)*

1. Yes
2. No

20. Do you know which specific practices are forbidden in accordance to the laws of the country regarding soil erosion? *(circle the number of your answer)*

1. Yes
2. No

21. Do you know if there is punishment to anyone who is found not conforming to the laws of soil and water conservation? *(circle number of your answer)*

1. Yes
2. No

22. Have you heard of anybody who was punished for not following the recommended practices of soil and water conservation? *(circle number of your answer)*

1. Yes
2. No

23. Do you know the specific practices which the laws say should be done to control soil erosion? *(circle number of your answer)*

1. Yes
2. No

- 23.1 If your answer to question 23 is **Yes**, please list the practices which the laws recommend.

24. If your answer to question 23 is **No**, that you do not know the practices, please explain

25. Do you think the approach which government is using to promote soil and water conservation is the good one? *(please explain briefly)*

26. What do you consider to be the best way to promote soil and water conservation in our country? *(please explain briefly)*

Finally, we would like to ask a few questions about you to help us interpret the results

APPENDIX 1 PART B

B General and Socio-economic Information

Please complete the details against each question in the space provided

1. Name of respondent _____
2. Village _____
3. T/A _____
4. EPA _____
5. RDP _____
6. Name of household head (if different from respondent) _____
7. Head of household (circle the number applicable):
 - 1 Male
 - 2 Female
8. Age (circle one answer)
 - 1 15-20 years
 - 2 21-30 years
 - 3 31 years and above
9. Number of people living in household (indicate numbers only)

Male	Female

10. Education level including that of respondent

Education level	Males	Females
Old standard 1-3		
Standard 1-5		
Standard 6-8		
Secondary school		
Adult literacy		

11. Number and age of people living in the household

Age	Males	Females
0-6 months		
7-12 months		
2-5 years		
6-20 years		
20-35 years		
35years and over		

12. How long have you stayed in this village? (*circle your choice*)

1. $\frac{1}{2}$ - 1 year
2. 2 – 5 years
3. 6 – 10 years
4. more than 10 years

13. Are you employed outside the home? (*circle one number*)

1. Yes
2. No (If response is No, go to question 15)

14. If Yes, what type of employment is it? (*please describe briefly*)

15. What is the source of income for the household?

16. How far away are you from the main road? (*circle one answer*)

1. less than 1 kilometer
2. 2-4 kilometers
3. 5-10 kilometers
4. more than 10 kilometers

17. Which of the following house hold items do you own? (*circle one answer*)

Description	Yes	No
Radio		
Bicycle		
Ox-cart		
Plough		

18. If you own a radio which radio station do you normally listen to? (*circle one answer*)

- 1 Radio 1
- 2 Radio 2
- 3 Capital Radio
- 4 Other (*specify*) _____

19. Do you read newspapers or magazines? (*circle one answer*)

- 1 Very often, everyday
- 2 Somewhat often, once in a while
- 3 Very rarely
- 4 Never

(*please specify the type of news papers and magazines which you read in the space below if applicable*)

_____	_____
_____	_____
_____	_____

I sincerely thank you for taking time to complete this questionnaire. Please return it to the extension staff at your earliest convenience, ideally, by March 31.

Please feel free to add additional comments you think may be of interest to the researcher on this subject.

THE END

APPENDIX 2

EXTENSION STAFF QUESTIONNAIRE

SOIL CONSERVATION POLICY IN MALAWI**Staff Questionnaire**

It is important that the respondents recognize at the onset that this exercise is **not** measuring right or wrong answers but it is attempting to assimilate information on the opinions of individuals involved in policy implementation regarding the extent and causes of soil erosion as well as the extent to which the soil conservation policy has achieved its intended objectives in Malawi. This exercise should take no more than 45 minutes to complete. Your input is **vital** to this research project and your participation is sincerely appreciated. *(The soil conservation policy referred to in this questionnaire is all the work under land resources conservation)*

Please provide the answers to these questions in the spaces provided

1. Name of staff _____
2. RDP _____
3. EPA (where applicable) _____
4. Post held _____
5. Highest educational qualification obtained _____
6. Circle your gender : M F
7. What is your understanding of soil erosion? *(please explain briefly)*

8. How is soil erosion caused? *(please explain briefly)*

9. What is your understanding of policy? *(please elaborate)*

10. Are you aware of the soil and water conservation policy of Malawi? *(circle your answer).*

1 Yes

2 No

11. How do you link your work to soil and water conservation policy implementation? *(Please explain).*

12. How serious do you perceive the soil erosion problem to be? *(please tick one answer only)*

Very serious requiring immediate and coordinated action

Serious requiring priority attention by farmers and government

Potentially serious we need more information before a commitment to action can be assessed

Not serious

Other *(please comment)*

13. If you were appointed to examine the soil erosion issue in the country, which of the problem areas in your opinion should first be addressed? (*Rank the following in order of importance, i.e. requiring most attention, where 1 is the most important and 5 is least important*)

1. lack of importance given to soil _____
2. national level control of soil erosion problems _____
3. inadequacies in the implementation of policy _____
4. lack of information on real nature and extent of the problem _____
5. non-uniform application of law and legislation enforcement _____

14. At what stage during the period before and after independence do you think the general public and farming community were most conscious of the extent of soil erosion problem? (*please elaborate briefly giving reasons*)

15. Can you relate the period of greater awareness to the soil erosion problem with any particular events? (*please elaborate*)

16. What do you believe may in the past have influenced farmer compliance with soil conservation laws and other controls? (*please explain*)

17. How best do you believe sustainable resource management policies should be **enforced** to ensure optimum compliance? (*please comment*)

18. Whose responsibility is the problem of soil erosion? (*please elaborate*)

19. Do you think what the government is doing to implement the soil and water conservation policy is effective? *(please explain your answer giving reasons)*

20. How, in your opinion should soil and water conservation programmes be implemented? *(please elaborate).*

21. Do you believe that the soil and water conservation policy has failed to control soil loss and degradation of land? *(please give the main reasons for your answer).*

22. What do you think should be done to ensure that the soil and water conservation policy should be effectively implemented in future? *(please explain)*

I sincerely thank you for taking your time to complete this questionnaire. Please return it to the Project Officer at your earliest convenience, ideally by 21st March 2002.

Please feel free to put additional comments you think may be of interest to the researcher on this subject that may constructively contribute to the project.

THE END

APPENDIX 3**LETTER OF INTRODUCTION AND SAMPLING PROCEDURES**

FROM: Gertrude Kambauwa, Geography Division, Memorial Tower Building, University of Natal, Durban, 4041.

TO: The Programme Manager, Blantyre ADD, P/Bag 379, Chichiri, Blantyre 3, Malawi, Central Africa.

Attn: Head of Land Resources Conservation Division

cc: The Deputy Director, Land Management & Training, LRCD, P. O. Box 30291, Lilongwe 3, Malawi, Central Africa.

RE: QUESTIONNAIRE SURVEY

Reference is made to the above captioned.

Further to my informal notice to you on my intention to conduct a self-administered questionnaire survey, herewith my detailed explanation of how the research is intended to be administered.

As you might be aware that in partially fulfilling the requirements of the coursework Master of Environmental Management (MEnvMgt) programme which I am pursuing, a dissertation which accounts for half the credits earned is required to be submitted by myself to the Department of Geography in the School of Life and Environmental Sciences of the University of Natal.

I chose a topic that is looking at the implementation of the soil and water conservation policy in Malawi as it impacts on the problem of soil erosion. Although this policy is not referred to as such in our country, the work that the Ministry of Agriculture and Irrigation Development has been doing on soil erosion before and after independence is what I am focusing on. This then required that in addition to the literature search on the topic, I should conduct a practical research component which will constitute the primary data. However, considering the fact that conducting a research of this nature using the resources at my disposal during the time I am doing my studies is not feasible, it became necessary to conduct the survey through a self administered questionnaire,

copies of which are attached complete with sampling procedures and relevant information, which can be downloaded from there.

I request that you assist me in conducting this survey and also by providing the required resources like human, stationery and any other resources required for the successful implementation of the survey.

The sample size for the survey is forty-five people in total: where fifteen will be members of staff and thirty will be farmers. The rest of the information is on the sampling procedures (which I have sent through the PROSCARP's e-mail address). I propose that the sampling procedures should be downloaded first before the questionnaires since it contains information regarding the page number setting. The farmer questionnaire has been translated for the respondents. The original English version copy is also attached for reference. Only five copies of this version, one for each RDP should also be produced.

The questionnaires are very academic and not really looking for what you may need to use immediately after they have been forwarded to you from the RDPs. Please bear with me on this, and in a separate note upon returning the questionnaires to me indicate all the feedback which the questionnaires will have attracted. Include any alterations which may have been made and incorporated to improve the respondents understanding of the questions, hopefully without changing the true meaning of the questions. It would be useful to incorporate such things in the write up.

I leave the issue of contacting the Project Officers to you as well so that you can do it on my behalf. Their cooperation will be greatly appreciated. However, I am aware of the current situation as regards the food shortage and hunger situation including related problems which the country is facing at the moment. Bearing this in mind and due to the nature of the exercise, may I request that it is conducted with all the precaution necessary not to raise expectations as well as to be sensitive to the timing and targeting of the farmers.

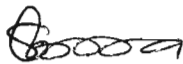
I believe that my explanation is clear, and that there should not be major problems in implementing the survey. I could be contacted for any clarifications of details any time. It is expected that the whole exercise should be completed before the end of the month of March. May I request you to consider assisting me within this time frame.

Taking cognisance of the fact that the LRC division has problems of manpower, **if** need arises, a member of my family (my husband) could be contacted and involved to assist on the issues pertaining to the survey on your behalf.

Lastly, please forward the completed questionnaires to the Deputy Director, LM & T who could assist with dispatch costs if these cannot be met at the ADD.

Thank you, and I look forward to your assistance and feedback on this very important matter.

Yours faithfully,



G.J.Kambauwa
University of Natal.

Telephone: (031) 260 1454/2420
Fax: (031) 260 1391
E-mail: 200299013@nu.ac.za

SAMPLING PROCEDURES

The survey requires that a total of 45 questionnaires be administered and hence reproduced from the originals downloaded from the e-mail as follows:

1. 15 questionnaires for staff
2. 30 questionnaires for farmers.

I propose that when reproducing the questionnaires should be photocopied back to back to save paper and reduce bulkiness.

Instruction for staff questionnaires

As you download the questionnaires check that the pages for this questionnaire are as follows:

- Q1 to Q9 on page 1
- Q10 to Q13 on page 2
- Q14 to Q19 on page 3
- Q20 to Q22 and general comments on page 4.

The selection of the members of staff to complete the questionnaire to proceed as follows:

- a) Each **Field Officer** at **RDP** level to complete one staff questionnaire (5)
- b) Select one **EPA** in the RDP and each **LRC Assistant** for that chosen EPA should complete one staff questionnaire (5).
- c) Select one **Section** from each of the selected EPAs and the **Field Assistant** manning that section should complete one staff questionnaire (5)

Instruction for farmer questionnaires

As in the staff questionnaire above, please ensure that as you download the questionnaires the pages are as follows:

Section A : **Chichewa version**

- Q1 to Q3 on page 1
- Q4 to Q7 on page 2
- Q8 to Q9.4 on page 3
- Q10 to Q15 on page 4
- Q16 to Q21 on page 5
- Q22 to Q26 on page 6

Section B

- Q1 to Q10 on page 7
- Q11 to Q16 on page 8

English version

- Q1 to Q4 on page 1
- Q5 to Q9 on page 2
- Q9.1 to Q12 on page 3
- Q13 to Q18 on page 4
- Q19 to Q26 on page 5

- Q1 to Q11 on page 6
- Q12 to Q17 on page 7

Q17 to Q19 and general comments on page 9

Q18 to Q19 and comment
on page 8.

The selection of the farmers to be involved to proceed as follows:

- a) From **each** of the F/As selected above, **select six (6) farmers** to respond to the farmer questionnaire. This should be the person who does most of the farming activities for that particular household and should be staying in the village. There is need to do sampling for the villages from which the farmers will be selected from which should proceed as follows:
- i. The names of the villages for each F/A selected should be listed down and numbered accordingly.
 - ii. The total number of the villages in the section for each of the F/As selected should be divided by 6, and the answer rounded up to the nearest whole number.
 - iii. This becomes the interval for selecting the villages from the prepared list of villages.
 - iv. The first village selected is the one with the number corresponding to the interval found in point (ii) above
 - v. The next village is found by counting down the rest of the villages, starting with the village immediately below the first one, using the interval value as the limit until a total of 6 villages have been selected.
- b) Sampling for farmers who will complete the questionnaire is not as easy in that already the targeted farmers should be those who are literate and able to write or members of their families can be asked to assist them. This is the reason the questionnaire should be left at the household for at least **two days** including the day of delivery. It is important to note that bias in the sampling should be eliminated by ensuring that the farmers selected are not the best only, a balanced selection is required. It could be that the Evaluation division at ADD level has a way of doing it, they could be consulted on the same.

Administration of the farmer questionnaire

After the households have been selected following the sampling procedures above, the F/A will have to deliver the questionnaires to the farmers households and explain clearly to them the purpose of and how they are expected to complete the questionnaire.

It is expected that the questionnaire should be left with the household for about two (2) days after which they will have completed answering, and it should be collected on the third day. The staff member should check that all questions have been attempted and responded to by the respondents.

After all questionnaires have been collected, they can be forwarded to the ADD MU.