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UNLOCKING RESOURCES: THE IMPACT OF LAND REFORM ON SUSTAINABILITY OF FOREST AND WOODLAND RESOURCES AND RURAL LIVELIHOODS - THE CASE OF MUFURUDZI RESETTLEMENT SCHEME (ZIMBABWE).

By Geofrey Mukwada

A thesis submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in fulfillment of the requirements of Doctor of Philosophy.

Johannesburg, 2006

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Declaration

I declare that this thesis is my own, unaided work. It is being submitted for the Degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

……..
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ABSTRACT

This thesis is about the relationship between planned resettlement, livelihoods and environmental resources in Zimbabwe. In Zimbabwean resettlement areas, assets such as human and physical capital, social networks and financial resources are often clearly insufficient to adequately provide inputs for the sustainable productive and extractive systems that are required to drive the rural economy. Due to uncertainties related to agricultural production doubts have been expressed about the benefits of state sponsored resettlement. Currently, debate is raging on whether land resettlement in Zimbabwe has yielded the intended benefits among land reform beneficiaries, with some scholars even questioning whether state sponsored resettlement is not merely an expensive way of reproducing the livelihoods of communal lands.

This thesis contributes to the ongoing debate about the link between rural livelihoods and land resettlement, using the case of Mufurudzi resettlement scheme in Zimbabwe. Based on a livelihood framework, the thesis argues that in order to fully understand the relationship between land reform and livelihoods, livelihood trajectories have to be examined. In line with this thinking the thesis presents a number of arguments. First, the thesis argues that there are many theoretical frameworks for analyzing the relationship between people, resettlement and environmental resources such as forests and woodlands and the sustainable livelihood framework is just one of them.

Second, resettlement does not necessarily always lead to environmental destruction. Instead resettlement provides the mechanism for unlocking the natural capital that local communities require for survival. Forest and woodland resources are one such form of natural capital. Under these circumstances access to natural capital, particularly in the form of forest and woodland resources, becomes the cornerstone of survival, notwithstanding the role that these resources play in supplying daily livelihood requirements such as food, shelter, fuel, medicines and other needs, in a harsh macro-economic environment. Apart from providing important products, forest and woodland resources also provide a mechanism through which land reform beneficiary communities can diversify their livelihoods. The key finding of this research is that despite their continual use during the past 25 years no wholesale

degradation has occurred to the forest and woodland resources in Mufurudzi. Informal CBNRM is responsible for this situation.

Dedication

To my wife Esther and children: Lesley T., Geoffrey (Jr.) .T. and Brandon, T.

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ACRONYMS AND ABBREVIATIONS

ADVAG	Department of Agricultural Development
AFC	Agricultural Finance Corporation
AFRODAD	African Forum & Network on Debt & Development
AGRIBANK	Agricultural Bank (now Land Bank)
AIDS	Acquired Immunity Deficiency Syndrome
API	Air Photo Interpretation
AREX	Department of Agricultural Research and Extension
AVISO	Information Bulletin on Global Environmental Change and Human Security
BSAC	British South Africa Company
CAMPFIRE	Communal Area Management Programme for Indigenous Resources
CAs	Communal Areas
CBD	Convention on Biodiversity
CBNRM	Community Base Natural resource Management
CBTPs	Community Based training Programmes
CIIFAD	Cornell International Institute for Food Agriculture and Development
CONEX	Department of Conservation and Extension
CPRs	Common Property Resources
CPT	Common Property Theory
DANIDA	Danish International Development Agency
DAPP	Danish People to People
DDF	District Development Fund
DERUDE	Department of Rural Development
DfID	Department for International development
DNR	Department of Natural Resources
DNRO	District Natural Resources
DRC	Democratic Republic of Congo
ECP	Eastern Cape Province
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
ESAP	Economic Structural Adjustment Programme
FAO	Food and Agricultural Organization
FC	Forestry Commission
FDT	Farmers Development Trust
FEWS	Famine Early Warning System
GIS	Geographic Information Systems
GMB	Grain Marketing Board
GOZ	Government of Zimbabwe
GPS	Global Positioning System
HIPC	Heavily Indebted Poor Country
HIV	Human Imuno-Deficiency Virus
ICA	Intensive Conservation Area
IKS	Indigenous Knowledge Systems
IMF	International Monetary Fund
ITCZ	Inter-Tropical Convergence Zone
IUCN	International Union for Conservation of Nature
LHA	Land Husbandry Act
LSCF	Large Scale Commercial Farms

MDC	Movement for Democratic Change
MERP	Millennium Economic Recovery Programme
MFTP	Master Farmer Training Programme
MSFT	Mean Spacing of Trees for Transect
MSSP	Mean Spacing of Trees at Sampling Point
NGOs	Non-governmental Organizations
NLHA	Native Land Husbandry Act
NRA	Natural Resources Act
NRB	Natural Resources Board
NTFPs	Non-Timber Forest Products
NWFPs	Non-Wood Forest Products
PCQM	Point Centre-Quarter Method
PRA	Participatory Rural Appraisal
RDCs	Rural District Councils
SADC	Southern African Development Community
SAFIRE	Southern Alliance for Indigenous Forest Resources
SAP	Structural Adjustment Programme
SAREC	Swedish Agency for Research Cooperation
SAS	Statistical Analysis System
SPOT	*Satellites d'Observation de la Terre*
SPSS	Statistical Package for Social Scientists
SSIP	Smallholder Irrigation Programme
SUDAM	Suprintendency for the Development of Amazonia
TLA	Traditional Leaders Act
TMB	Tobacco Marketing Board
TTLs	Tribal Trust Lands
UDI	Unilateral Declaration of Independence
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNIRIN	United Nations Integrated Regional Information Networks
VIDCO	Village Development Committee
WADCO	Ward Development Committee
WCED	World Commission on Environment and Development
WFP	World Food Programme
ZANU-PF	Zimbabwe African National Union-Patriotic Front
ZDERA	Zimbabwe Democracy and Economic Act
ZIMPREST	Zimbabwe Programme for Economic and Social Transformation
ZVAC	Zimbabwe Vulnerability Assessment Committee

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Dubbed the 'fast track' resettlement programme, or '*jambanja*' (lingo for overtly uncouth, uncontrollable, disruptive, intrusive, disorderly, lawless and sometimes violent behaviour), the 2000 large-scale invasions of white owned commercial farms in Zimbabwe have had a considerable destructive environmental impact. Even though it has been argued that these invasions were neither anarchic nor chaotic (Chaumba, *et al*, 2003b; Chaumba, *et al*, 2003c), they have generally been regarded as environmentally destructive because of the widespread poaching and deforestation they were associated with (Wolmer, *et al,* 2003b; Mtisi and Nicol, 2003). Mtisi and Nicol (2003) noted, for instance, that despite the fact that there was a 'Conservation and Environmental Policy Document' for 'fast track' resettlement schemes its adoption in the programme was absent.

The recent experience of resource destruction in spontaneous resettlement areas raises the question about whether resettlement inevitably leads to environmental destruction. One pertinent issue that needs to be examined, which has prompted this research, is whether a more managed resettlement programme leads to better resource management, better relationships between livelihoods and resources and better opportunities for Community Based Natural Resource Management (CBNRM). Another question that arises is whether land resettlement in Zimbabwe has always been environmentally destructive. This question goes to the heart of the debate that is currently raging, both internationally and within Zimbabwe, on whether land resettlement always leads to environmental degradation.

Being a planned resettlement scheme that has been in existence for more than two decades, Mufurudzi provides the opportunity to address this critical question. In this context, this research explores the relationship between planned resettlement, livelihoods and environmental resources. One of the difficulties about understanding the relationship between resettlement, livelihoods and environmental resources in Zimbabwe stems from the fact that resettlement is continuing in a less planned manner while the national economy is facing a crisis. Following government's more recently adopted 'fast track' land resettlement policy, large-scale transfers of human population have continued to take place between the crowded communal areas and the newly established resettlement areas. Within Mashonaland Central province, for example, people from communal areas such as Chiweshe, Bushu, Madziwa, Masembura and Chinamora, or even other provinces, are being resettled in more sparsely populated commercial farming areas around Mufurudzi, with 862 families having already been officially resettled in this resettlement area alone since 1981.

There are two key questions that the case of Mufurudzi can help to answer. The first relates to the relationship that exists between resettlement, livelihoods and environmental resources such as forest and woodland products. This question is pertinent, particularly in resettlement areas, where CBNRM studies have not been undertaken in the past. The case of Mufurudzi reveals the extent to which the livelihoods of the poor depend on the state of forest and woodland resources. As such, the case study traces the environmental changes that have taken place in Mufurudzi, including those that have affected the state of forest and woodland resources, with the

view to determine the forces that have been responsible for shaping such changes, as well as the implications of the changes on the livelihoods of local communities.

The second question is about the role of CBNRM in the conservation of forest and woodland resources in resettlement areas. In this regard the thesis identifies the institutions that are responsible for the management of forest and woodland resources in a resettlement context, as well as the suitability of the forest management policies and practices adopted hitherto and the implications they have on rural livelihoods in Mufurudzi. This helps to determine the validity of one of the tenets of the Convention on Biological Diversity (CBD), "that local communities can adopt holistic forest resource management practices that are compatible with their livelihood systems", and in the process ascertain if this also applies to *ex situ* communities, that is displaced or resettled communities, such as those found in Mufurudzi.

Secondary questions that ensue from the above key questions are:

a) Which resources do resettled communities derive from forests and woodlands in Mufurudzi and how important are these resources to the livelihoods of these communities?
b) What is the current state of the resources and why?
c) How has the resource base changed during the last two decades?
d) What prospects are there for the management of forest and woodland resources to ensure the sustainability of both the resources and the livelihoods of the people who depend on them in resettled communities?

Apart from addressing the above questions the Mufurudzi case study gives some insights into some areas that have hitherto not received adequate attention within CBNRM research. First, most CBNRM studies use qualitative analyses and accordingly fail to exploit the potential of integrating different data sources. Exceptions include Campbell, *et al* (1996) and Ingles *et al* (1999) who have advocated the adoption of integrated approaches in CBNRM research. The Mufurudzi case study reveals the complementarity that exists between, on the one hand hi-tech quantitative and state-of-the-art methodologies of environmental investigation, including remote sensing imagery, aerial photography and Geographical Information Systems (GIS), and on the other, traditional quantitative resource inventorying and qualitative methodologies that are based on local knowledge systems. The case study demonstrates that quantitative and qualitative methodologies of environmental research complement each other and also that fine-grained analysis of environment change can be achieved through multi-disciplinary methodologies. As noted by Bryant and Wilson (1998: 330):

> the full breadth of the human-environmental interaction cannot be captured by positivist approaches alone, but rather entails an inclusive approach that may combine qualitative techniques like oral history, participant observation or focus groups with quantitative methods like questionnaire surveys or census data analysis.

Unlike most previous CBNRM and hi-tech studies that tended to be cursory in approach, the case of Mufurudzi reveals that geographical patterns in tree resource use and distribution are evident even at micro-level. Ground surveying and ethnographic research, involving Participatory Rural Appraisal (PRA) methodologies, provided the means by which these patterns were revealed. Previously, environmental analyses tended to be coarse and as such they neither focused on the actual forest and

woodland resources or tree species that local communities depend on for survival nor their quantities or populations.

Second, unlike most CBNRM studies hitherto conducted in Zimbabwe, which are based on *in situ* community-resource relationships, this study contributes to debates in CBNRM by focusing on an *ex situ* community, that is a resettled community. Whereas most studies on livelihoods and CBNRM tended to concentrate on communal areas where, traditionally, social controls have been long known to exert considerable influence on patterns of natural resource use and conservation, similar research had yet to yield conclusive results in older planned resettlement areas, where different forms of land administration, social organization and power configurations are evident. Whereas within the communal areas the influence of traditional institutions and social controls on natural resource conservation appears to be obvious, particularly with respect to the management and governance of forest and woodland resources, the Mufurudzi case study suggests that formal CBNRM is more likely to succeed through co-management, especially where this is pursued in an enabling socio-economic and political environment. The findings of this study challenge "conventional wisdom" and question the relevance of the seemingly widely held but hitherto uncontested assumption within CBNRM literature that traditional institutions are the sole determinant of the success of formal CBNRM. In the case of Mufurudzi, a successful formal CBNRM regime is only likely to result from brokered collective and complementary roles of all key stakeholders rather than from the efforts of separate institutions and individuals. The case of Mufurudzi reveals further that on their own the key stakeholders that are found in resettlement areas lack the capacity to manage forest and woodland resources in a sustainable way.

Third, the Mufurudzi resettlement case suggests that deforestation should be viewed in ethnobotanical terms and therefore defined as a social problem rather than as a mere physical process involving loss of tree resource cover from the environment, as largely portrayed in existing broader literature on conservation. Previous researches tended to focus on quantitative measurements related to the amount of land cleared for specific purposes or the magnitude of anthropogenic damage caused to forest and woodland resources, with little regard to how local communities view the ensuing qualitative environmental changes that are linked to their livelihoods. Evidence from recent ethnobotanical studies indicates that local communities need to be full participants in studies on plant resource utilization and consequently they should be involved in data collection and analysis during such studies (Atkinson, 2005).

Fourth, as shown in most literature on environmental change, there has been considerable debate on explanations given about the role of people in environmental change, leading to the advancement of theories such as the equilibrium, non-equilibrium and environmental transformation theories, all of which are examined in Chapter 2. The case of Mufurudzi, like the greater part of the existing body of knowledge on rural livelihoods and CBNRM seems to confirm the validity of the environmental transformation theory. This research demonstrates, for instance, that though demographic changes have had a considerable effect on both forest based production and extraction economies of the communities found in Mufurudzi resettlement area, temporal and spatial patterns of tree resource distribution are complex and do not always indicate resource decline as normally suggested by traditional environmental theory.

Fifth, many previous CBNRM studies have made little attempt to include and accommodate natural resource inventories in their analyses, even though they have been conclusive about causes of natural resource degradation or depletion, even to the point of giving prescriptions for livelihood sustainability. The Mufurudzi case study involves the undertaking of a tree resource inventory to determine the impact of the anthropogenic influences that affect these resources. The case study reveals that the key drivers of environmental transformation, especially that which involves changes in tree resource distribution within resettlement areas, range from micro-level demands of natural products that are based on the preferences of individual households, to macro-level extra-territorial and often global forces that exert an indirect influence on local communities. The impact of these forces has led to a complex resource landscape, rather than oughtright resource degradation.

In this context, unlike most previous CBNRM studies which treated local communities as closed systems, the Mufurudzi case demonstrates that there is an 'organic' link between resettled communities and other communities found elsewhere in Zimbabwe, or even within the wider global arena. In most previous studies resource degradation was solely blamed on local communities and their 'ignorance', with lack of environmental awareness, lack of capacity to conserve environmental resources and poverty often cited as the principal causes of the degradation, thus setting wrong agenda about how forest and woodland resources can be conserved.

1.2 SCOPE OF THESIS

This thesis examines the role of forest and woodland resources in livelihood sustainability within the context of CBNRM and land reform. The thesis focuses on the use, access and governance of forest and woodland resources in old planned resettlement areas, as well as the sustainability of the livelihoods of the communities that depend on the resources, thus making it a typical ethnobotanical study.

The aim of the thesis is to examine the extent to which human-well-being has been influenced by the reciprocal relationship between rural livelihoods and forest and woodland resources within resettlement areas and how this relationship could ensure the conservation of the resources in future. One widely held view in CBNRM is that natural resources can best be conserved through co-management, involving all the important stakeholders (Scoones and Matose, 1993). Co- management refers to:

> a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources (Borrini-Feyerabend et al, 2000: 1).

Co-management entails the development of partnership between local resource users and other stakeholders. One form of co-management is joint forest management, whereby the state gradually hands over the responsibility of managing and protecting forests to local people (local stakeholders). Ultimately, the people themselves become the guardians or custodians of the forest, while the state provides technical support.

In this thesis stakeholders are defined as:

> those who have an interest in a particular decision, either as individuals or representatives of a group. This includes people who influence a particular decision, or can influence it, as well as those affected by it (Lee, 2002: 25).

Accordingly, it is argued in the thesis that since people "both contribute to and benefit from the forest" (Colfer and Byron, 2001: 9), then sustainability can be achieved if the beneficiaries are considered as an integral component of the forest ecosystem due to the mutual dependence that exists between them and the forest (Vayda, 1983; Wardell, 2000; Prabhu, 1995). As noted by Masur and Cuco (2002), local communities regard forest resources as a basis for subsistence agriculture, healthcare, soil and water conservation, recreation, food security, income generation, construction materials and other uses. Consequently, in line with 'conventional wisdom', it is argued that social policies that enhance sustainable livelihoods must be pursued in forest and woodland management. Such policies include adoption of co-management, and require changes in the political, institutional and legislative arrangements for valuation of forest resources (Wardell, 2000). But is co-management an achievable objective and if so is it the panacea to forest and woodland resource degradation? Is co-management itself free from constraints? How has CBNRM thrived in *ex situ* communities where formal or legitimate co-management CBNRM institutional structures are almost non-existent? The above questions constitute the 'linchpin' of this thesis.

1.3 STRUCTURE OF THESIS

Figure 1.1: Structure of Thesis

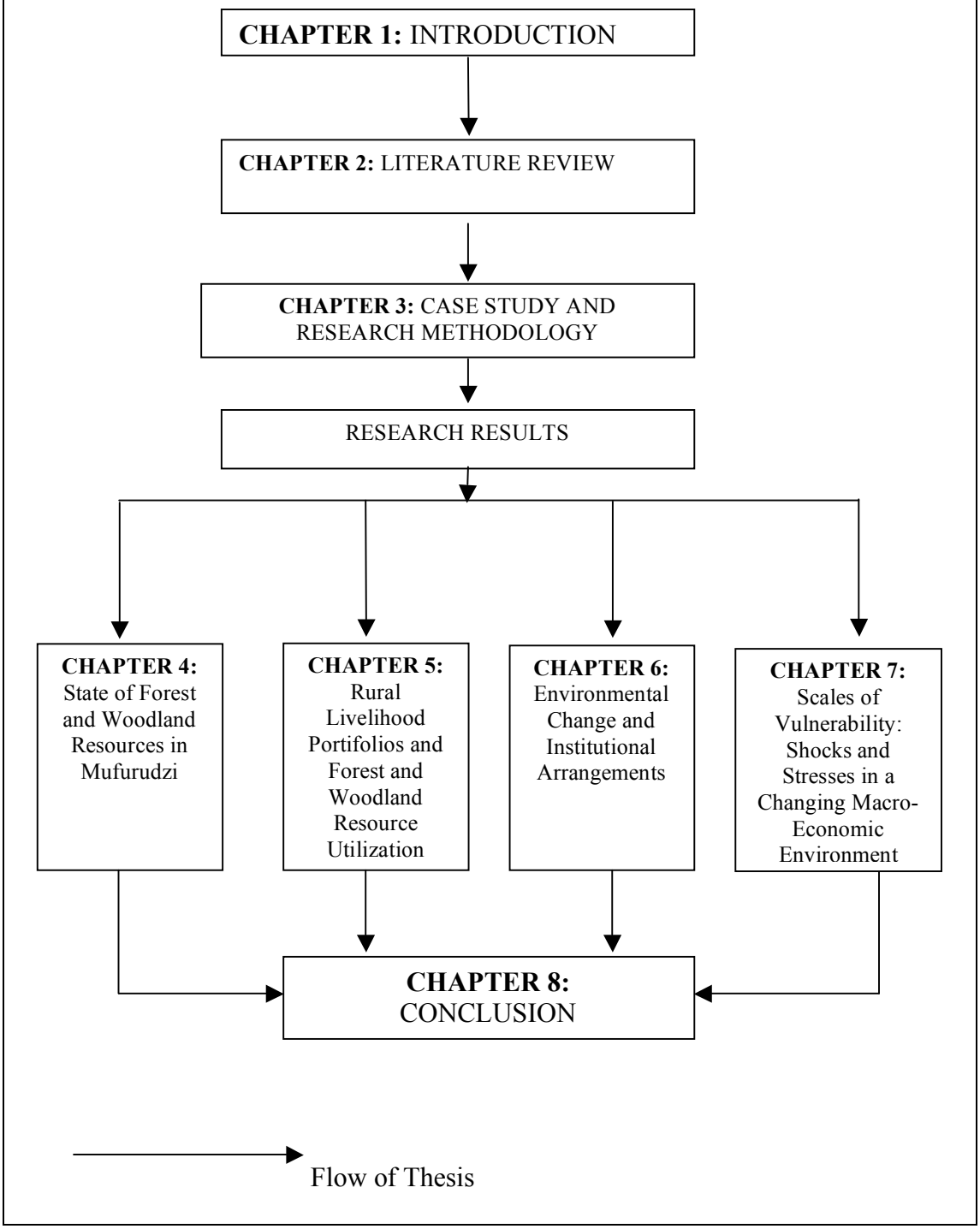


Figure 1.1 shows the structure of the thesis. **Chapter 2** presents the literature that was reviewed, embracing previous empirical investigations and the major theories that

have been advanced in an attempt to explain the relationship between people and the environment.

Chapter 3 contextualizes the case study and describes the research methodology that was employed. Methodological triangulation is a central feature of this research, allowing the collection and collation of social and bio-physical data depicting the status of both rural livelihoods and that of forest and woodland resources in a resettled environment. The state of forest and woodland resources in Mufurudzi is described in **Chapter 4**, while **Chapter 5** examines the role of forest and woodland resources in the rural economy of Mufurudzi. Chapter 5 also examines the social-economic, cultural and political processes that regulate livelihood diversification as well as the relationship between the livelihoods of land reform beneficiary households and natural capital. The major issues pertaining to the management and conservation of forest and woodland resources are analyzed in **Chapter 6**. It is also in this chapter that the major institutions that regulate the use and conservation of forest and woodland resources, are explored. **Chapter 7** assesses the vulnerability of land reform beneficiaries and its importance in the selection of livelihood portfolios and the extent to which households depend on forest and woodland resources when presented with multiple crises.

Chapter 8 concludes the thesis. The chapter ties together the concepts discussed in earlier chapters and reveals the extent to which empirical research results can be accommodated by the existing body of knowledge in community based natural resource management.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

As argued in Chapter 1, the relationship between land resettlement, the environment and CBNRM has not yet been fully explored. This chapter (Chapter 2) first examines the literature that exists on how the relationship between people, resettlement and environmental resources such as forest and woodland resources has been analyzed in the past. The chapter argues that resettlement warrants special attention because of the involvement of 'grafted communities' in the management of environmental resources under a new system of land administration and institutional arrangements. Using case studies drawn both internationally and from Zimbabwe, the chapter demonstrates that the impact of resettlement on the environment has been analyzed differently under different schools of thought. These schools of thought include orthodox ecological science, environmental transformation theories, community based natural resource management (CBNRM) and sustainable livelihood theories.

Whereas orthodox ecological science envisages the decline of environmental resources in resettlement areas the environmental transformation school of thought has clear links with CBNRM and sustainable livelihood theories. Two key issues emerge from this chapter: (1) that these schools of thought are not totally independent of each other and (2) that access to land and forest and woodland resources plays a critical role in shaping the livelihoods of local communities, especially resettled communities. These issues are central to the current debate on how seemingly environmentally destructive development processes, including those taking place in resettlement areas (found in environments where land reform has been implemented), can be harmonized with natural resource conservation to ensure both livelihood

sustainability and environmental sustainability. Evidence from the existing body of literature reveals that land resettlement transforms the state of the natural environment, though the manner in which this transformation is taking place and the explanations that have been given for it vary geographically, depending on local circumstances, as well as according to the school of thought used to analyze the transformation. The chapter concludes that even though there is no consensus among scholars regarding the relationship between people, land resettlement and environmental resources there is a mutual link between livelihood systems in resettlement areas and environmental resources, especially forest and woodland resources.

2.2 ORTHODOX ECOLOGICAL SCIENCE AND RESETTLEMENT

2.2.1 Arguments Presented Within the Orthodox Ecological Science Approach

The relationship between people and the environment has been perceived differently over time. From the 18th century up to the 1980s the predominant view held by ecologists and environmentalists alike was that any use of biological resources from the environment results in environmental damage because it upsets the balance of the ecosystem. The principal school of thought that dominated this period is the equilibrium theory. The rise of the equilibrium theory was in tandem with global events and in many respects reflected the influence of these events. Critical among such events were the Conference on Ecological Aspects of International Development of 1968, Stockholm Declaration of 1972, Cocoyoc Declaration of 1974 and the formulation of the World Commission on Environment and Development (WCED) in 1980, all of which placed emphasis on the harmonization of population growth, economic growth, development and the environment. The central argument that powered debates during these events was that the environment needed to be preserved from degradation and one way of doing so was to regulate population growth so that it

does not outstrip the supply of natural resources from the environment. The persistence of this view in literature even up to now clearly demonstrates how influential the equilibrium theory is likely to continue to be in future.

One of the major theoretical inspirations for the equilibrium school of thought was Thomas Robert Malthus (1766-1834), who maintained, in his *Essay on Population* (published in 1798), that population had the capacity to cause environmental destruction once it exceeds the carrying capacity of the environment. The literature that was produced from the 18th century up until the 1990s was pro-Malthusian, suggesting that the human-environment interface, even in resettlement areas, is characterized by inevitable environmental degradation and resource destruction. For instance, in a FAO study it was found that in tropical dry forest regions forest cover and population density were negatively correlated, with a correlation coefficient of -0.22 (FAO, 1993). Similar conditions were reported in moist tropical countries such as Bangladesh, Haiti, El Salvador and Nepal (Rowe *et al*, 1992). Deforestation is considered as widespread in the tropics (FAO, 1988). The equilibrium theory purports that resettlement, for whatever reason, has a detrimental effect upon the environment, if it is not carefully managed. For example, Woube (1996) posits that forced resettlement is one of the principal causes of environmental deterioration. According to this school of thought failure by planners and researchers to implement suitable development plans (Zanamwe, 1988) or high population pressure on the environment often result in deforestation, soil erosion, desertification (McIntosh, 1990; Whitlow, 1988; Tevera, 1994; GOZ, 1989; Meyers, 1990; Rudel, 1991; Bojo, 1993), especially in areas where land is communally managed.

The most widely held view, which has been advanced by orthodox ecological science, is that the use of natural resources undermines environmental sustainability, and in turn undermines biodiversity and supply of wild resources, and thus creates a vicious cycle of degradation. This view had a strong following in the 1980s, even though it is still regarded as valid by some today. The extent to which the livelihoods of local communities are affected by natural resource use is demonstrated by the impacts that deforestation has on the supply of forest products to these communities. In Zimbabwe, the environmental effects of deforestation have been widely explained in terms of natural resource use (Whitlow, 1988). Deforestation has been viewed as a precursor to most forms of environmental deterioration that prevail elsewhere in tropical Africa. One form of environmental deterioration that has been attributed to deforestation is land degradation, which can generally be defined as the deterioration of the quality and utility of land (Blaikie and Brookfield, 1987).

"Extensive deforestation has always been associated with loss of biodiversity, climate change, threats to the cultural survival of indigenous populations, degradation of watersheds, and desertification in dry tropics" (Rowe *et al,* 1992: 38), loss of species (Wilson, 1988), reduction in carbon sequestration and low rainfall (Mather, 1992), soil erosion, bush encroachment and changes in plant species composition (Ayoub, 1988; Mace, 1991; O'Connor, 1994), as reflected by the range succession model (Clements 1916; Roux and Vorster, 1983), the 'state-and-transition-model' (Westoby *et al* , 1989) and the 'threshold model of plant composition'. The emphasis within the above argument is on the physical state of the environment rather than on the needs of the people who depend on it. Arguments on environmental degradation, which often focus on the altered species composition of forests and woodlands, revolve around the

undermining of the livelihoods of local communities due to the fact that the remaining species or their populations are considered as inadequate to meet the needs of these communities, thereby causing critical shortages of resources such as energy, construction materials, shelter, food, ethno medicines and other resources. According to this argument access to resources diminishes with increasing loss of forest and woodland cover, as illustrated by shortages of forest products in deforested areas, leading to the erosion of livelihoods (Bradley and Dewees, 1989).

Later day protagonists of the equilibrium theory, largely known as Neo-Malthusians, have cited resettlement as the cause of environmental degradation in the Elementeita watershed in Kenya, and attributed spatial changes in woodland and forest areas and related forms of land degradation, such as recession of the water table and erosion to resettlement (Mwaura and Moore, 1991). Others argued further that in areas that have already experienced deforestation, heavy grazing causes soil erosion, bush encroachment and changes in plant species composition (Ayoub, 1988; Mace, 1991; O'Connor, 1994). Global remote sensing based studies were used to justify these claims. It was argued, for instance, that the destruction of tropical forests has increased by nearly 40% in the 1980s (Aldhous, 1993), and it has been noted that resettlement policies are partly to blame for the problem (Kajura, 1994). It was even maintained that in some cases resettlement resulted in the extension of the same environmental degradation that prevailed in the original settlement (Madulu, 1995). Environmental impacts of resettlement were reported as disastrous in Ethiopia (Dejene, 1990, Steingraber, 1988; United Nations Integrated Regional Information Networks [UNIRIN], 2003); Kenya (Obare and Wangwe, 1999); Indonesia (Miller, 1997); as well as the Nepal, Philippines and Japan (World Rainforest Movement

[WRM], 1999), particularly where resettlement is poorly conceived, inadequately planned, insufficiently funded or where it is implemented forcibly (Gebre Yintiso, cited by the [UNIRIN]: http://www.allafrica.com, January 2003). The critical problems reported in resettlement schemes in all the cited cases included deforestation, soil erosion, decline in food production, fuel wood crises and misuse of water resources and destruction of wildlife habitats (Repetto, 1988; Timberlake, 1986; Timberlake, 2000). The case of the Superintendency for the Development of Amazonia (SUDAM) in Rondonia (Brazil) was used as a classic example of this form of destruction (Mahar, 1989; Park, 1992; Goza, 1994; Skole and Tucker, 1993). A similar study was undertaken in the Likhu Khola watershed of Nepal, where environmental problems such as deforestation, sedimentation, erosion, flooding, and loss of soil fertility were reported as worsening (Carter, 1993).

In general, according to the equilibrium theory, the change in the species composition of vegetation in deforested areas, and the purported subsequent denudation can be explained in terms of 'orthodox ecological science models', particularly the range succession model (based on the original plant succession model that was developed by Clements in 1961). Research in South African rangelands by Roux and Vorster (1983) is an example of research that was based on the Clementsian model. Similar models include the 'state-and-transition-model' which was proposed by Westoby *et al* (1989) and the 'threshold model'. Orthodox ecological science models have generally been labelled Neo-Malthusian models due to the importance they place on the impact of population size on the state of the environment. Neo-Malthusians argue that if the size of the population (whether human or animal population) exceeds certain limits the equilibrium between the population and the environment is disturbed, leading to

both the degradation of the environment, as well as the decimation of the population. It is precisely for this reason that Neo-Malthusian models are referred to as 'equilibrium theory'.

The Neo-Malthusian school of thought argues that in all cases where land is communally managed environmental resource destruction is inevitable. As the human population continues to grow, more land has to be cleared to make way for cultivation, while demand for forest and woodland resources soars. Under these circumstances more trees would have to be cut for fodder, firewood, and to make household artifacts or poles for the construction of fences, kraals and huts. Forests and woodlands would also be exploited more for a wide range of non-timber forest products (NTFPs) (Falconer, 1990; Assies, 1997). The regeneration capacity of forests and woodlands would be curtailed under these circumstances. Neo-Malthusians would argue that the stabilization of the population in Zimbabwean communal and resettlement areas is a long-term solution to the problem of resource depletion and shortage of land-based resources (Murphree and Cumming, 1993). Therefore, to Neo-Malthusians the key to sustainable utilization of forest and woodland resources in resettlement areas is demographic, that is it rests on the control of population growth.

A very influential variant of the equilibrium theory was introduced by Hardin's 'Tragedy of the Commons' which was published in 1968. Hardin argued that resources held in communes are prone to degradation because people compete to maximize individual utility when utilizing them. Ironically, discussions around Hardin's work gave rise to the Common Property Theory (CPT) in the late 1980s

which has discredited orthodox ecological science, and become the cornerstone of CBNRM (Campbell, *et al*, 2001; Fabricius, 2004). The CPT argues for potential success in the conservation of communally owned resources rather than their destruction (Boggs, 2000). In line with the CPT, Neo-Malthusians have argued that common property resources have two important characteristics, namely excludability and subtractability. Excludability is the difficulty of exclusion, which results from the high costs associated with fencing off areas where the resources are found or enforcement of property of rights as a measure of controlling access to the resources. Subtractability is the creation of rivalry or competition between resource users. Neo-Malthusians argue that both of these characteristics promote the degradation and depletion of resources.

When applied to environments where resettlement has been implemented the Clementsian model and Hardin's argument purport that environmental degradation would be expected to follow once the balance of the 'pristine ecosystem' is disturbed by resettlement. It is argued that population growth in resettlement areas has a domino effect that yields undesirable temporal environmental consequences. This form of analysis has been challenged by the proponents of the non-equilibrium theory, who contend that changes in the environment, for example those related to vegetation composition, are not necessarily a reflection of human related environmental stress since such changes may occur spatially and through time as a result of natural processes (Smith, 1998).

2.2.2 Case Studies on Explanations on the State of Forest and Woodland Resources in Tropical Dry Forests as Viewed From Equilibrium Theory Perspective

Deforestation is reported as prevalent in tropical dry forests such as miombo woodlands (Campbell *et al*, 1996). The picture painted by a considerable number of researchers in Africa presents an environment that is undergoing destruction as a result of excessive resource use and mismanagement. Wardle *et al,* (2003: 20) argue that:

> Many explanations of the cause(s) of deforestation focus on population growth, the building of roads, incompetent government policies, or the political power of timber concessionaires. Such analyses, however, tend to focus on the obvious precursors to deforestation rather than seeking other underlying causes.

It has been argued that deforestation in tropical dry forests has resulted from multiple underlying socio-economic conditions, including poverty; legal and policy decisions made by administrators; unfavourable tenure conditions; inappropriate methods of harvesting; over-dependence on forest and woodland products; resettlement; lack of sound institutional arrangements; lack of empowerment by the settler farmers; and illiteracy (Ferguson-Bisson, 1992; SAREC/Forestry Commission, 1996; Minghua, 2003). Wardle *et al* (2003: 20) posit that:

> Two possible explanations for deforestation can satisfy the conditions of the 'final' cause: (1) to earn resource rents (revenues) from harvesting trees, and (2) to provide land for other uses. Indeed, these two 'causes' really collapse into one: the high social opportunity cost of forested land.

Viitanen (1996) has suggested a different way of analyzing deforestation, and argues that two forms of deforestation exist, namely natural deforestation and subsistence deforestation. Whereas the former results from natural environmental conditions the latter is caused by use of forest and woodland products for survival. Some of the critical causes of subsistence deforestation in tropical Africa include grazing, forest

fires, logging and destruction of forests for settlement and infrastructure building (Okafor, 1993; SAREC/Forestry Commission, 1996; Yirdaw, 1996). Subsistence deforestation is considered as most critical where population densities, as well as, demand for land and forest resources are high.

Nevertheless, it has been noted that the causes of deforestation and the resultant land degradation are either ultimate or proximate (Seely and Jacobson, 1994). Ultimate causes are human related factors such as socio-political, economic and administrative factors while proximate causes relate to the biophysical conditions within the environment. These causes act synergistically (Geist and Lambin, 2002). Where poverty is prevalent the immediate needs for survival always supersede environmental concerns such that little effort is directed towards resource management since people will be struggling to eke a living. Under these conditions livelihoods of local communities depend directly on forest and woodland resources. For example, in sub-Saharan African tropical dry forests, wood supplies more than 75% of all energy requirements (Bogach, 1985), while in the tropical dry forests of the Southern African Development Community (SADC) region fuel wood accounts for four-fifths of the total energy consumption (Yirdaw, 1996). It is generally agreed that poor people sometimes constitute a formidable threat to sustainable forest management (Colfer and Bryson, 2001), though this view is disputed by others like Banuri and Marglin (1993), Dove (1993) and Arnold (2001). For example, Arnold (2001) states that in some instances deforestation has actually been precipitated by rising incomes rather than by poverty.

Neo-Malthusians have argued that the increase of the human population in the SADC region leads to an increase in demand for basic needs such as food, shelter, clothes, education and health, and puts pressure on forest and woodland resources since people will have to rely more on these resources as a source of livelihood (Palo, 1990; Yirdaw, 1996). Rowe, *et al* (1992) have noted that in the tropics many cattle owners overstock woodlands that have been converted to pasture in order to maximize short-term income. Orthodox ecological science regards degradation of forest and woodland resources in the tropics as a concomitant of certain underlying factors, among which are undefined property rights, poverty and tenurial conditions (Rowe, *et al*, 1992; Southgate, 1992; Scoones and Matose, 1993), exploitation of forests and woodlands for short-term gains (Rowe, *et al*, 1992), and weak institutional arrangements (Thomas-Slayter *et al*, 1991; Whiteside, 1998; Ayensu, 1986; Brechin, *et al*; 1990), as well as inadequate understanding and knowledge about the social, political, and economic complexities related to the consumption of forest resources (Haeuber, 1993). In most cases deforestation is explained in of terms failure of government policy to fulfill national goals and to satisfy the demands of conflicting interests.

2.2.3 Equilibrium Theory and the Case of Zimbabwean Resettlement Schemes

In most of the literature on Zimbabwean resettlement and communal areas the dominant Neo-Malthusian position that has been advanced is that the livelihoods of communities in areas where resources are communally managed have been eroded by resource degradation, which in turn has resulted from competition amongst users. Regarding Zimbabwe, McNamara (1993: 4) maintained that "resettlement areas are undergoing the most rapid rates of woodland clearance in the absence of any effective local institutions with management responsibilities". It is also argued that resettlement areas were settled by poor, inexperienced and undercapitalized peasants in marginal

areas (Scoones and Matose, 1993). Another example is the argument that was advanced by Bojo (1993: 227) who stated that:

> Indigenous woodlands still cover between 11 million hectares and 12 million hectares, or approximately one third of Zimbabwe's land area. They are, however, under increasing pressure due to high population growth, resettlement schemes and insufficient management.

More recently, the environmental impacts of resettlement in Zimbabwe have been negatively highlighted and reported as the most obvious dangers of Zimbabwe's increasingly rapid resettlement programme that have substantial long-term damage to the environment (UNPD, 2002).

2.2.4 Critique of Orthodox Ecological Theory and the Emergence of Alternative Schools of Thought

Since the mid-1980s, the equilibrium theory has come under intense scrutiny and criticism. This has led to the emergence of opposing schools of thought. The more prominent among the 'new theories' are the non-equilibrium theory, which emerged in the mid-1960s, the environmental transformation and sustainable livelihood approaches that came into existence in the late 1990s. However, the watershed appears to be the United Nations Conference on Environment and Development (UNCED) of 1992, dubbed the Rio Summit, which through the Convention on Biodiversity acknowledged the need to harmonize the livelihoods of local communities with biological resources, as well as the need to support the initiatives of such communities in the management of the resources that are found in their ecosystems. Since then CBNRM has taken root.

The non-equilibrium theory emanated from within the orthodox ecological science approach itself. One form of 'non-equilibrium theory' was propounded by Westoby *et*

al (1989). They argued that the sequential stages suggested by the Clementsian model are a fallacy, and reasoned that in any given area changes in vegetation composition occur in a set of discrete 'states' which are separated by a set of 'transitions', denoting the dynamics of the vegetation. These dynamics, which do not necessarily follow any particular sequence, are the changes that are brought about by natural conditions such as climate change or fire, as well as anthropogenic factors like grazing practices, stocking rates and burning, all of which can influence the composition of vegetation. The threshold theory, another form of non-equilibrium theory, purports that environmental conditions may reach certain levels that are capable of inducing irreversible changes in the composition of the vegetation. Viewed within the context of land reform, it would seem that land resettlement is envisaged as a process that is capable of causing 'states' and 'transitions' or irreversible undesirable environmental consequences, just like in the equilibrium theory.

Even though there is no agreement between the equilibrium and non-equilibrium ecological science approaches regarding the manner in which vegetation changes occur within the natural environment there is convergence of thinking on the fact that inappropriate use and management of the environment yield conditions whereby unwanted and less useful species are given the preponderance to dominate the plant community. It is on this basis that the protagonists of these schools of thought argue that species composition of vegetation can be used as an indicator of environmental change, even in resettlement areas.

Within this context, ecological science (whether in the form of equilibrium or non-equilibrium theory) has been criticized for being Neo-Malthusian and for its simplistic

linear approach that fails to explain the complex human-environment relationships that characterize the real world. In reality environmental change is not a mere outcome of the inverse relationship between population and environmental resources (Leach and Mearns, 1996). The view that the relationship between population and the state of the environment is linear, capable of following 'discrete series of states or sequences' has been further disqualified for its failure to recognize the fact that different categories of people do not have equal access (or demands) to environmental resources, in which case their conceptions about these resources are variable (Poro *et al*, 2001). It is generally argued that different categories of people have different entitlements to environmental resources and therefore contribute differently to environmental degradation. In other words, the state of the environment is not necessarily determined by the size of the entire population but by the actions of those of its members who have access to environmental resources (Smith, 1998).

Thus, ecological science approaches, taking the forms of both the equilibrium and non-equilibrium theories have failed to adequately explain the process of environmental change, a phenomenon that has led to the 'birth' of an alternative school of thought - the school of environmental transformation, which has become the cornerstone of CBNRM. One feature that ecological science has ignored is the relationship between the transforming environment and the adaptive capabilities of the livelihoods of the people who live in it, as explained below. Consequently, ecological science approaches have been challenged for lack of attention to the ability of people to adapt to environmental change and for arguing that people always overuse environmental resources at their disposal.

2.3 THE ENVIRONMENTAL TRANSFORMATION APPROACH AND RESETTLEMENT

2.3.1 Arguments Presented Within the Environmental Transformation Approach

One criticism that has been levelled against the Neo-Malthusian philosophy, as portrayed in orthodox ecological science, is that it depicts environmental change as a progressive, successional and sequential process that threatens the environment, especially where changes in vegetation composition are concerned. According to the 'orthodox ecological science' paradigm, environmental degradation is purported to increase with the demands exerted by a growing human population, which occurs once environmental equilibrium has been disturbed. Yet, there is increasing realization that the environment does not merely degrade, but rather undergoes transformation or even improves through time, thus making it a desirable historical process in some cases (Battersbury *et* al, 1997).

For example, whereas deforestation can arise from the human-environment interaction in resettlement schemes, claims that regard this process as environmentally deleterious have been dismissed as false by some researchers. Within this context, it is generally agreed that 'environmental transformation' approaches to environmental analysis should constitute the basis for understanding environmental change (Smith, 1998), including that resulting from loss of forest and woodland cover and its impacts on livelihoods. The theoretical arguments for the appropriateness of 'environmental transformation approaches' to environmental enquiry have been dealt with elsewhere (see for instance, Bryant, 1992; Pickles and Watts, 1992; Escobar, 1995; Peet and Watts, 1995; Scoones, 1996; Leach and Mearns, 1996; Battersbury *et* al, 1997; Smith 1998), and shall not be exhaustively discussed here. However, these approaches, which can generally be regarded as anthropocentric (Gimble and Laidlaw, 2002),

have emerged due to the failure of orthodox disciplines such as the othordox ecological science to provide a satisfactory approach to environmental analysis (Smith, 1998; Gimble and Laidlaw, 2002).

Fundamentally, 'environmental transformation approaches' are holistic (Farrington *et* al, 1999; Goldman *et al*, 2000b) and populist approaches in which the poor are put at the center of the analysis (Farrington, 2001). It is for this reason that environmental transformation approaches are generally regarded as sustainable livelihood approaches. The more recently evolved livelihood approach recognizes the close relationship that exists between livelihoods of local communities and environmental resources such as natural forest and woodland resources (Shackleton *et al*, 2000; Shackleton and Shackleton, 2004). Apart from possessing market related values or direct-use values some forest and woodland resources also possess non-monetized values or indirect-use and passive values such as aesthetics, shade, sacred areas, existence values and ecological services, as well as social cohesion (Shackleton *et al*, 2000; Gimble and Laidlaw, 2002; Turner, 2004).

It should be noted, however, that 'environmental transformation approaches' deal largely with household-based productive activities (Conway *et al*, 2002) and focus on the assets of the poor, their vulnerabilities, preferences and livelihood strategies (Goldman *et al*, 2000b; Farrington, 2001). As succinctly put by Bradley and Dewees (1993: 108), even within the household economy, management strategies help to increase the diversity of resources on which households rely "for sustainable agricultural productivity, meeting subsistence needs, improving nutritional intake, and occasionally for income generation." Such forms of livelihood adaptability and

strategies enhance the capacity of households or even that of entire local communities to cope with the natural hazards that are encountered in their environment by applying the stream of options and alternatives that they are capable of creating. This focus makes the environmental transformation central to the understanding of livelihood diversification and CBNRM.

2.3.2 Environmental Transformation Approaches' Explanations to the State of Forest and Woodland Resources: The Case of Resettlement in Zimbabwe

Scoones and Matose (1993: 159) argue, that:

> As more woodland is transformed into coppice or pollard woodland the total biomass productivity per unit area increases, although the standing biomass declines…. Hence, deforestation (removal of large trees) may not always be detrimental; the transformation of forests to other states is selective and often increases their economic value as sources of multi-purpose products.

Scoones and Matose (1993) have also noted that deforestation may increase browse, wood fuel production and supply of particular pole sizes. Furthermore, wood users usually adapt to the transforming environment and make adjustments, depending on the signals received from the transforming forest or woodland, a fact that allays fears expressed by Neo-Malthusians and doomsday environmental alarmists who predict environmental crises characterized by imminent shortages of resources. For example, fuel wood crises have been widely wrongly predicted. As aptly put by Scoones and Matose (1993: 159):

> The alarmism over deforestation and the impending wood fuel crisis was overstated, producing ill-informed and inappropriately designed policies and projects. Today this has been widely recognized and the shift to an analysis of sustainable forest and woodland use is appropriate.

Rather than focusing on environmental degradation or plant succession and changes in plant composition, as emphasized in the orthodox ecological sciences noted above, some environmental analysts have maintained that the change of the state of any

environment should be considered relative to the livelihoods needs that depend on that environment. Protagonists of this approach would argue that the interaction between livelihoods, including the livelihoods of communities in resettlement areas, and the environment leads to environmental transformation rather than degradation.

From a theoretical point of view, there is clearly no consensus between 'orthodox ecological science approaches' and 'environmental transformation approaches' regarding the analysis of human-environment relationships. Therefore, presenting environmental change as 'degradation' or 'transformation', as articulated by the two schools of thought is neither a matter of polemics nor purpose but a matter of recognition of fundamental differences that exist between these schools of thought. However, 'orthodox ecological science approaches' have not been spared from a barrage of further criticism because of their Neo-Malthusian stance, one of which is centred on the role of institutions in CBNRM.

2.4 COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT (CBNM) AND RESETTLEMENT

2.4.1 Arguments Presented Within the CBNRM Approach

Local institutions are pivotal in Community-Based Natural Resource Management (CBNRM) structures that are required for the conservation of forest and woodland resources. CBNRM initiatives are currently receiving widespread attention in both policy and academic circles (Twyman, 2000). In academic circles, CBNRM is beginning to earn recognition as one of the most significant developments in natural resource management thinking and practice (Lee, 2002). However, the relationship between CBNRM, land resettlement and the environment is still to be adequately explored.

The success of CBNRM in any given area rests on the existence of communities in that area since there is no possibility of CBNRM taking place without the community. This argument stems from the fact that communities do not necessarily exist in all situations (Blench, 1998; Whiteside, 1998). Many researchers have challenged the traditional view of defining the community as a "distinct social group in one geographical location that shares common cultural characteristics" (Lee, 2002: 14). In reality communities are heterogeneous and comprise different groups of people. According to Sellers (1988) community membership could be defined in terms of variables such as present or previous residence, property ownership, kinship ties or a combination of these factors and, consequently, any individual household could belong to a number of communities which are geographically nestled together.

Campbell and Shackleton (2002) noted that throughout southern Africa the community is defined in terms of membership of the group involved in a CBNRM initiative as well as the geographic boundaries of the area where the CBNRM is undertaken. More recently Fabricius (2004) argued that communities are elusive and difficult to define because local groupings constantly redefine and re-align themselves and have a tendency to reformulate their objectives. These groupings constitute the stakeholders.

2.4.2 Role of Stakeholders in Forest and Woodland Resource Management

In CBNRM, all stakeholders should be recognized as an important 'forest constituency' (Behan, 1988). In forest and woodland resource management, stakeholders usually include government departments and institutions, members of the local community, local institutions and traditional leaders, Non-Governmental Organizations (NGOs) and special groups such as youths and women, as well as other

groupings within the community. Each of these categories of stakeholders has its own 'stake' or 'claim' on the forest and is presented with different sets of opportunities and constraints when making decisions in community forest and woodland management. Lee (2002) states that in CBNRM stakeholders can be classified into three categories, namely public, private and community stakeholders. Public stakeholders include central government, local government and relevant ministries in central, provincial or local government. The private stakeholders are primarily the private sector whereas community stakeholders are community groups and NGOs that are working on behalf of the community. The roles of these categories in CBNRM should be complementary and they can be achieved through co-management. It has therefore been argued that:

> The existence of multiple stakeholders with legitimate and varying claims obviously implies a process of communication, negotiation and conflict resolution for forests to be sustainably managed (Colfer and Byron, 2001:11).

The recognition of different stakeholders warrants collaborative/ collective management (co-management), demanding the inclusion of all the important constituents, including those within the local community, whenever key decisions are made about the management of forest and woodland resources so that the sustainability of these resources is ensured. In principle community involvement has been known to be the major way through which devolution and democratization of the management of natural resources can be ensured. However, in practice governments have tended to take it as a mere cost reduction strategy which enables them to attenuate budgets for their forestry departments by passing management costs to the local community. Furthermore, instead of creating genuine local partners (co-managers) devolution has been known to perpetuate state control through local proxies (Hobley, 1996). There is usually a gap between policy statements on

devolution and the demonstrated willingness of the government to let real control over resources go to the communities (Nhantumbo *et al* 2003, Norfolk, *et al* 2003b).

CBNRM is considered as a key process in community forest management and its implementation determines the successful management of other natural resources such as soil, water and wildlife by the community. Normally, the use and management of natural resources such as forest and woodland resources are determined by the decisions and actions of the different categories of stakeholders that are found in an area (Schmink, 1999).

Studies in Indonesia and Cameroon, for example, have revealed that women are a very important 'constituency' in the management of forests within local communities (McDougall, 2001; Tiani, 2001; Brown and Lapuyade, 2001). However, different categories of stakeholders benefit differently from the use of forest and woodland resources (Poro *et al* 2001), yet for forest and woodland resources to be managed sustainably the benefits derived from them must be seen to be equitable (Scoones and Matose, 1993). It seems, however, that sustainability is only achievable where local stakeholders consider it as desirable and beneficial (Sardjono and Samsoedin, 2001).

A number of criteria have been suggested for identifying important stakeholders in the management of any forest. These criteria include the proximity of people to the forest, their pre-existing rights to forest resources, their dependence on forest products as a way of coping with social deprivation and poverty, their indigenous knowledge systems regarding the forest, as well as the extent to which their culture is integrated with the forest (Gunter, 2001; Colfer and Byron, 2001). Fair apportionment of forest

products among stakeholders ensures security and sufficiency of access of stakeholders to the products and guarantees the sustainability of the products. Colfer *et al*, (2001) state that security denotes reasonable certainty that the resources will be available in future.

2.4.3 Community Heterogeneity

The CBNRM approach maintains that though the sustainability of forest and woodland resources is threatened by the factors that have been outlined above, one of the greatest threats to these resources is lack of homogeneity and cohesion within the community. Bruce (1989: 61) notes:

> Far from being homogeneous, communities are usually divided by factors such as class, caste, religion, ethnicity, gender, geographical origin, length of settlement, or even household cycle considerations.

In many cases communities are economically, socially and culturally stratified and are consequently riddled by conflicts. The prevalence of conflicts within any community undermines CNBRM. Twyman (2000: 806) states that:

> Conflicts and tension can inhibit effective capabilities as well as jeopardize the goals of social justice in resource management actions, and ecological sustainability. CBNRM initiatives must understand the dynamics, mechanisms and structures of resource relationships and the dynamic linkages between and within livelihoods whether or not they are based on natural resources.

In some cases conflicts result when different groups of people vie for the control of important environmental resources. A DfID funded research project in the Usungu basin of Tanzania, for instance, revealed that conflicts existed between the Masai and Sukuma pastoralists and sedentary agriculturalists such as the Sangu, Nyakusa and Hebe tribes (Cleaver, 2002). These conflicts resulted from the desire to control pastureland and water resources. Similar conflicts have been reported in CBNRM project areas in Zimbabwe. In the Lusulu area of Binga, in northern Zimbabwe, for

example, Tonga wildlife committees resolved to bar Ndebele children from attending schools which were built with proceeds from the Communal Area Management Programme for Indigenous Resources (CAMPFIRE), a CBNRM initiative, insisting that these children must pay fees. These committees also denied Ndebele speaking people CAMPFIRE benefits such as revenue and meat handouts (Dzingirai, 2003). Where conflicts prevail, different groups of resource users compete and in the process undermine the resource base.

2.4.4 Role of Institutions in Forest and Woodland Resource Management

Probably one of the greatest weaknesses of the Neo-Malthusian philosophy and 'ecological science approaches' to the analysis of environmental change is their failure to recognize the role that institutions play in natural resource conservation. Embedded within the Common Property Theory (CPT) of the 1980s was the strong and enduring view that institutions were fundamental in regulating natural resource use. These institutions are, however, 'immersed' in a maze of stakeholders, each of which has some interest or a 'stake' or 'rights' in the way the forest or woodland must be used or managed (Colfer and Byron, 2001). Fabricius (2004) notes, for instance, that in southern Africa institutions constitute one of the core elements of CBNRM and went further to outline the historical development of CBNRM within the region. This includes the pre-colonial era that prevailed before the 17th century; the period of top-down preservation, which started in the early 1920s; and the era of democratization, which emerged in the mid 1980s. During the pre-colonial era CBNRM was largely achieved through informal traditional institutions such as chiefs, kings, headmen and traditional healers among other traditional leaders. Following colonization, traditional resource management systems were replaced by state institutions and resource preservation was largely achieved through coercion (Murphree, 1991). In the mid

1980s, in countries that had gained political independence, the process of democratization witnessed the emergence of formal grassroots CBNRM structures. The legacy of the entire historical process was the emergence of a two-tier CBNRM system, characterized by both the formal CBNRM and the informal resource management systems (Turner 2004). However, the importance of local institutions in the management of natural resources and promotion of rural livelihoods still needs to be researched (Ntshona and Lahiff, 2001).

Contrary to the Neo-Malthusian view that common property resources such as communal forests and woodlands are prone to wanton destruction, which is central in 'orthodox ecological science approaches', 'anti-Malthusians' have used empirical evidence to argue that local institutions can play a critical role in preventing the degradation of common property resources, including 'open access' resources (Forsyth and Leach, 1998; Chambers and Conway, 1992; Tiffen *et al*, 1994). Common property resources are resources held in communes (Hardin, 1968; Thiesenhusen, 1995; Ciriacy-Wantrup and Bishop, 1975). 'Common property' in this context is corporate group property (Bromley, 1992; Bruce 1999), describing resources that belong to a legally recognized group of people.

Common property resources or communal property regimes (CPRs) are, by nature, those resources held by an identifiable community of users in which outsiders to that community are excluded and in which use by members is regulated by cultural norms (Bromley and Cernea, 1989). Communities that form the user group for CPRs have institutions and rules that define the use and management of the resources (Ciriacy-Wantrup and Bishop, 1975). It is further argued that the actions of individuals

regarding the use of CPRs are also governed by the expectations and norms of other members of the society, also referred to as societal controls (Nhira and Fortmann, 1993), and therefore people are not free to function as 'free raiders' and successfully maximize individual utility out of available resources. In addition it has also been argued that local responses to change are socially and environmentally specific and are capable of being shaped by institutions for purposes of promoting resource sustainability (Forsyth and Leach, 1998). Institutional structures and processes within local communities define the options that are available in the environment and enable local people to select their survival strategies (Goldman, *et al*, 2000b), to the extent of even improving the quality of their environment (Mortimore *et al*, 1994; Mortimore and Tiffen, 1995). Such strategies could be directly based on the exploitation of natural resources (Goldman, *et al,* 2000a), including forest and woodland resources.

Furthermore, "institutions with responsibilities for natural resource and woodland management have also changed historically" (Scoones and Matose, 1993: 159), leading to the creation of new rules that deal with new challenges in natural resource governance.

Put differently:

> Such new rules and institutions may be brought about by changing circumstances such as increased population, perceptions of a wood fuel crisis or loss of essential tree species or tree forms, soil erosion or other environmental degradation or economic crises. Examples of new institutions (in Zimbabwe) are wildlife committees, VIDCOs and natural resource committees (Nhira and Fortmann, 1993: 140).

As noted by Fabricius (2004: 33):

> One of the hallmarks of CBNRM is its attention to the local and traditional knowledge base. This knowledge is constantly evolving and is embedded in

> local institutions. These are the local 'memory' for natural resource management. One important characteristic of traditional knowledge is that it is mostly tacit, whereas scientific knowledge is mostly explicit.

In Zimbabwe, local institutions include both contemporary and customary institutions. Contemporary institutions are formal local government institutions such as Village Development Committees (VIDCOs) and Ward Development Committees (WADCOs), while key customary institutions are include spirit mediums (*mhondoros* or *svikiros)* village heads, headmen and chiefs (Bernard and Kumalo, 2004). However, both contemporary and customary institutions and rules are designed by the local community in order to deal with perceived threats or imminent problems faced by that community, though their formation might be at the instigation of outside institutions.

It has been reported that local customary institutions exert a number of controls to ensure judicious use of forest and woodland resources. Gumbo (1993) noted that in Zimbabwe there are institutions that are responsible for creating rules and regulations that govern ownership and access to resources, including rules that prohibit the cutting of certain trees or particular modes of fruit harvesting. Four categories of such rules or controls were identified by Nhira and Fortmann (1993), namely sacred controls, pragmatic controls, civil contract, and the setting up of contemporary institutions and rules within local communities. Sacred controls are norms of tree use control based on folklore or ecological religion, which are enforced by individual internalization of the norms, community sanction or traditional leaders (Nhira and Fortmann, 1993; Ranger 2003). Sacred controls have been widely reported throughout Zimbabwe (Wilson, 1988; Gumbo *et al,* 1989; Matose, 1991). According to Nhira and Fortmann (1993) pragmatic controls refer to both long-standing and recently adopted

norms designed to maintain sustainable supply of essential forest products. Taboos that prohibit the cutting of fruit trees are an example of pragmatic controls. Civil contract is a collection of controls which are based on norms of civility. These norms regulate the daily conduct of individuals within the community and are the basis of sound social fabric. Such norms restrain individuals from cutting trees or collecting fruit or firewood from other people's homesteads without seeking prior permission from them (Matose, 1991; Nhira and Fortmann, 1993). Acting in the contrary is considered as *contra bonos mores* (acting against the norm). Traditional institutions, community by-laws, taboos, rules and regulations that are meant to promote judicious use of forest and woodland resources are known to have a decisive role in the conservation of miombo woodlands (Clarke *et al* 1996), and have a long history of existence in Zimbabwe (Ranger 2003). They are the *sine qua non* of informal CBNRM.

In CBNRM theory it is a foregone conclusion that alongside community needs assessment and stakeholder analysis, the historical changes of institutions that manage natural resources within local communities and the controls they use to do so must be understood in order to ensure the sustainability of both the livelihoods of these communities and the resources they depend on (Scoones and Matose, 1993; Farrington, 1996). This also applies to forest and woodland resources.

However, not all researchers subscribe to the view that local institutions always have the capacity to prevent natural resource degradation. As noted by Campbell, *et al,* (1993: 42):

> It is argued that as pressures on the remaining resources become more intense, management strategies may become more active…. In terms of management

> of trees, there is little evidence of this occurring in Zimbabwe. If anything, the opposite is happening: that is, taboos on tree cutting are not as frequently upheld; some trees that were formerly protected in fields are being cut; protected woodlands are losing their protection status; there is more tree cutting for fuel; and traditional methods for collecting medicines are often not followed.

For example, the retention of trees in the fields, a widely undertaken traditional practice in Zimbabwe, is under threat despite the backing it is receiving from local institutions. The practice had weathered attempts by government extension services to promote total removal of indigenous trees from the fields (Wilson, 1988; Scoones *et al,* 1993). Some of the tree species that are normally selectively retained in fields include *Lonchocarpas capassa; Parinari curatellifolia; Faidherbia albida (formerly Acacia albida)*, which were seen as capable of improving yields or supplying fruit and herbal medicines (Campbell, *et al*, 1993; Okafor, 1993). An argument that has been widely pursued is that population pressure is increasingly becoming a threat to selective retention of trees and other conservation practices in the communal areas of Zimbabwe. It has been argued that the depletion of forest and woodland resources has undermined the conservation role of contemporary and customary institutions.

In Zimbabwean resettlement areas lack of legitimate CBNRM institutional structures has been reported. According to Scoones and Matose (1993) there are a number of factors that contributed to this situation. First, most settler communities have found it difficult to evolve strong local institutions since their membership is derived from diverse ethnic origins, comprising largely of young people who have no leadership experience. Second, due to lack of strong leadership settler communities:

> Have found it difficult to exclude those wanting to make use of the resettlement area woodland resources for wood collection, grazing and so on (usually neighbouring communal area people)…. The result was the breakdown of exclusion rules and the evolution of a practically open access

> situation, where resettlement resources are open to anyone (Scoones and Matose, 1993: 166).

Third, it has also been difficult to sanction settlement community members for collaborating with outsiders in the extraction of wood or grazing of cattle. In most Zimbabwean resettlement areas this situation has been caused by the difficulty of defining community membership and exclusion rules.

It has been noted, however, that objective evaluation or systematic monitoring of the environmental impacts of Zimbabwe's resettlement schemes is lacking (Elliott, 1995), making the identification of long-term solutions difficult. There is therefore need to find long-term solutions to undesirable environmental change, with the objective to foster economic development while minimizing unacceptable environmental impacts (Tobin and Knausenberger, 1998). In this context it can be concluded that one of the fundamental outcomes of successful institutional arrangements is sustainability of livelihoods, of which livelihood diversification is a key component.

2.4.5 Tenurial Security

Underlying the situation described above are principles of tenurial niches and *de facto* tenure that are sanctioned by the afore-stated institutional controls. Tenurial niches describe the different forms of proprietorship and control over trees. The tenurial niches that exist in Zimbabwean resettlement areas include indigenous communal woodlands that are controlled by the state; woodlots planted and controlled by groups; and trees planted and controlled by individual households (Nhira and Fortmann, 1993). The last category of trees include those trees that are found in individuals' fields and homesteads over which informal *de facto* tenurial rights are exercised (Scoones and Matose, 1993; Rapold, 2001). In this regime the rights that are exercised

by individuals may fall into four categories of rights as suggested by Ostrom and Schlager (1996). These include:

a) Withdrawal rights – rights to obtain and use units of a resource (that is, usufruct rights)
b) Management rights – rights to regulate internal use patterns and to direct day to day stewardship
c) Exclusion rights – rights to determine who has access
d) Alienation rights – rights to sell

It is noteworthy that though the above rights are conferred upon individuals through legitimate controls they are not legally sanctioned and are therefore subject to revocation by the state, a fact that makes them tenuous. Rights in communal woodlands tend to be collective but their legal status is the same as those exercised over individually controlled woodlands and trees.

Mandondo (2000: 2), for example, notes that:

> The conferment of any of the above rights on specific actors, however, also places obligations on other actors to recognize such rights. In practice, people often use and assert claims to resources that they are neither entitled to own nor manage. Rights are therefore, usually only as secure as the extent to which others are willing to recognize them.

Consequently, these rights are under threat, especially due to the informal and formal privatization of land holdings that prevails throughout Africa, "disrupting or extinguishing the multiple forms of land and resource rights (including both individual and group rights)…" (Arnold *et al*, 2003: 14). The annexure of woodlands and trees in the fields by individual households, which excludes other members of the community from accessing their products, is a common practice in Zimbabwe (McNamara, 1993).

Some of the debates about the underlying causes of deforestation in Zimbabwean resettlement schemes revolve around insecurity of tenure. It is argued that due to insecurity of tenure resettled households are less inclined to adopt sound woodland management practices or cultivate trees on their land (McNamara, 1993). Alluding to this view Scoones and Matose (1993: 164) contend in a World Bank Report that:

> In resettlement areas rights to reside and cultivate are governed by a five year renewable permit system. Settlers are obliged to comply with state legislation as a condition of their permit. Nevertheless, the resettlement officer may withdraw permits to reside, cultivate or depasture stock under the Rural Lands Act. This presents a highly insecure tenure arrangement in a legal sense, but in practice few removals have occurred.

Referring to the relationship between tenurial insecurity and woodland conservation in Zimbabwean resettlement areas, Fortmann and Bruce (1993: 207) argued that:

> Since some settlers feel a sense of tenurial insecurity and they may be reluctant to defend and manage the woodlands…. Another issue concerning tree tenure is whether settlers would be entitled to the fruits of the trees they had planted if they were evicted since, unlike structural improvements, it would be difficult to remove the fruit trees without killing them.

However, it could be equally argued that tenurial insecurity does not pose any threat to resettled households since some households have built permanent structures such as brick houses or even planted some trees in their homesteads (Scoones and Matose, 1993). Thus, "the impact of insecure tenure arrangements on settler commitment and investment is not easy to determine and in the absence of any appropriate studies, opinion is divided" (Fortmann and Bruce, 1993: 205).

Tenurial insecurity is the deciding factor in the selection of cultivated tree species and where the trees are planted. These observations were made in the Gaohong area of China, where species selection depends on the perceptions that farmers have about security of tenure. In the Gaohong area it has been reported that those farmers whose

security of tenure is weak choose to grow fast growing species such as bamboo rather than timber trees (Minghua *et al*, 2003). This is especially the case where the local community is only empowered by customary or locally accepted traditional rights which are of limited legal use. As noted by Ingles *et al*, (1999: 51):

> Holding legal rights as well as customary ones can increase confidence, which in turn stimulates interest in collaboration with government and investment in resource management.

2.4.6 Weaknesses of the CBNRM Approach

Though CBNRM provides an alternative way of understanding the link between institutions, livelihoods and environmental resources its theoretical foundations are uncertain. Alluding to this view Fabricius (2004: 20) notes:

> There is also a growing realization that the theoretical foundations of CBNRM are on shaky ground: our predictive understanding of the relationship between people and natural resources is weak, as is our understanding of the factors that shape the outcome of this relationship.

Furthermore, the existing body of theory on CBNRM demonstrates that much of the discussion revolving around conditions that influence its success or failure has not revealed much about resettlement areas. In Zimbabwe, for instance, studies in CBNRM have been carried out extensively in the communal areas while resettlement areas have been largely ignored.

2.5 SUSTAINABLE LIVELIHOOD APPROACHES

Chimhowu and Hulme (2006) have identified the different frameworks that have been proposed for analyzing livelihoods. The most prominent ones, in chronological order, include the Sustainable Livelihood Framework (SLF) (Carney, 1998; Scoones, 1998; Carney, 1999); Capitals and Capabilities Framework (Bebbington, 1999); the Sustainable Livelihood Diamond (UNDP, 1999); and the Framework for Thinking about Diverse Rural Livelihoods (Ellis, 2000). Conceptually, these frameworks are

similar though the SLF has gained greater popularity, "partly because of its robust analytical ability and also because of its widespread promotion by donor agencies" (Chimhowu and Hulme, 2006: 729). The SLF is based on the notion that households require five forms of assets for survival. These include natural, physical, human, social and financial forms of capital which must be harnessed within an appropriate institutional and structural environment to sustain the households. The SLF has been seen as the most suitable framework for studying livelihoods in resettlemet areas, particularly due to its recognition of the diverse means through which households in these areas can contruct livelihoods, of which farming is just one (Francis, 2001; Murray, 2002; Chimhowu and Hulme, 2006).

2.5.1 Arguments Presented Within Sustainable Livelihood Approaches

Sustainable livelihood approaches took a centre stage in the late 1990s. They seem to derive from the non-linear dynamic systems theory which suggests that the state of the environment is dependent on conditions that prevail within it or in locations that are functionally linked to it (Phillips, 2001). Such conditions could precede the current state of the environment or may arise where the environment is sensitive to defined local conditions or influences, thus providing geographical and historical context to livelihood dynamics (Murray, 2002). In this context the state of livelihoods in any given area would depend on the state of the environment in that area, in terms of its ability to provide the above five forms of capital, since that would determine the resources that are available for different livelihood options. In this respect sustainable livelihood approaches resemble orthodox ecological science approaches. However, sustainable livelihood approaches are also partly rooted in the people's history paradigm and the political economy paradigm (Beck, 1989; Chambers, 1989). Twyman (2000: 783) observed that "the livelihood opportunities open to people, and

the diverse portfolios of activities that make up a living, are now key areas of conceptual and empirical research."

Sustainable livelihood approaches suggest that poor people are vulnerable to shocks and stressors which occasionally arise within their environment. The former are sudden changes in environmental conditions, for example those associated with drought, while the latter are the cumulative build up of certain undesirable conditions, such as a worsening economic crisis. The sustainable livelihood theory argues that poor people try to diversify their portfolio of assets, including investments, stores and claims so that they are better positioned to deal with contingencies and hazards that may lead to irreversible losses (Chambers, 1989; Swift, 1989). However, depending on their status, households benefit differently from livelihood diversification. For example, Ersado (2003: 28) notes that:

> Households with a more diversified income base are better equipped to withstand the unfavourable welfare impacts of the financial and weather shocks Zimbabweans experienced in the early 1990s. The fact that better-off households have a more diversified income base following the shocks implies that the poor are more vulnerable to economic shocks. These findings thus strengthen the need for the public provision of well-designed safety nets before implementing significant policy changes.

Ersado (2003) has argued further that the poor are disproportionately hurt by short-run volatility and economic downturns that arise due to fiscal austerity and exposure to global market forces, especially in countries which are characterized by weak social and market institutions. Where poor communities are severely stressed natural capital, particularly in the form of forest and woodland resources, may become incorporated into their off-farm income diversification strategies. Livelihood diversification is the process by which households construct a diverse portfolio of activities in order to improve their living standards and manage risk, and apart from income generation it

also encompasses the social institutions, gender relations, property rights and other non-income support systems that sustain a living. Livelihood diversification is one of the key elements of disaster reduction strategies (Baas and Battista, 2004). It essentially involves the construction of a portfolio of activities meant to cope with shocks and risks (Ersado, 2003). However, Smith (2001) has queried the notion of livelihood diversification and even questioned the ability of poor households to increase productive strategies when confronted with external shock and stress. Smith (2001) argues that the concept of productive replacement is more appropriate since households are likely to adopt 'new' strategies in place of existing ones in order to deal with the shock and stress.

One key process in livelihood diversification is diversification of income sources. Income generation is one of the main components of livelihood strategies (Ellis, 1998). Households could diversify their income sources by engaging in on-farm and off-farm (non-farm) activities (Reardon, *et al,* 1998; Rosenzweig and Wolpin, 1993). Andrew *et al,* (2003) maintained that land-based livelihood diversification plays a vital role in reducing the vulnerability of rural households to risks such as the loss of a job or pension, drought, floods, disease and death.

Recognizing the potential vulnerability of rural livelihoods, Bryceson (2000) has argued further that there must be a policy which supports the development of sustainable rural livelihoods, while Berdegue *et al*, (2000) have maintained that sustainable livelihoods can be enhanced by creating non-agricultural rural employment. It has been argued by some, however, that the granting of land rights and usufruct rights to users of forest resources and other natural resources, in general,

constitutes the basis for both livelihood sustainability and sustainable use of the resources (Lahiff, 2001; Turner, 2001; Kepe and Cousins, 2002). In this context, rights are "claims that have been legitimized by social structures and norms" (Farrington, 2001: 2). Besides helping the community to defend its rights, the state should therefore promote devolution and community participation in natural resource management (Turton and Farrington, 1998; Shackleton *et al*, 2002). Devolution denotes the transfer of authority over natural resources and the relinquishing of both decision-making and benefits from state control to the local community (Shackleton *et al*, 2002), and is critical in the sustainable use of forest and woodland resources, since communities will only manage them if it is in their interest (Brown *et al*, 2002). In line with this argument it is maintained that the identification of the historical process that brings about environmental and livelihood related changes, as well as their sustainability, may only be achieved by adopting participatory methodologies in natural resource management. There are a number of advantages that are offered by participatory methodologies. Colfer and Byron (2001) noted that participatory methodologies provide forest actors, that is stakeholders in forest resource management, with the opportunity to: enunciate traditional rights and responsibilities; protect identified rights; gain access to benefits derived from forests; and integrate their knowledge systems, experiences and preferences into forest management systems. In the process communities that rely on forest and woodland resources are empowered to cope with the environmental 'stresses and shocks' that threaten livelihood sustainability. This argument is most valid for southern Africa where forest and woodland resources "are central to the livelihood systems of millions of rural and urban dwellers" (Campbell *et al*, 1996: 1), even though "uses, benefits, and values have been consistently understated and, consequently, the conservation and

management of these resources has been given low priority in government development plans" (McNamara, 1993: 1).

However, Boyd and Slaymaker (2000), have identified another set of conditions that must be met in order for sustainability of rural livelihoods to be attained. These include intensification and commercialization of agriculture; off-farm diversification; improvement of social cohesion at both household and community levels; as well as improvement of livelihood security by enhancing access to land and markets.

2.5.2 Livelihood Diversification and Resettlement

There is still need for examining the intricacies of a livelihoods focused perspective on land reform that is appropriate for southern Africa as a whole (Lahiff and Scoones, 2001). However, the relationship between land resettlement and livelihoods has already been explored in Zimbabwe (Kinsey, 1998; Kinsey, 1999; Kinsey *et al,* 1998). There is no consensus about how sustainability of rural livelihoods can be achieved and normally livelihood strategies adopted vary geographically, as well as through time. Resettlement is one way through which rural livelihood diversification can be achieved. When carefully planned, resettlement has the capacity to enhance options for livelihood diversification because it provides a mechanism through which poor people gain more access to environmental resources.

Based on research conducted in Zimbabwean resettlement areas Kinsey (2002) has observed that there are two strategies of livelihood diversification. Kinsey (2002: 621) noted:

> The first such strategy is the decision to diversify within agriculture by altering crop mix or changing the balance between crops and livestock so that positive covariance is reduced and/ or whole farm incomes rises. The second,

> not mutually exclusive, decision is to diversify out of agriculture by investing in enterprises that, although based in the rural landscape, entrepreneurs hope will be less prone to the effects of a bad season than is farming.

The importance of both on-farm and off-farm forms of livelihood diversification strategies has been noted. In communities found in resettlement areas livestock holding has been regarded as an important aspect of agriculture based way of providing means of coping with natural hazards. For example, in Rengwe resettlement scheme, found in Hurungwe district in northern Zimbabwe, livestock sales account for about 14% of the total annual income earned by poor households (Chimhowu, 2002). However, it has been argued further that due to the prevalence of poverty, Zimbabwean resettlement schemes or paid employment in commercial agriculture have not, by themselves, provided a solution to the problem of food security (Bradley and Dewees, 1993). As noted by Bradley and Dewees, (1993) though rates of malnutrition are slightly lower amongst households in resettlement areas, compared to those occurring amongst families in the large-scale commercial sector, malnutrition is still a problem in these areas. Enmeshed in a web of poverty and deprivation, settler communities are generally regarded as vulnerable to both the economic and environmental problems facing the country, making them highly dependent on forest and woodland resources, at times to the point of over-utilizing these resources.

Currently debate is raging on whether communities in post-colonial Zimbabwe resettlement schemes are facing critical shortages of forest and woodland products. On this issue Scoones and Motose (1993: 165) have concluded that:

> Resettlement areas have not been short of wood resources; indeed most effort in recent years has been invested in clearing woodland for agriculture. The incentives to evolve management systems in such situations of resource surplus are limited.

Thus, sustainable livelihood approaches regard claims that resettlement leads to the destruction of forest and woodland resources as unfounded. Yet, land degradation has been reported as a widespread ecological disaster in Zimbabwean resettlement areas, especially those that were more recently founded (UNDP, 2002). To the contrary, in line with the 'environmental transformation theory' it is envisaged that institutions within local communities play a pivotal role in conserving natural resources within the transforming environment, thus ensuring the sustainability of both the natural resources and the livelihoods that depend on them.

2.5.3 Woodland Resources and Livelihood Sustainability

Within the sustainable livelihood approach it is maintained that the rural environment is susceptible to natural hazards and vulnerable communities often face critical food shortages, and as a result forest and woodland resources obviously become an important source of their livelihood. Consequently, access to environmental resources is critical to rural based livelihood strategies while the destruction of these resources has been considered as a threat to livelihoods.

One important argument that has been advanced is that the relationship between livelihoods and the environment varies according to geographical context. It has been noted, for example, that in Kwa-Zulu Natal (South Africa), poor people undertake a wide range of livelihood activities such as informal trading, seasonal piece-work, formal jobs and other activities to cope with their environment (Cross *et al*, 1996; Taylor and Cains, 2001), while in Malawi the collection of wild fruit, sale of firewood and charcoal, brewing of beer for sale, emigration, opening of gardens in wetlands and weaving of baskets and mats for sale were considered as the main livelihood

strategies that enabled rural communities to cope with environmental hazards such as drought and economic hardships between 1970 and 2000 (Whiteside, 1998; CARE, 2000; Frankenberger *et al*, 2003). In the Derre forest reserve of Mozambique hunting and sale of traditional beer and pottery are common livelihood strategies (Nhantumbo, *et al,* 2003), whereas in the Sangwe and Mahenye communal areas of Zimbabwe some households derive their livelihoods from wildlife and crafts (Mombeshora *et al,* 2001).

In the Eastern Cape Province (ECP) of South Africa, due to declining formal employment opportunities, many households have turned to informal activities, including traditional land-based activities (Lahiff, 2003). Ntshona and Lahiff (2003) noted, for instance, that in Mdudwa village in ECP people now heavily depend on wild resources for their livelihoods. These include resources such as fuel wood, rushes, thatch grass, wild fruit, wild vegetables and medicinal plants which are collected from various areas inside and outside the village. Referring to the importance of wild resources to rural livelihoods Cross *et al*, (1996: 188) have argued that:

> The issue of rural livelihoods in relation to natural resources can be approached in several ways. Natural resources affect livelihoods either directly, by being used to support the household or to produce things the household needs to support itself, or indirectly, by supplying things the household would otherwise have to pay for.

Throughout southern Africa, a wide range of birds, rodents, lizards, fish, insects and other animals constitutes an important component of rural diets in miombo areas (Campbell *et al*, 1993; Brigham *et al*, 1996; Cunningham and Davis, 1997). Okafor (1993) noted a number of benefits that indigenous woody plants provide to local communities in southern Africa. In this region indigenous woody species serve as

shelterbelts and windbreaks, boundary marks, ornaments and provide privacy to homesteads. Forest and woodland resources also provide environmental benefits such as watershed protection, wildlife habitats, shade and anchorage for field contour bunds and terraces, as well as products like fuel, timber stakes, construction poles, fodder, fruits, leaf vegetables, nuts, honey, wild vegetables, oil seeds, tannin, resins, gums, fibres, and raw materials for winnowing trays, dyes and ethno medicines (Bradley and Dewees, 1989; Okafor, 1993; Campbell *et al*, 1993; SAREC/Forestry Commission, 1996). For example, bark extracts from *Dispyros mespiliformis, Parinari curatellifolia, Sclerocarya birrea and Strychnos cocculoides* are used to treat diarrhoea (Okafor, 1993). The Tonga people in the Zambezi valley use a wide range of herbal medicines to treat diarrhoea, eye troubles, wounds, toothache, insect and snake bites, coughs and other respiratory ailments (Bradley and Dewees, 1989). The dietary importance of forest and woodland resources to local communities in southern Africa has been widely recognized. For instance, leaf vegetables are an important source of minerals, niacin, vitamin A and protein, all of which are deficient in staple diets (Wilson, 1989). About the importance of indigenous forest and woodland resources in Zimbabwe McNamara (1993: 1) notes that:

> Indigenous woodlands and trees contribute to the improvement of food security, to meeting rural subsistence needs, to the generation of rural income, to agricultural productivity, and to the protection of the environment.

In the southeastern Zimbabwe a wide range of important resources are derived from forest and woodland resources. These include edible fruits, nuts, medicines, thatching grass, fodder and raw materials for carving and construction (Mombeshora and Wolmer, 2000).

2.6 NATURAL RESOURCE CONSERVATION AND RESETTLEMENT: THE CASE OF ZIMBABWE

2.6.1 History of Natural Resource Conservation in Zimbabwe

Research in Zimbabwe has revealed that natural resource conservation has assumed different forms at different stages in the history of the country. During the pre-colonial era ethno-ecological knowledge played a crucial role in natural resource management. Collective regimes of common property management (*res communis*) were of vital importance in controlling the utilization and conservation of all natural resources, including forest and woodland resources. Ecological religion or spiritual ecology had a strong influence on both natural resource use and conservation (Bernard and Kumalo, 2004). Under these circumstances none of the environmental resources were regarded as open access (*res nullius*) resources (Murphree and Cumming, 1993). In pre-colonial Zimbabwe resource conservation was achieved:

> Through common property regimes, clearly bounded and with explicit rules of inclusion and exclusion, rights and obligations (Murphree and Cumming, 1993: 145).

The common property regimes that existed then guaranteed that forest and woodland resources, whose products were a vital supplement for agricultural produce (Arnold, 1991) were given adequate protection. Within the socio-cultural milieu that prevailed then, traditional institutions, notably chiefs, headmen and spirit mediums, who were seen as the designate representatives of the ancestral spirits, had authority to sanction the manner in which the resources were used, including forests and woodlands (Ranger, 2003; Bernard and Kumalo, 2004). Ancestral spirits were presumed to be the owners and guardians of both land and natural resources. Thus, under these management arrangements and circumstances, ancestral spirits were regarded as the owners of forest and woodland resources while communities were both the beneficiaries and custodians of these resources.

In pre-colonial Zimbabwe the exploitation of all natural resources was expected to be carried out according to well-laid down regulations and their use was done in the interest of both the community and the spirits. Lack of compliance with the set regulations was seen as a way of invoking calamity from the ancestral spirits (Mukamuri, 1995; Ranger 2003). Murphree and Cumming (1993) have argued that natural resource management by common property regimes during the pre-colonial times was economically viable, ecologically sustainable and organizationally efficient due to the fact that compliance with the rules that regulated the use of the resources was internally generated and not externally imposed. Consequently, it has been argued that natural resource degradation during the pre-colonial period was minimal.

It has been argued that colonization led to the destruction of local institutions and transformed the existing system of common property resource or common pool resource (Williams, 1998) management (*res communis*), which operated on the basis of collective management of natural resources, into open access (*res nullius*) resources, thereby rendering them vulnerable to overexploitation and degradation. Another argument that has been advanced is that colonization also led to the confinement of indigenous populations into areas where environmental resources were inadequate to sustain their livelihoods. The outcome was the undermining of the livelihoods of local communities and widespread environmental degradation (Whitlow, 1988; Arnold, 1991). Consequently, the problem of critical shortage of land and other common property resources like forest and woodland resources emerged in the communal areas (CAs), a situation that was exacerbated by strict enforcement of colonial legislation.

By 1980, at Zimbabwe's independence, the effectiveness of the traditional structures that governed the management of natural resources by common property regimes had already been seriously eroded. The expropriation of natural resources from indigenous populations, particularly through the enactment of the Natural Resources Act (NRA) of 1941, which prohibited the use of natural resources, including wildlife, certain timber resources and minerals, was one of the factors that contributed to this erosion. By denying indigenous people access to a wide range of resources the enforcement of the NRA was received with resentment by most black Zimbabweans. The externally imposed technocratic approach of regulating natural resource use and management which the Act demanded was seen as a threat to the existing management by common property regimes, as well as to indigenous cultures.

As noted by Murphree and Cumming, (1993: 147)

> The effect was that in most communal lands the mechanisms of collective conformity were curtailed and elements of an 'open access' perspective developed, with individual entrepreneurship invading the commons as a collective sense of proprietorship was lost.

Consequently, massive deforestation and other serious related forms of land degradation took place, resulting mainly from loss of security of tenure, a condition that was exacerbated by large-scale translocations and displacement of indigenous people from the expropriated land. The situation was worsened by imposition of new land-use plans in the CAs by government agencies, following the promulgation of the Land Husbandry Act. Within this context, it can be argued that colonialism usurped the authority of traditional institutions to the extent that local communities and their traditional leadership lost the autonomy required for both effective self-management and conservation of natural resources. Consequently, the inhabitants of CAs lost the

sense of ownership to their natural resources, including the forest and woodland resources that were found in areas that were allocated to them, and started to treat these resources as 'open access' resources rather than 'common property resources'. The outcome was disastrous – widespread natural resource degradation. The current state of forest and woodland resources in Zimbabwe is largely the enduring legacy of the country's colonial past (Katerere *et al* 1993).

Presently, in Zimbabwe, the greatest threats to natural resources have been associated with the communal areas (CAs). High population densities and the erosion of traditional institutions are regarded as the main causes of environmental degradation in Zimbabwean CAs (Whitlow, 1988; Scoones and Matose, 1993; Ranger, 2003). Deforestation, soil erosion, overgrazing and siltation are some of the most widespread forms of environmental degradation in these areas. However, three principal causes of deforestation have been identified in Zimbabwe, namely expansion of arable land, demand for wood fuel and construction poles, and forest fires (Katerere *et al* 1993).

2.6.2 Community Based Natural Resource Management in Zimbabwe

Community based natural resource management (CBNRM) has always been regarded as the basis for any successful initiative to achieve integrated forest and woodland resource management. It has been suggested that in Zimbabwe, for example, CBNRM projects for forest and woodland resource conservation could be designed along similar lines as the national Communal Areas Management Programme For Indigenous Resources (CAMPFIRE) (McNamara, 1993).

In CAMPFIRE, local communities in wildlife areas derive both direct and indirect benefits from the 'appropriate authority' that is granted to Rural District Councils

(RDCs), on their behalf, by the National Parks and Wildlife Authority, which allows RDCs to retain proceeds from exploited wildlife resources. Revenue generated from CAMPFIRE projects is used to purchase grinding mills, build schools, clinics, roads and to provide other basic needs to local communities in wildlife areas. Households in these communities are also allocated game meat. Wolmer *et al,* (2003) maintained that CAMPFIRE achieved iconic status in southern Africa and internationally and became the most famous example of CBNRM. The Zimbabwean CBNRM initiatives have opened considerable debate in natural resource management. Consequently, some CBNRM approaches have been discredited for their pro Neo-Malthusian stance while questions have also been raised about what pre-conditions should be met for CBNRM to succeed. For example, Mandondo (2000: 15) has argued that community based approaches are:

> Premised on the deep green ethos and values of a global (western) environmental discourse and scientific culture, that is, participation for environmental conservation. Decentralization conceptualized within the framework of that culture is supply-led, guided by that culture's values and inherently top-down. That culture, being insular, domineering and conditional, offers little space to 'think' alternative forms of empowerment without green strings attached. It conceptualizes community empowerment in the instrumental mode, that is, participation for environmental conservation. This paradigm draws inspiration from the Malthusian logic of static sustainability thresholds on how populations and their consumption levels relate to the environment. The challenge to civil society is to demand decentralization on the terms and definitions of beneficiary communities.

Within this context, decentralization denotes the transfer of entrustments, including regulatory and executive powers, responsibility and authority in decision-making, institutional infrastructure and assets as well as administrative capacity from central government to local governments or communities but its most desirable form is devolution, described here as the process by which "the entrustments are transferred more or less completely to the local users" (Mandondo, 2000: 3). Such entrustments

include regulatory and executive powers, as well as responsibility and authority in decision-making that can be transferred to local governments and communities (Crook and Manor, 1998).

Decentralization often leads to more sustainable and equitable use of natural resources since decision-makers are closely located to places where their policies will be implemented. It is generally agreed that proximity improves the understanding of specific biophysical, social and institutional conditions that affect the management of forests at the local level (Carney, 1995; Casson, 2001). Decentralization also provides better opportunities of assessing how forest and woodland resources are being used or managed within local communities. Taken simply, decentralization confers both the right to use a resource and the responsibility or obligation to manage that resource to those who benefit from the use of the resources. With particular reference to Zimbabwe, Murphree (1991) contends that communities can become effective institutions of sustainable natural resource management if granted genuine proprietorship over the resources. Such proprietorship is based on the notion that:

> The right to use resources, determine the mode of usage, benefit fully from their use, determine the distribution of such benefits and determine the rules of access. Any policy which excludes these components will frustrate the goal of making communities effective institutions for resource management (Murphree, 1991: 14).

Similarly, Rapold (2001) maintains that natural resources are managed in a more sustainable way when people are empowered. According to Rapold (2001: 6) empowerment is "the reinforcement of the capacity of actor groups to use and manage their environment and to participate in decision making processes and institutions."

Government legislative reforms should create conditions that are conducive to decentralization with the view to promote investment in woodland management and tree cultivation in resettlement areas. Prospects for resource sharing schemes or co-management options should be explored where rights of use, ownership and management cannot be vested in local institutions. Resource sharing "refers specifically to the joint use and management of protected forest, woodland and plantation; by the Forestry Commission on the one hand and by local communities on the other" (Bradley and Dewees, 1993:115).

The Zimbabwean experience seems to differ from what has been reported elsewhere. For example, the assumption that local people will automatically become custodians of the natural resource base once they are given the opportunity to participate and benefit from biodiversity has been described as naïve (Hamilton-Smith, 2000; Turner 2004; Fabricius, 2004). Studies in Asia and Africa have shown that devolution policies yielded limited benefits for local communities (Shackleton *et al* 2002). Fabricius (2004: 22) noted that local institutions are often weak, unstable and unacceptably flexible while "traditional institutions are disappearing and are being replaced by open-access systems and lawlessness." Turner (2004: 9) has argued further that it is also wrongly assumed that rural populations in developing countries are environmentally wise and responsible, "with innate commitment to nature conservation." In Indonesia formal and informal processes of decentralization that are currently taking place have far reaching implications for both forest management and the livelihoods of the communities living in and around forests (Casson, 2001).

Whereas some CBNRM strategies revolve around decentralization and devolution others are crafted around institutional development and strengthening, development of sound government policy and community empowerment. About Zimbabwe, McNamara (1993: 3) noted that: "the long-term productivity of woodland and tree resources will ultimately depend on the viability of local institutions and social structures." However, in Zimbabwe, McNamara (1993) argues for a more technocratic approach and considers the role of government as central in curbing deforestation. In a World Bank Report, McNamara (1993: 1) notes that:

> Policy reforms that are backed up by modest investment in forest protection infrastructure and a considerable strengthening and reorientation of the government's rural forestry research, extension, education and training services, could make a decisive contribution to improved management of indigenous woodlands and to more productive agroforestry farming systems.

Such a role requires legislative reforms, as well as increased involvement and strengthening of important stakeholders in forest and woodland resource management, including both contemporary and customary local institutions, since the government has neither the capability nor the means to effectively manage these resources at local level (Scoones and Matose, 1993; McNamara, 1993).

However, McNamara (1993: 4) further suggests that:

> Incentives to invest in woodland management and tree cultivation in resettlement areas coupled with a more secure form of tenure for resettled households, such as inheritable long-term leases.

The above forest and woodland management efforts could be augmented by introducing silvicultural practices such as fire protection, selective tree felling and thinning, protection of seedlings from herbivores, coppice and pollard management, seasoning and treatment of poles with termiticides before use, species selection,

retention of trees in the fields, pen feeding on livestock, and tree planting, as well as other management practices (Campbell *et al* 1993).

However, in Zimbabwe, earlier efforts to combat deforestation revolved around tree planting, but such efforts have been thwarted by a number of constraints. In Shurugwi (Midlands province), for example, tree planting was impeded by high costs of fertilizers, unavailability of seedlings, drought, prohibitive costs of fencing established woodlots to prevent damage by livestock, inadequate extension services, lack of information on suitable agroforestry practices and general lack of information on proper management of trees (Okafor, 1993). Other constraints cited in different parts of Zimbabwe were revealed by the baseline survey for the Rural Afforestation Programme, which was initiated by the Forestry Commission in the early 1980s. These include labour and time related constraints, insufficient land for tree cultivation, lack of tools and equipment for planting and managing established woodlots, prevalence of tree diseases, pests and weeds, soil erosion and theft (Campbell *et al* 1993).

2.6.3 Planned Land Resettlement in Post-Colonial Zimbabwe

In the post-colonial Zimbabwean land reform programme emphasis has been placed on the redistribution of what the government considers to be under-utilized land. Since 1980 the government has justified its land reform policy on a number of factors, including the attainment of an acceptable and equitable distribution of land, reduction of landlessness among people who were displaced by war, development of a greater degree of economic security and welfare for the rural population, and the conservation of land and the environment for future generations. Other considerations revolved around the need to reduce population pressure in the communal areas through the

transfer of land from the freehold tenure system (either owned by the state of commercial farmers) to the leasehold tenure system in designated resettlement areas (Katerere *et al* 1993). The above factors constitute the objectives of the Zimbabwean Transitional National Development Plan of 1982, in which land resettlement is a central component.

Originally, the government's intention was to alleviate overcrowding and population pressure on land-based resources in CAs, including forest and woodland resources. However, this situation is not unique to Zimbabwe alone. Overcrowding is a common feature in those areas that were allocated to colonial subjects, a pattern that prevails in former European colonies found throughout Africa, where land was divided along racial lines. For example, in South Africa in 1994 (at independence) blacks were confined to the 'homelands' with only 14% of the land even though they accounted for over 75% of the country's population (SARDC/ IUCN/ SADC, 1994).

In Zimbabwe as a whole, a total of 6,481 commercial farms, constituting approximately 9.2 million hectares, had been listed for resettlement by June 2000, under what has come to be called the 'fast track' land reform programme (UNDP, 2002). However, by 1997 the government had already transferred 3.5 million hectares of land to about 70 000 families (Moyo, 2000). In Mashonaland Central province, where Mufurudzi resettlement scheme (the study area) is found, large-scale land redistribution and resettlement have taken place. In this province a total of 48 849.4 hectares of land has been gazetted for compulsory acquisition by Government, in terms of the Land Acquisition Act (Chapter 20:10, cited in The Herald: 2 June, 2000: pp 11-17).

Table 2.1: Distribution Of Commercial Farms in Mashonaland Central Province

	Characteristics			
District	**Number of commercial farms**	**Number of commercial farmers**	**Total amount of farm land (hectares)**	**Total amount of land in use (hectares)**
Mazowe	71	27	61 151,165	30 281,020
Bindura	28	9	36 947,660	10 407,980
Muzarabani	33	4	10 585,600	5 762,700
Mt. Darwin	9	3	245204,540	11 125,320
Guruve	11	5	23 548,800	2 166,000
Shamva	33	12	30 417,390	839,900
Rushinga	n/a	n/a	n/a	n/a

n/a - data not available

Source: (Sunday Mail, 2 April, 2000: pp10)

The government has justified the massive 'fast track' land redistribution programme on a number of reasons. First, the government has recently instituted a new land policy that bars individuals from owning more than one farm. Table 2.1 shows that, on average, individual commercial farmers in Mashonaland Central own about three farms.

Second, the government intends to resettle landless peasants on underutilized land, thus enabling local communities to earn a living and improve their livelihoods by harnessing underutilized resources. As noted by Whiteside (1998), one way of enabling communities is to improve their access to resources. According to table 2.1, of the 407 855 hectares of prime land owned by commercial farmers only about 60 583 hectares are under productive use. Third, throughout Zimbabwe, the government is planning to transfer some of the commercial farmlands that border CAs to landless peasants in these areas. However, some researchers have criticized the 'fast track' land redistribution programme as environmentally disastrous (UNPD, 2002; Chaumba *et al* 2003b; Wolmer *et al* 2003b; Mtisi and Nicol, 2003).

2.7 CONCLUSION

Existing literature suggests that in tropical dry forests such as the miombo woodlands found in Zimbabwe there is a mutual relationship between livelihood systems and forest and woodland resources. Different theoretical arguments have been advanced to explain the environmental changes that result from this relationship, all of which are attributable to different schools of thought, leading to debates about how the sustainability of forest and woodland resources can be achieved. There is no consensus among scholars regarding the impact of resettlement on forest and woodland resources. While some of these debates fall within the schools of thought that have already been discussed others totally assume different inclinations.

Orthodox ecological approaches maintain that the overuse of forest and woodland resources is the cause of the degradation of these resources. These approaches regard resettlement as generally environmentally destructive. The Neo-Malthusian view is a typical example of the orthodox ecological sciences that have dominated this perspective. A considerable range of examples can be drawn from literature to support the dominance of this view, as already noted. In line with this view, it is maintained that demographic and technocratic solutions are needed to achieve sustainability.

Environmental transformation approaches, on the other hand, argue that any form of human-environment interaction, including that which involves the use of forest and woodland resources in resettlement areas, leads to the transformation of the environment and does not necessarily cause the degradation of the environment. CBNRM approaches present a similar position. These approaches maintain that local communities are capable of managing the resources that they depend on for survival.

In these approaches it is generally agreed that local institutions have the capacity to regulate the way environmental resources are used. Finally, sustainable livelihood approaches argue that the state of the environment determines whether local communities can cope with the environmental challenges that confront them or not. Different groupings within the community have different strategies of coping with these challenges, rendering some groupings more vulnerable than others.

Even though there is no consensus among scientists and researchers, regarding the appropriateness of the above schools of thought or about the nature of changes that occur in the environments where resettlement programmes have been implemented the existing literature demonstrates that these schools of thought are not completely independent of each other. There are certain cross-cutting issues that are used as reference points in all of them. For example, there is a general agreement that environmental change results from both proximate and ultimate causes, which can either be natural or subsistence, that is anthropogenic. Among important cross-cutting issues that act as underlying causes in environmental change are government policy and legislation, tenurial security and the state of the macro-economic environment that prevails in a country. There is general agreement that these conditions have the capacity to determine the manner in which people interact with environmental resources.

The challenge is to determine a combination of solutions that is workable for resettlement areas to ensure a sustainable relationship between people and environmental resources. Moyo *et al* (1993) have suggested the adoption of an integrated approach as a development strategy for ensuring environmental

sustainability and rural transformation. In such an approach, production systems such as cropping, animal husbandry and biomass conservation have to be managed in a holistic manner. This entails the co-ordination of productive activities such as agriculture and forestry, and social, economic, environmental and rural development considerations (Sharma *et al*. 1992), encompassing control of population growth, introduction of sustainable agriculture and implementation of environmental action plans (Cleaver and Schreiber, 1990), improvement of tenurial rights (Sharma *et al* 1992; IUCN, 1989; Molapo, 1998), enhancement of local participation, that is 'stakeholders', in natural resource management through decentralization and implementation of community based natural resource management practices (Sharma *et al*. 1992; Cernea, 1992; Mutepfa, 1998; Colfer and Byron, 2001) and development of appropriate conservation policies (Southgate, 1992; Sharma *et al* 1992). The strength of the integrated approach lies in its ability to address both the ultimate and proximate causes of deforestation as well as its capacity to enhance livelihood sustainability. It would appear that in the above context the integrated approach is based on the reductionist philosophy which argues for the inclusion of all important variables as a means of minimizing risk or reducing uncertainty. The approach has the advantage that it evokes a multi-disciplinary approach in research, which justifies the adoption of methodological integration, as suggested in Chapter 3.

CHAPTER 3

CASE STUDY AND RESEARCH METHODOLOGY

3.1 INTRODUCTION

The purpose of this chapter is to examine the changing relationship between rural livelihoods and natural resources in post-settlement Mufurudzi, one of the first resettlement schemes to be set up in post-colonial Zimbabwe, within the context of the dynamically changing socio-political environment that evolved after the institution of the country's land reform programme. The chapter first examines how resettlement 'transformed' the livelihoods of land reform beneficiaries in Mufurudzi resettlement scheme and then describes the methodology that has been used to analyze the link between livelihoods and natural resources within the bio-physical and socio-political environment that has characterized Zimbabwe in its recent history.

3.2 HISTORICAL BACKGROUND TO THE LAND QUESTION, RESETTLEMENT AND NATURAL RESOURCE CONSERVATION IN ZIMBABWE

The imposition of white rule in Zimbabwe (known as Rhodesia before independence), under the British South Africa Company (BSAC) in 1890 had an influence on the manner in which indigenous populations viewed and managed natural resources, including land, as well as forest and woodland resources. When the BSAC's hopes to find the 'Second Rand' in the then Rhodesia were dashed (Murphree and Cumming, 1993) a deliberate policy was set up to diversify the economy by encouraging 'white agriculture' (Kay, 1970). As noted by Mandondo (2000: 5):

> A central feature of the expansion of settler rule under the BSAC was the expropriation of land and the assets (e.g. cattle) from indigenous communities. Fading hopes of discovering new gold deposits forced more and more settlers to turn to agriculture, and this reinforced the process of alienation of land and resources from indigenous communities.

The BSAC land policy led to the appropriation of the most fertile and advantageously located land for whites (Arrighi and Saul, 1973), the majority of which were large-

scale farmers, to whom the land was allocated on freehold tenurial basis (Whitlow, 1988). Katerere *et al* (1993: 14) argue that:

> The land allocated for freehold tenure by large-scale farmers was intended to support high levels of productivity while practicing appropriate conservation techniques.

Such a policy was backed by a number of laws which were promulgated to disenfranchise and alienate indigenous people from both fertile land and land based resources such as forest and woodland products. Prominent among these laws was the Land Apportionment Act of 1931, which allowed the white settler government to confine the black majority, to the less fertile, hilly, rocky and drought-stricken marginal areas of the country. These areas constitute the present day communal areas (CAs). Approximately 75% of the land in the CAs is of poor quality (McIntosh, 1990).

As early as 1896, 15 million acres of productive farmland had already been expropriated by the white settler government (Mukarati, 1980). By 1925 the amount of land appropriated for whites had increased to 31 million acres (12 520 000 ha) and by 1931, when the Land Apportionment Act, was promulgated it had increased by another 19 million acres (7 710 000 ha) (Kay, 1970). Table 3.1 shows the amount of land in different categories after the promulgation of the Land Apportionment Act.

Table 3.1: Land Categories Following the 1931 Land Apportionment Act

Category	**Size (Hectares)**	**% of Total**
Tribal Trust Land	16 300 000	41.6
African Purchase Area	1 730 000	4.4
European Area	14 450 000	37.0
Unreserved Area	2 480 000	6.1
National Lands	4 280 000	10.9

(**Source**: Kay, 1970: 53)

The Land Apportionment Act made it explicit that 198 539 km^2 of the land in Zimbabwe would be reserved for 50 000 whites while 117 602 km^2 was allocated to blacks, and the remaining 74 859 km^2 was reserved for national parks, forest reserves and state land (Murphree and Cunning, 1993). As a result the indigenous population lost propriety rights to more than two-thirds of the land they held in 1890.

Subsequent land related colonial legislation did not do much to eliminate the inequitable distribution of land in the country. For example, the Native Land Husbandry Act (NLHA) of 1951 merely provided subsequent settler regimes with the legal basis for the enforcement of conservation measures, the adoption of sound methods of farming, and the replacement of the traditional land tenure system that was based on communal ownership of land and environmental resources by a system of individual ownership (Whitlow, 1988). The NLHA sought to register and limit grants of individual farming and grazing rights (Murphree and Cumming, 1993). By the mid-1960s the imbalances in land distribution between blacks and whites had fuelled African nationalism to levels which could not be ignored by the settler regime, then under Ian Smith's Unilateral Declaration of Independence (UDI) rule.

The Land Apportionment Act of 1970 was viewed by the settler regime as a concept of parity, meant to address the problem of the maldistribution of land (Christopher, 1971). However, "this parity was more cosmetic than real since it took no account of land quality or population size" (Whitlow, 1988: 13). The Land Apportionment Act merely extended the African areas or CAs, then known as African Reserves or Tribal Trust Lands (TTLs) and provided for African Purchase Areas (APAs). Blacks were still confined to the less suitable and marginal land. Nevertheless, the promulgation of

the Land Apportionment Act was an acknowledgement of colonial governments' awareness of the inequitable distribution of land between blacks and whites.

The progressive deterioration of the quality of land, loss of natural resources (including forest and woodland resources) and the subsequent degradation of the environment that occurred in the CAs invited legitimate questions about land reform and resettlement, making inequitable land distribution a politically contested issue. Following Zimbabwe's independence in 1980, the first democratically elected government embarked upon a land reform programme in order to alleviate population pressure in the CAs. This involved the transfer of land from individual land ownership to peasants, that is from the 'non-reform sector' to the 'reform sector' (Thiesenhusein, 1995), as a way of addressing the problems of social injustice, landlessness and environmental degradation in the CAs. Some planners and developers view land reform as a solution to those environmental problems that are induced by population pressure while others argue that such problems can only be solved by empowering or strengthening local institutions.

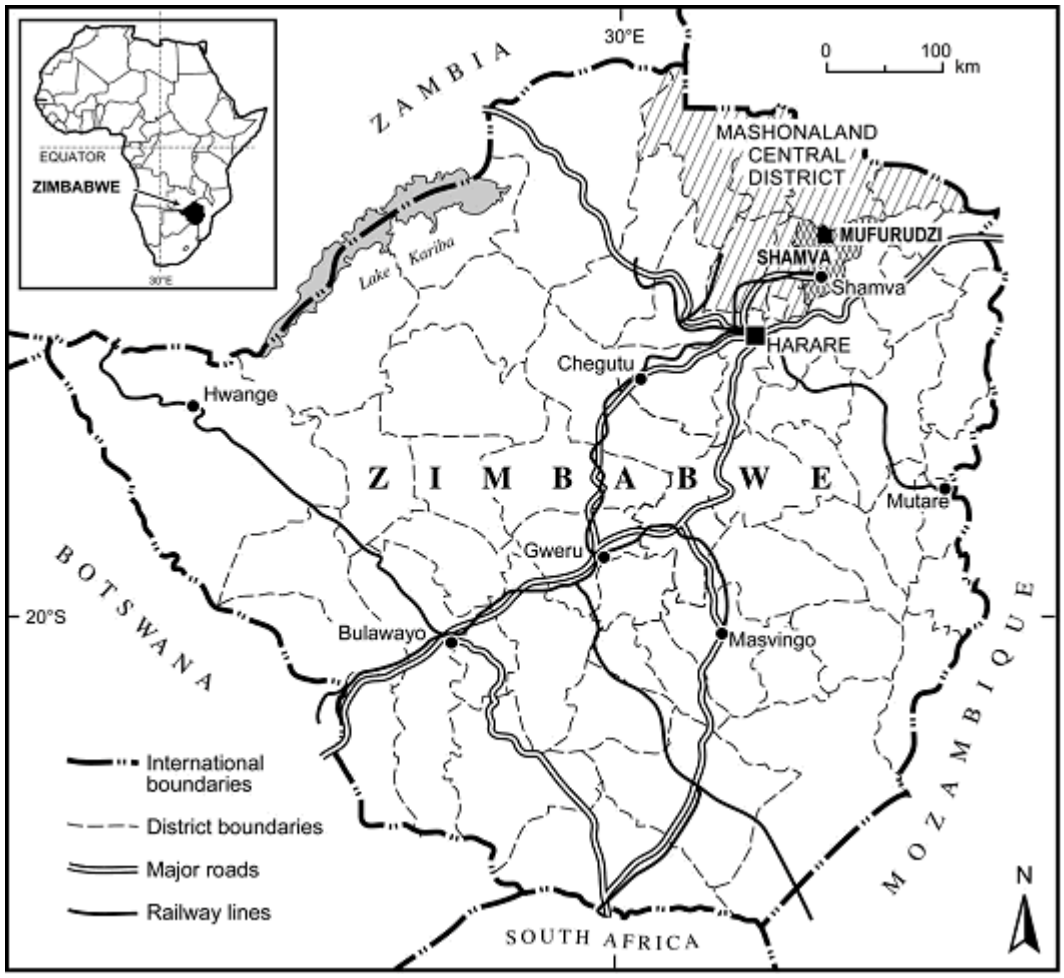
Zimbabwe's post-colonial land reform is a politically driven policy, which attempts to redress inequitable distribution of productive agricultural land (Kay, 1970; Christopher, 1971; Arrighi and Saul, 1973; Mukarati, 1980; Davies, 1984; GOZ, 1998; Moyo 2000). The policy was prompted by the recognition of racially skewed ownership of land, a feature that was inherited from the country's colonial past (SARDC/ IUCN/ SADC, 1994). However, there is no consensus among researchers regarding land shortage, either in Zimbabwe or in other southern African countries such as Lesotho, South Africa, Swaziland and Malawi (Potts, 2000).

Being a sub-Saharan country (Figure 3.1) whose economy is agriculturally based, Zimbabwe's land resettlement is also regarded by government as indispensable to economic development. The redistribution of commercial farmland to the land hungry soon after independence in 1980 (Lahiff, 2000) was viewed by government as a strategy for harnessing underutilized resources for national development. Initially the key beneficiaries of land resettlement included various categories of landless former farm workers from the designated commercial farms, villagers from the surrounding communal areas, as well as demobilized former guerillas and Rhodesian soldiers who could not be co-opted into the national army. Mufurudzi is one of the resettlement schemes that were set up during the first phase of resettlement in post-colonial Zimbabwe.

3.3 MUFURUDZI RESETTLEMENT SCHEME

Mufurudzi resettlement scheme, like many other planned resettlement schemes that are dotted around the Zimbabwean countryside, is an outcome of the government's land redistribution policy that began in the early 1980s. In Zimbabwean government nomenclature, Mufurudzi is a model A type of intensive resettlement scheme, whereby households were allocated arable landholdings on an individual basis. Permits, which were issued in terms of the provisions of the Rural Land Act, were granted to settlers to allow for activities such as settlement, grazing and cultivation, all of which are central to the livelihoods of land reform beneficiaries, without appropriating them individual rights of land ownership (Fortmann and Bruce, 1993).

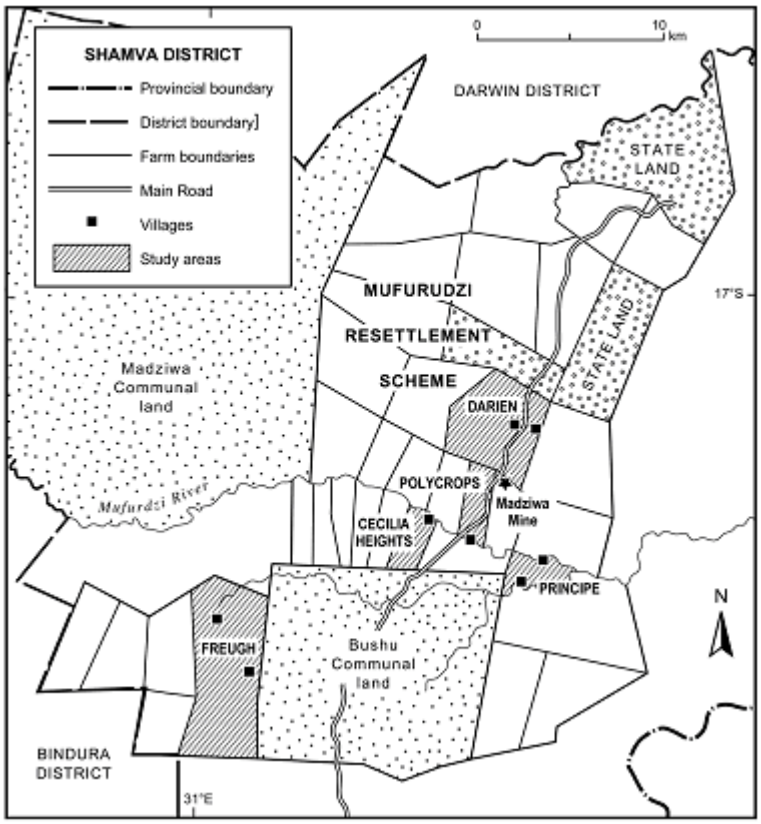
Figure 3.1: Location of Study Area



Mufurudzi resettlement scheme covers approximately 82 595 hectares of land, extending over two agro-ecological zones, namely agro-ecological regions II and III. Mufurudzi resettlement scheme consists of four different sections, each exhibiting different environmental characteristics (table 3.2 and table 3.2). Mufurudzi resettlement scheme comprises 33 former commercial farms, found along Mufurudzi river, a tributary of the Mazowe, and is found in the Shamva district of Mashonaland Central province (Figure 3.1). The Mazowe catchment area is one of the major drainage basins that nestle within the Zambezi river basin. Situated in miombo woodlands, Mufurudzi resettlement scheme is found in an environment that is not

only ecologically complex, but also prone to critical environmental problems such as soil erosion, siltation, flooding and drought.

Figure 3.2: Location of Study Areas



Apart from new homesteads and previously existing buildings that were inherited from the former commercial farming properties, there is a considerable range of infrastructural developments that have emerged on the landscape. Davies (1984) notes that resettlement in Zimbabwe has led to the conversion of commercial farms into 'peasant' farming communities, village dwellings, small arable plots, communal grazing and new patterns of access roads and tracks. New infrastructure includes schools, clinics, fences, boreholes, power lines, roads, dip tanks, telephones and water supply dams, the establishment of which has had an important effect upon the environment, signified by the emergence of new land use patterns. Many of the

planned infrastructural developments that have taken place in the resettlement scheme have had an obvious impact on both the biophysical and social environments and in the process creating new biophysical and social landscapes. A considerable number of infrastructural developments took place well after resettlement had already begun. Due to lack of resources many existing farm houses were converted into administrative offices for the government departments that operate in the scheme.

In Mufurudzi, planned resettlement occurred in two main phases. The first phase took place between 1981 and 1982 and it was during this phase that Section I of the scheme was set up. In this section residential stands and fields had already been surveyed and demarcated by October 1981 when the time the first land reform beneficiaries were resettled. The siting of villages, roads, boreholes, schools, dip tanks and other forms of infrastructure was done according to government laid plans, and the resettled villagers were rarely consulted in the process. The major contribution that the land reform beneficiaries made was the naming of the villages, some of which were named after revered liberation war heroes such as Tongogara and Takawira. Nevertheless, the names that were given to the majority of the villages reflected the euphoria that gripped Zimbabwe soon after independence in 1980, as well as the hopes that 'the new land owners' in Mufurudzi had about the emergence of a new socio-political order in a country that had been under white minority rule for almost a century. Such names included Mupedzanhamo, Mudzinge and Zvataida, which portrayed the idealistic optimism that Robert Mugabe brought when he won the first democratic election in 1980. Mugabe, the newly elected prime minister, had just ushered in a new political dispensation based on the doctrine of scientific socialism and egalitarianism, which had found ready acceptance among the black majority. To

some villagers resettlement offered the opportunity to reclaim the 'lost ancestral land' that they had been alienated from in 1951 when the Native Land Husbandry Act (NLHA) was promulgated. Some villagers such as Musona, the village head of Mufurudzi II, recounted how his family had been forcibly removed from what eventually became the Cecilia Heights estate in Mufurudzi to Bushu communal area in order to make way for a commercial ranch.

Section II and Section III of Mufurudzi were established during the second phase of resettlement which took place between 1993 and 1994. Resettlement during this phase started in February 1993 after the opening of an irrigation scheme at Principe (Section II) by the Department of Rural Development (DERUDE), with the assistance of the nongovernmental community. Most of the beneficiaries who were resettled in both phases were landless peasants from the surrounding communal areas who were not in formal employment. Some land reform beneficiaries were, however, former farm workers who had previously earned their living from monthly wages. These beneficiaries had lost their jobs following the designation of the farms they were working on. There is also a category of land reform beneficiaries who were formerly employed by the civil service prior to independence. This category mainly consisted of demobilized military personnel. The last category of land reform beneficiaries includes some landless peasants who had been displaced by war. Such beneficiaries comprised people who formerly lived in urban areas, where government welfare and wage labour were the major source of livelihood. A significant proportion of the beneficiaries came from areas within Mashonaland Central province, including Shamva, Bindura, Muzarabani, Mt. Darwin and Rushinga. Approximately 22% of the beneficiaries emanated from outside Mashonaland Central province.

The land reform beneficiaries faced a number of problems when they first moved to the scheme. First, schools and clinics were unavailable in the scheme. Some families had to leave their children in the communal areas to enable them to attend shool. In some cases children were forced to abandon school in order to live with their families in the resettlement scheme. Second, none of the beneficiaries were allowed to engage in off-farm formal employment. This meant that they were not able to afford agricultural inputs without assistance. Initially, beneficiaries were supplied with basic assistance to meet the cost of tillage and inputs for at least one hectare of the land allocated to them. Among the basic inputs that were supplied by government were fertilizers and seed. In addition, agricultural extension services were provided throughout the scheme. Crop quotas were set for the resettled farmers while depots were set up for the collection and marketing of produce. Both government agencies and farmer organizations provided input support schemes and marketing infrastructure for the beneficiaries. Since the initial criteria for selection was that one had to be poor and landless to be eligible for resettlement many beneficiary households found it difficult to adjust to the resettled environment where large amounts of inputs and labour were required for set crop quotas. Consequently, agricultural production was generally low during the early years of resettlement due to the inadequacy of government support.

The beneficiary selection criteria had been altered by 1993-94 when the second planned resettlement phase took place in Mufurudzi. For example, many households that found it difficult to repay their agricultural loans during years of drought were now allowed to seek formal employment in urban areas. Without any meaningful

savings or means of acquiring the required inputs, former farm workers for instance, were unable to cope with crop quotas or loan repayments. Many of them did not own cattle and only relied on social capital (social connections) to secure labour and draught power. Land reform beneficiaries from nearby communal areas such as Bushu and Madziwa depended on resources from their former communal areas, most of which were derived from the beneficiaries' next of kin.

The majority of the households who were resettled during the first phase received housing loans from the Ministry of Local Government and Housing. In some cases the loans were repayable over a period of twenty-five years. In this housing scheme the beneficiaries received roofing materials, and cement as well in some cases, while they were expected to mould earth bricks for their own houses. Before the houses were built, however, the beneficiaries would erect temporary structures to accommodate their households. Besides landlessness and poverty other criteria which were considered during the 1993-94 phase were acquisition of training from agricultural colleges or farmer training programmes, experience in farming, as well as membership to disadvantaged groups such as women. These selection criteria applied to all resettlement areas in Zimbabwe. There were not many graduates from agricultural colleges who were resettled in the scheme, however, as many of them opted to seek formal employment elsewhere.

In Mufurudzi the benefits of resettlement extend beyond access to agricultural resources. Communities in this scheme, as is the case elsewhere in Zimbabwe, rely heavily on environmental resources such as forest and woodland products for their livelihood. For instance, the 1992 census (the most recent published population

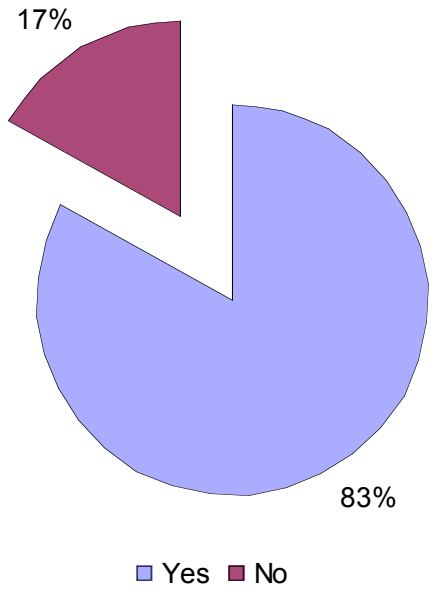
census results) revealed that 95% of the households in rural Zimbabwe use wood for cooking, compared with only 28% in urban areas. As a whole, the majority of the people in Mashonaland Central province, where Mufurudzi is located, are resource poor and cannot afford other forms of energy, such as electricity, coal, natural gas and paraffin. As we shall see in Chapter 5, all households in Mufurudzi rely on fuel wood for lighting, heating and cooking.

Forest and woodlands are not only important for supplying the energy requirements of the majority of the people in Mufurudzi resettlement scheme but are also a source of other important products such as poles for fencing and construction, as well as non-wood forest products (NWFPs) like wild fruits, mushrooms and honey, many of which are key to the livelihoods of the communities that are found in the scheme.

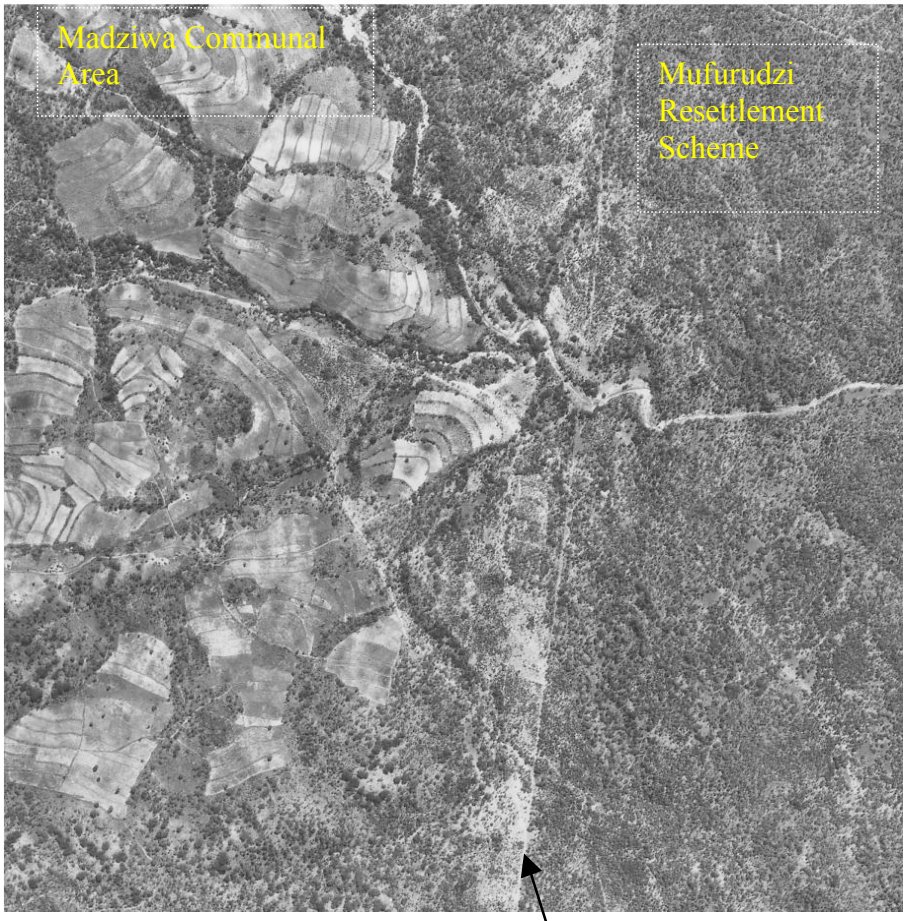
3.4 LIVELIHOODS PRIOR TO RESETTLEMENT

As we shall see in subsequent chapters, resettlement has generally improved the livelihoods of settler communities in Mufurudzi in two ways. Firstly, resettlement increased livelihood options through diversification of livelihood strategies within the productive system of the rural economy. Secondly, resettlement enhanced the beneficiaries' access to forest and woodland resources, as demonstrated in figure 3.3.

Figure 3.3: Percentage of Respondents Who Noted That Forest and Woodland Resources are Less Available in Their Areas of Origin Than in Mufurudzi



Prior to resettlement the majority of the beneficiaries were crowded in resource impoverished communal areas where they had no adequate access to both arable land and land based resources such as forest and woodland products, and about 45% of these beneficiaries are former residents of Madziwa and Bushu communal areas. Plate 3.1, for example, shows conspicuous disparities in forest and woodland cover between Mufurudzi resettlement scheme and Madziwa communal area in the west. About 83% of the beneficiaries acknowledged that forest and woodland products are more available in Mufurudzi than in areas they originated from, as shown in figure 3.3. The livelihoods of this category of land reform beneficiaries were anchoured on communal subsistence farming, even though their activities were only based on small sandy infertile plots.



Scale: Approximately 1: 65 000
(Source: Surveyor General 1981)

Plate 3.1: Disparities in forest and woodland cover between Mufurudzi resettlement area and adjacent communal areas in southern Madziwa in 1981.

3.5 LIVELIHOODS IN MUFURUDZI

The diversity of biophysical landscapes within Mufurudzi has led to the evolution of complex patterns of livelihood strategies (table 3.3 and table 3.4). Historically, these strategies have always revolved around on-farm activities. With its mean annual rainfall of about 700mm and mean annual temperature of 20^{o} C the biophysical environment in Mufurudzi generally provides adequate conditions for both crop and livestock farming.

Table 3.2: Major Sections of Mufurudzi Resettlement Scheme

Section	Farming System	Natural Regions	Number of Settlers
I	(Dryland)	II and III	566
II	(Dryland)	III	71
II	(Irrigated)	II	60
III	(Dryland)	II	165

In Mufurudzi resettlement scheme each settler farmer was allocated arable land, whose use depends on the farmer's cropping programme, as well as the ability of the farmer to source inputs such as labour, draught power, fertilizers, pesticides and seed. Overall, the major crops that are grown in Mufurudzi are maize, groundnuts, beans and cotton, though a wide range of other crops are raised under irrigation. Tobacco is, however, fast emerging as one of the major cash crops in dryland sections of the scheme.

Table 3.3: Natural Regions of Mufurudzi

Natural Region	Annual Rainfall (mm)	Predominant Type of Farming	Main Farming Activities
Natural Region II (Intensive Farming Region)	700-1000	Large-Scale Commercial	Rainfed cultivation of maize, tobacco, cotton. Small scale winter wheat production and horticulture, especially under irrigation
Natural Region III (Semi-Intensive Farming Region)	650-800	Large-Scale Commercial practiced alongside a high proportion of Subsistence Communal Farming	Rainfed cultivation of drought-resistant crops such as cotton, Soya beans and sorghum, though maize is also widely grown. Other crops could be raised under irrigation.

Before the commercial farms were designated for resettlement a wide range of farming systems, including intensive crop production and semi-intensive farming operations that were based on production of short season crops, fodder and livestock used to be practiced in the area (CONEX, 1981). Mixed farming was practiced on most farms. Commercial agriculture, was practiced in most parts of the scheme, including, dairy farming, ranching, 'truck farming' and grain production. Maize was widely grown in the area, while wheat was grown on a small scale, especially as a winter crop. Export crops such as cotton and tobacco were grown on a considerably large scale. The majority of the households that were found in the scheme earned their livelihoods as farm workers.

Following resettlement two clearly distinct systems of farming have emerged, namely dryland farming and irrigation based farming (table 3.2). Both of these systems are supported by livestock holding.

3. 5.1 Dryland Farming

According to the original plan of Mufurudzi, each household that was resettled in the dryland farming areas was allocated 4.8 hectares for cultivation and 40 hectares of communal grazing land for eight livestock units or twelve heads of cattle. Each livestock unit, with the equivalence of 500kgs of live animal weight, was allocated 5 hectares. The permits were specific to households but were also non-inheritable. The children of the land reform beneficiaries were expected to apply for their own resettlement permits rather than inherit land from their parents.

Dryland farming, also referred to as rain fed agriculture, has been the most widely practiced form of farming undertaken in Mufurudzi, and is the mainstay of the

livelihoods of the majority of households in the scheme, particularly those outside Principe irrigation scheme. In this system of farming livelihood sustainability depends on patterns of natural weather and crop production is viewed as a seasonal activity which largely takes place between October and April when the rain bearing Inter-Tropical Convergence Zone (ITCZ) shifts to Zimbabwe.

Farmers involved in dryland farming would produce a wide range of cash crops and food crops with the hope that they would at least harvest something in the event of an environmental shock or stress. The main cash crops included tobacco, though surplus produce of food crops such as maize, ground nuts and round nuts was also sold. For many households, however, production of most food crops was done on a subsistence basis where produce was normally retained for household consumption or for local barter trade and in some cases exchanged for farm labour.

Since its establishment in Mufurudzi dryland farming has always received support from a wide range of stakeholders, including government, private sector and NGOs. Government support largely included provision of extension services through the Department of Agricultural Research and Extension Services (AREX) and the marketing of cash crops such as grain and cotton by its parastatals such as the Grain Marketing Board (GMB) and Cotton Company of Zimbabwe, a government owned corporation. AREX officials, who are often resident in the scheme, provided basic training in crop and animal husbandry and also acted as source of information on market trends on different types of crops as well as advisors on sound soil conservation measures. Other forms of government support took the form of input

supply schemes and soft loans that farmers received through the government land bank, AGRIBANK.

Much of the support that was derived from the private sector emanated from input suppliers and commodity processors. Such support included extension, training, provision of inputs and provision of funds for farmers that were contracted to produce certain specialized agricultural commodities, especially tobacco and cotton. The production of tobacco, for instance, received support from the Farmers Development Trust (FDT), which gave farmers AREX aided technical advice, as well as inputs.

Being seasonal, however, rain fed agriculture has always been viewed as a limited livelihood strategy. Realizing the unreliability of rain fed agriculture some NGOs such as CARE International and Danish People to People (DAPP) have embarked on community based intervention projects by diversifying sources of households' food requirements and income.

For example, in 1984 DAPP provided villagers in Mudzinge with seed for a communal beans field as well as inputs for a gardening project, alongside donations of cattle and scotch carts to the land resettlement beneficiaries. Due to the unreliability of rain fed agriculture most villagers have relied on food aid from both government and the donor community during drought years. Such aid helped most land resettlement beneficiaries to survive the 1982-84, 1991-92 and 2001-02 droughts. During drought, government food aid was normally chanelled through the Department of Social Welfare, while food from the donor community was distributed by CARE International and the World Food Programme (WFP). However, in years of normal

rainfall nearly 96.2% of the land reform beneficiary households received all their income from crop sales.

3.5.2 Irrigation Based Farming

The irrigation based farming model was introduced in Mufurudzi in 1991, ten years after the founding of the resettlement scheme, when an irrigation scheme was constructed in Principe. Since its completion in 1993 two villages have been built in the scheme, namely Principe A and Principe B, each of which was set up on its own irrigation block. The scheme consists of about 60 ha of irrigable land and has the potential of bringing approximately 1117 hectares under irrigation. Principe irrigation scheme was founded through intergovernmental co-operation between Zimbabwean and Danish governments. It was constructed by the Department of Rural Development (DERUDE) but funded by DANIDA, through its Smallholder Irrigation Programme (SSIP). Water released from Eben dam, upstream on Mufurudzi river, and stored in a holding weir from which it was pumped into the two irrigable blocks from two pumping stations. As long as the pumping stations were operational beneficiaries would be assured of both food and income throughout the year.

Each household was allocated 1 hectare of arable land only rather than 4.8 hectares that was allocated in the dryland farming system. In addition, each household was also allocated 0.25 hectares for a residential stand and another 0.8 hectares for communal woodlots and communal graveyards, as is the case in the dryland farming areas. Revocable resettlement permits were issued to the beneficiaries. Unlike in the dryland farming system though, occupancy permits could be inherited by one's spouse or children after death.

In some cases special contractual arrangements existed between farmers and input suppliers and commodity processors and commodity merchants. In these arrangements farmers were given production quotas in which they were required to produce specified amounts of a given crop in exchange for inputs such as fertilizers, chemicals and seed by an input supplier who in turn took the responsibility of buying all the produce from the farmer. Livelihoods in the irrigation based farming system were organized very differently from those that prevail in the dryland farming system.

In both dryland and irrigation based farming regimes livestock holding played an important role, contributing to livelihoods through access to manure, draught power, milk and in critical times, income. However, livestock populations were generally small and the contribution of livestock towards total livelihoods was minimal.

3.6 RELEVANCE OF MUFURUDZI AS A CBNRM AND LIVELIHOOD CASE STUDY

Mufurudzi resettlement scheme provides an ideal research opportunity that may help answer questions about the relationship between resettlement, natural resources and rural livelihoods in environments where large-scale commercial farms have been replaced by smallholder agriculture. There are two reasons for this.

First, the success and constraints of Community Based Natural Resource Management (CBNRM) can be assessed for the period of the two decades over which Mufurudzi resettlement scheme has been in existence. Most CBNRM studies are based on snapshots of environment-livelihood relations. In this context CBNRM is understood to mean: "a bottom-up approach to the integration of conservation and development" (Cornell International Institute for Food, Agriculture and Development [CIIFAD], 1999: cited in Lee, 2002: 17).

CBNRM is a recently emerged conservation and rural development strategy in which communities are mobilized and organized to monitor and manage natural resources in their local areas. CBNRM has received considerable policy development and research attention in recent times (Christofferson *et al,* 1998; Getz *et al,* 1999) and its research methodologies have recently gained prominence among scholars to the extent that:

> even in the academic world CBNRM is beginning to earn the recognition as one of the most significant developments in natural resource management thinking and practice (Lee, 2002: 6).

Mufurudzi resettlement scheme offers an excellent opportunity for analyzing the effectiveness of CBNRM as an alternative forest management policy, as well as for assessing the role of institutions in the management of indigenous forest and woodland resources. In this regard, the case of Mufurudzi is what Kitchin and Tate (2000) would refer to as a community study. It provides an opportunity for evaluating the long-term co-evolution of local and technocratic institutions and their roles in forest and woodland resource conservation in resettlement areas that were established in postcolonial Zimbabwe. The study is a form of ethno botanical analysis, which espouses serious rethinking of the roles of *ex-situ* communities in the management of forest and woodland resources within an environment that is characterized by a history of dynamic land administration systems and absence of effective national legislation.

Second, Mufurudzi is characterized by a complex biophysical, economic and socio-political milieu. The case of Mufurudzi gives insight on the impact that a changing physical, economic and socio-political environment has on rural livelihoods and

demonstrates how livelihood portfolios evolve in response to the state of the environment. It also demonstrates that some livelihood strategies that are not normally considered as important in government plans are actually central to the survival of some land reform beneficiaries, particularly in cases where environmental shocks and stresses are severe.

3.7 METHODOLOGY

In order to address the diversity of the data that were required in this study a range of methodologies was employed in the study. These include aerial photograph interpretation (API), satellite imagery, questionnaire surveying, vegetation surveying and participatory rural appraisal (PRA), as well as use of secondary sources of information and Geographic Information Systems (GIS). Data collection involved a number of stages. The first stage required the undertaking of a reconnaissance survey of the study area. This provided the opportunity to familiarize with the study areas and to establish contact with potential key informants from various government institutions, including Department of Agricultural Research and Extension (AREX), District Development Fund, Department of Water, as well as settler farmers and other stakeholders in Mufurudzi resettlement scheme.

The collection of data involved methodological triangulation (Patton, 1990) or what Warwick (1983) described as methodological integration, whereby both quantitative (survey) and qualitative methods of investigation (in depth anthropological and ethnographic approaches) were employed. Whereas the former enabled 'hard data' to be collected through questionnaires or recording schedules, the latter allowed vital 'soft data' to be gathered (Whyte and Alberti, 1983). Due recognition of the weaknesses of the employed methodologies was taken into consideration. The former

provided the basis for quantitative analysis and assessment of environmental change, which the latter approaches fail to adequately achieve, while the latter provided the means through which environmental change can be analyzed as a historical process, within the context of livelihood sustainability in *ex situ* communities. Methodological triangulation, under these circumstances, was a 'hybridization' and holistic process in which a multi-faceted approach constituted the basis for environmental investigation. This integration of scientific, historical and social science approaches is essential for an understanding of any process of environmental change (Beinart and McGregor, 2003).

Methodological triangulation was also justified on the basis of the observations that were made by Ellis (2001) who argued that the diversity of livelihoods cannot be captured by participatory and qualitative methods on their own. Ellis (2001) maintains that these methods are useful when investigating community-wide institutions, widely held perceptions, and the priorities that are placed by people on desirable livelihood outcomes, but fail to capture adequate information at individual or household levels or the relationship between livelihood patterns and assets.

Contributing to this argument Bryant and Wilson (1998) have maintained that the entire spectrum of human-environmental interaction can only be captured by using inclusive approaches, combining qualitative techniques like oral history, participant observation or focus groups with quantitative methods like questionnaire surveys or census data analysis. Consequently, in this study participatory and qualitative methods needed to be complemented by quantitative methods such as surveying.

3.8 SAMPLING PROCEDURES

Farms were sampled for study prior to data collection. This was achieved through landscape analysis, involving the use of aerial photographs and satellite images to systematically classify the physical landscapes found within Mufurudzi resettlement scheme on the basis of the changes that have occurred in the scheme since 1980. The sampling of farms was necessary for two reasons. Firstly, due to paucity of resources it was not possible to carry out a 'global' study in which all farms in Mufurudzi would be covered in any significant depth. Secondly, sampling was the basis for the comparative analyses that were done for purposes of assessing spatial differentiation within the bio-physical landscape. In this regard sampling was part of the initial bio-physical assessment of the environment. Within each of the three administrative sections of the scheme, that is sections I, II and III, landscapes were classified according to the magnitude of the forest and woodland cover losses that have been induced by cultivation, as shown in table 3.4.

The property (farm) boundaries that existed prior to resettlement were used as the geographical units within which loss of woodland cover was measured. To achieve this, property boundaries were extrapolated from 1:50 000 topographic maps to 1:25 000 aerial photographs with the aid of a *Geoscope* stereoscope, while a *Keuffel and Esser* planimeter and ArcView Geographic Information Systems (version 3.2a) were used to determine the spatial extend of each property as well as that of the deforested areas in the property. The planimeter was used during the initial stages of the investigation, prior to the digitization and incorporation of the spatial data, such as property boundaries and deforested areas, into a Geographic Information System (GIS).

The use of a planimeter was necessary because of the irregular nature of the shapes of the cleared areas. The setting of the tracer arm of the planimeter was 31.46 cm, in which case each revolution on the main scale was equivalent to 100 cm^2, while 1 unit on the veneer scale denoted 0,1 cm^2. The rationale of basing the study on *a priori* property boundaries for purposes of area measurement rather than those of existing villages is that resettlement villages in Mufurudzi resettlement scheme (as is the case with all other schemes), do not have clearly defined administrative boundaries, and as such they do not exist on Zimbabwean topographic maps.

Furthermore, most of the village boundaries are being contested by local communities and are always in a continuous process of shifting, at times in line with alterations in technocratic plans, and at others due to power struggles within the local community. This is particularly evident along the boundary between Darien and Rataplan farms. The identification of the deforested areas was achieved through a visual analysis of the variations of the textural composition or 'tone' of the aerial photographs and satellite images, while ground truthing was the main validation procedure. Using the data that was extrapolated onto the aerial photographs, maps were drawn, showing both the boundaries of the farms, as well as those of areas that were cleared for cultivation. The maps were then scanned at the resolution of 300 digital pixels per inch (dpi) using an Epson Perfection 3170 photo scanner and digitized into a GIS as well as geo-referenced.

Two sets of aerial photographs, namely the 1981 and 1986 1:25 000 contact prints, as well as 1996 SPOT and 2001 Landsat images were used in this analysis. Each of these sets covers the resettlement scheme. The 1986 aerial photographs are the latest

contact prints available for the largest part of the resettlement scheme while the 1996 SPOT and 2001 Landsat images were the only source of satellite data that was available for the analysis. For better landscape analysis, photographs were scanned at the resolution of 300 dpi using the Epson Perfection 3170 photo scanner while Adobe 7.0.1 and PhotoImpact 6 software were used in API.

The comparison of the above-mentioned two sets of photographs and the satellite images revealed three main categories of landscapes. The first category comprised prefectures characterized by extensive deforestation between 1981 and 2001. Such areas mainly resulted from the opening of new fields in previously non-cultivated areas. The second category consisted of areas where deforestation was either slight or inconspicuous while the third included landscapes where previously cultivated land had reverted to woodland by 2001.

For each of the three aforementioned categories of landscapes a farm was randomly selected within each section of the scheme, as shown in the table 3.4**,** to yield a purposive stratified random sample. In order to achieve this, a table of random numbers was used. All the villages in the sampled properties were included in the study, making the study a census survey. A total of eight villages were sampled and both quantitative and qualitative methods of data collection were employed in the study.

3.9. DATA COLLECTION

Both bio-physical and socio-economic data were collected and analyzed using a variety of techniques. Bio-physical data were collected through ground surveying of

vegetation while socio-economic data were collected through questionnaire surveying, informal interviews and participatory rural appraisal (PRA).

3.9.1 Bio-physical Data

In order to establish the state of the forest and woodland resource base in Mufurudzi it was necessary to carry out ground surveys within the woodland. This form of vegetation surveying was carried out with the primary purpose of undertaking tree resource inventory. The scale at which a vegetation survey is carried out determines the level of detail that is recorded and depends on the objective of the survey (Timberlake, 1999). Scoones and Matose (1993: 159) have noted that:

> Studies of woodland cover concentrate on large forest blocks and generally give no indication of the changing distribution of woody biomass availability, as closed forest areas are transformed into scattered woodland sites, trees in fields or trees in home areas.

The above quotation highlights the weaknesses of most hi-tech methodologies of assessing tree resource changes and justifies the selection of the ground survey method that was adopted in this study. In this study 'snap shot' analyses on the spatial variability of tree resources were undertaken along designated transects within different parts of Mufurudzi. Both qualitative and quantitative inferences were derived from the results. Transect analyses provided the actual means of capturing information "along some ecological, physical or social gradient, thus producing a cross-section of conditions in a (any) particular place" (Jackson and Ingles, 1998: 38).